Classic Science

PARENT COPY

ELEMENTARY EARTH SCIENCE

The lab of MR.Q

First of all thank you very much for choosing to use this book with your family. You will not be disappointed! I have been asked by several families the same question, "**Who** are you and **why** are you doing this?" Without going into great detail, E=McQ is owned, operated and stressed over by me. Yep… little o' me. I am an educator by profession and began working with homeschool families several years ago while offering free programs to area families to explore various concepts in science. I guess I can't stop doing what I love!

This product is the fruit of my ten-year labor in science education. Having worked with homeschool families over these years I have gained an appreciation for your needs, struggles and wants. I could not make this curriculum any simpler for your child to master the concepts of science. It is completely reusable, relatively cheap (I tried to keep it under the cost of a tank of gas), adaptable to various needs at home and as fun as humanly possible.

Like I said, I am an "army of one". I have no problem with you using this one copy for your entire family. However, if you give or loan this book out to another family you are putting a lot of pressure on me. If this happens too often, I may not be able to continue producing this curriculum. I am not telling you to keep this curriculum a secret! But I have provided some options for you should another family wish to use this curriculum:

- If your friends are asking to borrow your copy to use throughout the year, please ask them to read this copyright page and go to my website: www.eequalsmcq.com so that they may purchase their own book!

- If you are reselling this curriculum please be aware that its value will diminish if many people are selling it for a lower amount of money. This, too, puts pressure on little o' me. If this is the path you choose, I hope you (or the buyer) will consider providing a small contribution to support my continued work. I know it is impossible to regulate this, but I am certain you will do the right thing!

- If you are part of a CO-OP or other similar group of homeschool families, you may purchase licensing/copying rights for use in your classrooms at a **MUCH** reduced rate. Please contact me at mrq@eequalsmcq.com with any questions.

Thank you so much for purchasing this copy of

Classic Science: Elementary Earth Science!

I am so grateful for all of the work you do for your children and I am honored that you have chosen to bring this curriculum into your home. I am certain it will provide your child a complete background into the various concepts of earth science. Here is how this curriculum has been prepared for you:

Timeline

This booklet is a four-week unit from a much larger 36-week curriculum for children of ages 7-10. The weekly curriculum has been arranged into four-week units. Each week has been broken down into three separate days to make it easier for you to set up a schedule:

The first day of each week contains a reading assignment and worksheet review for your child.

The second and third days contain hands-on activities to reinforce each weekly reading! Don't worry about expensive materials for these activities! Most equipment can be found around the home or at a local store.

Tests

You will find a Unit Test and its answer key at the end of each unit (the end of each unit can be found in Chapters 4, 8, 12, 16, 20, 24, 28, 32 and 36) inside the Parent Copy.

Gasp! "Science fair projects"

In addition, you will find several weekly activities that are entitled "ESP Activities". These are inquiry-based activities that require a child to set up an experiment and collect data. In essence, these are mini-science fair projects. Before you start to cringe at the thought of doing many "science fair projects" I have provided a method for you to use. It is called the Exploring Scientific Procedures (ESP) Method and has been included in this book on pages A-Q

Many people have found it to be an easy, step-by-step guide for you and your child to approach these inquiry-based projects! DON'T PANIC! They are not as hard as you may imagine. Think of it this way, at the end of this year, your child will have completed several science fair projects! This is many times more inquiry-based projects than the average public school student…and your child is only beginning! All you have to do is read these pages a couple of times before working with your child! You will not be disappointed!

Future books

Next year, a fourth book will be available: Elementary Chemistry. This book will follow the same classical approach to learning with a detailed look at the chemical concepts of our lives! Until then, check out my website (www.eequalsmcq.com) and sign up for my monthly LabNotes for activities you can do with your family!

I am honored that you have chosen this curriculum but I am eternally grateful for your time, patience and willingness to educate your child in the sciences. I can only hope that your children will attain the passion I have for this field. Thank you for all you are doing to help shape tomorrow!

Above all else….Keep asking questions and keep searching for the answers! And if you get stuck, I'm only a click away mrq@eequalsmcq.com

Take care,

Scott McQuerry

Table of Contents

Chapter 1

Shallow pan
One bag of flour
Container of cocoa
Measuring tape
Marble
Cereal boxes
Flashlight
Scissors

Chapter 2

Calculator
Bathroom scale (optional)
Various household objects (with weight provided on the label, i.e. bag of flour, sugar, etc.)
10 different colored beads
5 feet of string
Meterstick

Chapter 3

One apple
One knife
3/4 cup of sugar
1/2 cup of packed brown sugar
1/2 cup of M&M's
1/2 cup of milk chocolate chips
1-3/4 cups flour mixed with 1 tsp. Baking powder and 1 tsp. salt
One clear quart jar

Chapter 4

Shallow Baking Dish
Water
Small Mirror
Modeling Clay (optional)
White Paper
Flashlight
Small sheet of cardboard
One sheet of white paper
Aluminum foil approximately 1 x 1 - inch (3 x 3 centimeters)
Pin or sharp point
Tape
Scissors
Ruler
Candle

Chapter 5

Large tablecloth or sheet
Heavy object (i.e. bag of flour, sand, etc...)
Marble
Piece of paper
Measuring tape
Scissors

Chapter 6

Meter stick or measuring tape
Tape
Three feet of string
Sharpened pencil
2 foot dowel rod (or similar item)
Bucket of gravel or sand
Driveway or sidewalk
Chalk

Chapter 7

Four sandwich cookies (like oreo's)
Paper plate
Plastic/butter knife
Pencil/pen
Large sheet of heavy cardboard (about a three foot square)
Knife
Eight ping-pong balls or Styrofoam balls
Glue
Black permanent marker

Chapter 8

One grape
One orange
Flashlight
Toothpick
Small amount of clay (optional)
One dodge ball, beach ball or basketball
One tennis ball or baseball
At least two other people to help out

Chapter 9

Scissors
Tape
Small empty box (shoe box size)
File folder/cardstock/heavy weight paper
Books or magazines
Aluminum foil
Two drinking straws
Marshmallows
Thermometer
piece of paper
string
scissors
warm lamp or hotplate

Chapter 10

One bright flashlight
One piece of paper
Pen/pencil
Several small objects (i.e. BB's, tiny marbles, paper dot cut-outs, etc.)

Chapter 11

Access to newspaper, tv or internet for weather data
Cup or bowl
Food coloring
Water
Measuring tape or ruler
Drinking straw
Clock with second hand

Chapter 12

A hotplate or electric stove
One empty soda can
Water
Large plastic bowl filled with cold water
Tongs
gloves
Thermometer
Cotton balls
Rubber band
Water
Rubbing alcohol

Chapter 13

Raw egg
Container filled with water
Salt
Spoon

Chapter 14

Large clear jar
Wire screening, fine kitchen strainers, or cheesecloth
Ice cubes
Hot water
Empty 2 liter bottle
Matches
Water
Measuring spoons
Dark colored paper, wall, sheet, etc.

Chapter 15

Empty 2L plastic bottle
Thermometer
Plastic baggie
Ice
Salt
Two pencils (or a wire strainer that can fit the bottle)
Scissors
Birthday candle
Candle holder (hex nut, clay, etc.)
Clear glass jar (olive jars work great!)
Shallow pan
Ruler or measuring tape
Matches
Water

Chapter 16

Styrofoam cup
Water
Lamp (with at least a 75 watt bulb)
Thermometer
Styrofoam cup
Soil
Lamp (with at least a 75 watt bulb)
Thermometer

Chapter 17

Two film canisters
Two sugar cubes
Ruler
Pencil
Two sheets of sandpaper (rough and fine)
Freezer (or a cold day)
Water
Measuring tape

Chapter 18

Potatoes
Fine tipped, permanent marker
Sharp knife
Three candy bars (Snickers, Milky Way, etc.)
Paper towels

Chapter 19

Metal or heavy plastic pan--full-sized loaf pans work fine
Sand
Water
A smooth brick
A rubber mallet
A car and a driver
A felt-tipped pen
Lined pad of paper
Measuring tape

Chapter 20

Vinegar
Baking Soda
Tall, clear and skinny container (olive jars work well)
Ruler
Tape
Pancake mix
Skillet
Teaspoon
Water
Thermometer
Hot plate/stove
Magnifying glass
Ruler
Glass jar (about the size of a peanut butter jar)

Chapter 21

4 cups sugar
2 cups water
Small saucepan
Wooden spoon
Candy thermometer
One small, clean glass jar
Measuring cup
Cotton string
A weight to hang on the string (such as a screw or galvanized washer)
Penny
Paper clip
One brick
Chalk
Old glass jar

Chapter 22

Old plate or aluminum pie tin
One paper towel
Epsom salt
Water
Matches (optional)
Large-mouthed glass/plastic jar (about a quart in size)
Enough uncooked rice to fill the container mentioned above (about ¾ full)
One small ball (rubber, ping pong, etc..)

Chapter 23

One-half pound (8 oz.) of milk chocolate bars
6 cups miniature marshmallows
½ cup chopped walnuts (optional)
6 cups crisp rice cereal
½ cup water
1 cup corn syrup
2 cups granulated sugar
1 ¼ cup butter/margarine
1 teaspoon baking soda
Nine small paper cups
Sand
Epsom salt
Water
Old newspapers
Scissors

Chapter 24

Plate
Syrup or honey
Measuring spoon
Measuring tape
Cup or bowl
Clock with second hand
Microwave oven

Chapter 25

Large dish pan
Drinking glass shorter than the pan
Plastic wrap
Several clean marbles
Masking tape
Muddy water
Soil sample of sand, silt, clay and gravel mixed together
1 quart jar
Alum (optional)
Water

Chapter 26

One clear container (about one cup in volume)
One spoon
Small bag of candy coated chocolate (with or without nuts)
Small container of pudding (chocolate or butterscotch)
Small bag of gummy worms
Colored sprinkles
Two or three chocolate sandwich cookies, crushed
Paper and pencil
One cup of gravel, sand and clay
One plastic/glass container
Water
Measuring cup
Sawdust and flour (optional)

Chapter 27

Two or three Baked Potatoes - halved
Small plastic "baggies"
Toothpicks
Magnifying lens (optional)
Soup can with both ends removed
Wire mesh (small amount from an old screen door)
Jar
Spoon
Water
Paper towels
Magnifying glass

Chapter 28

Sand
Newspaper
Empty jar (about the size of a small pickle jar)
Shoebox lid (any lid of similar size/shape will work)
Drinking cup
Water
Red, grape or orange soda
One generous scoop of Vanilla ice cream
Clear soda pop
Small gummy bears, chocolate chips, crushed cookies, cereal, crushed ice or other material to represent sand and gravel
Cake decoration sprinkles
Drinking straw
Clear plastic cup
Ice Cream scoop
Spoon

Chapter 29

Seven or eight clear plastic salad trays (you can find these at deli's, supermarkets, etc...)
Permanent marker
Scissors
Tape
Photocopier (optional)
metal baking pan will work fine
Two sheets of newspaper
plastic wrap that is much larger than the size of the baking pan

Chapter 30

One shoe box trimmed to two (2) inches deep, v-notched at one end, and completely lined with plastic wrap
Sprinkling can or containers (re-cycled plastic pop bottles with holes poked into the bottom)
Measuring cups
Ruler
Sod (indoor/outdoor carpet, discarded carpet, and terry cloth all work as substitutes)
Soil (enough for the five trays to be filled with the same soil)
water
Pinecones
Bucket of water
Foil-lined baking sheet
Oven

Chapter 31

Two identical glass jars (mason jars work fine)
4 cups cold water
10 ice cubes
One clear plastic bag
Thermometer
White vinegar
As many objects as you can find which include: Chalk, Old seashells, Baking soda, Sugar, Sand, Rocks, Eggshells, etc...
Eyedropper or drinking straw
Glass bowl

Chapter 32

Petroleum jelly
Three small pieces (about 3 inch square) of stiff clear plastic
Strips of clear tape or contact paper (optional)
White paper
Magnifying glass
8 oz. of Cool Whip non-dairy topping
Red food coloring
Whisk
Two white, opaque lids that will fit the cool whip containers below
Cool Whip containers
Frosting spreader
Bowl (large enough for 16oz of the topping)
Large spoon
Permanent marker

Chapter 33

Sturdy cardboard square (about 5 inches on each side will work)
String
Paper or plastic cup
Water
Clay or dough
Butter knife

Chapter 34

Aluminum (or glass) baking pan
Lemonade-flavored powdered drink mix
Sand (enough to fill the pan)
Straws
Glass of water
Misting bottle
pH paper (found with the garden or pool supplies at any WalMart/Target; you will only need 12 strips per child)
Clear plastic bag (zipper style, sandwich size works best)
Measuring spoon
Masking tape
Rubber band or twist-tie
Masking tape

Chapter 35

Two small towels
One clear plate (glass or plastic is fine)
Strips of cloth (wool is best, but cotton works well too!)
Salt and pepper
Puffed rice cereal and small pieces of Paper (optional)
Small plastic object like a credit card or a ruler.
Container of water

Chapter 36

One large pinecone
Peanut butter
Birdseed
String
Pencil/paper
Ruler
Kitchen Scale (optional)

Exploring Scientific Procedures

Exploring Scientific Procedures (ESP) is a method of introducing the concepts of scientific inquiry to children which include:

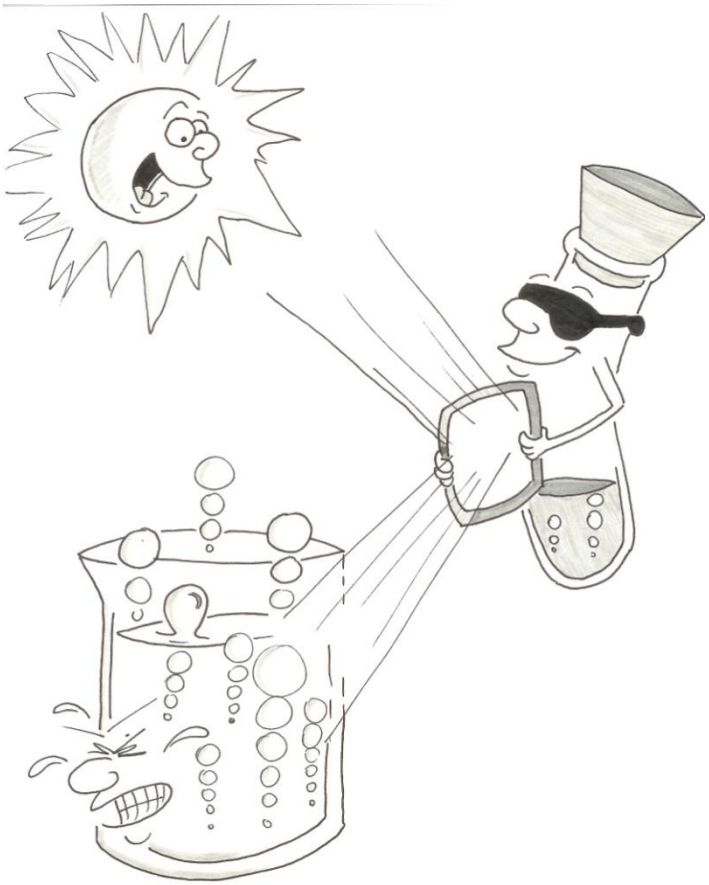
Independent/Independent Variables

Hypothesis building

Constructing data tables

and

Graphing



The materials necessary to perform this method are cheap and easy-to-find and use. Most materials can be found around the home.

This background into the method is intended to train you, the educator, on the basics of scientific inquiry. A rough timeline has been provided within this presentation to guide you through the potential administration of the method to children of various ages.

The proven success of this method has been accomplished through short, weekly activities with children over a long period of time.

ESP should be presented to children much like multiplication facts: in repetitive short bites, spread out over an extended timeframe. Children will begin to see how the independent/dependent variables, hypothesis, data tables and graphs are all related to the process of effective scientific inquiry.

What ESP is...

ESP is a method to integrate the process of scientific inquiry into your regular science curriculum

ESP encourages problem-solving strategies for children and adults

ESP is low cost !!!

ESP is a discipline that requires time and patience

ESP should be used repetitively, in short amounts, over a long period of time (similar to learning multiplication tables!!!)

What ESP is not...

ESP is not a script to be read

ESP is not a curriculum to be memorized, but a method towards scientific literacy

ESP does not have a standardized timeline

ESP is not exclusively for children

ESP is not a long list of definitions found within a massive textbook

(two definitions are all you need.....)

Definition #1

Independent Variable

What "I" change in the experiment

To make life easier for your children, you may want this "change" to be measurable - i.e. weight, mass, volume, height, etc..

Definition #2

Dependent Variable

The result from the change you made

This variable, also known as data, "depends" on your independent variable and, again, should be measurable.

The independent and dependent variables are close relatives and can be found throughout the following steps of scientific inquiry:

QUESTIONS
HYPOTHESES
DATA TABLES
GRAPHS

Let's start with a...

QUESTION

Does the _____ affect the _____ ?
(Independent Variable) (Dependent Variable)

Now that you've asked a QUESTION, it is time to change it into a...

HYPOTHESIS

If the _____ is _____,
(Independent Variable) (increased/decreased)

then the _____ will _____.
(Dependent Variable) (increase/decrease)

All data that is collected within an experiment must be in an easy format for future study. The following data table should remain the same throughout each of your child's experiments. With practice, they will become very proficient in recording data that can be easily analyzed.

DATA TABLE

Independent Variable	Dependent Variable			
	Trial One	Trial Two	Trial Three	Average

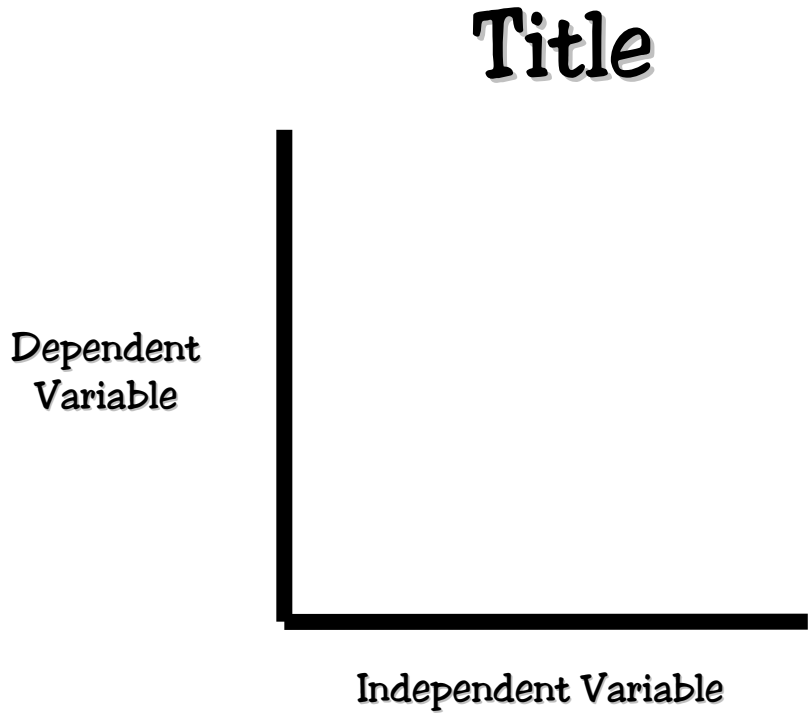
While analyzing the data in an experiment, you are typically looking for patterns and relationships between what you are changing (the INDEPENDENT VARIABLE) and your data (the DEPENDENT VARIABLE).

GRAPH

A GRAPH can help visualize the data in a way that is easier to see any of these possible relationships.

The TITLE of any GRAPH should restate the HYPOTHESIS of the experiment…

….this helps the person who is reading your graph to easily identify what the data is all about!!!



GRAPH Titles

The effect of the _____
(Independent Variable)
on the _____.
(Dependent Variable)

Children must see the independent variable and the dependent variable in the...

QUESTIONS
HYPOTHESES
DATA TABLES
GRAPHS

Let's try an example...

QUESTION

Does the distance a rubber band is pulled back affect the distance a rubber band can travel?

Can you identify the Independent and Dependent variables?

IV = …distance a rubber band is pulled back

DV = …distance a rubber band can travel

LOOK FOR THESE PHRASES THROUGHOUT THE EXAMPLE!!!

HYPOTHESIS

If the distance a rubber band is pulled back is increased, then the distance a rubber band can travel will decrease.

DATA TABLE

Distance a rubber band is pulled back	Distance a rubber band can travel			
	Trial One	Trial Two	Trial Three	Average

GRAPH

The effect of the distance a rubberband is pulled back on the distance a rubberband can travel

Distance a rubber band can travel

Distance a rubber band is pulled back

The phrases...

"distance a rubber band is pulled back"
and
"distance a rubber band can travel"

can be seen throughout the entire experiment!

YOU NEVER CHANGE THE PHRASES...

Therefore, the child will easily see the relationships between the:

QUESTIONS
HYPOTHESES
DATA TABLES
GRAPHS

Have your child explore one activity a week. At first, provide them with a question, a hypothesis a data table and a graph...

...after a few weeks, ask your child to start writing their own hypothesis from your question. In addition, have them set up their own data table and graph before starting the experiment. With weekly repetition, children will be able to effectively set up, run and analyze the results of a scientific experiment!

More importantly, each experiment can be used to reinforce the scientific concept your child is currently learning.

For example…..

If your child is learning about how energy can be transferred from potential to kinetic, you can use the rubber band experiment to reinforce this concept….

…and while they are learning about the transfer of potential energy to kinetic energy, they are also practicing effective scientific inquiry procedures!

Once your child becomes more proficient at this model….

You can really start having fun with them!

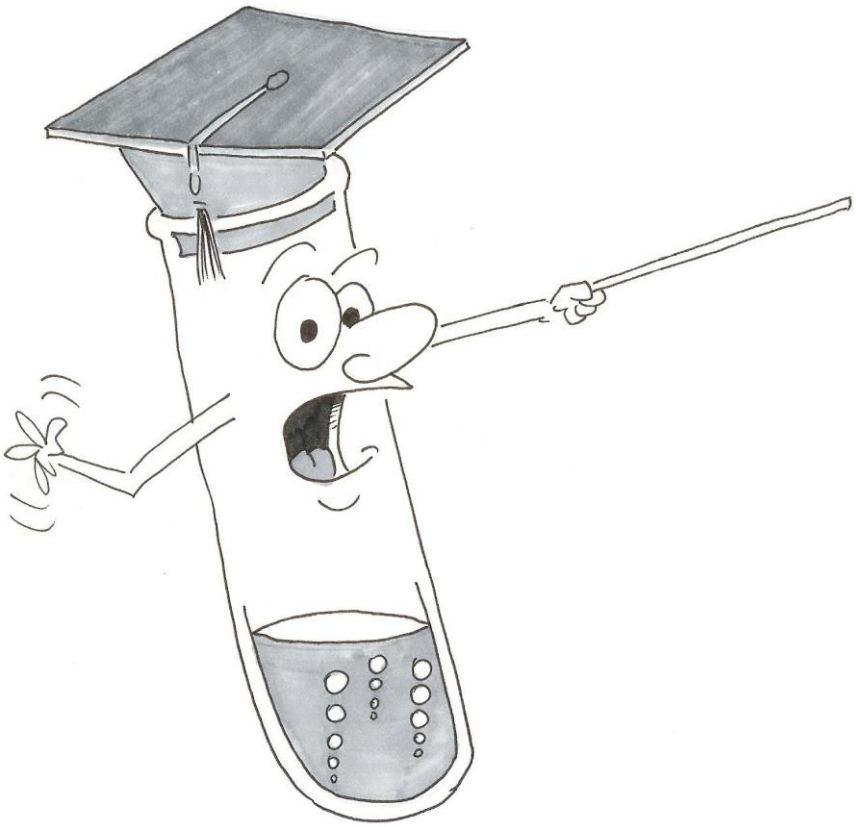
SOURCES OF ERROR

Have the child list:

All of the materials used in the experiment
(i.e. ruler, rubberband, etc.)

and

All of the possible ways the materials could have been changed (each of which is a "SOE") (i.e. size, shape, color of rubber band, angle of the launch, presence of wind, etc…



All materials in an experiment must remain CONSTANT

The possible changes in materials identify sources of error (SOE) that could alter the results of an experiment.

Constants are very important because you only want to change ONE variable in your experiment!!!

Why do you only want to change ONE thing in your experiment?

So that you can identify what variable is altering the results in your experiment…..

….if you changed two variables, how would you know which one is affecting the results???

Constants share their importance with another factor in experiments..

The Control

The control is a trial within your experiment that is used to identify any unknown SOE's that may be affecting your data

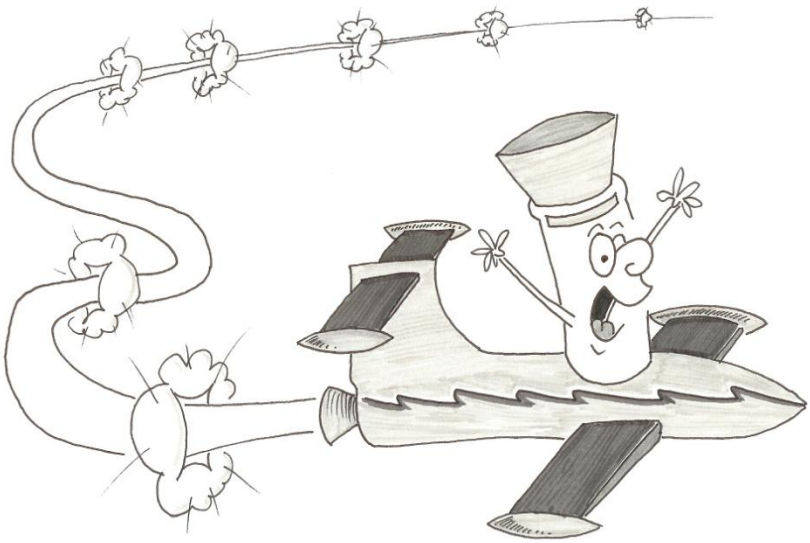
For example...

If your child wishes to see the effects of salt water on the growth rate of plants, the CONTROL in this experiment would be to use ordinary water with their plants to gauge the normal growth rate. Along with this CONTROL, the child will grow other plants with varying levels of salt water...

If all the plants die, with the exception of the CONTROL, you may assume that the salt is the culprit!!! If even the CONTROL perishes, you may have an unknown SOE in the water that needs to be identified.

The CONTROL is the normal expectation of what is to happen

Typically, you tend to already know what to expect with your CONTROL, but you run the trials anyway…just to be certain there are no hidden SOE's that could affect your results.



So what do you do when your child is very comfortable with setting up, running and analyzing the results from an experiment???

The **QMS** stands for:
Question
Method
Solution

Consider the QMS Strategy as the "challenge phase" of this method…..

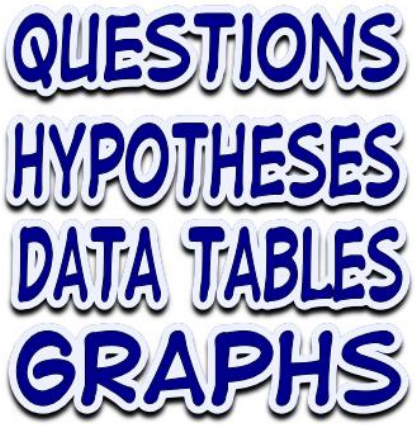
Up to this time, you have been providing your child with the Question to solve in their experiments

Now, let's change the procedure a bit…

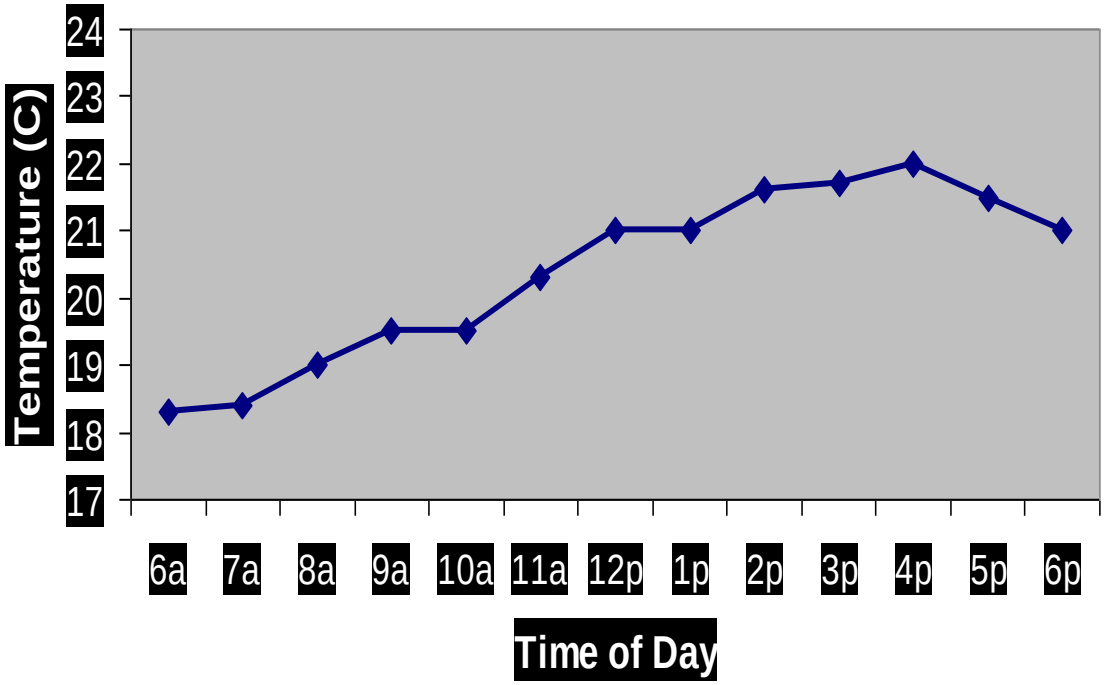
Instead of providing the question to your child, now provide the Method (a procedure) or Results (a data table or graph) for them to follow….

- For example -

By providing a completed graph to your child, or perhaps a procedure, your child can be asked to determine the experimental



By providing a graph such as this:



The Independent and Dependent Variables can be identified and can be used to create a question and a hypothesis such as these:

Question:

Does the time of day affect its temperature?

Hypothesis:

If the time of day is increased, then the temperature will increase/decrease

….and a data table such as this:

Time of day	Temperature			
	Trial One	Trial Two	Trial Three	Average
8am				
Noon				
4pm				

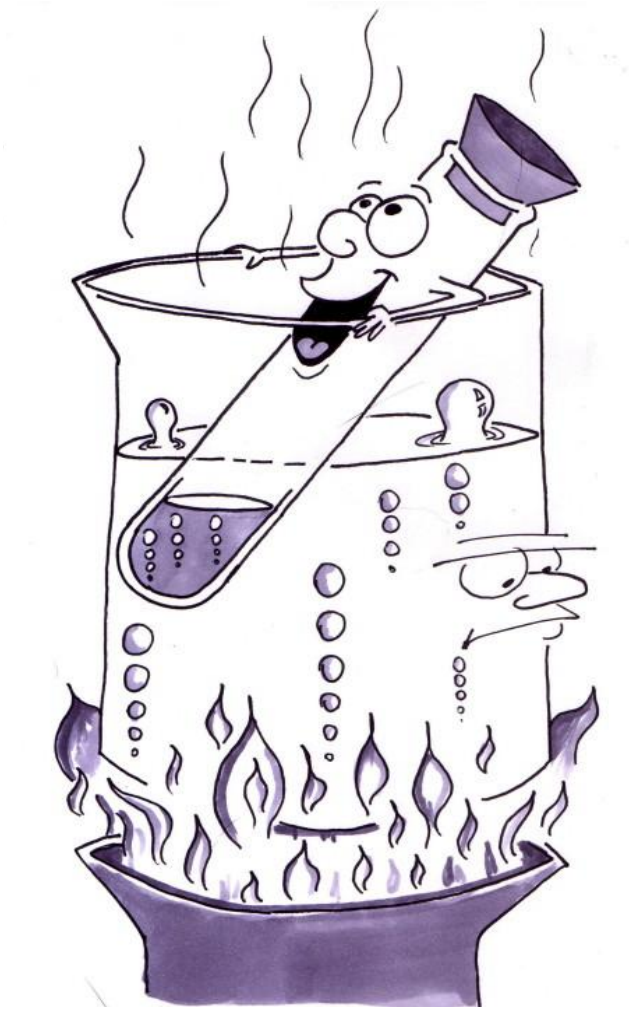
The QMS Strategy forces the child to look at an experiment from a more practical way…

as a PROBLEM to solve!!!

Do not forget !!!

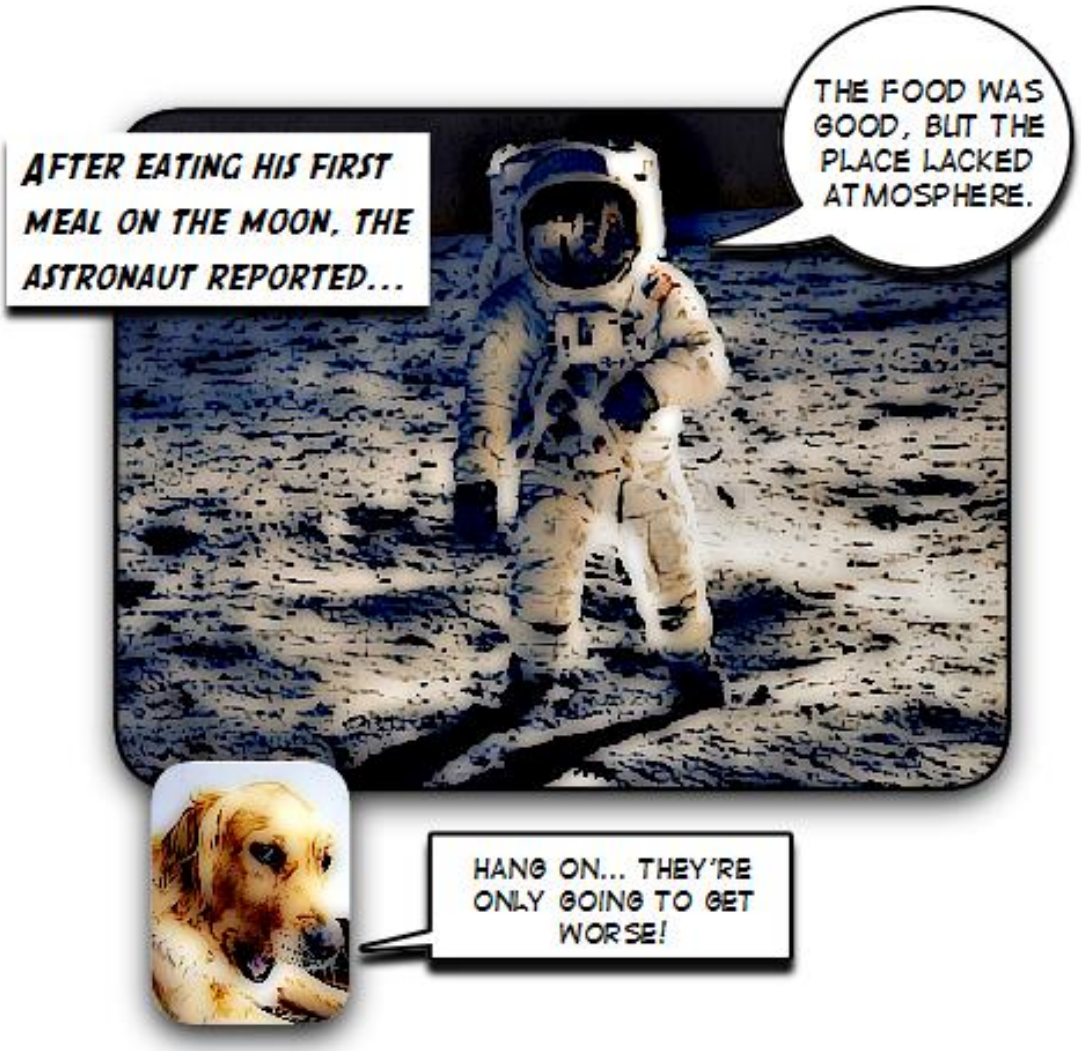
You really cannot be "wrong" In running a scientific experiment...as long as you can defend your data.

It does not matter if your data supports or does not support the hypothesis; each experiment should set the stage for further experiments to explore.



WEEK ONE:

Stars and the Universe



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Shallow pan	Marble
One bag of flour	Cereal boxes
Container of cocoa	Flashlight
Measuring tape	Scissors

You and your child(ren) will be covering the following Science Standards this week:

All objects in the universe have properties, locations, and movements that can be observed and described.

The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

Definitions:

Astronomers	scientists who study the universe
Universe	a word we use to describe everything that exists...everywhere
Telescope	tool used to make faraway objects appear closer
Galaxies	a large group of gas, dust and many stars. There are billions of galaxies in the universe.
Stars	huge balls of hot gas that give off a large amount of energy (like heat and light)
Milky way galaxy	the name of the galaxy that we live in
Sun	our nearest star
Comet	a chunk of ice, gases and dust that spins around a sun; a "dirty snowball"
Orbit	the movement of an object around a sun
Asteroids	large chunks of rock that are floating in space
Meteoroids	smaller chunks of rock (less than 20 feet long) that float around in space
Meteor	"shooting stars" or "falling stars"; falling meteoroids moving so quickly through the air they get very hot and burn up, leaving a glowing trail behind them in the air
Meteorite	the name given to a meteor that does not entirely burn up in the air and smashes into the ground
Planets	large round bodies of rock or gas that orbit stars
Earth	our home planet, the third planet from the sun
Solar system	All of the planets, asteroids, meteoroids and comets that orbit a star

Sample Questions to ask after your child finishes their reading for Day One:

Place in order of greatest size to smallest size: Planet, star, universe and solar system

Universe, solar system, star, planet

What is earth's closest star?

The sun.

What is the difference between a comet and an asteroid?

A comet moves in orbit around a star while an asteroid may simply float in space.

What is the difference between a meteor and a meteoroid?

A meteor is a meteoroid that is falling through our atmosphere.

Answers to Worksheet Questions for Day One:

Page One:

3-meteor
9-earth
10-Solar system
5-Meteoroids
6-Planets
7-Meteorite
2-Orbit
1-stars
13-Milky way galaxy
12-telescope
15-comet
8-Asteroids
4-sun
14-Galaxies
16-Universe
11-astronomers

Page Two:

Comparisons between stars and planets:

- both have a round shape
- both are found within a solar system
- both may be made of gas

Differences between stars and planets:

- stars give off much more energy than planets
- planets orbit stars
- stars are not made up of rock

Page Three:

1. universe
2. galaxy
3. solar system
4. stars
5. comet
6. meteoroid
7. meteorite

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Crashing into Earth"

The following list will give you the most important items to review for your activity today!

Asteroids "ast-ur-oids" are large chunks of rock that are floating in space.

Meteoroids "meet-ee-or-oids" are smaller chunks of rock (less than 20 feet long) that float around in space. Millions of meteoroids float towards us everyday. When this happens, the meteoroid is called a meteor "meet-ee-or". You may have heard of meteors as "shooting stars" or "falling stars"! These small chunks of rock are moving very quickly and heat up quite a lot! In fact, they get so hot that pieces of them burn off and leave a trail behind them!

Most meteors burn up before they reach the ground, but not all of them! If a meteor smashes into the ground, it can cause a lot of damage! when this happens, astronomers call the meteor a meteorite "meet-ee-or-ite"!

ESP Activity: Crashing into Earth

Students will create craters on their simulated moon.

Materials:

Shallow pan	Container of cocoa	Marble
One bag of flour	Measuring tape	

Activity:

1) Fill the shallow pan with about 1/4 inch of flour and sprinkle cocoa over the surface.
2) Drop the marble from a known height onto the surface of the pan.
3) Measure the diameter of the impact crater in the flour.
4) Mix the contents of the pan together and sprinkle more cocoa onto the surface.
5) For experimentation, increase or decrease the height of the marble.

Explanation:

As particles or rocks are traveling through space, they are known as meteoroids. When they enter the Earth's atmosphere, they light up brightly as friction vaporizes the surface of the meteoroid. At this time, a meteoroid is known as a meteor. If this object does not entirely burn up in the atmosphere and it strikes the Earth, it is known as a meteorite. The marble creates a crater within the surface of the flour in similar fashion to meteorites which strike the Earth.

Independent variable: Height of the marble

Dependent variable: Diameter of the crater

Hypothesis:

If the HEIGHT OF THE MARBLE is (increased/decreased), then the DIAMETER OF THE CRATER will (increase/decrease).

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Portable Planetariums"

The following will give you the most important items to review for your activity today!

Stars are huge balls of hot gas that give off a large amount of energy (like heat and light).

Our sun is our closet star.

Groups of stars we see in the night sky are called constellations

Portable planetariums

Children will use a cereal box and a flashlight to construct their own planetarium.

Materials:

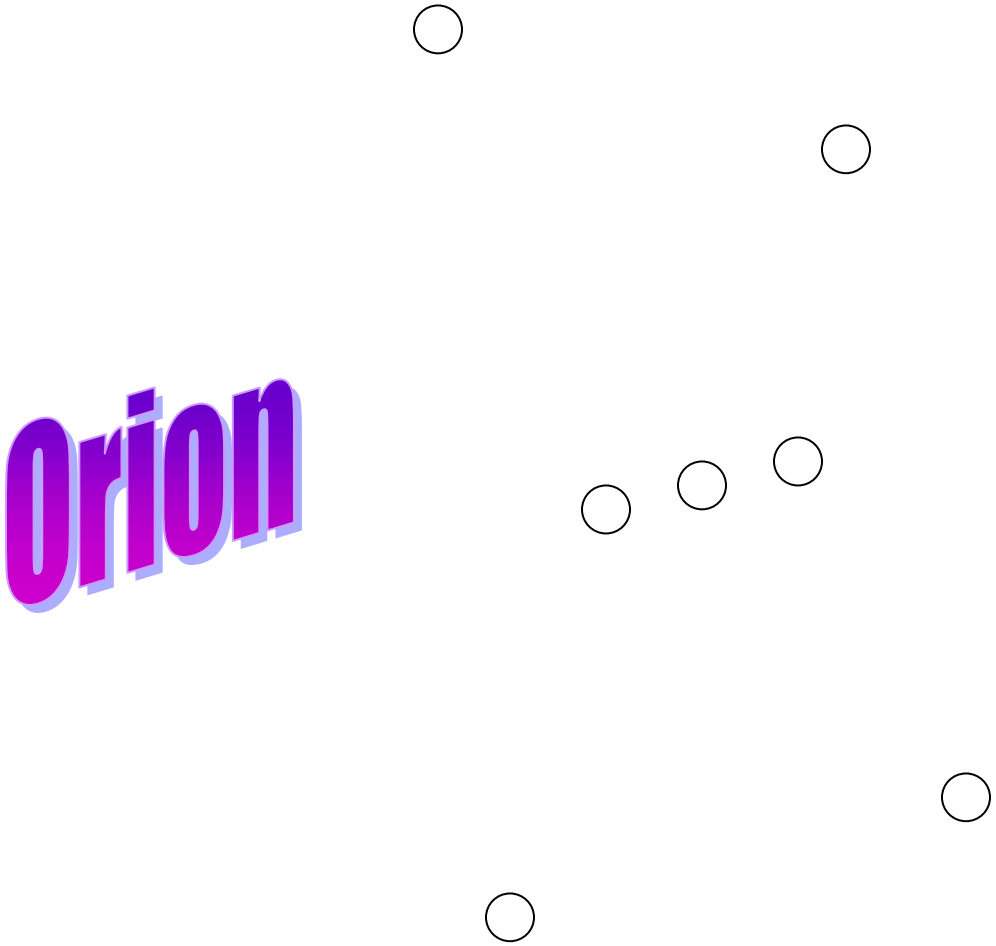
cereal boxes
flashlight
scissors
constellation map (attached)

Activity:

1) Remove the cereal from the box.
2) Place the constellation map onto the surface of the box.
3) Punch holes through the side of the box in the right positions for the given constellation.
4) Cut a round opening in the side of the box for the flashlight.
5) Insert the flashlight and turn on your planetarium in a darkened room. You should see the constellation shining through the holes of the box.
6) Take your portable planetarium on a stargazing trip to help you find constellation in the sky.

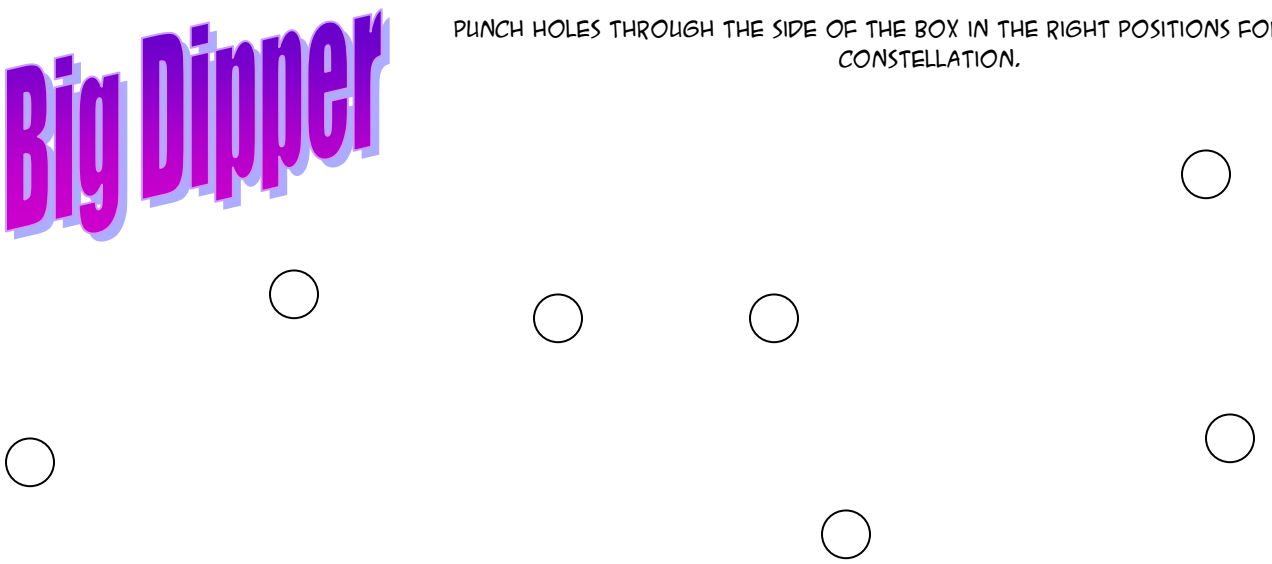
Explanation:

A planetarium consists of half a hollow sphere on the inside of which have been placed the various stars in their relative positions. The half sphere spins slowly to give the appearance of the stars moving through the night sky. Making a portable planetarium is a good way to familiarize yourself with the grouping of stars (known as constellations) before you to stargazing to look for.



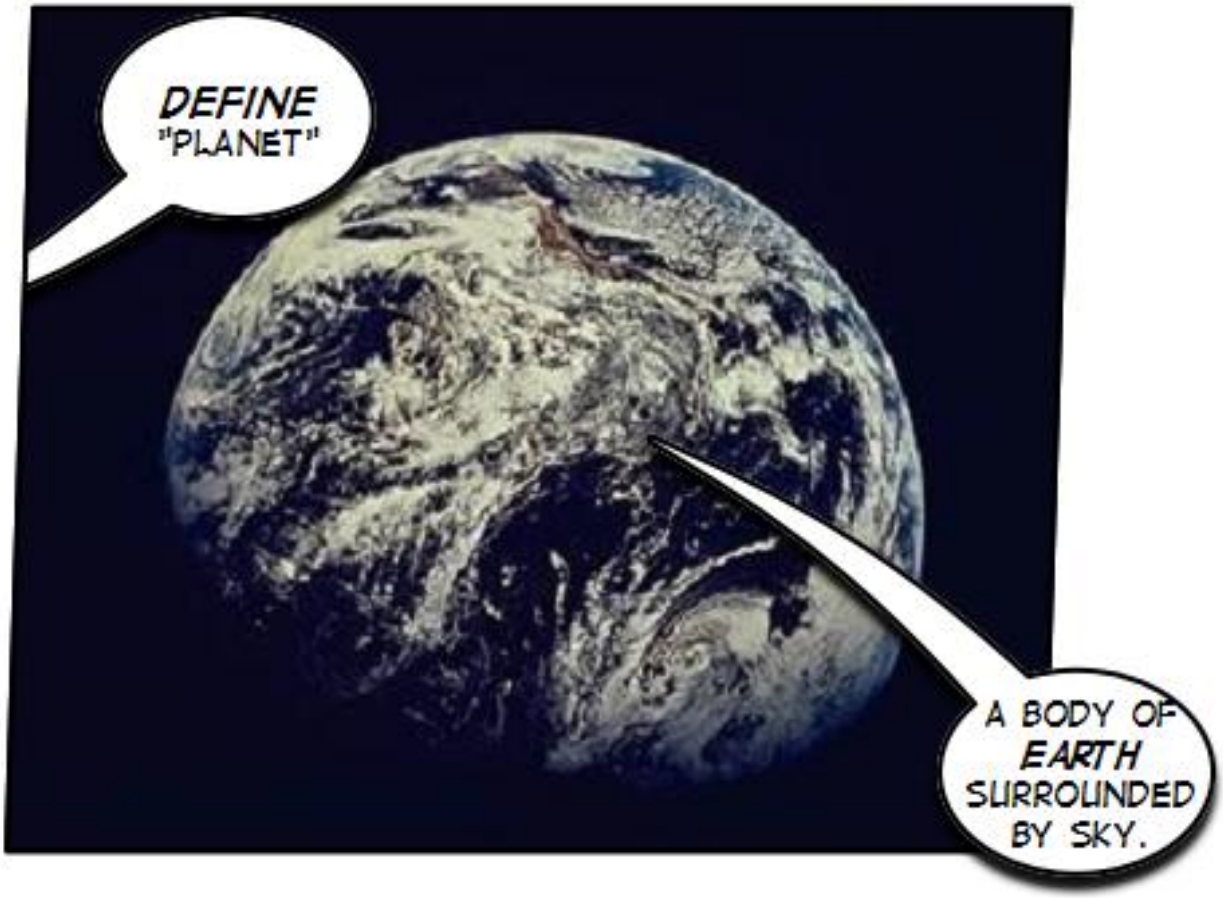
PLACE THE CONSTELLATION MAP ONTO THE SURFACE OF THE BOX.

PUNCH HOLES THROUGH THE SIDE OF THE BOX IN THE RIGHT POSITIONS FOR THE GIVEN CONSTELLATION.



WEEK TWO:

Our solar system



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Calculator
Bathroom scale (optional)
Various household objects (with weight provided on the label, i.e. bag of flour, sugar, etc.)

10 different colored beads
5 feet of string
Meterstick

You and your child(ren) will be covering the following Science Standards this week:

All objects in the universe have properties, locations, and movements that can be observed and described.

The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.

Definitions:

Terrestrial planets	("tur-rest-tree-ul"); planets that are "earth-like" or "made of rock"; in our solar system they would be mercury, venus, earth and mars
Moons	large bodies of rock that orbit a planet
Mercury	("mur-cur-ee"); the closest planet to our sun; does not have a moon; it is less than half the size of earth; it has no air; and, the temperature of the ground reaches 800°F
Venus	("vee-nus"); the second planet in our solar system; it is almost the same size as Earth; does not have a moon; surrounded by air that is filled with a gas called carbon dioxide; the temperature of this planet can reach 870°F
Mars	the fourth planet from our sun; the coldest of all the terrestrial planets (about -80°F); known as the "red planet" because of its color; two moons orbit this planet; the air around this planet is filled with carbon dioxide gas.
Gas giants	planets which do not have much (if any) solid ground at all; the gas giants in our solar system are jupiter, saturn, uranus and neptune
Jupiter	("joo-pit-er"); one of the gas giants in our solar system; the largest planet in our solar system; may have more than 39 moons; the temperature on this planet is about -211°F; most of the gas on this planet is hydrogen
Hydrogen	("hi-dro-jen"); the most common chemical found in the known universe
The "Great Red Spot"	A huge storm on Jupiter that has lasted for hundreds of years which looks like a swirling group of red clouds that is larger than the Earth
Saturn	a gas giant within our solar system; the sixth planet from the sun; much larger than Earth; most of the gas found on this planet is hydrogen; contains at least 47 moons and a thick band of seven rings (containing small pieces of ice) that surround the planet; the temperature of this planet is -285°F
Uranus	("yur-ah-nus"); a gas giant within our solar system; the seventh planet in our solar system; contains at least 21 moons and three small rings of ice; the temperature of this planet is -328°F; most of the gas that makes up this planet is hydrogen

Neptune	the last gas giant in our solar system; the eighth planet from the sun; contains at least eleven moons and four rings of ice; most of the gas on this planet is made up of hydrogen and it is very cold...-346°F
Triton	("try-ton"); a moon which orbits neptune; one of the largest moons in our solar system
Carbon dioxide	a gas that our bodies breathe out; most of the air around venus and mars contain this gas

Sample Questions to ask after your child finishes their reading for Day One:

Identify the order of planets in our solar system:
Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune

What is the warmest planet in our solar system? Why is it so warm?
Mercury; Mercury is the warmest planet in our solar system because it is the closest to our sun

What gas makes up most of the gas giants?
Hydrogen

What is the difference between a gas giant and a terrestrial planet?
Gas giants are planets that are made up of gas while terrestrial planets are made up of rock and/or ice

Answers to Worksheet Questions for Day One:

Page One:

Across
4- Great Red Spot
6-Mars
12-Terrestrial planets
13-Hydrogen
14-Uranus

Down
1-Carbon dioxide
2-Triton
3-Moons
5-Jupiter
7-Gas giants
8-Mercury
9-Neptune
10-Saturn
11-Venus

Page Two:

1. B
2. B
3. A
4. C
5. C
6. A

Page Three:

Answers will vary. Be certain your child drew and labeled all eight planets, and the sun, in proper order:

Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "How much do you weigh?"

The following will give you the most important items to review for your activity today!

The weight of an object depends on the force of gravity.

How much do you weigh?

Children will understand that the weight of an object depends on the force of gravity.

Materials:

Calculator
Bathroom scale (optional)
Various household objects (with weight provided on the label, i.e. bag of flour, sugar, etc.)
Weight Chart

Activity:

1) Collect several items from home and identify the weight of each item. Write these weights down on your Weight Chart.

2) Explain to the child that the force which pulls us to the ground is called gravity. Therefore, if gravity was a little bit stronger than normal, an object would appear to weigh a little bit more. This is what happens on other planets in the solar system!!!

3) Use your calculator to multiply the weight of your objects with the number on the Weight Chart. These numbers show the amount of gravity on each planet as compared to Earth's gravity. For example, the gravity on Mercury is 40% less than on Earth! So, a four-pound bag of four on Earth would only weigh 1.6 pounds!

Explanation:

Gravity is a force that attracts objects to each other. This force is pulls an object (like you or I) toward the center of another object (like the earth). When you weigh yourself, you are measuring the amount of gravity that is pulling you towards the Earth. The Moon has a weaker gravitational attraction than Earth. In fact, the Moon's gravity is only 1/6 of Earth's gravity. So, you would weigh less on the Moon.

Weight Chart

	Multiply the Earth weight by:	The "new" weight would be:
Mercury	0.4	
Venus	0.9	
Earth	1	
Moon	0.17	
Mars	0.4	
Jupiter	2.5	
Saturn	1.1	
Uranus	0.8	
Neptune	1.2	
Pluto	0.01	
Sun	28	

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Planetary Bracelet"

The following will give you the most important items to review for your activity today!

The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons

All of the planets have different properties and are not evenly spaced between each other throughout our solar system.

Despite their differences in size, each planet is pulled by the force of gravity from the sun. This force causes all of our planets to orbit around the sun.

Planetary "Bracelet"

Children will create a scale model of a solar system in the form of a HUGE bracelet.

Materials:

10 different colored beads
6 feet (2 meters) of string
Meterstick

Activity:

Inform the child that you will be exploring the distances between each of the planets in our solar system. These distances will be measured in Astronomical Units (AU). One AU is the distance between the Earth and the sun (which is about 93,000,000 miles).

The following list may be helpful:

Planet Name	Distance From Sun	Astronomical Units (AU)	Length of string attached to each bead
Mercury	36,000,000 miles	0.4	4 cm
Venus	67,000,000 miles	0.7	7 cm
Earth	93,000,000 miles	1	10 cm
Mars	142,000,000 miles	1.5	15 cm
Jupiter	484,000,000 miles	5	50 cm
Saturn	887,000,000 miles	9.5	95 cm
Uranus	1,784,000,000 miles	19	190 cm
Neptune	2,796,000,000 miles	30	300 cm

For younger children:

Pre-cut the lengths of string found on the last column of the chart.

For older children:

Have the child complete the chart by multiplying each AU distance by the scale factor of 10 cm per astronomical unit. (10 cm represents 1 AU)

Tie one bead at the end of each piece of string. For example, a 4 cm length of string is to be tied to one bead. This represents the distance from the Sun to the planet Mercury.

Then, attach the free end of the string to the bead that has the 7 cm length of string. Now you have Mercury AND Venus attached to each other. Repeat this process as shown on the chart above.

Once you have completed your "bracelet", remind the child that our solar system is HUGE in size by normal standards. You may also want to discuss how planets farther away from the Sun are colder, and planets closest to the Sun are warmer.

WEEK THREE:

The Earth

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One apple
One knife
3/4 cup of sugar
1/2 cup of packed brown sugar
1/2 cup of M&M's
1/2 cup of milk chocolate chips
1-3/4 cups flour mixed with 1 tsp. Baking powder and 1 tsp. salt
One clear quart jar

You and your child(ren) will be covering the following Science Standards this week:

The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.

The solid earth is layered with a lithosphere; a hot, convecting mantle; and a dense, metallic core.

Definitions:

Geologists	("gee-all-o-jists"); Scientists who study the Earth
Gravity	("gra-vi-tee"); a force that pulls objects towards each other in space
Equator	("ee-quay-tor"); an imaginary line that divides a planet into two equal sides, each of these sides is called a hemisphere
Hemisphere	("hem-es-fear"); equal sides of a planet, divided by an equator
Cardinal directions	("card-in-all"); north, south, east and west; a set of directions created to help everyone face the same way
North pole	the most northern spot in the northern hemisphere
South pole	the most southern spot in the southern hemisphere
Crust	the outside area of our planet
Mantle	large area of the earth under the crust; this area contains large amount of solid and melted rock
Core	the very hot center of the earth that is made up of different kinds of metals

Sample Questions to ask after your child finishes their reading for Day One:

Is it possible to "see" the equator on our planet?
Yes, it appears as a small "bump" that completely circles our planet

Why are cardinal directions so important to everyone?
Much like all of science, we must be able to communicate with everyone around the planet in a clear and understandable manner. Cardinal directions helps everyone on the planet know which way to turn if attempting to follow directions

What are the layers of the earth called? Which layer is in the middle of the earth? Which one is on the outer surface of the earth?
Core (center of the earth), mantle (middle of the earth) and crust (outer surface of the earth)

What force makes our planet, and all planets, look like a large ball?
Gravity causes our planet to resemble a ball

Answers to Worksheet Questions for Day One:

Page One:

5-equator

1-gravity

10-hemisphere

2-crust

7-mantle

8-cardinal directions

6-geologists

9-south pole

4-north pole

3-core

Page Two:

Check your child's work

Page Three:

Answers will vary. Be certain your child describes their journey through the crust, mantle and core along with the increasing heat they will experience. In addition, they will need to describe their journey to the other side of the planet which would include their path out of the core into the mantle and out of the crust!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Eating the Earth"

The following list will give you the most important items to review for your activity today!

The earth contains layers known as the crust, mantle and core.

Each of these layers has different thicknesses and is composed of different materials.

Eating the Earth

Children will explore an edible model of the earth's layers.

Materials:

One apple
One knife (be careful! Only an adult should use the knife!)

Activity:

1) An adult will cut the apple into half, vertically, through the stem and down through the core.

2) Give one half of the apple to the child and point out the similarities to between it and the earth: **The skin of the apple represents the layer of crust on the earth.**

3) Explain to the child that compared to all the other layers of the earth, the crust is the thinnest of them all.

4) The earth's mantle is the largest layer of the earth. The mantle is made up of mostly molten rock. Explain to the child: **The largest part of the apple, the white part that we usually eat, represents the Earth's mantle.**

5) The earth's core is like a little round ball in the middle of the earth that is made up the metals nickel and iron. Explain to the child the following analogy: **The Earth's core is represented by the core of the apple.**

6) Instruct the students to draw and label a diagram of their model. You may ask them to identify other items they know of that resemble this model of the earth. One other example could be a hard-boiled egg, or the cross-section of a baseball.

7) When the child completes their diagram, they may eat their model.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Five Layer Earth Cookies"

The following will give you the most important items to review for your activity today!

Scientists use models much like those found in this activity (although not nearly as tasty) to better understand and visualize abstract concepts. This includes the visualization of thousands of miles of rocks and minerals under our feet!

The solid earth is layered with a lithosphere; a hot, convecting mantle; and a dense, metallic core.

Five Layer Earth Cookies

Children will create a tasty model of the earth's layers.

Materials:

$\frac{3}{4}$ cup sugar
$\frac{1}{2}$ cup packed brown sugar
$\frac{1}{2}$ cup M&M's
$\frac{1}{2}$ cup milk chocolate chips
1 $\frac{3}{4}$ cups flour
1 tsp. baking powder
1 tsp. salt
One clear quart jar

Activity:

Have the child layer each of the following ingredients separately into the quart jar. Layer the ingredients in the following order:

1) 3/4 cup of sugar
2) 1/2 cup of packed brown sugar
3) 1/2 cup of M&M's
4) 1/2 cup of milk chocolate chips
5) 1 3/4 cups flour mixed with 1 tsp. baking powder and 1 tsp. salt

Explanation:

As each layer is added, explain to the child that each ingredient represents a different layer of our planet...

The **sugar** represents Earth's inner core.
The **brown sugar** represents the Earth's outer core.
The **M&M's** represent the mantle of the earth.
The **milk chocolate chips** represent Earth's crust.
The large layer of **flour, baking powder and salt** represents earth's atmosphere.

Baking Instructions:

Empty cookie mix into large mixing bowl; stir to combine. Add 1/2 cup softened butter, 2 eggs slightly beaten, and 1 tsp. vanilla; mix until completely blended. Roll heaping tablespoonfuls into balls. Place 2 inches apart on a lightly greased cookie sheet. Bake at 375° for 13 to 15 minutes until tops are very lightly browned. Cool 5 minutes on cookie sheet; remove to wire racks to cool completely. Yield: 2-1/2 dozen

WEEK FOUR:

Our sun and moon

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Shallow Baking Dish
Water
Small Mirror
Modeling Clay (optional)
White Paper
Flashlight
Small sheet of cardboard
One sheet of white paper

Aluminum foil approximately 1 x 1 -inch (3 x 3 centimeters)
Pin or sharp point
Tape
Scissors
Ruler
Candle

You and your child(ren) will be covering the following Science Standards this week:

The sun provides the light and heat necessary to maintain the temperature of the earth.

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Definitions:

Radiant energy	also known as "light energy"; most of the energy we receive from the sun is a form of radiant energy
Visible light	all of the light that can be seen (i.e. all of the colors of the rainbow)
Infrared light	a form of light given off by the sun which we cannot see but can feel as being warm
Speed of light	the speed in which light travels from the sun; 186,000 miles per second
Satellite	any object that orbits a larger object
Reflects	bounces
Craters	bowl-shaped holes found on the moons and other terrestrial planets when meteoroids, comets and asteroids smashes into its surface

Sample Questions to ask after your child finishes their reading for Day One:

What are the different kinds of light that our sun gives off? Which one is responsible for heating our planet?

Visible and infrared light is given off by the sun. Infrared light is responsible for warming our planet.

What makes something a "satellite"?

Anything that orbits a larger object is a satellite.

Does earth have craters?

Yes. All terrestrial planets and their moons have been struck by objects in space.

If the sun were to blow up (don't worry!) right now, how long would it take for us to see that it has gone away?

The light we see from the sun has to travel millions of miles before it can reach us. If the radiant energy given off by the sun were to immediately stop, we would still see a stream of light from the sun for eight minutes until it ran out!

Answers to Worksheet Questions for Day One:

Page One:

1) radiant energy
2) visible light
3) infrared light
4) speed of light
5) satellite
6) reflects
7) craters

Page Two:

ACROSS

4-speed of light
5-reflects
6-visible light
7-radiant energy

DOWN

1-craters
2-satellite
3-infrared light

Page Three:

Comparisons between visible and infrared light

Both are forms of radiant energy
Both travel at the same speed

Differences between visible and infrared light

Infrared light warms objects when it touches them
Visible light allows organisms to see things

Answers for Unit One Review:

Starting from the sun I travel at the speed of light past the first planet in our solar system, mercury. I'm not slowing down as I reach the second planet, Venus either. As I speed past earth, I bounce off its satellite, the moon, and continue through the solar system. I pass the last terrestrial planet, mars and keep on moving!

I pass by several large chunks of rock floating around in space which astronomers on earth call asteroids. I speed past Jupiter then Saturn, Uranus and finally Neptune. As I leave our solar system, I continue moving towards other solar system in the Milky Way Galaxy.

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Building a Rainbow"

The following list will give you the most important items to review for your activity today!

Visible light, unlike infrared light, is composed of several different colors we know as the spectrum.

As light passes through an object, such as glass or water, visible light can be bent. Each color bends in different angles which allow us to see a rainbow.

Building a Rainbow

Children will understand that light is composed of all the colors in the spectrum

Materials:

Shallow Baking Dish
Water
Small Mirror
Modeling Clay (optional)
White Paper
Flashlight

Activity:

1) Fill a flat dish half full of water.
2) Put the mirror in the dish so it slants back against the side. Secure it with the modeling clay (optional).
3) Shine a flashlight on the part of the mirror under the water.
4) Hold the piece of white paper above the light. A rainbow will appear on the paper.
5) Put the rainbow away and have the students name each color.

Explanation:

People first thought rainbows were something of a supernatural explanation. The first person to realize that light contained color was a man in 1666 named Sir Isaac Newton. Newton discovered the colors when he bent light. We see a rainbow of colors when we use a prism or water to separate the colors of sunlight. Light is bent as it passes through the water or prism and the colors are spread apart into a spectrum. Each color becomes individually visible. Each color has a different wavelength with red being the longest and violet the shortest. When light passes through a prism or water, each color is bent at a different angle.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Finding the Size of the Sun"

The following will give you the most important items to review for your activity today!

You should never look directly into the sun! You can permanently damage your retinas and, since you have no nerve endings within this part of your eye, you may not even know you are damaging yourself! Be careful!

Simple devices and the use of mathematics are very important to scientists! The pinhole viewer is no exception!

Finding the Size of the Sun

Children will build a simple device that can be used to determine the size of celestial objects.

Materials:

Sheet of cardboard
One sheet of white paper
Aluminum foil approximately 1 x 1 -inch (3 x 3 centimeters)
Pin or sharp point
Tape
Scissors
Ruler
Candle

Activity:

1) Cut a square about 3/4 x 3/4-inch (2 x 2 centimeters) out of the center of the cardboard.
2) Place the piece of aluminum foil over the opening and tape it in place at the edges.
3) Using the pin or other sharp point, puncture the foil to produce a small hole. You now have a pinhole viewer.

To test your pinhole viewer...

1) Set up the candle about 4 inches (10 centimeters) away from one face of the pinhole viewer.
2) Light the candle.
3) Turn out the lights in the room.
4) Hold a white sheet of paper a few inches or centimeters away from the opposite side of the pinhole viewer. You should be able to see an image of the flame projected on the paper.

5) Discuss with your family what happens to the size of the image as you move the paper farther away. What happens as you move the candle farther away?

To measure the diameter of the sun...

Hold the pinhole viewer so that the light from the Sun passes through the hole and falls on a sheet of white paper held behind the hole. Try to make the distance between the pinhole and the paper as large as possible.

Using your ruler, measure:

The diameter of the image of the Sun on the paper

The distance from the pinhole to the paper

You can calculate the diameter of the Sun using the following formula:

(Diameter of the image of the Sun) divided by (Distance from the pinhole to the paper) multiplied by (Distance from Earth to the Sun)

= DIAMETER OF THE SUN

Note: The distance from the Earth to the Sun is approximately 93,000,000 miles (149,600,000 kilometers).

Explanation:

The pinhole viewer you built can project a variety of light sources. More complex pinhole viewers and cameras use a dark chamber behind the pinhole. This allows for the projection of images from sources that are not as bright as the ones used in this exercise. In a basic way, this is how cameras work.

Unit One Test

Match the words in the first column to the best available answer in the second column.

____ **asteroids**	1. bowl-shaped holes found on the moons and other terrestrial planets when meteoroids, comets and asteroids smashes into its surface
____ **astronomers**	2. Scientists who study the Earth
____ **comet**	3. "shooting stars" or "falling stars"; falling meteoroids that move so quickly through the air that they get very hot and burn up, leaving a glowing trail behind them in the air
____ **core**	4. very large round bodies of rock or gas that orbit around stars
____ **craters**	5. large chunks of rock that are floating in space
____ **crust**	6. the name given to a meteor that does not entirely burn up in the air and smashes into the ground
____ **Earth**	7. Scientists who study the universe
____ **equator**	8. the movement of an object around a sun
____ **geologists**	9. our home planet, the third planet from the sun
____ **gravity**	10. any object that orbits a larger object
____ **hemisphere**	11. large bodies of rock that orbit a planet
____ **infrared light**	12. large area of the Earth under the crust; this area contains large amount of solid and melted rock

___ **mantle**	13. a form of light given off by the sun which we cannot see but can feel as being warm
___ **meteor**	14. a chunk of ice, gases and dust that spins around a sun; a "dirty snowball"
___ **meteorite**	15. the outside area of our planet
___ **meteoroids**	16. also known as "light energy"; most of the energy we receive from the sun is a form of radiant energy
___ **Milky Way galaxy**	17. all of the planets, asteroids, meteoroids and comets that orbit a star
___ **moons**	18. equal sides of a planet, divided by an equator
___ **orbit**	19. our nearest star
___ **planets**	20. the speed in which light travels from the sun; 186,000 miles per second
___ **radiant energy**	21. smaller chunks of rock (less than 20 feet long) that float around in space
___ **satellite**	22. a force that pulls objects towards each other in space
___ **solar system**	23. the name of the galaxy that we live in
___ **speed of light**	24. the very hot center of the Earth that is made up of different kinds of metals
___ **stars**	25. a word we use to describe everything that exists...everywhere
___ **sun**	26. an imaginary line that divides a planet into two equal sides, each of these sides is called a hemisphere
___ **telescope**	27. huge balls of hot gas that give off a large amount of energy (like heat and light)!
___ **universe**	28. a tool that is used to make faraway objects look closer than they are.

Which one is right? Circle the correct answer.

1. All of these are satellites except?
   a) the moon
   b) the sun
   c) Triton

2. Visible light travels as fast as?
   a) infrared light
   b) satellites
   c) mercury

3. Which of the following is the thickest on Earth?
   a) core
   b) mantle
   c) crust

4. Which of the following are in order of largest to smallest?
   a) universe, star, galaxy, solar system
   b) universe, solar system, galaxy, star
   c) universe, galaxy, solar system, star

5. Scientists who study the universe are called?
   a) astronomers
   b) geologists
   c) astrologers

6. Stars can be found...
   a) only in our solar system
   b) only in our galaxy
   c) throughout the universe

Draw lines to show the path of the moon and the Earth as they orbit the sun.

Unit One Test Answer Key

Matching

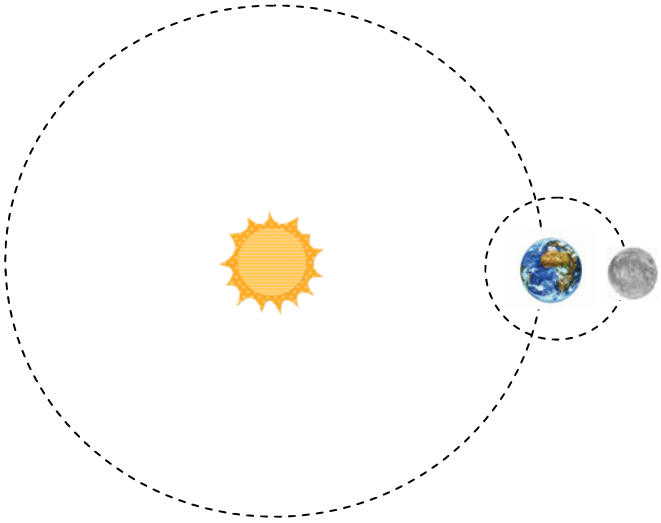
5-Asteroids
7-Astronomers
14-comet
24-core
1-craters
15-crust
9-earth
26-equator
2-geologists
22-gravity
18-hemisphere
13-infrared light
12-mantle
3- Meteor
6-Meteorite
21-Meteoroids
23-Milky way galaxy
11-Moons
8-Orbit
4-Planets
16-radiant energy
10-satellite
17-Solar system
20-speed of light
27-stars
19-sun
28-telescope
25-universe

Multiple choice

1) b
2) a
3) b
4) c
5) a
6) c

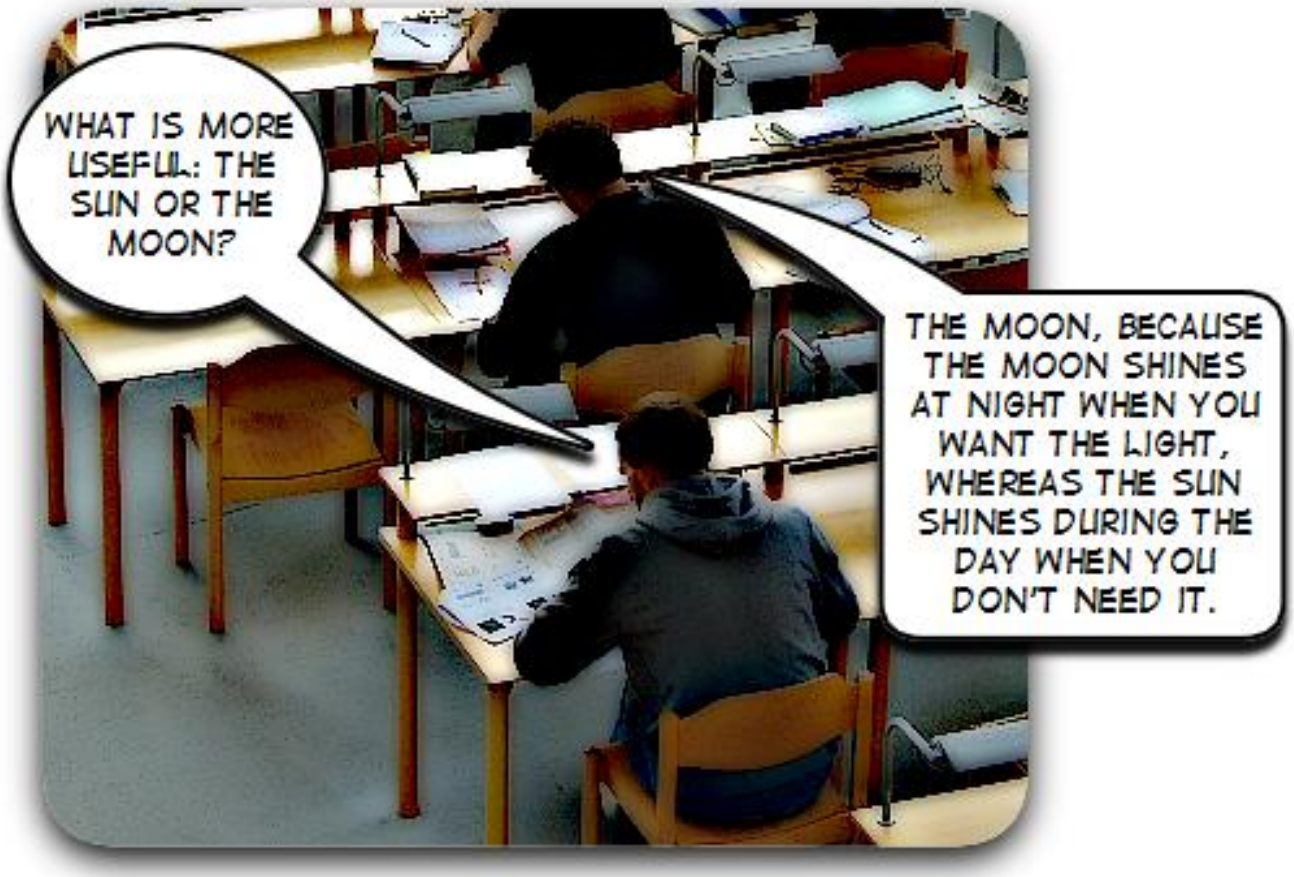
Orbit drawing

Answers will vary. Do not grade this page. It will be useful in the next unit. The correct orbital pathway should look like this:



WEEK FIVE:

Rotation and revolution



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Large tablecloth or sheet
Heavy object (i.e. bag of flour, sand, etc...)
Marble
Piece of paper
Measuring tape
Scissors

You and your child(ren) will be covering the following Science Standards this week:

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.

Definitions:

Sunrise	the time when the sun can be seen for the first time in the morning
Sunset	the time when the sun can no longer be seen at the end of the day
Revolving	when an object moves around another object (for example… when a planet orbits a sun, it is revolving around the sun)
Rotating	when an object spins around, like a top
Axis	an imaginary line that connects the north and south poles through a planet
Astronauts	people who travel in outer space
Weightlessness	also known as microgravity; a smaller amount of gravity; when astronauts are "floating" in space, gravity is not pulling on them very much, making them "weightless"

Sample Questions to ask after your child finishes their reading for Day One:

Which cardinal direction does the sun rise?

The sun rises in the east.

Do satellites rotate on an axis, or are planets only able to rotate?

Nearly every object in space rotates on an axis, this includes our sun, all of the planets and their moons.

What is the difference between rotation and revolution?

Rotation is a motion similar to a top; a spinning motion. Revolution is a linear motion; this means that the object is moving in a straight line.

Is there gravity in space?

Yes. all objects in space have gravity pulling on them.

Answers to Worksheet Questions for Day One:

Page One:

5-astronauts
7-axis
4-revolving
6-Rotating
1-sunrise
3-sunset
2-weightlessness

Page Two:

Comparison of rotation and revolution

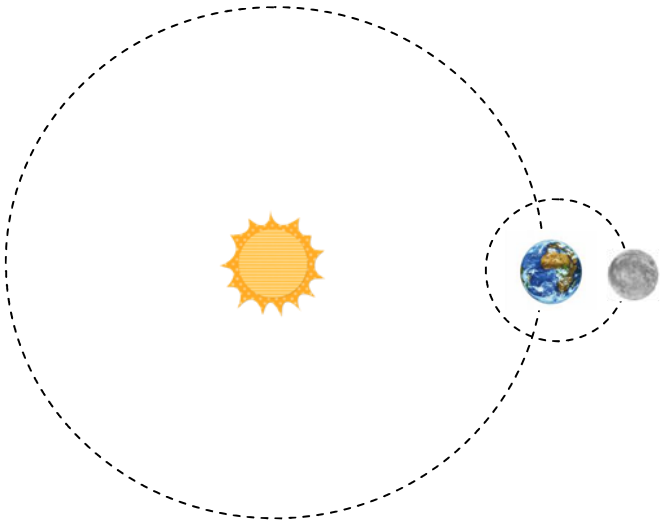
Both have to do with motion
Both affect objects in space

Differences between rotation and revolution

Rotation describes an object moving like a top
Revolution describes an object moving a certain distance

Page Three:

Your child should draw an object that looks similar to this:



Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Gravity on a Sheet"

The following list will give you the most important items to review for your activity today!

All objects in space rotate and revolve and pull on objects with their own gravity.

The larger the object, the stronger the pull of gravity; therefore, the sun (being the largest object in our solar system) contains the largest amount of gravity. Because of this fact, all of the planets in our solar system are pulled in a circular orbit around the sun.

Gravity on a Sheet

Children will model a planet in motion.

Materials:

Large tablecloth or sheet
Heavy object (i.e. bag of flour, sand, etc...)
Marble

Activity:

1) Secure the ends of the sheet or tablecloth about 2/3 down to the four legs of a sturdy table. You may need string or tape to make a secure connection.
2) Carefully place the heavy object in the center of the tablecloth. It may be best to have the object stretch the cloth until it rests on the floor!
3) Ask the child to predict what will happen to the path of the marble if they roll it across the sheet.
4) Have the child roll the marble across the sheet, varying its speed until it's path winds down towards the heavy object.
5) Was the child's prediction correct?

Explanation:

The path of the marble is identical to the path of a satellite in outer space. Moons and planets are drawn towards the powerful gravitational fields of larger objects (like the sun). This causes the smaller objects' paths to be spiral in nature. If the speed of an object is too fast, it will not be drawn towards the larger object in space. You can test this by speeding up the marble. If it is rolled too quickly, it will fall off of the tablecloth before the heavy object can pull it in! Scientists use this within all of their spacecraft designs. Gravity is a powerful tool in the development of spacecraft!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Wishing upon a Star"

The following will give you the most important items to review for your activity today!

Scientists use the process of sampling to determine the estimated size of a large population. This can be the population of stars in the sky or the numbers of organisms in an area!

ESP Activity: Wishing upon a Star

Children will use estimation and sampling to study the night sky.

Materials:

Piece of paper
Measuring tape
Scissors
Starfield sheet (see attached)

Activity:

1) Cut a 1"x 1" hole in a piece of paper.
2) Place the Starfield sheet on the table.
3) Lay the sheet with the 1"x 1" hole over the Starfield sheet in a random position.
4) Record the number of stars within the hole in the paper and repeat this procedure two more times.
5) Multiply the number of stars in each trial by 30 (since the actual Starfield sheet is 30 times greater than the hole), add each of these trials together and take an average by dividing this sum by three.
6) Repeat steps three through five for experimentation at least two more times.

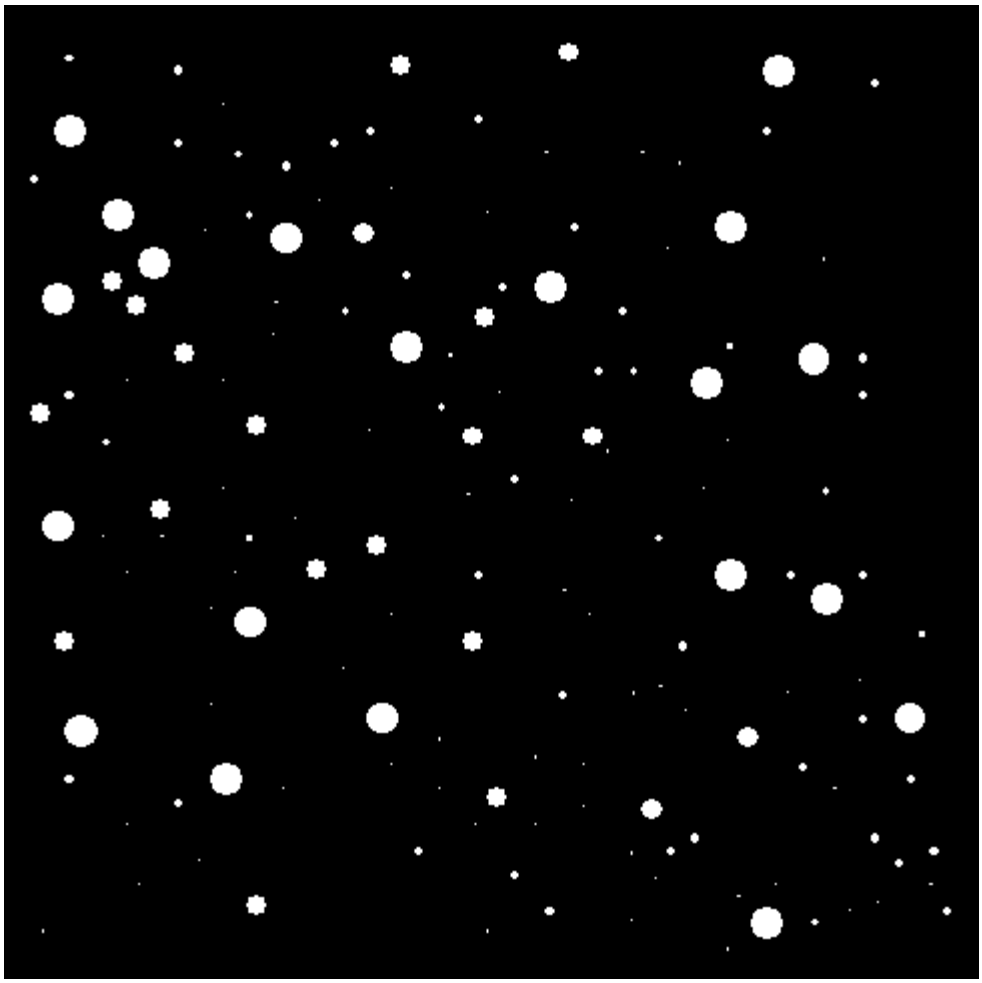
Explanation:

Scientists use this same method (known as sampling) to determine the estimated size of a large population. The actual number of stars within the Starfield is 200. In order to determine the most accurate estimation, it would be best to take an average of all trials that you undergo. As with all of science, the more trials you run, the more accurate your estimate will be!

Independent variable: Number of attempts
Dependent variable: Accuracy of your estimate
Hypothesis:

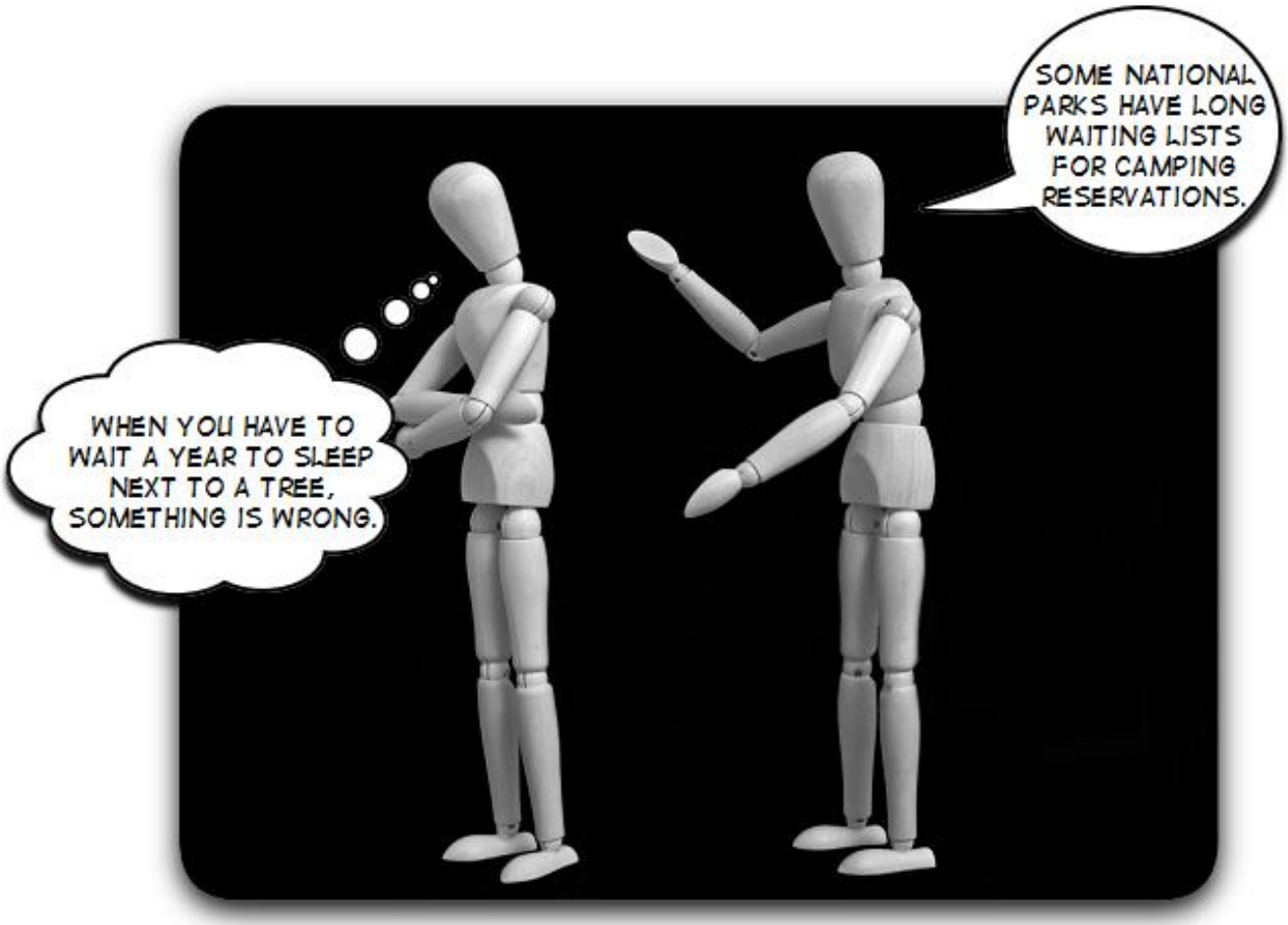
If the NUMBER OF ATTEMPTS is (increased/decreased), then the ACCURACY OF YOUR ESTIMATE will (increase/decrease).

STARFIELD



WEEK SIX:

Days, months and years



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Meter stick or measuring tape
Tape
Three feet of string
Sharpened pencil
2 foot dowel rod (or similar item)

Bucket of gravel or sand
Driveway or sidewalk
Chalk

You and your child(ren) will be covering the following Science Standards this week:

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Definitions:

Year	the time it takes for a planet to make one revolution around its sun
Day	the time it takes for a planet to make one rotation on its axis
Lunar day	the time it takes for the moon to rotate once on its axis; 27 days
Months	measurement of time on earth that is closely related to the lunar day
Sunspots	small, cooler areas on the sun that appear darker in color.

Sample Questions to ask after your child finishes their reading for Day One:

Why is an earth year different than a Martian year?
An earth year is shorter than a martian year because the earth's orbit around the sun is shorter than the martian orbit.

How did scientists discover that the sun spins on an axis?
By observing sunspots, scientists were able to determine that the sun spins on an axis.

How long does it take for the earth to make one rotation?
24 hours

How long does it take for the moon to make one rotation?
27 days

Answers to Worksheet Questions for Day One:

Page One:

1) year
2) day
3) lunar day
4) months
5) sunspots

Page Two:

Check your child's work for completion

Page Three:

1) Mercury
2) Mars
3) The farther the planet is located from the sun, the longer the revolution (amount of days).

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Where in the world?"

The following list will give you the most important items to review for your activity today!

Simple observations of the sun need to be communicated clearly to any scientist throughout the planet. The use of math is one such way for scientists to communicate universally.

The use of simple tools, such as a protractor, is another way for children to realize that math is extremely important in science!

Where in the world?

Students will determine the position of the sun throughout the day.

Materials:

Meter stick or measuring tape
Tape
Protractor (see attached)
Three feet of string
Sharpened pencil

Activity:

1) Place the measuring tape on the ground outside, with one end pointing towards the sun.
2) Use the tape to stand the protractor upright against the side of the measuring tape. The protractor should be positioned with its center located at the end of the measuring tape. (see attached)
3) Tie one end of the string to the point of the pencil.
4) Stand the pencil on the measuring tape and move it back and forth until the shadow cast by the pencil reaches the end of the tape.
5) Pull the string to the end of the measuring tape and the shadow and record the angle where the string crosses the protractor.
6) For experimentation, repeat this procedure at different times of the day.

Explanation:

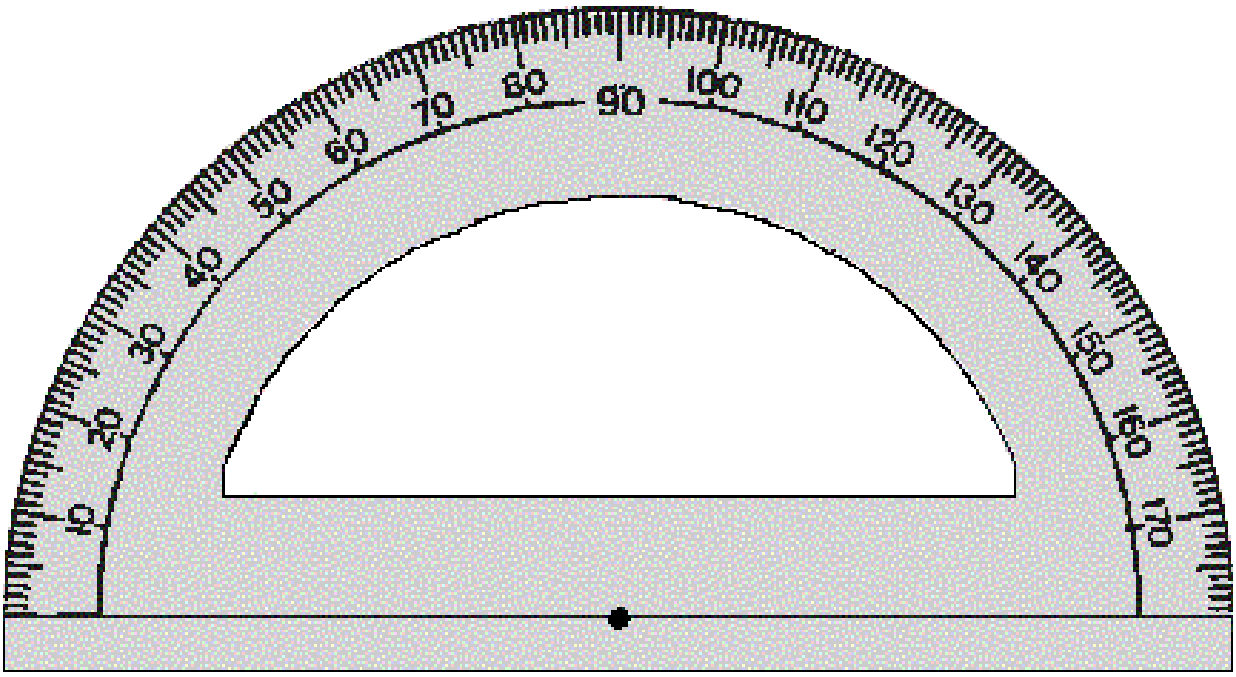
This activity identifies the general position of the sun as it rises in the East and sets in the West. The student should identify the angle of the sun at it rises in the morning (around zero degrees) to its highest angle (around noon) and the decreasing angle of the sun as the day ends. The effectiveness of this activity can be enhanced if it is repeated during different times of the year. During the winter months, the sun's angle is considerably lower than during the summer months.

Independent variable: Time of the day

Dependent variable: Angle of the sun

Hypothesis:

If the TIME OF THE DAY is (increased/decreased), then the ANGLE OF THE SUN will (increase/decrease).



PLACE THE END OF THE MEASURING TAPE HERE

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Astronomy with a Stick"

The following will give you the most important items to review for your activity today!

Since it is impossible for children to directly observer the rotation of our planet, indirect methods must be used.

The study of shadows is an important way for children to understand our patterns of rotation and revolution.

Astronomy with a Stick

Children will make indirect observation of the earth's rotation

Materials:

2 foot dowel rod (or similar item)
Bucket of gravel or sand
Driveway or sidewalk
Chalk

Activity:

1) Insert the dowel into the bucket of gravel or sand making certain it is as straight as possible.
2) Place the bucket outside where it will not be disturbed and will be in full sun throughout the day.
3) Every five minutes mark length and direction of the shadow.
4) Repeat this activity for at least 60 minutes.
5) Discuss with them whether it is the Sun or the Earth that is moving in the observations you are making, will the length or position of the shadow tell us anything, will the shadow continue to get longer, etc.

Explanation:

The Sun's clockwise motion is an apparent motion caused by the rotation of the Earth. The counterclockwise rotation of the Earth in the Sun's light causes the shadow of the gnomon to move clockwise. As the Sun appears to move higher above the horizon before solar noon, the shadow grows shorter and shorter. After solar noon, the shadow grows longer and longer. The Sun is at its highest altitude above the horizon when the shadow is shortest. You can tell the students that at this instant, the Sun is on the meridian and is due south of the observer. NOTE: Depending on your location and the time of year, the length of the gnomon's shadow will vary. Therefore, your students may have to experiment to find a workable gnomon height and circle circumference in order to find the true North at Solar Noon.

WEEK SEVEN:

Moon Phases

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Four sandwich cookies (like oreo's)
Paper plate
Plastic/butter knife
Pencil/pen
Large sheet of heavy cardboard (about a three foot square)
Knife
Eight ping-pong balls or Styrofoam balls
Glue
Black permanent marker

You and your child(ren) will be covering the following Science Standards this week:

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Definitions:

Disk	a round-shaped object
Sphere	a ball-shaped object (3D)
Lunar orbit	one complete revolution of the moon around the earth; approximately 29.5 days; contains all of the lunar phases
Waxing	occurs when the amount of light reflecting off of the moon is growing
Waning	occurs when the amount of light reflecting off of the moon is getting smaller
Crescent	"curved shape"
Gibbous	"gib-us"; to swell
Blue moon	the occurrence of two full moons in one month

Sample Questions to ask after your child finishes their reading for Day One:

What is the difference between waxing and waning?

During waxing, the amount of light reflecting off of the moon Is growing while during waning, the amount of reflected light is decreasing

What is so special about a blue moon?

A blue moon only occurs once in every 2.5 years.

Why is one of the moon's phases called "gibbous"?

The shape of the moon appears to swell from its quarter shapes.

How long does it take for the moon to make one revolution around earth?

29 $\frac{1}{2}$ days

Answers to Worksheet Questions for Day One:

Page One:

3-blue moon
7-crescent
2-disk
6-gibbous
8-lunar orbit
4-sphere
1-waning
5-waxing

Page Two:

1) C
2) A
3) B
4) A

Page Three:

1) **blue moon** - the occurrence of two full moons in one month
2) **waxing** - occurs when the amount of light reflecting off of the moon is growing
3) **waning** - occurs when the amount of light reflecting off of the moon is getting smaller
4) **crescent-** "curved shape"

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Tasty Moon Phases"

The following list will give you the most important items to review for your activity today!

The moon rotates on its axis at the same pace as it revolves around Earth. As a result, the moon always keeps the same side pointed toward us throughout its orbit.

Tasty Moon Phases

Children will model the moon phases using cookies.

Materials:

Four sandwich cookies (like Oreo's)
Paper plate
Plastic/butter knife
Pencil/pen

Activity:

Have the child label the phases of the moon on the face of the paper plate. The following list may be helpful for you. Each phase has been identified with a particular "time" as can be found on a clock:

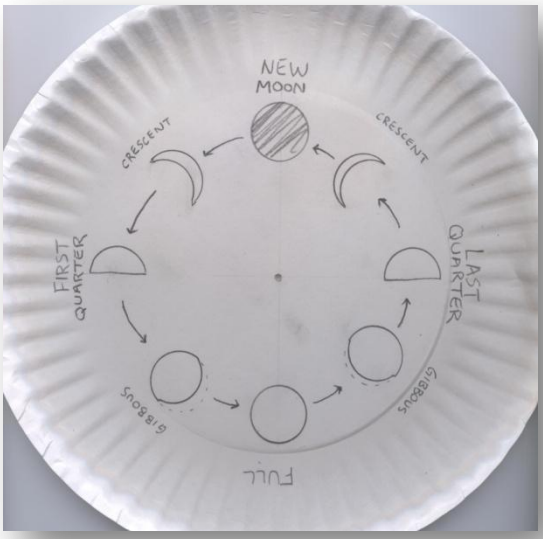
12 o'clock – New Moon
3 o'clock – Last Quarter
6 o'clock – Full Moon
9 o'clock – First Quarter

For older students, they may add the following phases:

Between 12 o'clock and 3 o'clock – Crescent Moon
Between 3 o'clock and 6 o'clock – Gibbous Moon
Between 6 o'clock and 9 o'clock – Gibbous Moon
Between 9 o'clock and 12 o'clock – Crescent Moon

Have the child twist apart the cookies and scrape off the cream to simulate the four primary moon phases. Older students can add the crescent and gibbous moons to their model.

You can check the accuracy of the child's model with the following diagram:



Explanation:

The moon rotates on its axis at the same pace as it revolves around Earth. As a result, the moon always keeps the same side pointed toward us throughout its orbit. We only see the moon because sunlight reflects back to us from its surface; it has no light source of its own. What changes is the portion of the moon that can be seen from Earth. The sun always illuminates half of the moon. The half of the moon facing the sun is always lighted; but the lighted side does NOT always face Earth. As the moon circles Earth, the amount of its disk facing us that is lighted by the sun changes, altering how much of the lunar surface appears bright and how much is in darkness. The changes are known as phases, and repeat in a specific cycle.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "It's Just a Phase"

The following will give you the most important items to review for your activity today!

During the moon's cycle, the actual shape of the moon never changes. It is always a sphere. We only see the moon because sunlight reflects back to us from its surface;

The sun always illuminates half of the moon. The half of the moon facing the sun is always lighted; but the lighted side does NOT always face Earth.

It takes 29.5 days to go from one New Moon to the next

It's Just a Phase...

Children will take part in a 3D model of moon phases.

Materials:

Large sheet of heavy cardboard (about three feet square)
Knife
Eight ping-pong balls or Styrofoam balls
Glue
Black permanent marker

Activity:

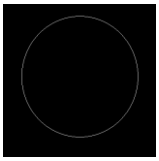
1) Take the large piece of cardboard and cut it into a square and Cut a circle in the center of the cardboard large enough for a child to put his/her head through.
2) Get 8 (or more if wanted) ping pong balls. Using a black permanent marker, color one half of each ball black.
3) You will be gluing the balls to the cardboard sheet about 16-24 inches away from the hole in its center. It is very important to glue each of the balls with the black side facing the same direction.
4) In order to locate where to glue the balls onto the cardboard, first think of a compass... if you were to look down onto the cardboard square, you will need to glue the balls between 16-24 inches away from the hole at the following compass locations:

   North, Northeast, East, Southeast, South, Southwest, West and Northwest

5) Remember! Each of the balls must have their black sides facing the same direction. All of these sides could be facing north, south, east or west... it doesn't really matter.

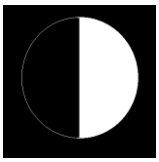
Now the fun part...

6) Have the child insert their head into the hole of the cardboard. Their head represents the earth. Now, have the child rotate their head while inside the hole to model the rotation of the earth. As they face each ping pong ball, they will notice a different phase of the moon:

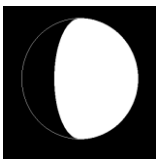


New Moon - The Moon's unilluminated side is facing the Earth. The Moon is not visible (except during a solar eclipse).

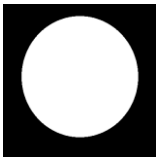
Waxing Crescent - The Moon appears to be partly but less than one-half illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



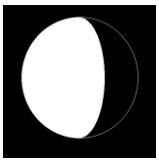
First Quarter - One-half of the Moon appears to be illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



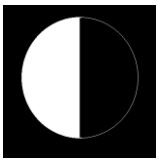
Waxing Gibbous - The Moon appears to be more than one-half but not fully illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



Full Moon - The Moon's illuminated side is facing the Earth. The Moon appears to be completely illuminated by direct sunlight.



Waning Gibbous - The Moon appears to be more than one-half but not fully illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.



Last Quarter - One-half of the Moon appears to be illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.

Waning Crescent - The Moon appears to be partly but less than one-half illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.

Explanation:

During the moon's cycle, the actual shape of the moon never changes. It is always a sphere. We only see the moon because sunlight reflects back to us from its surface; it has no light source of its own. What changes is the portion of the moon that can be seen from Earth. The sun always illuminates half of the moon. The half of the moon facing the sun is always lighted; but the lighted side does NOT always face Earth. As the moon circles Earth, the amount of its disk facing us that is lighted by the sun changes, altering how much of the lunar surface appears bright and how much is in darkness. The changes are known as phases, and repeat in a specific cycle. These are the primary phases: New Moon, First Quarter, Full Moon, and Last Quarter. (It takes 29.5 days to go from one New Moon to the next.)

WEEK EIGHT:

Eclipses

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One grape	Small amount of clay (optional)
One orange	One dodge ball, beach ball or basketball
Flashlight	One tennis ball or baseball
Toothpick	At least two other people to help out

You and your child(ren) will be covering the following Science Standards this week:

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Definitions:

Lunar eclipse	an event in which the Earth gets in between the sun and the moon, causing a shadow that can be seen on the moon
Solar eclipse	an event in which the moon gets in between the sun and the earth causing a shadow that can be seen on the earth
Umbra	the shadow caused by the moon during a solar eclipse
Path of totality	the path of the moon's shadow during a solar eclipse
Corona	a bright ring of light that encircles the moon when it is completely blocking the sun's light within the path of totality
Penumbra	an incomplete shadow that passes over the earth during a solar eclipse.
Partial eclipse	an incomplete eclipse for all people within the penumbra during a solar eclipse; in this area, part of the sun can still be seen as the moon passes over only part of the sun

Sample Questions to ask after your child finishes their reading for Day One:

During a lunar eclipse, what causes a shadow to be formed?
The earth causes a shadow to be formed on the moon as it gets in between the sun and moon.

Why don't we see a lunar eclipse during every new moon?
The orbits of the earth and moon are not directly lined up with the sun.

How can a massive star be covered up by a tiny moon?
It cannot be entirely covered up which is why only those who are within the path of totality can see a total solar eclipse.

What would you see if you were within the penumbra of a solar eclipse?
You would see a partial eclipse of the sun as a part of the moon would cover a small portion of the sun.

Answers to Worksheet Questions for Day One:

Page One:

5- lunar eclipse
7- solar eclipse
6- umbra
1- path of totality
4- corona
3- Penumbra
2- partial eclipse

Page Two:

Comparisons between solar and lunar eclipses

Both form shadows
Both involve the sun, moon and earth
Both do not happen very often

Differences between solar and lunar eclipses

The earth's shadow causes a lunar eclipse
The moon's shadow causes a solar eclipse
A corona only occurs during a solar eclipse

Page Three:

Your child should draw and label something similar to these two drawings:

Unit Two Review Answer Key

ACROSS

1 weightlessness
5 sunset
8 day
9 lunar eclipse
11 sphere
13 lunar day
14 revolution
22 axis
23 astronauts
24 rotates
25 gibbous
26 year
27 path of totality

DOWN

2 solar eclipse
3 disk
4 month
6 partial eclipse
7 corona
10 umbra
12 blue moon
15 lunar orbit
16 penumbra
17 sunspots
18 waning
19 waxing
20 crescent
21 sunrise

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Fruity Eclipse"

The following list will give you the most important items to review for your activity today!

A lunar eclipse is an event in which the Earth gets in between the sun and the moon, causing a shadow that can be seen on the moon.

A solar eclipse is an event in which the moon gets in between the sun and the earth causing a shadow that can be seen on the earth.

A fruity eclipse

Children will model an eclipse using everyday items at home.

Materials:

One grape
One orange
Flashlight
Toothpick
Small amount of clay (optional)

Activity:

1) Place the toothpick one half of the way through the grape.

2) Secure the other end of the toothpick into a small amount of clay, Styrofoam, etc... so that the grape will stand about 2 inches above the table.

3) Place the orange three inches away from the grape.

4) Now shine the flashlight onto the grape (moon) from about one foot away. Notice the shadow that forms on the orange (earth). This shadow should be darker in the middle and lighter on the outside.

Explanation:

This model represents the activities that take place during the eclipse of the sun. The darker part of the shadow on the earth represents the Area of the earth where total solar eclipses can be seen. The lighter part of the shadow identifies where a partial solar eclipse can be seen from the earth.

Day Three

1) Review Day One with the information found below.

2) Run this week's activity, "Sun and Moon: Identical Twins? I think not!"

The following will give you the most important items to review for your activity today!

The sun is massive compared to the moon. However, the distance between the earth, sun and moon can change the way we perceive their size!

Sun and Moon: Identical twins? I think not!

Children will explore why the sun and the moon appear to be the same size.

Materials:

One dodge ball, beach ball or basketball
One tennis ball or baseball
At least two other people to help out

Activity:

1) The parent will hold the large ball about eye level with the child. This represents the sun.
2) Have another person stand about six feet away from the "sun" and hold up the small ball. This represents the moon. (If you cannot find another person, no problem... you can rest the small ball on a table, or shelf that can easily be seen by the child.
3) Have the child stand in front of the smaller ball, facing both the "moon" and the "sun". The child will represent an earth observer.
4) Now, have the "earth observer" and the sun slowly walk backwards until the child can observe that both the small and larger balls appear to be the same size.
5) When this is done, have the child take note of the distance between the three objects. He/she should see that the distance between the earth and the moon is much smaller than between the earth and the sun.

Explanation:

The sun is massive compared to the moon. However, the distance between the earth, sun and moon can change the way we perceive their size!!! The farther an object is from us, the smaller it appears to be. This happens with our sun... it is much farther away from us than our moon. So, the sun looks much smaller than it really is. Since the moon is still far away from us, but not as far away as the sun, it too looks smaller.

Unit Two Test

Match the words in the first column to the best available answer in the second column.

___ **astronauts**	1) the time when the sun can be seen for the first time in the morning
___ **axis**	2) the time when the sun can no longer be seen at the end of the day
___ **blue moon**	3) when an object moves around another object (for example… when a planet orbits a sun, it is revolving around the sun)
___ **corona**	4) when an object spins around, like a top
___ **crescent**	5) an imaginary line that connects the north and south poles through a planet
___ **day**	6) people who travel in outer space
___ **disk**	7) also known as microgravity; a smaller amount of gravity; when astronauts are "floating" in space, gravity is not pulling on them very much, making them "weightless"
___ **gibbous**	8) the time it takes for a planet to make one revolution around its sun
___ **lunar day**	9) the time it takes for a planet to make one rotation on its axis
___ **lunar eclipse**	10) the time it takes for the moon to rotate once on its axis
___ **lunar orbit**	11) measurement of time on Earth that is closely related to the lunar day
___ **months**	12) small, cooler areas on the sun that appear darker in color.

___ **partial eclipse**	13) a round-shaped object
___ **path of totality**	14) a ball-shaped object (3D)
___ **penumbra**	15) one complete revolution of the moon around the Earth; approximately 29.5 days; contains all of the lunar phases
___ **revolving**	16) occurs when the amount of light reflecting off of the moon is growing
___ **Rotating**	17) occurs when the amount of light reflecting off of the moon is getting smaller
___ **solar eclipse**	18) "curved shape"
___ **sphere**	19) "gib-us"; to swell
___ **sunrise**	20) the occurrence of two full moons in one month
___ **sunset**	21) an event in which the Earth gets in between the sun and the moon, causing a shadow that can be seen on the moon
___ **sunspots**	22) an event in which the moon gets in between the sun and the Earth causing a shadow that can be seen on the Earth
___ **umbra**	23) the shadow caused by the moon during a solar eclipse
___ **waning**	24) the path of the moon's shadow during a solar eclipse
___ **waxing**	25) a bright ring of light that encircles the moon when it is completely blocking the sun's light within the path of totality
__ **weightlessness**	26) an incomplete shadow that passes over the Earth during a solar eclipse.
___ **year**	27) an incomplete eclipse for all people within the penumbra during a solar eclipse; in this area, part of the sun can still be seen as the moon passes over only part of the sun

Which one is right? Circle the correct answer.

1. What causes the phases of the moon?
   a) different amount of light given off by the sun
   b) shadows of the Earth on the moon
   c) the position of the moon and the Earth in space

2. A lunar day is a type of:
   a) revolution
   b) rotation
   c) orbit

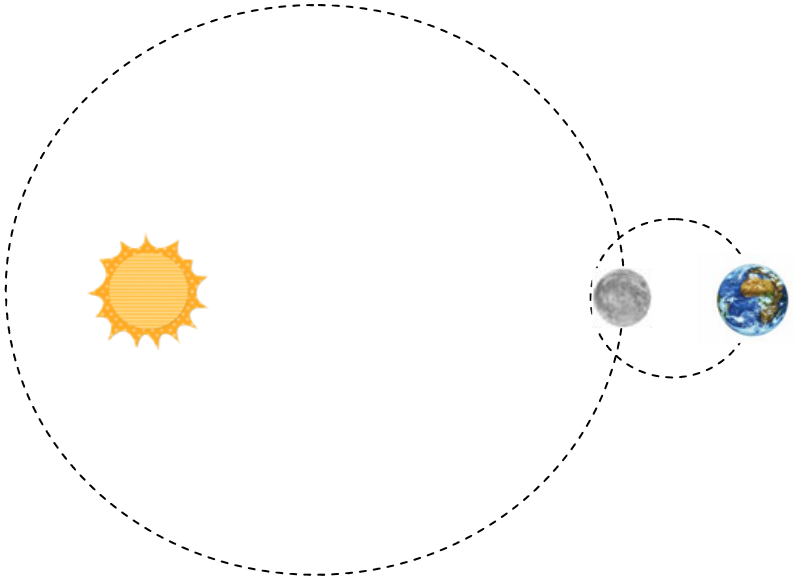
3. Which of the following has the longest year?
   a) Earth
   b) Mercury
   c) Neptune

4. In which cardinal direction do you find a sunset?
   a) west
   b) north
   c) east

5. What causes an eclipse?
   a) different amount of light given off by the sun
   b) shadows from the Earth or the moon
   c) one of the eight moon phases causes eclipses

6. Which of the following has the greatest amount of gravity?
   a) Earth
   b) moon
   c) sun

What is wrong with this picture? Describe three things that are not correct:



1) _____

_____

2) _____

_____

3) _____

_____

Unit Two Test Answer Key

Matching

6-astronauts	21-lunar eclipse	14-sphere
5-axis	15-lunar orbit	1-sunrise
20-blue moon	11-months	2-sunset
25-corona	27-partial eclipse	12-sunspots
18-crescent	24-path of totality	23-umbra
9-day	26-penumbra	17-waning
13-disk	3-revolving	16-waxing
19-gibbous	4-Rotating	7-year
10-lunar day	22-solar eclipse	8-weightlessness

Multiple choice

1) C
2) B
3) C
4) A
5) B
6) C

Fix the picture

1) The moon should be revolving around the earth
2) The earth should be equally distant from the sun during its revolution.
3) The moon should be equally distant from the earth during its revolution.

WEEK NINE: Energy

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Scissors
Tape
Small empty box (shoe box size)
File folder/cardstock/heavy weight paper
Books or magazines
Aluminum foil

Two drinking straws
Marshmallows
Thermometer
piece of paper
string
scissors
warm lamp or hotplate

You and your child(ren) will be covering the following Science Standards this week:

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Definitions:

Energy	the ability to do work
Work	pushing or pulling something to make it move
Meteorologists	("me-t-or-ol-o-gist"); scientists who study how the sun warms the earth which causes our weather
Radiation	("raid-e-a-shun"); the main transfer of heat from the sun to the earth
Conduction	("con-duck-shun"); the transfer of heat between two objects that are touching
Convection	("con-duck-shun"); the transfer of heat through a gas or liquid that is in motion
Atmosphere	("at-mos-fear"); all the gases that make up our air
Convection currents	areas of warm air rising from the surface of the earth

Sample Questions to ask after your child finishes their reading for Day One:

What are the three ways to transfer heat?
Radiation, conduction and convection

What do convection currents have to do with our weather?
Areas of warm air rising around the world drive our weather patterns.

What is the relationship between work and energy?
In order to do work (move something), you must use energy!

What do meteorologists study?
Meteorologists study how the sun warms the earth, causing our weather.

Answers to Worksheet Questions for Day One:

Page One:

7-atmosphere
5-conduction
6-convection
8-convection currents
1-energy
3-meteorologists
4-radiation

Page Two:

Please check your child's work.

Page Three:

Similarities between radiation, conduction and convection: (only two are needed!)

- All three have to do with heat transfer
- All involve some form of work
- All are important for our weather

Differences between radiation, conduction and convection: (only two are needed!)

- radiation comes directly from the sun
- conduction requires two objects to touch to transfer heat
- convection requires gas or liquids in which to transfer heat

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Sun-sational Cooker"

The following list will give you the most important items to review for your activity today!

Almost all of the energy we use in our daily lives comes from the sun.

Solar energy can be utilized in a variety of ways, including the cooking of food.

ESP Activity: Sun-sational Cooker

Students will explore Newton's laws by transferring energy from one object to another.

Materials:

Scissors
Tape
Small empty box (shoe box size)
File folder/cardstock/heavy weight paper
Books or magazines
Aluminum foil
Two drinking straws
Marshmallows
Thermometer

Activity:

1) Place a marshmallow in a sunny spot indoors for ten minutes. Insert a thermometer into the marshmallow and record the temperature
2) Tear or cut the file folder/paper into a shape that is slightly larger than the empty box.
3) Place the paper into the empty box so that it curves into the shape of a tube cut in half (or a skateboarding ramp).
4) Tape the paper into place and cover with aluminum foil with the shiny side facing up.
5) Cut a small slit (about three inches) in each end of the box.
6) Join two straws together by their ends and skewer a marshmallow in the middle of this elongated straw. Rest the ends of the straw in the box slits.
7) Rest your solar cooker in the same sunny spot. Try to aim the cooker in the direction of the sun (propping up the cooker with books or magazines).
8) Leave the cooker in place for ten minutes and record the temperature of the marshmallow.
9) For experimentation, use the tape to block portions of the slits so that the straws will rest farther away from the foil.

Explanation:

Almost all of the energy we use in our daily lives comes from the sun. Solar energy can be utilized in a variety of ways, including a means to cook our food. There are parts of the world where it is not possible to have a conventional oven; therefore, solar cookers are utilized to prepare meals. The solar cooker that was created in this activity reflects light off of the foil surface and focuses this energy onto the marshmallows in the center of the cooker.

Independent variable: Distance of the marshmallow from the cooker

Dependent variable: Temperature of the marshmallow

Hypothesis:

If the DISTANCE OF THE MARSHMALLOW FROM THE COOKER is (increased/decreased), then the TEMPERATURE OF THE MARSHMALLOW will (increase/decrease).

Day Three

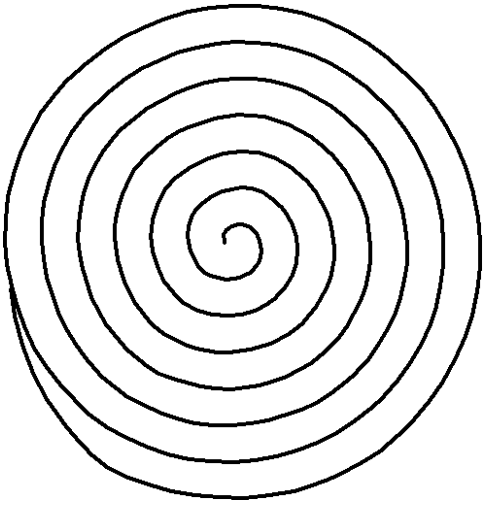
1) Review Day One with the information found below.
2) Run this week's activity, "Warm Air on the Move"

The following will give you the most important items to review for your activity today!

The rising of warm air is not easily seen. However, the affects of this type of heat transfer (convection) can be observed. This is accomplished by observing how convection can be used to do work, such as rotating the spiral within this activity.

Warm air on the move

Children will construct a device to demonstrate convection



Materials:

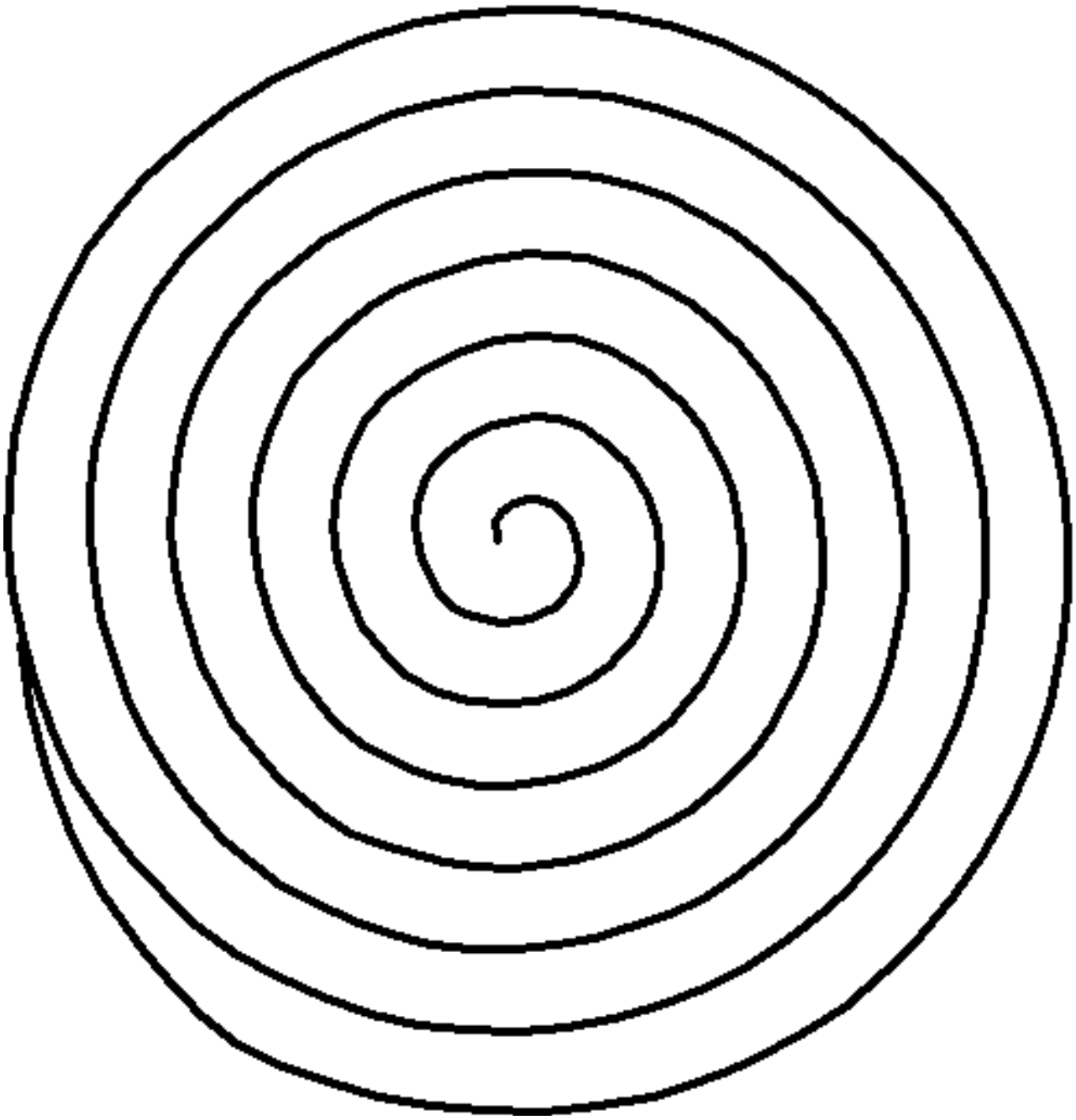
Spiral pattern (provided)
String
Scissors
Warm lamp or hotplate (be careful!)

Activity:

1) Cut out the spiral pattern on the following page.
2) Make a small hole in the center.
3) Hang the spiral from a knotted piece of thread.
4) Hold the device over a warm lamp or hotplate (again… be careful!)
5) You should notice that the device will begin to spin.

Explanation:

When heated air rises, it creates an updraft due to convection. As the air moves upwards, it carries with it a considerable amount of force. The movement of large air masses of different temperatures across regions of land plays a major role in the weather.



WEEK TEN: Seasons

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One bright flashlight
One piece of paper
Pen/pencil
Several small objects (i.e. BB's, tiny marbles, paper dot cut-outs, etc.)

You and your child(ren) will be covering the following Science Standards this week:

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.

Definitions:

Season	one of four parts of the year that have (roughly) the same temperature and amount of daylight and nighttime
Summer solstice	("soul-stiss"); the day of the year in the Northern Hemisphere where we receive the most light in one day; this occurs when our orbit around the sun points the northern hemisphere most towards the sun on June 21st
Winter solstice	the day of the year in the Northern Hemisphere where we receive the least amount of light in one day; this occurs when our orbit around the sun points the northern hemisphere farthest away from the sun on December 21st

Sample Questions to ask after your child finishes their reading for Day One:

What are the four seasons that people can experience throughout the year?

Summer, spring, fall and winter

Does the distance of our planet to the sun affect our seasons?

No; it is the tilt of the earth that has more effect on our seasons than our distance to the sun.

What is so important about both of our solstices?

The days in which we receive the most and the least amount of light in one day throughout the year are known as solstices.

Does everyone on the planet go through all four seasons?

No; the equator and the poles both have different seasonal patterns than the rest of the planet. The equator receives direct sunlight year-round while the poles never receive direct sunlight.

Answers to Worksheet Questions for Day One:

Page One:

2-summer solstice

3-winter solstice

1-season

Page Two:

Comparisons between the summer and winter solstices:

Both identify different amounts of sunlight

Both tell us when we are in the middle of a season

Differences between the summer and winter solstices:

The summer solstice identifies the longest day of the year

The winter solstice identifies the shortest day of the year

Page Three:

1) B
2) C
3) A
4) A
5) B

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "The Reason for the Seasons"

The following list will give you the most important items to review for your activity today!

For those of us in the northern hemisphere, we receive more direct sunlight during the summer months This means that more of the sun's energy is allowed to reach our area and therefore keeps us very warm.

Since the earth is tilted on an axis, the sun's rays are spread out more during the winter months.

The reason for the seasons

Children will discover why the earth has different seasons during the year.

Materials:

One bright flashlight
One piece of paper
Pen/pencil
Several small objects (i.e. BB's, tiny marbles, paper dot cut-outs, etc.)
Dark room

Activity:

1) While inside a darkened room, hold the flashlight over a the paper that has been placed on a table.
2) The parent will hold onto the flashlight while the child draws a circle around the brightest circle on the paper. Be certain to take note of the height of the flashlight over the paper! (If your flashlight does not create a powerful beam, you can create a blinder around the edge of the flashlight out of paper. Or... you can cover the flashlight with a piece of aluminum foil and cut out a circle for the beam to travel through.)
3) Repeat this same procedure one more time. However, keeping the flashlight the same distance from the paper, hold it at an angle. Now have the child draw the oval-shaped light that can be seen on the paper.
4) Turn on the lights and ask the child to predict which object they drew is larger?
5) Now instruct the child to "fill in" the circles with their small objects. Small candies work well, as do paper dots, marbles, etc... Have the child count the number of objects needed to fill both of the drawings. They should notice that the oval shape takes more objects to fill than does the circle.

Explanation:

This is a model of what happens to the earth during our seasons. For those of us in the northern hemisphere, we receive more direct sunlight during the summer months. This is similar to the circle-shaped light that the child completed first. This means that more of the sun's energy is allowed to reach our area and therefore keeps us very warm.

However, since the earth is tilted on an axis, the sun's rays are spread out more during the winter months. This is similar to what happened with the oval-shaped drawing. The light is spread out over a greater area. On earth, this means the heat we receive is spread out too!!! This is why it is colder during the winter months.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Graphing our Seasons"

The following will give you the most important items to review for your activity today!

The tilt of the Earth in its orbit about the Sun affects not only the intensity of the solar radiation at a given location, but also the number of daylight hours. These two effects combine to create the weather we usually associate with each season.

Graphing our seasons

Children will use graphs to analyze our weather patterns.

Materials:

Data chart (provided)

Graph paper (provided)

Activity:

1) Instruct the child to make two separate graphs:

Month vs. average sunlight (hours) AND Month vs. average temperature

2) Have the child look at both graphs when completed. Does the shape of the graphs look similar or different? They should look very similar!

Explanation:

The tilt of the Earth in its orbit about the Sun affects not only the intensity of the solar radiation at a given location, but also the number of daylight hours. These two effects combine to create the weather we usually associate with each season. In the Northern Hemisphere, the Summer Solstice (longest day, shortest night) occurs around June 21. From June 21 to December 21, the days grow shorter and the nights longer. There are two equinoxes, during which the hours of daylight and night are equal: the Vernal Equinox (around March 21) and the Autumnal Equinox (around September 22). One can observe these changes by recording the times of sunrise and sunset and measuring the length of the day. Changes in these times are large enough (about a minute a day) to be seen on a graph. The figure below shows such a graph made from sunrise and sunset times at the National Optical Astronomical Observatory located on Kitt Peak near Tucson, Arizona for September to December. If begun in September and continued through the Winter Solstice (about December 22), the graph should show the gradual decrease in the number of daylight hours (in the Northern hemisphere) with the minimum at the Winter Solstice. It would be interesting to include either of the equinoxes on the graph as well.

Data chart

Month	Average sunlight hours	Average high temperature
Jan	4	3
Feb	6	5
March	6	12
April	8	18
May	9	23
June	11	28
July	11	32
Aug	10	31
Sept	9	27
Oct	8	20
Nov	6	12
Dec	5	5

NAME: _____

(TITLE)

(DEPENDENT VARIABLE)

(INDEPENDENT VARIABLE)

NAME: _____

(TITLE)

(DEPENDENT VARIABLE)

(INDEPENDENT VARIABLE)

WEEK ELEVEN:

Climate and weather

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Access to newspaper, tv or internet for weather data
Cup or bowl
Food coloring
Water
Measuring tape or ruler
Drinking straw
Clock with second hand

You and your child(ren) will be covering the following Science Standards this week:

Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.

Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Definitions:

Climate	the normal weather for an area over a long period of time (like 30 years!)
Weather	our day-to-day patterns of temperature, wind, precipitation, etc.
Air pressure	weight of the air pressing down on the earth
High air pressure	areas where there is much more air crammed into a small part of the atmosphere
Low air pressure	areas where there is very little air crammed into a small part of the atmosphere
Wind	air in motion; affected by differences in air pressure as air moves from high pressure areas to low pressure areas
Coriolis effect	the curving motion of our wind around the Earth as it rotates on its axis

Sample Questions to ask after your child finishes their reading for Day One:

Do the oceans absorb energy easier than the solid ground?

No; water reflects radiation from the sun much easier than the solid ground. This is why bodies of water take longer to warm up than the ground.

What is the #1 reason for our weather?

The uneven heating of the earth causes our weather.

What is the difference between climate and weather?

Climate is the collection of day-to-day weather data over a period of at least 30 years.

What causes the wind to move in our atmosphere?

The movement of air from high to low pressure areas and the Coriolis Effect cause our wind pattern.

Answers to Worksheet Questions for Day One:

Page One:

3-air pressure
1-climate
7-coriolis effect
5-high air pressure
4-low air pressure
2-weather
6-wind

Page Two:

ACROSS
1 -high air pressure
3 -low air pressure
5 -weather
6 -coriolis effect

DOWN
2 -air pressure
4 -climate
5 -wind

Page Three:

Area #1 should be labeled "equator" because the average climate temperature is much higher than that of Area #2.

Area #2 should be labeled "North pole" as the average temperature is much lower!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Weather or not... Here it comes!"

The following list will give you the most important items to review for your activity today!

The entire science of meteorology rests on huge amounts of data that is collected about the weather.

It is extremely important to take accurate measurements for scientists to study in the future! Graphing data sometimes helps scientists to see patterns in weather that may have been overlooked.

Weather or not… Here it comes!

Children will record the daily weather changes in their area to make predictions about the future.

Materials:

Access to newspaper, tv or internet for weather data
Record log (provided)

Activity:

1) Obtain three days worth of weather data including: temperature, wind direction, wind speed, air pressure, humidity and precipitation
2) You can retrieve this information from the newspaper, television news stations or on the internet (www.weather.com is very good!)
3) Record all of this information on the record log.
4) Use the following chart to make a forecast for the weather. You may choose to provide a one-, three- or five-day forecast. Continue to record your data until your forecast time has expired and see if your predictions were correct.

Basic rules for forecasting the weather

Look for the weather to become cloudy and wet when:
The temperature rises quickly or is very warm in the evening.
Air pressure falls quickly.
The wind shifts from the south or the east.

Look for steady rainfall/snow when;
The wind is coming from the south, southeast or northeast, and the air pressure is falling.

Look for clearing weather when:
The temperature falls quickly, especially in the afternoon.
The air pressure rises.
The wind shifts from a westerly or northwesterly direction.

Look for continued bright weather when:
The air temperature is normal.
The air pressure remains steady or rises.
A light breeze blows from the west or northwest.

Look for colder weather when:
Air pressure is falling quickly and the wind is east or northeast.
The wind swings from the southwest to the west or from the west to the northwest or north.

Look for warmer weather when:
Air pressure falls.
The wind swings from the north or west to the southwest or south

Quick Reference

Wind direction	Air pressure	Resulting weather
West	Low and rising	Clearing and cooler
East to North	Low and falling	Strong wind and rain
East to Northeast	High and falling	Strong wind and rain
East to Northeast	High and falling	Rain within a day
South to Southeast	Low and falling	Storm
South to Southeast	High and falling	Rain within a day
South to Southeast	High and falling	Rain, high winds soon
South to Southwest	Low and rising	Fair weather soon
Southwest to Northwest	High and steady	More fair weather
Southwest to Northwest	High and falling	Rain in a day or two
Southwest to Northwest	High and falling	Temperature rising
Southeast to Northeast	High and falling	High wind and rain
Southeast to Northeast	Low and falling	High wind and rain
Southeast to Northeast	Low and falling	More rain
Southeast to east	High and falling	Rain within a day

Explanation:

A great deal of time and energy has been used up in the pursuit of forecasting the weather. Unfortunately, it is still not 100% accurate!!! Nevertheless, the entire science of meteorology rests on huge amounts of data that is collected about the weather. These general hints are intended to give the child a basic look at some of the rules a meteorologist uses in forecasting the weather.

Weather record log

Date and time				
Temperature				
Wind direction				
Wind speed				
Air pressure				
Humidity				
Precipitation				
Forecast				

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Look! Up in the sky!"

The following will give you the most important items to review for your activity today!

Scientists study the movement of air within the atmosphere by tracking the presence of trace gases.

A trace gas is one that is not found in great amounts within the atmosphere. Methane is usually the trace gas that meteorologists use to track movements in our atmosphere.

ESP Activity: Look! Up in the sky!

Students will simulate air movements through our atmosphere.

Materials:

Cup or bowl
Food coloring
Water
Measuring tape or ruler
Drinking straw
Clock with second hand

Activity:

1) With the measuring tape, record the distance from the center of the cup/bowl to the edge of the water.
2) Fill a cup or bowl three-quarters full and stir it with the drinking straw making certain to travel around the cup/bowl ONCE every second for at least 20 seconds.
3) Place one drop of food coloring on the edge of the water's surface in the cup and record the amount of time it takes for the coloring to travel completely around the bowl. You may need to look at the water from above for accuracy.
4) For experimentation, slow down the speed by which you stir the water.

Explanation:

Scientists study the movement of air within the atmosphere by tracking the presence of trace gases. In this simulation, the water represents the atmosphere and the food coloring represents a trace gas (such as methane.) To calculate the velocity of the food coloring, you would multiply the radius (the number you found in step #1) by 6.28. You would then divide this number by the amount of seconds it took for the food coloring to travel around the cup. This number is the velocity of your food coloring. Meteorologists use this same formula to determine how fast clouds, winds and storms are traveling in the atmosphere!

Independent variable: Speed of stirring
Dependent variable: Time for a complete revolution
Hypothesis:

If the SPEED OF STIRRING is (increased/decreased), then the TIME FOR A COMPLETE REVOLUTION will (increase/decrease).

WEEK TWELVE:

Water

In looking at a drop of water under a microscope, we find there are twice as many H's as O's.

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

A hotplate or electric stove
One empty soda can
Water
Large plastic bowl filled with cold water
Tongs
gloves
Thermometer
Cotton balls
Rubber band
Water
Rubbing alcohol

You and your child(ren) will be covering the following Science Standards this week:

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor.

Definitions:

States of matter	different forms of matter; a solid, liquid or gas
Water vapor (steam)	the gaseous state of matter for water
H_2O	the chemical formula for water
Atom	smallest part of everything in the world
Molecule	("maul-ee-koo-el"); two or more atoms joined together
Freezing	ability of molecules to stick to each other to turn a liquid into a solid by removing heat
Melting	the ability to make molecules slide around each other to make a fluid from a solid by adding heat
Evaporation	("ee-vap-or-a-shun"); the complete separation of molecules from each other from a liquid into a gas
Condensation	("con-den-sa-shun"); the ability to turn a gas into a liquid by removing heat

Sample Questions to ask after your child finishes their reading for Day One:

When ice turns into water vapor, what states of matter does it pass through?

Solid to liquid to gas.

What is the difference between an atom and a molecule?

A molecule is made up of two or more atoms.

When molecules are sliding around each other, what state of matter are they most likely in?

Liquid

What is the reverse of evaporation (liquid to gas)?

Condensation; gas to lquid

Answers to Worksheet Questions for Day One:

Page One:

4-atom

9-condensation

8-evaporation

6-freezing

3-H_2O

7-melting

5-molecule

1-states of matter

2-water vapor (steam)

Page Two:

1) B
2) B
3) A
4) A
5) B
6) C

Page Three:

Answers may vary. Be certain to check your child's work!

Unit Three Review Answer Key

1) States of matter
2) water vapor (steam)
3) H_2O
4) Atom
5) molecule
6) freezing
7) Melting
8) evaporation
9) condensation
10) climate
11) weather
12) air pressure
13) high air pressure
14) low air pressure
15) wind
16) Coriolis effect
17) season
18) summer solstice
19) winter solstice
20) energy
21) work
22) meteorologists
23) radiation
24) conduction
25) convection
26) atmosphere
27) convection currents

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Energy in the Air"

The following list will give you the most important items to review for your activity today!

The weight of air is very impressive, over 14 pounds per square inch! That means on every square inch of your body you have the equivalent of a bowling ball pushing down on you!

It is very easy to manipulate objects in our life to see the effects of air pressure: airplanes, vacuum cleaners and drinking straws all use air pressure in order to do work!

Energy in the Air

Children will witness the massive power of our atmosphere.

Materials:

A hotplate or electric stove
One empty soda can
Water
Gloves
Large plastic bowl filled with cold water
Tongs

Warning: children should not perform this activity as it requires the boiling of water on a stove or hotplate. Parents should do this demonstration for the students to observe only! Be very careful!

Activity:

1) Rinse out the soda can and fill the bowl with cold water.
2) Place about a tablespoon of water into the empty can and place it onto the hotplate/stove. Heat the can until you see steam coming out of the hole. One you see the steam, allow the water to boil for one more minute.
3) While wearing gloves, get a very good grip on the can with the tongs. It may help to hold onto the can with the tongs so that your hand is facing up... this is because, in one quick motion, you are going to turn the can upside down and place the top of the can (the side with the opening!) into the water. Be careful not to dump any hot water on yourself!
4) Within moments, the can will implode on itself and become crushed!

Explanation:

When you boiled the water in the can, it changed states from a liquid to water vapor. This gas pushed the air that was originally inside the can out through the hole. When the can was turned upside down and placed in the water, the water vapor condensed and turned back into water. Remember...

Water molecules in the liquid state are much closer together than molecules in the gas state. Since you boiled most of the molecules out of the can, there were not as many left over when you trapped the opening of the can under cold water! Because there were not as many molecules inside the can, you lowered the air pressure inside the can!

Once the water vapor began to condense back into a liquid, there was not as much pressure inside the can as there was outside the can. So... the pressure of the air pushing from the outside of the can was large enough to crush it.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Energized Storms"

The following will give you the most important items to review for your activity today!

Within our oceans, heat energy is absorbed by water molecules as they evaporate from the ocean. This energy is stored in the large mass of water vapor until it freezes in the upper atmosphere. At this time, the heat energy is released, causing the surrounding air to become warmer, less dense and to rise. This rising air mass decreases the air pressure in the same area which causes wind speeds to increase and a stronger storm to be created.

ESP Activity: Energized Storms

Children will explore how a storm gets its "energy".

Materials:

Thermometer
Cotton balls
Rubber band
Water
Rubbing alcohol

Activity:

1) Rubber band a cotton ball onto the bulb of the thermometer.
2) Place the thermometer on a flat surface and record the temperature every minute for ten minutes.
3) Wet the cotton ball with rubbing alcohol and record the temperature every minute for ten minutes.
4) For experimentation, dilute the rubbing alcohol with water.

Explanation:

As molecules evaporate from the cotton ball, heat is carried away by the evaporating liquid. Since alcohol evaporates faster than water, the thermometer that contains the most alcohol will have more heat carried away. It is this thermometer that should record the coolest temperature. This process occurs within our oceans as heat energy is absorbed by water molecules as they evaporate from the ocean. This energy is stored in the large mass of water vapor until it freezes in the upper atmosphere. At this time, the heat energy is released, causing the surrounding air to become warmer, less dense and to rise. This rising air mass decreases the air pressure in the same area which causes wind speeds to increase and a stronger storm to be created.

Independent variable: Concentration of alcohol
Dependent variable: Temperature
Hypothesis:

If the CONCENTRATION OF ALCOHOL is (increased/decreased), then the TEMPERATURE will (increase/decrease).

Unit Three Test

Match the words in the first column to the best available answer in the second column

____ **air pressure**	1) the normal weather for an area over a long period of time
____ **atmosphere**	2) our day-to-day patterns of temperature, wind, precipitation, etc.
____ **atom**	3) weight of the air pressing down on the Earth
____ **climate**	4) areas where there is much more air crammed into a small part of the atmosphere
____ **condensation**	5) areas where there is very little air crammed into a small part of the atmosphere
____ **conduction**	6) air in motion
____ **convection currents**	7) the curving motion of our wind around the Earth as it rotates on its axis
____ **convection**	8) one of four parts of the year that have (roughly) the same temperature and amount of daylight and nighttime
____ **Coriolis effect**	9) the day of the year in the Northern Hemisphere where we receive the most light in one day
____ **energy**	10) the day of the year in the Northern Hemisphere where we receive the least amount of light in one day
____ **evaporation**	11) the ability to do work
____ **freezing**	12) pushing or pulling something to make it move
____ **H_2O**	13) scientists who study how the sun warms the Earth which causes our weather

___ **high air pressure**	14) the main transfer of heat from the sun to the Earth
___ **low air pressure**	15) the transfer of heat between two objects that are touching
___ **melting**	16) the transfer of heat through a gas or liquid that is in motion
___ **meteorologists**	17) all the gases that make up our air
___ **molecule**	18) areas of warm air rising from the surface of the Earth
___ **radiation**	19) different forms of matter; a solid, liquid or gas
___ **season**	20) the gaseous state of matter for water
___ **states of matter**	21) the chemical formula for water
___ **summer solstice**	22) smallest part of everything in the world
___ **water vapor/steam**	23) two or more atoms joined together
___ **weather**	24) ability of molecules to stick to each other to turn a liquid into a solid by removing heat
___ **wind**	25) the ability to make molecules slide around each other to make a fluid from a solid by adding heat
___ **winter solstice**	26) the complete separation of molecules from each other from a liquid into a gas
___ **work**	27) the ability to turn a gas into a liquid by removing heat

Describe what happens to water as it passes through all three states of matter. Be certain to include the following words in your description:

Radiation

Conduction

Convection

Fill in the blank with the correct answer from the list below.

If water goes through these actions:	The water will change from:
Freezing	1)
Melting	2)
Evaporation	3)
Condensation	4)

Liquid to Solid **Solid to Liquid**

Gas to Liquid **Liquid to Gas**

Unit Three Test Answer Key

Page One

3-air pressure
17-atmosphere
22-atom
1-climate
27-condensation
15-conduction
18-convection currents
16-convection
7-Coriolis effect
11-energy
26-evaporation
24-freezing
21-H_2O
4-high air pressure
5-low air pressure
25-melting
13-meteorologists
23-molecule
14-radiation
8-season
19-states of matter
9-summer solstice
20-water vapor/steam
2-weather
6-wind
10-winter solstice
12-work

Page Two

Answers will vary; however, the child should be able to describe all three changes in the states of matter of water (ice to liquid, liquid to gas).

In addition, the child may state that radiation from the sun can be used to turn ice into liquid or liquid into gas. Conduction can influence a change in state if a warm object is touching ice or liquid water. In terms of convection, warm air rising from the earth can melt ice and snow from a solid to a liquid.

Page Three

1) Liquid to solid
2) Solid to liquid
3) Liquid to gas
4) Gas to liquid

WEEK 13:

Water in the Environment

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Raw egg
Container filled with water
Salt
Spoon

You and your child(ren) will be covering the following Science Standards this week:

Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.

Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Definitions:

Humidity	amount of water vapor in the air
Precipitation	falling droplets of liquid water or frozen ice
Water cycle	pattern in which water travels throughout the environment
Greenhouse gas	a gas that is able to absorb and reflect some of the heat that is given off from the earth
Greenhouse effect	The ability of greenhouse gases like water vapor to absorb and reflect heat from earth

Sample Questions to ask after your child finishes their reading for Day One:

What are different types of precipitation?

Rain, snow, sleet and hail are all examples of precipitation.

Why is water vapor so important to our survival?

Water vapor is a greenhouse gas which traps heat within our atmosphere. Without water vapor, life would cease to exist on earth.

How does the water cycle work?

Liquid Water on the earth evaporates into water vapor and floats in the air.
Water vapor condenses into liquid water or freezes into ice while floating in the air.
Liquid water or pieces of ice get too heavy and fall to earth (precipitation).
And the cycle continues again...

How is our atmosphere not like a greenhouse?

Greenhouse gases in our atmosphere allow heat to escape in all directions, including space. This does not happen within a greenhouse as the glass panels trap the heat within the building.

Answers to Worksheet Questions for Day One:

Page One:

5- greenhouse effect

4- greenhouse gas

1- humidity

2- precipitation

3- water cycle

Page Two:

Answers will vary. Be certain your child draws a picture which includes the following topics: evaporation, condensation and precipitation

Page Three:

Answers will vary. Be certain your child states something similar to the following text:

In a greenhouse, the sun's radiation is allowed to enter the building through its glass walls. Objects inside a greenhouse are warmed and start to heat the air through conduction. As large amounts of warmed air start to rise by convection, the heat is trapped by the glass walls! In a greenhouse, heat cannot escape.

This does not happen in the atmosphere!
Our planet is not covered in glass walls!

Heat is allowed to escape into space because our greenhouse gases, like water vapor, absorb and reflect heat in all directions!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Egg-citing Activity"

The following list will give you the most important items to review for your activity today!

The topic of density is a concept which is universal throughout all branches of science. By adding more salt into the water, the solution becomes denser, thereby allowing the egg to float once its density is greater than that of the egg.

By definition, "density" means "the amount of matter occupied by an object in relationship to its size"; therefore, the volume of the water did not increase, but the amount of matter dissolved into it did! So, as the amount of matter increased inside the water, so did its density!

ESP Activity: "Egg-citing" activity

Children will determine how an egg can float in water.

Materials:

Raw egg
Container filled with water
Salt
Spoon

Activity:

1) Fill the container with water.
2) Gently place one raw egg into the container. Record whether or not the egg floats.
3) Remove the egg from the container and fill it once again with water.
4) Stir a generous amount of salt into the water, making certain to record the actual amount. (When the salt does not dissolve any more, you have enough salt in the water!)
5) Gently place the egg into the water. Record whether or not the egg will float.
6) For experimentation, determine the amount of salt required to float the egg.

Explanation:

The raw egg is denser than the water; therefore, it will sink. However, when you add salt to the water, it increases the water's density. The egg will float in the salt water because it is now less dense than the salt water. The amount of salt within our oceans varies depending upon geographical location; however, on average you would find the amount of salt within oceans to be between 3.3% and 3.7%. For those of you who are not afraid of a little math….would your egg float in the ocean?

Independent variable: Amount of salt

Dependent variable: Ability of the egg to float

Hypothesis:

If the amount of salt is (increased/decreased), then the ability of the egg to float will (increase/decrease).

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Walking through the Water Cycle"

The following will give you the most important items to review for your activity today!

The path of water through the environment does not ever follow a simple pattern. There are millions of possibilities for every water droplet to pass through.

Walking through the Water Cycle

Children will describe the movement of water within the water cycle with this activity.

Materials:

One set of water cycle posters (provided)

9 cubes (patterns provided)

Water cycle table (provided)

Activity:

1) Place the nine water cycle posters and their cubes in different areas around your home.
2) The child will need to pick one of the nine stations and write down the name of the station (Clouds, Plants, Animals, Rivers, Oceans, lakes, Ground Water, Soil, or Glaciers) on their paper.
3) The child will then roll the die and proceed to the station number that it signifies. If the child rolls the station number that he/she is currently at, they are to write down the name of that station once again.
4) In essence, a roll of the die determines where water will travel during this journey. Have the child roll a total of ten dice and record their path. Then, have them start over at the same station and go through another ten steps. It is unlikely that the child will record the same path!
5) After going through two complete journeys, provide the water cycle table (provided) and instruct the child to write their journey through the environment. Have them identify any cycles they may have encountered.

Explanation:

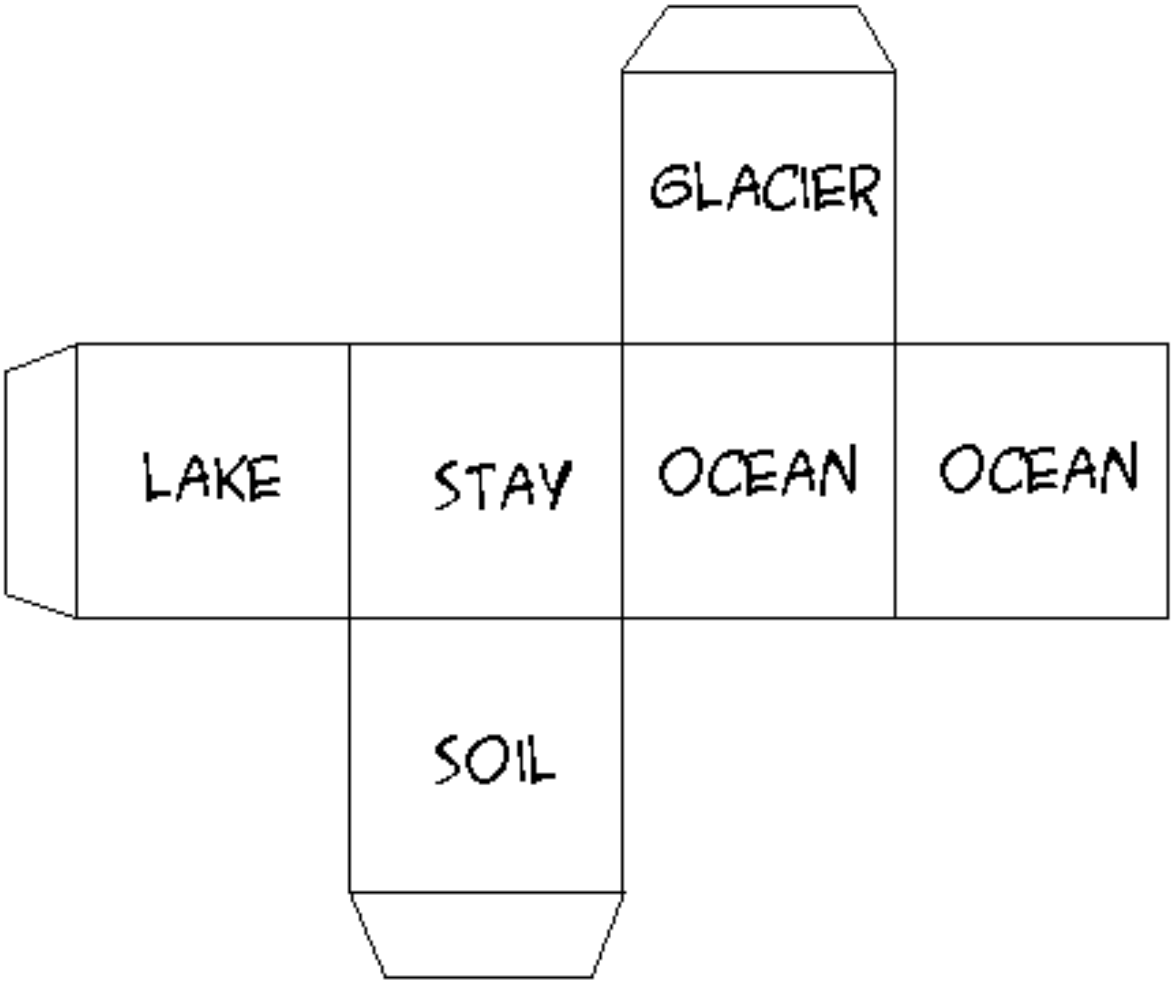
The path of water throughout the environment is variable. While changing between solid, liquid and gaseous forms, water moves through the earth, the atmosphere and living creatures. Without water, life would not exist.

Water Cycle Table

STATION	DIE SIDE LABELS	EXPLANATION
Soil	one side *plant*	Water is absorbed by plant roots.
	one side *river*	The soil is saturated, so water runs off into a river.
	one side *ground water*	Water is pulled by gravity; it filters into the soil.
	two sides *clouds*	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	one side *stay*	Water remains on the surface (perhaps in a puddle, or adhering to a soil particle).
Plant	four sides *clouds*	Water leaves the plant through the process of transpiration.
	two sides *stay*	Water is used by the plant and stays in the cells.
River	one side *lake*	Water flows into a lake.
	one side *ground water*	Water is pulled by gravity; it filters into the soil.
	one side *ocean*	Water flows into the ocean.
	one side *animal*	An animal drinks water.
	one side *clouds*	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	one side *stay*	Water remains in the current of the river.
Clouds	one side *soil*	Water condenses and falls on soil.
	one side *glacier*	Water condenses and falls as snow onto a glacier.
	one side *lake*	Water condenses and falls into a lake.
	two sides *ocean*	Water condenses and falls into the ocean.
	one side *stay*	Water remains as a water droplet clinging to a dust particle.
Ocean	two sides *clouds*	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	four sides *stay*	Water remains in the ocean.
Lake	one side *ground water*	Water is pulled by gravity; it filters into the soil.
	one side *animal*	An animal drinks water.
	one side *river*	Water flows into a river.
	one side *clouds*	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	two sides *stay*	Water remains within the lake or estuary.
Animal	two sides *soil*	Water is excreted through feces and urine.
	three sides *clouds*	Water is respired or evaporated from the body.
	one side *stay*	Water is incorporated into the body.
Ground Water	one side *river*	Water filters into a river.
	two sides *lake*	Water filters into a lake.
	three sides *stay*	Water stays underground.
Glacier	one side *ground water*	Ice melts and water filters into the ground.
	one side *clouds*	Ice evaporates and water goes to the clouds (sublimation).
	one side *river*	Ice melts and water flows into a river.
	three sides *stay*	Ice stays frozen in the glacier.

CLOUDS

CUT OUT THE PATTERN BELOW



PLANTS

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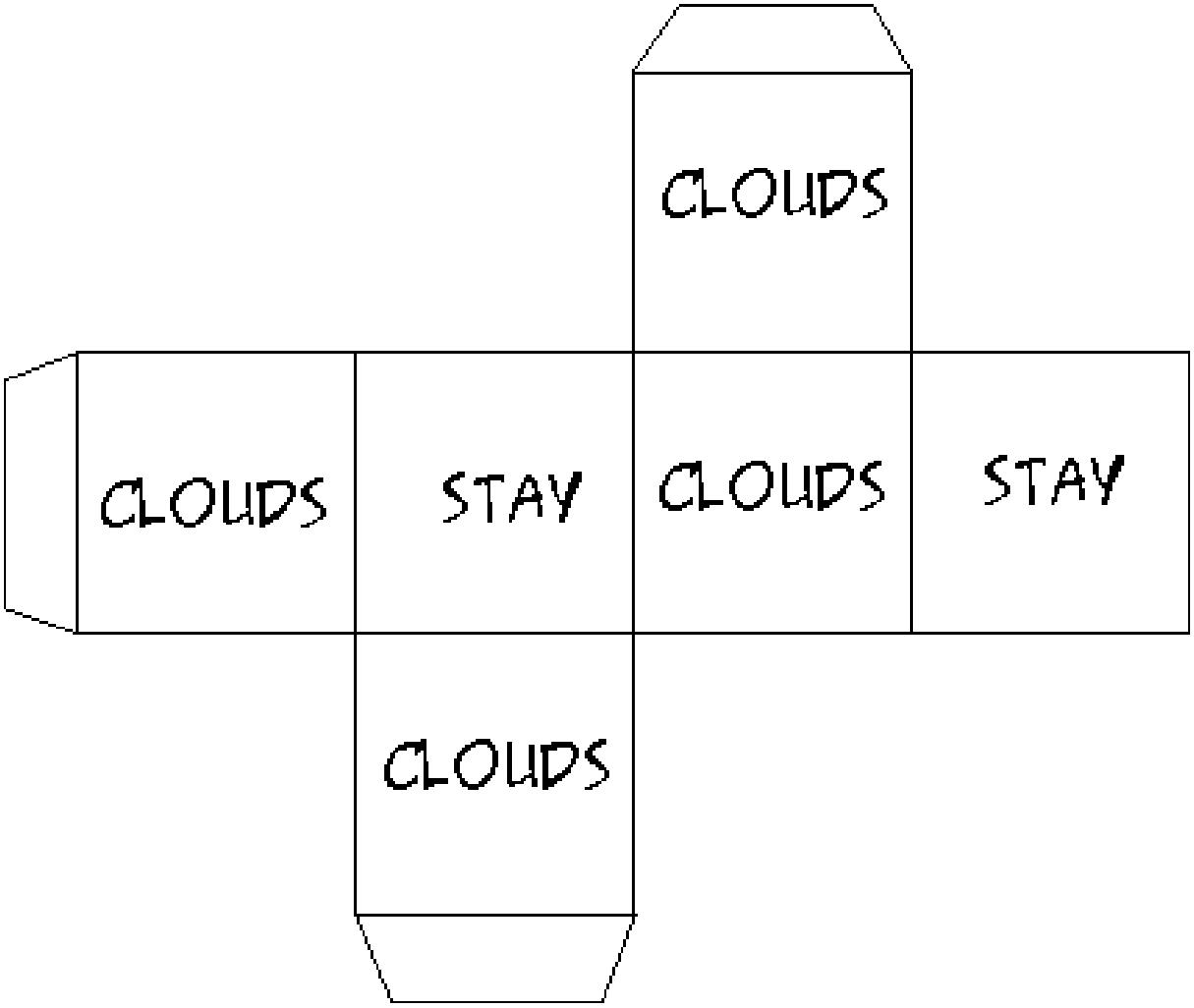

ANIMALS

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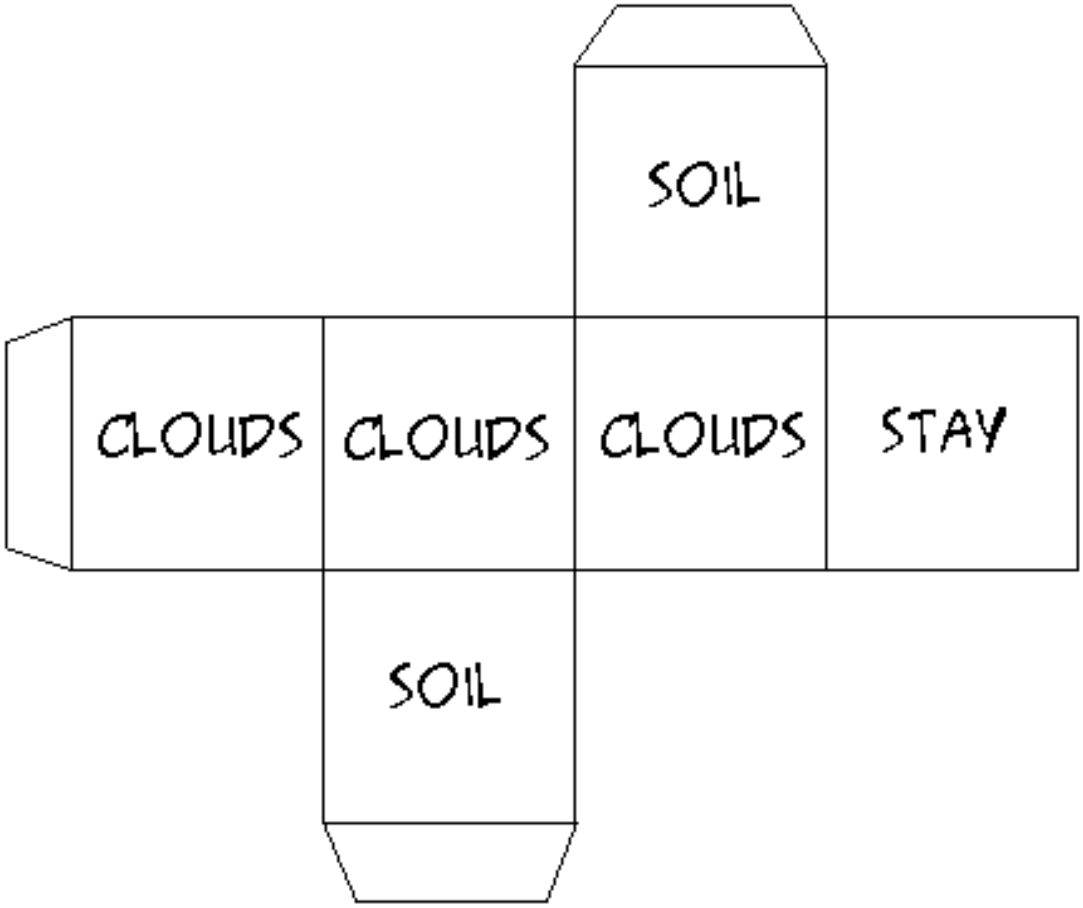

RIVERS

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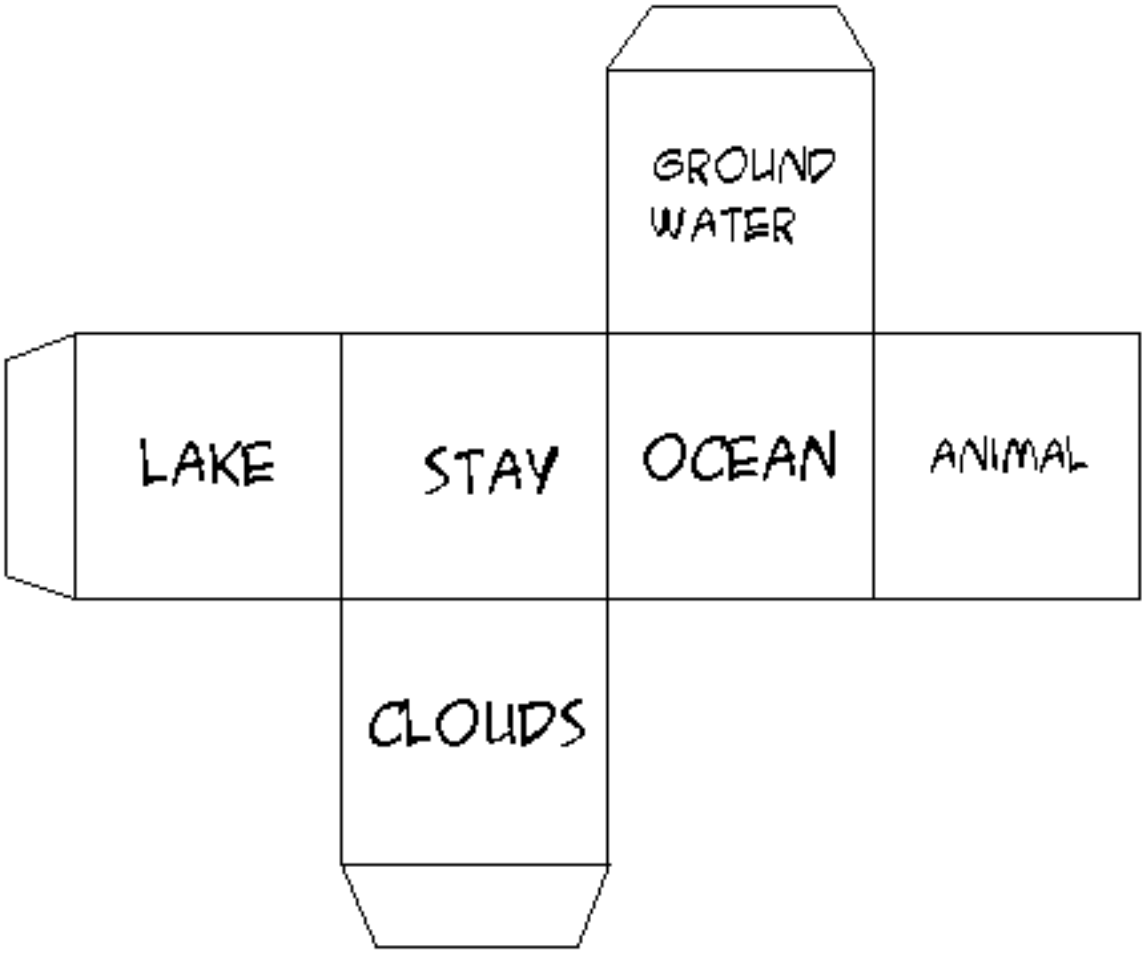

OCEANS

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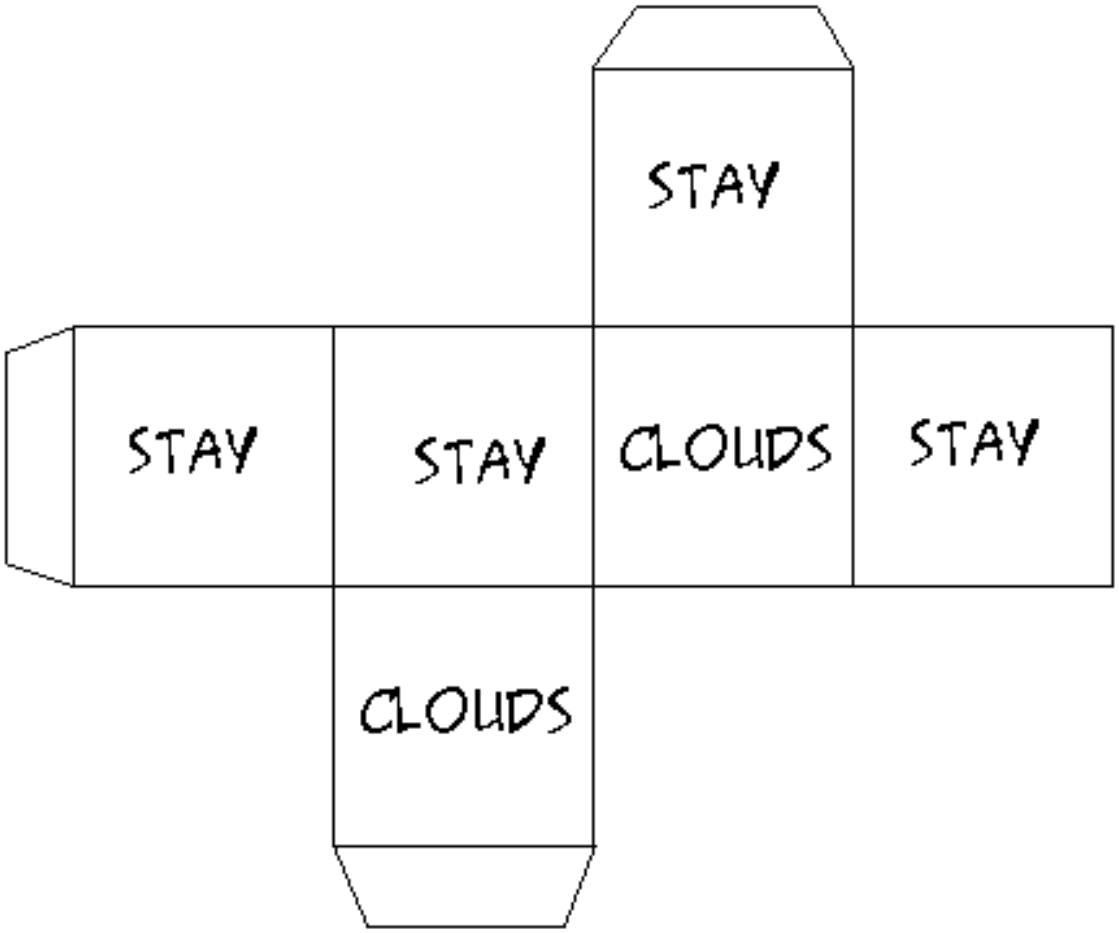
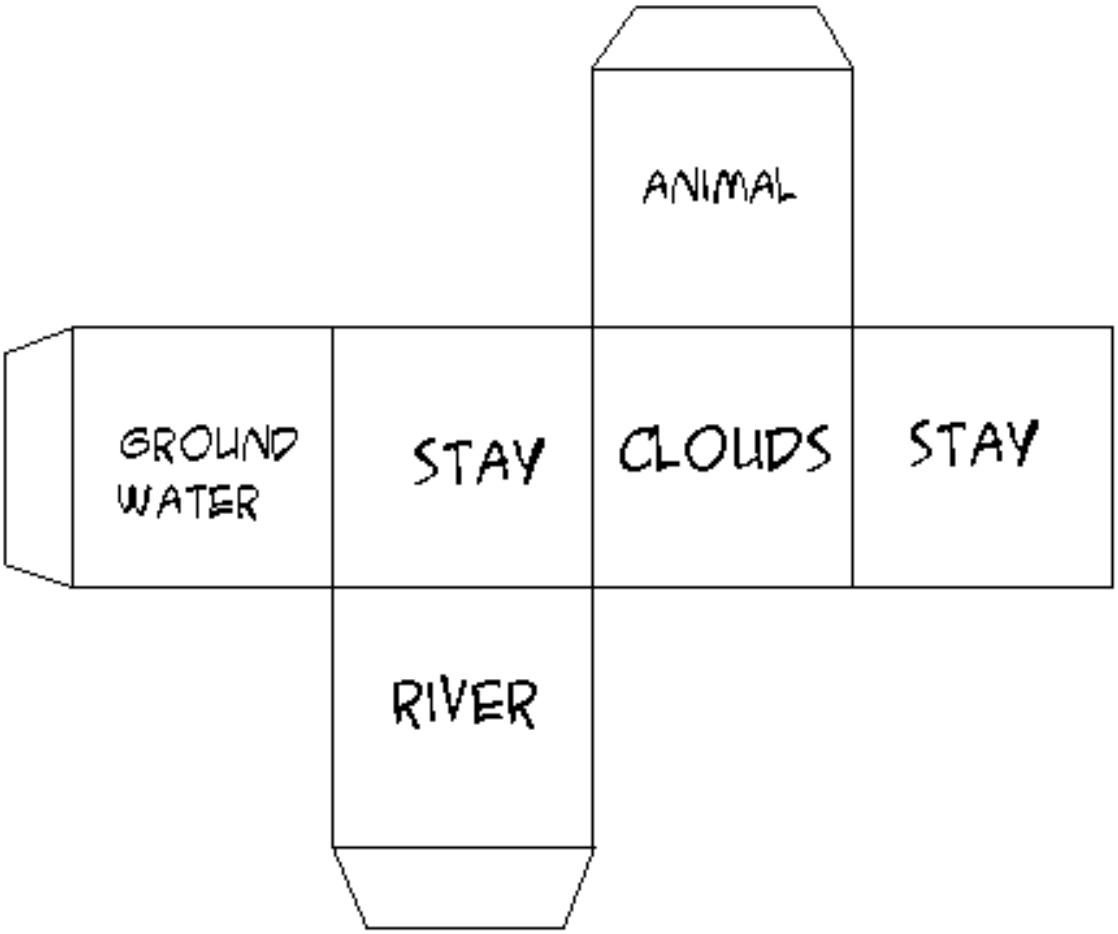


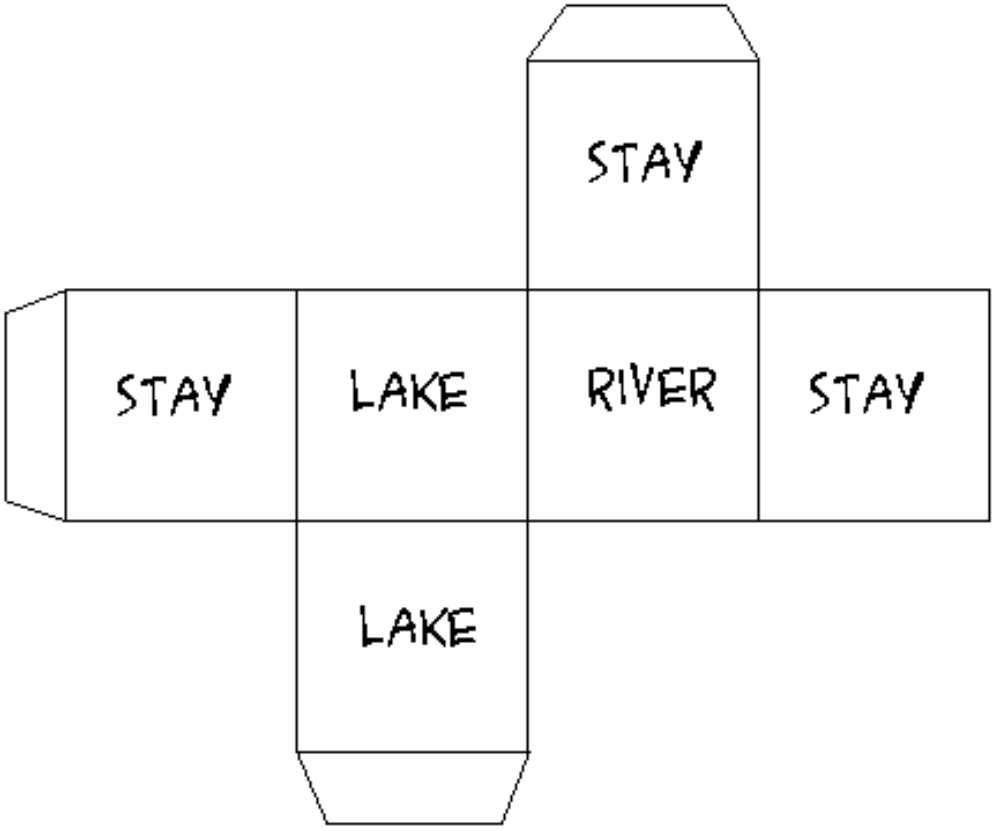
LAKES

CUT OUT THE PATTERN BELOW



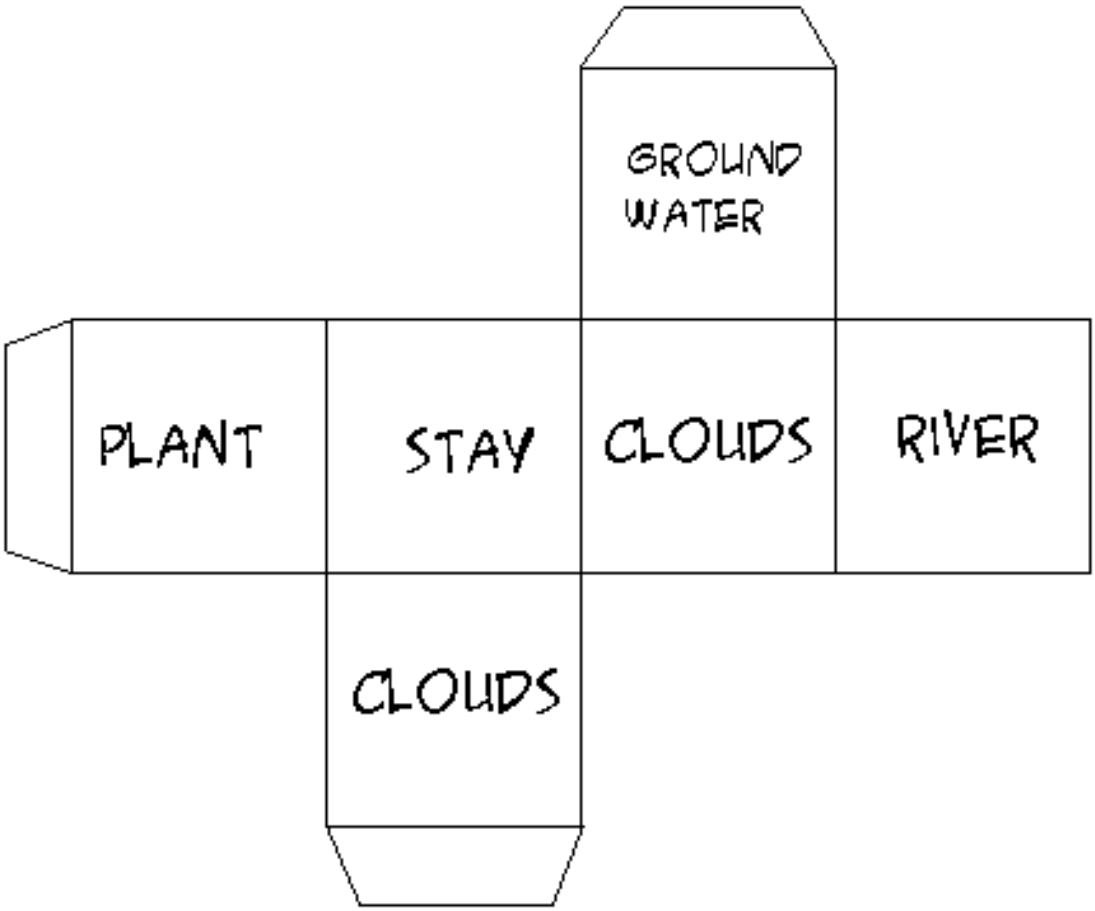
GROUND WATER

CUT OUT THE PATTERN BELOW



SOIL

CUT OUT THE PATTERN BELOW



GLACIERS

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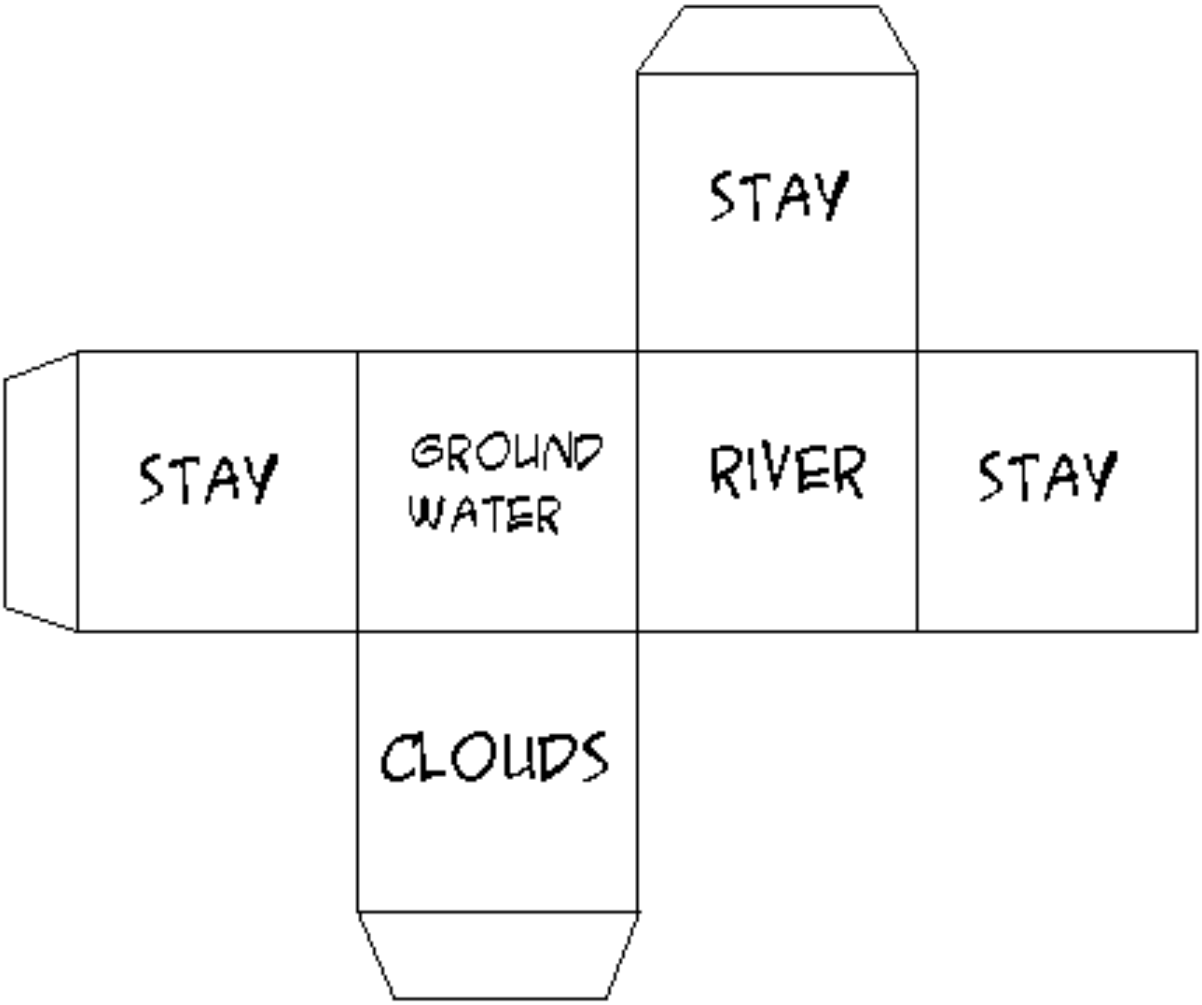
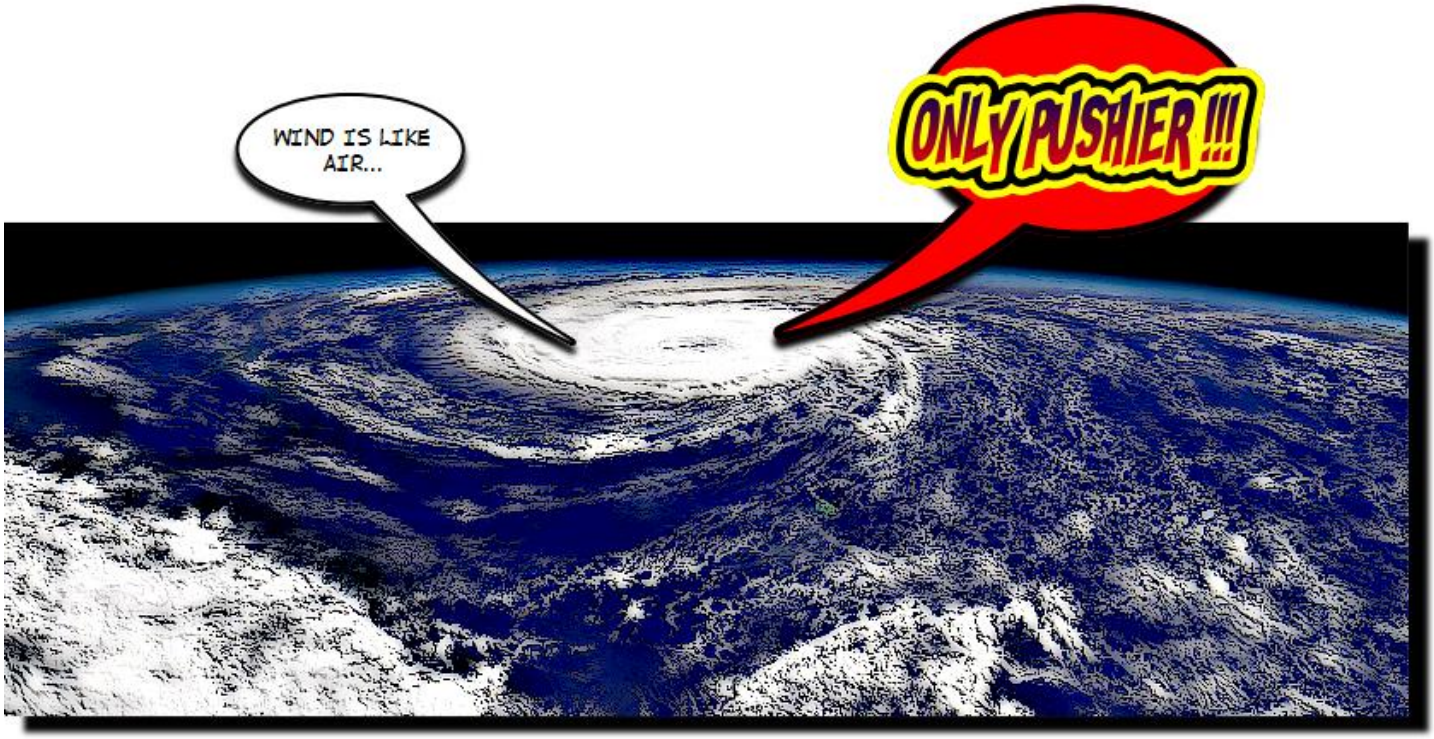


WEEK 14: Clouds



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Large clear jar
Wire screening, fine kitchen strainers, or cheesecloth
Ice cubes
Hot water

Empty 2 liter bottle
Matches
Water
Measuring spoons
Dark colored paper, wall, sheet, etc.

You and your child(ren) will be covering the following Science Standards this week:

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Clouds, formed by the condensation of water vapor, affect weather and climate.

Definitions:

Clouds	a visible collection of tiny water droplets or frozen ice pieces floating in the air
Dewpoint	the temperature in which a gas is able to condense
Condensation nuclei	("kon-den-sa-shun nuke-lee-eye"); tiny particles of dust, dirt, smoke, etc. that allow water vapor to hold onto before it can condense to form a cloud
Ceiling	("see-ling"); the distance between the earth and the bottom of a cloud
High clouds	clouds with ceilings that are at least 20,000 feet
Middle clouds	clouds with ceilings between 6,500 and 20,000 feet
Low clouds	clouds with ceilings under 6,500 feet
Cirrus	clouds that are very high, thin and see-through
Cumulus	Clouds that have flat bottoms and large, puffy shapes (almost like cotton balls)
Stratus	clouds that are long, flat and seem to fill up the sky like a large sheet
Fog	a cloud that forms near the ground as the air temperature at the surface cools to the dewpoint temperature
Burn off	when the heat from the sun causes the top of a batch of fog to evaporate
Dew	condensed water on objects on the surface of the earth whose temperature has reached the dewpoint temperature
Deposition	the change of state of a gas directly into a solid; frost is a product of deposition which occurs when the dewpoint falls below the freezing point of water

Sample Questions to ask after your child finishes their reading for Day One:

Why do clouds look so different?

The height and the shape of the clouds cause them to look different from each other.

How is fog formed?

When the air temperature near the ground reaches the dewpoint temperature, fog can be formed.

How is dew formed?

Much like fog, dew is formed when objects on the surface of the earth reach the dewpoint temperature. When this happens, water can condense onto these objects.

What is frost?

Frost takes place when the dewpoint falls below freezing. This causes water vapor to go through deposition (converting from gas straight into a solid)

Answers to Worksheet Questions for Day One:

Page One:

12-burn off
4-ceiling
8-cirrus
1-clouds
3-condensation nuclei
9-cumulus
14-deposition
13-dew
2-dewpoint
11-fog
5-high clouds
7-low clouds
6-middle clouds
10-stratus

Page Two:

ACROSS

1 cumulus
4 deposition
6 Fog
7 High clouds
9 ceiling
11 Low clouds
12 stratus

DOWN

1 Condensation nuclei
2 Burn off
3 cirrus
5 Middle clouds
8 dewpoint
10 dew

Page Three:

Answers will vary. Be certain your child states something similar to the following text:

in order for water vapor to condense, you need something for the gas to hold onto (condensation nuclei). But condensation nuclei are not only found in the air... sometimes, when the temperature of objects on the surface of the earth (like grass, trees and buildings) fall below the dew point, water vapor can condense on these objects too! When water vapor touches these cooled objects, they have something to hold onto and start condensing into a liquid!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Foggy Situation"

The following list will give you the most important items to review for your activity today!

When the air temperature at the surface cools to the dewpoint temperature, it is possible for a cloud to form near the ground. This is known as fog. Most of the time, fog is formed at night or early mornings when the air is cooling.

A Foggy Situation

Children will create fog in their own homes!

Materials:

Large clear jar
Wire screening (wire strainers work well... as does cheesecloth and a rubberband)
Ice cubes
Hot water

Activity:

1) Fill a large clear jar about 1/3 full of hot water.
2) Place the wire screen or strainer over the opening. If you must use cheesecloth, secure it to the bottle with the rubber band.
3) Place 5-6 ice cubes on the screen and observe.
4) Fog will form inside the jar.

Explanation:

Fog can form anywhere and at anytime if the weather conditions are right. For fog to occur, warm water must evaporate underneath a cool air mass. This cool air cause the warm moist air to condense again into a liquid... these small droplets of liquid water is what we call fog!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Cloud Recipe"

The following will give you the most important items to review for your activity today!

Clouds form when warm air rises into the atmosphere and cool or condense. While the warm air cools it condenses into liquid or ice. For this to occur however, the water vapor within the warm air must have something to hold onto in order to condense

ESP Activity: Cloud recipe

Children will create a cloud within a bottle.

Materials:

Empty 2 liter bottle
Matches
Water
Measuring spoons
Dark colored paper, wall, sheet, etc.

Caution: Be certain to have an adult assist you with the use of matches! Safety first!

Activity:

1) Pour 1 Tbs of cold water into the 2 liter bottle, cap it and shake for one minute.
2) Light a match, blow it out and quickly drop it into the bottle. Make certain to fasten the cap onto the bottle quickly.
3) Hold the bottle against a dark colored background and squeeze. A cloud may appear to form within the bottle. Record what you observe.
4) Increase the temperature of the water for experimentation. When recording your data, look for the temperature that creates the most observable cloud.

Explanation:

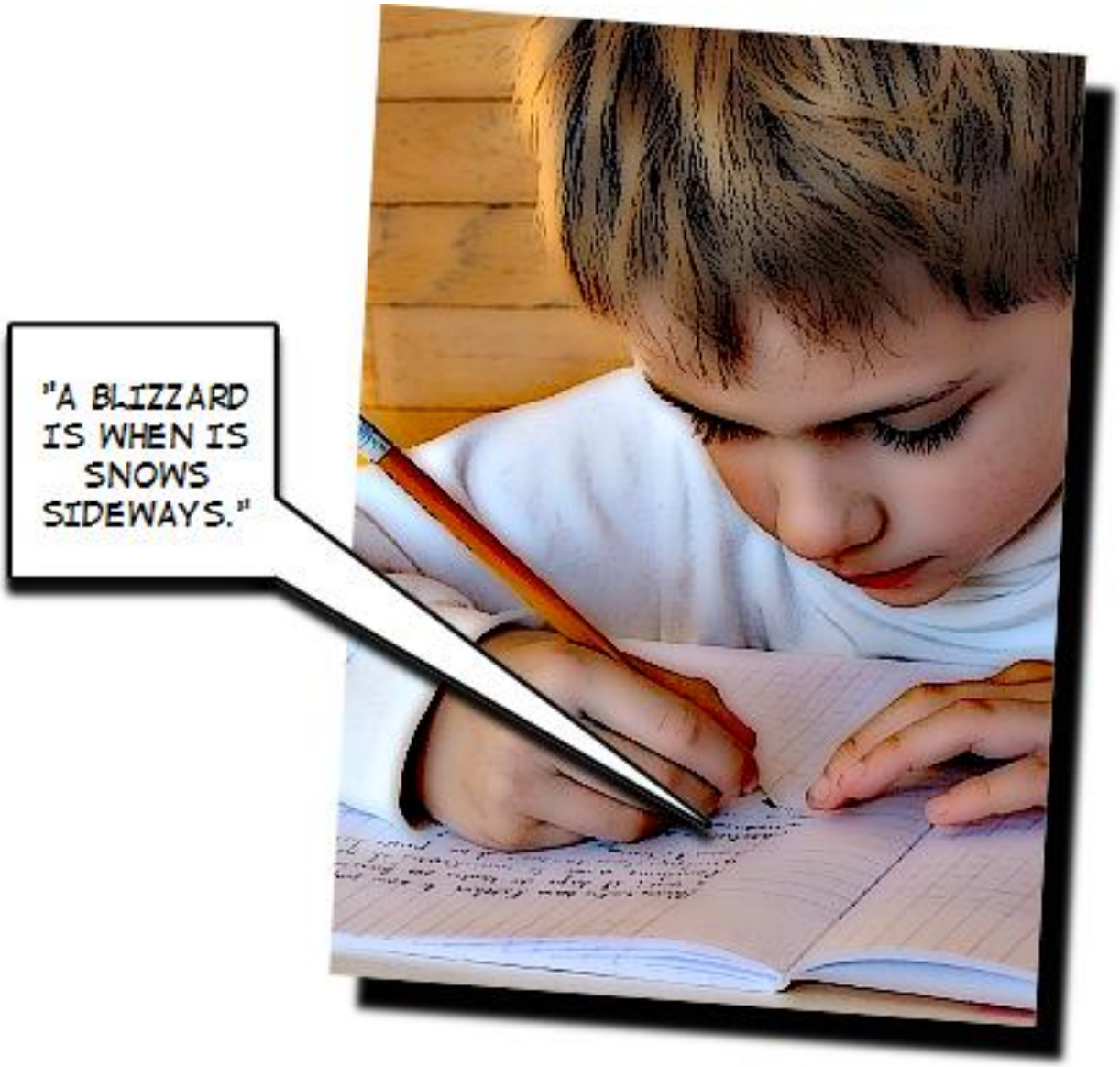
Clouds form when warm air rises into the atmosphere and cool or condense. While the warm air cools it condenses into liquid or ice. For this to occur, however, the water vapor within the warm air must have something to hold onto in order to condense. Smoke, dust, etc. is very prevalent throughout our atmosphere and works very well for cloud formation. Within this experiment, the smoke from the burnt matches serves this purpose. You should have observed that the warmer the water, the more dense the cloud….this occurs because the cooler air cannot hold as much water vapor as warmer air.

Independent variable: Temperature of the water
Dependent variable: Density of a cloud
Hypothesis:

If the temperature of the water is (increased/decreased), then the DENSITY OF a cloud will (increase/decrease).

WEEK 15:

Weather fronts



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Empty 2L plastic bottle
Thermometer
Plastic baggie
Ice
Salt
Two pencils (or a wire strainer that can fit the bottle)
Scissors

Birthday candle
Candle holder (hex nut, clay, etc.)
Clear glass jar (olive jars work great!)
Shallow pan
Ruler or measuring tape
Matches
Water

You and your child(ren) will be covering the following Science Standards this week:

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Clouds, formed by the condensation of water vapor, affect weather and climate.

Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

Definitions:

Air masses	large areas of air with similar temperatures
Front	the area where a cooler air mass and a warmer air mass join
Cold front	type of front that take place when cold air mass runs into a warmer air mass
Warm front	type of front where a warm air mass is moving into a cold air mass.
Occluded front	("oh-klu-dead"); type of front in which the cooler air mass from a cold front runs into the cooler air mass inside a warm front
Stationary front	a front that is not moving
Cyclone	("sigh-clone"); low pressure area at the center of all storms; the air inside these low pressure areas are spiraling upwards into its center

Sample Questions to ask after your child finishes their reading for Day One:

What type of front occurs when a warm air mass is moving into (and over) a cold air mass?

Warm front

Which type of front is responsible for our precipitation?

All of these fronts can cause precipitation.

Why does a cold front produce much stronger storms?

The warm air that is forced upwards when a cold front moves in travels very quickly, providing fuel for a very powerful, and brief, storm.

What is the temperature like after warm and cold fronts pass by?

High pressure usually follows a cold front, making the air temperature much lower. The air temperature behind a warm front is the opposite; it is usually higher.

Answers to Worksheet Questions for Day One:

Page One:

1-air masses
3-cold front
7-cyclone
2-front
5-occluded front
6-stationary front
4-warm front

Page Two:

Answers will vary. Check your child's work!

Page Three:

Comparisons between warm front and cold front

- Both involve the joining of cold and warm air masses
- Both provide precipitation
- Both are in motion

Differences between warm front and cold front

- cold air runs into a warm air mass in a cold front
- warm air masses tend not to have such strong storms
- the storms that take place after a cold front are much more powerful

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "When Two Air Masses Meet..."

The following list will give you the most important items to review for your activity today!

The temperature of the air inside a cold air mass warms quickly when it touches warm air. As this air warms, it becomes less dense and rises as colder, denser air, sinks to the bottom.

When Two Air Masses Meet

Children will recreate what happens when two air masses collide.

Materials:

Empty 2L plastic bottle
Thermometer
Plastic baggie
Ice
Salt
Two pencils (or a wire strainer that can fit the bottle)
Scissors

Activity:

1) Puncture a small hole in the side of the bottle about 1 inch from the bottom. The hole should be large enough to hold the thermometer firmly.
2) Remove the top of the bottle with the scissors leaving only flat, straight walls.
3) Record the temperature of the air at the bottom of the container.
4) Fill the bag with ice and add 3-4 tablespoons of salt. Seal the baggie.
5) Support the baggie on two pencils placed crosswise over the bottle. You may use a wire strainer if it is possible.
6) Record the air temperature in the bottle every minute for the next 10 minutes.

Explanation:

The temperature at the bottom of the bottle should drop very quickly. You may need to explain to the child that the temperature of the air inside a cold air mass warms quickly when it touches warm air. As this air warms, it becomes less dense and rises as colder, denser air, sinks to the bottom of the bottle. What happened inside the bottle happens whenever warm and cold air masses collide. In real life, we tend to see a great deal of cloud formation at these times and a very good chance for rain!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Pressurized Air"

The following will give you the most important items to review for your activity today!

Air temperature and air pressure are very closely related. You cannot change one of these features without altering the other within the environment.

As temperature decreases within this activity, so does the air pressure!

ESP Activity: Pressurized Air

The pressure of air will be clearly demonstrated with this activity.

Materials:

Birthday candle
Candle holder
(hex nut, ball of clay, etc.)
Small, clear glass jar
(olive jars work great!)
Shallow pan
Ruler or measuring tape
Matches
Water

Caution: Be certain to have an adult assist you with the use of matches! Safety first!

Activity:

1) Place the candle holder in the center of the pan and insert the candle into the opening.
2) Pour 1/2 inch of water into the pan.
3) Light the candle and carefully invert the glass jar over the candle. The jar's opening should not rest entirely onto the pan but it should be completely submerged into the water.
4) Water will be pushed into the glass jar from the space between the jar's opening and the pan after the candle burns out.
5) Record the height of the water in the glass jar.
6) For experimentation, increase the amount of water in the pan.

Explanation:

This activity simulates the relationship between air temperature and air pressure within out atmosphere. The candle stops burning after it runs out of oxygen within the glass jar. Without this heat source, the air temperature within the glass jar decreases. As the temperature decreases, so does the pressure within the jar. Outside of the jar, air pressure within the water forces the water through the small opening between the jar and the pan, thereby raising the jar's water level.

Independent variable: Height of water in the pan
Dependent variable: Height of water in the jar
Hypothesis:

If the HEIGHT OF WATER IN THE PAN is (increased/decreased), then the HEIGHT OF WATER IN THE JAR will (increase/decrease).

WEEK 16:

Our weather: Tying it all together

Styrofoam cup
Water
Lamp (with at least a 75 watt bulb)

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Thermometer
Styrofoam cup
Soil

Lamp (with at least a 75 watt bulb)
Thermometer

You and your child(ren) will be covering the following Science Standards this week:

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Clouds, formed by the condensation of water vapor, affect weather and climate.

Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

Definitions:

No new definitions are provided in this chapter. Please instruct your child to review all of the vocabulary for chapters 13-15.

Sample Questions to ask after your child finishes their reading for Day One:

How does the sun's energy affect our weather?
Radiation from the sun causes molecules on earth to speed up and warm. This begins the process of evaporation of water and our weather patterns.

How does the rotation of the earth affect our weather?
The rotation of the earth mixes our air masses, causing fronts to occur.

How does water that is evaporated get back to earth?
After condensing/freezing into a cloud, water can fall back to earth in the form of precipitation.

What is meant by a "greenhouse gas"?
Clouds of condensed/frozen water act as a blanket around the earth by reflecting some of our planet's heat back to its surface. This is very important as it keeps our atmosphere relatively warm when we are not facing the sun.

Answers to Worksheet Questions for Day One:

Page One (True or False):

1) True
2) False - The solid parts of the earth (like mountains and fields and islands) absorbs and releases heat into the air. However, The liquid parts of the earth (like the oceans and rivers) cannot move heat as fast.
3) True
4) False - in nature, water is always changing its shape from a solid (ice), a liquid (water) and a gas (water vapor)!
5) True

Page Two:

1) B
2) C
3) C
4) B
5) C

Page Three:

Answers will vary. The answer should state some examples of connections between living and nonliving objects within the Earth.

Unit Four Review Answer Key

Answers will vary. Your child may include any of the following information:

Energy is the ability to move something by pushing or pulling an object. When radiation from the sun reaches the earth, it speeds up the molecules in the water and on land! As the sun warms the ground and the water, the air that is touching these parts of the earth get warmed too! Because of conduction, the cooler air molecules get warmed by touching the warmer molecules in the ground and the water. Convection allows The warmer air to rise and warm the atmosphere!

The sun warms the earth unevenly and Our planet is always rotating. Since the earth is warmed up unevenly, the air above these different areas are warmed unevenly too! Warm and cold air masses affect our air pressure because the air from a high air pressure area is always moving towards a low pressure area. it is our rotation that mixes all of our air masses and different air pressure around the earth! As cooler air masses and warm air masses move across the earth, they sometimes mix with each other, creating fronts, which cause all kinds of nasty weather!

Radiation also causes evaporation of our liquid water into water vapor. As water vapor rises into the atmosphere it cools and condenses back into liquid. If it is cold enough, this liquid will freeze. A collection of liquid or frozen water droplets floating in the air is known as a cloud.

When a cloud contains too much water, it falls back down to earth in the form of precipitation. Once on the ground, water can be recycled once again! While in the atmosphere, water acts a greenhouse gas where it helps to keep some of our heat trapped on our planet! This keeps our planet warm when it is not facing the sun for one half of the day!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Uneven Heating of the Earth (Part I)"

The following list will give you the most important items to review for your activity today!

The uneven heating of water and land directly influences our seasonal changes which impact our weather and climate. When compared to land (in Part II), the heating of water does not occur as readily as that of soil.

ESP Activity: The Uneven Heating of the Earth (Part I)

Children will determine how our oceans warm up.

Materials:

Styrofoam cup
Water
Lamp (with at least a 75 watt bulb)
Thermometer

Activity:

1) Fill the cup one half full of water, insert the thermometer and record the temperature of the water every minute for a total of ten minutes.
2) Position the cup of water about four inches from the light source.
3) Turn on the light and record the temperature of the water every minute for a total of ten minutes.

Explanation:

This activity is the first of two separate procedures that can be used separately or as a means of comparison. The uneven heating of water and land directly influences our seasonal changes which impact our weather and climate. When compared to land (in Part II), the heating of water does not occur as readily as that of soil. Have you ever jumped into a swimming pool too early in the year? It takes longer for water to warm up; however, it takes longer for the water to lose its heat.

Independent variable: Exposure to light
Dependent variable: Temperature of the water
Hypothesis:

If the EXPOSURE TO LIGHT is (increased/decreased), then the TEMPERATURE OF THE WATER will (increase/decrease).

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "The Uneven Heating of the Earth (Part II)"

The following will give you the most important items to review for your activity today!

The results from this activity can be compared with The Uneven Heating of the Earth: Part I. The temperature of the soil should rise higher than that of water.

The uneven heating of water and land directly influence our seasonal changes which impact our weather and climate.

ESP Activity: The Uneven Heating of the Earth (Part II)

Children will determine how our continents warm up.

Materials:

Styrofoam cup
Soil
Lamp (with at least a 75 watt bulb)
Thermometer

Activity:

1) Fill the cup one half full of soil, insert the thermometer and record the temperature of the soil every minute for a total of ten minutes.
2) Position the cup of soil about four inches from the light source.
3) Turn on the light and record the temperature of the soil every minute for a total of ten minutes.

Explanation:

The results from this activity can be compared with The Uneven Heating of the Earth: Part I. The temperature of the soil should rise higher than that of water. This occurrence is typical throughout the world. Both containers of water and soil will lose some of their heat over time; however, the soil will lose its heat more rapidly than water. It is important to note that both containers will not return to their starting temperature after the light source is removed for ten minutes. As stated before, the uneven heating of water and land directly influence our seasonal changes which impact our weather and climate.

Independent variable: Exposure to light
Dependent variable: Temperature of the soil
Hypothesis:

If the EXPOSURE TO LIGHT is (increased/decreased), then the TEMPERATURE OF THE SOIL will (increase/decrease).

Unit Four Test

Match the words in the first column to the best available answer in the second column.

____ **air masses**	1) large areas of air with similar temperatures
____ **condensation nuclei**	2) the area where a cooler air mass and a warmer air mass join
____ **ceiling**	3) type of front that take place when cold air mass runs into a warmer air mass
____ **high clouds**	4) type of front where a warm air mass is moving into a cold air mass.
____ **middle clouds**	5) type of front in which the cooler air mass from a cold front runs into the cooler air mass inside a warm front
____ **low clouds**	6) a front that is not moving
____ **cirrus**	7) low pressure area at the center of all storms
____ **cumulus**	8) a visible collection of tiny water droplets or frozen ice pieces floating in the air
____ **stratus**	9) the temperature in which a gas is able to condense
____ **fog**	10) tiny particles of dust, dirt, smoke, etc. that allow water vapor to hold onto before it can condense to form a cloud
____ **burn off**	11) the distance between the Earth and the bottom of a cloud
____ **front**	12) clouds with ceilings that are at least 20,000 feet

___ **dew**	13) clouds with ceilings between 6,500 and 20,000 feet
___ **deposition**	14) clouds with ceilings under 6,500 feet
___ **humidity**	15) clouds that are very high, thin and see-through
___ **precipitation**	16) clouds that have flat bottoms and large, puffy shapes (almost like cotton balls)
___ **water cycle**	17) clouds that are long, flat and seem to fill up the sky like a large sheet
___ **greenhouse gas**	18) a cloud that forms near the ground as the air temperature at the surface cools to the dewpoint temperature
___ **greenhouse effect**	19) when the heat from the sun causes the top of a batch of fog to evaporate
__ **cold front**	20) condensed water on objects on the surface of the Earth whose temperature has reached the dewpoint temperature
___ **warm front**	21) the change of state of a gas directly into a solid
___ **occluded front**	22) amount of water vapor in the air
___ **stationary front**	23) falling droplets of liquid water or frozen ice
___ **cyclone**	24) pattern in which water travels throughout the environment
___ **clouds**	25) a gas that is able to absorb and reflect some of the heat that is given off from the Earth
___ **dewpoint**	26) the ability of greenhouse gases like water vapor to absorb and reflect heat from Earth

Fill in the blanks in the story below with the following words:

Air masses	**Energy**	**Precipitation**
Air pressure	**Evaporation**	**Radiation**
Cloud	**Freeze**	**Rotating**
Condenses	**Fronts**	**Water vapor**
Conduction	**Greenhouse gas**	
Convection	**Molecules**	

_____ is the ability to move something by pushing or pulling an object. When _____ from the sun reaches the Earth, it speeds up the _____ in the water and on land! As the sun warms the ground and the water, the air that is touching these parts of the Earth get warmed too! Because of _____, the cooler air molecules get warmed by touching the warmer molecules in the ground and the water. _____ allows the warmer air to rise and warm the atmosphere!

The sun warms the Earth unevenly and our planet is always _____. Since the Earth is warmed up unevenly, the air above these different areas are warmed unevenly too! Warm and cold _____ affect our _____ because the air from a high air pressure area is always moving towards a low pressure area. It is our rotation that mixes all of our air masses and different air pressure around the Earth! As cooler air masses and warm air

masses move across the Earth, they sometimes mix with each other, creating _____, which cause all kinds of nasty weather!

Radiation also causes _____ of our liquid water into water vapor. As _____ rises into the atmosphere it cools and _____ back into liquid. If it is cold enough, this liquid will _____. A collection of liquid or frozen water droplets floating in the air is known as a _____.

When a cloud contains too much water, it falls back down to Earth in the form of _____. Once on the ground, water can be recycled once again! While in the atmosphere, water acts a _____ where it helps to keep some of our heat trapped on our planet! This keeps our planet warm when it is not facing the sun for one half of the day!

Unit Four Test Answer Key

Page one:

1-air masses
10-condensation nuclei
11-ceiling
12-high clouds
13-middle clouds
14-low clouds
15-cirrus
16-cumulus
17-stratus
18-fog
19-burn off
2- front
20-dew
21-deposition
22-humidity
23 precipitation
24-water cycle
25-greenhouse gas
26-greenhouse effect
3-cold front
4-warm front
5-occluded front
6-stationary front
7-cyclone
8-clouds
9-dewpoint

Fill in the blanks

Energy is the ability to move something by pushing or pulling an object. When **radiation** from the sun reaches the earth, it speeds up the **molecules** in the water and on land! As the sun warms the ground and the water, the air that is touching these parts of the earth get warmed too! Because of **conduction**, the cooler air molecules get warmed by touching the warmer molecules in the ground and the water. **Convection** allows The warmer air to rise and warm the atmosphere!

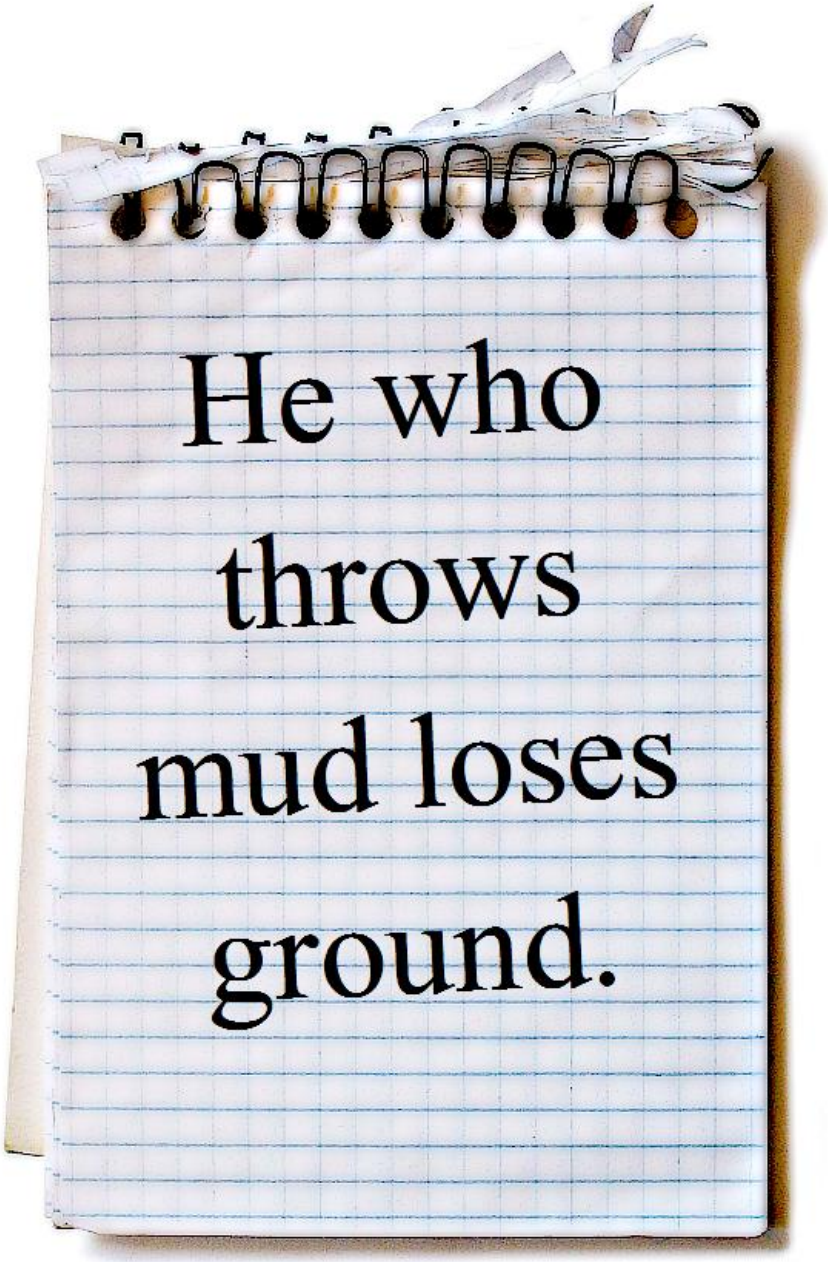
The sun warms the earth unevenly and Our planet is always **rotating.** Since the earth is warmed up unevenly, the air above these different areas are warmed unevenly too! Warm and cold **air masses** affect our **air pressure** because the air from a high air pressure area is always moving towards a low pressure area. it is our rotation that mixes all of our air masses and different air pressure around the earth! As cooler air masses and warm air masses move across the earth, they sometimes mix with each other, creating **fronts**, which cause all kinds of nasty weather!

Radiation also causes **evaporation** of our liquid water into water vapor. As **water vapor** rises into the atmosphere it cools and **condenses** back into liquid. If it is cold enough, this liquid will **freeze**. A collection of liquid or frozen water droplets floating in the air is known as a **cloud**.

When a cloud contains too much water, it falls back down to earth in the form of **precipitation**. Once on the ground, water can be recycled once again! While in the atmosphere, water acts a **greenhouse gas** where it helps to keep some of our heat trapped on our planet! This keeps our planet warm when it is not facing the sun for one half of the day!

WEEK 17:

Weathering and Erosion



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Two film canisters
Two sugar cubes
Ruler
Pencil
Two sheets of sandpaper (rough and fine)
Freezer (or a cold day)
Water
Measuring tape

You and your child(ren) will be covering the following Science Standards this week:

Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Definitions:

Weathering	a natural method that breaks apart large rocks into smaller rocks
Physical weathering	takes place when the weather causes rocks to be worn down, cracked or broken
Chemical weathering	takes place when acids cause small parts of rock to dissolve
Dissolve	melt away
Erosion	The moving of rocks and soil to another place
Deposition	deposits of soil, sand and rocks that have been dropped off by moving water
Glaciers	large sheets of ice that slowly slide down a mountain, causing large amounts of erosion

Sample Questions to ask after your child finishes their reading for Day One:

What is the difference between physical and chemical weathering?

Physical weathering is caused by weather conditions while chemical weathering is caused by the dissolving of rock from acids

How is deposition similar to erosion?

Both are involved with the movement of rocks, sand and soil to different areas.

What does it mean to say that the "earth has a changing face?"

The surface of the earth is always changing its shape.

Is it possible to watch a glacier move down a mountain?

Yes, but it is moving very slowly. Only a few inches every day!

Answers to Worksheet Questions for Day One:

Page One:

3-chemical weathering
6-deposition
4-dissolve
5-erosion
7-glaciers
2-physical weathering
1-weathering

Page Two:

Comparison of erosion and deposition:

- Both deal with the movement of rocks
- Both can involve the use of water to move these rocks

Differences between erosion and deposition:

- Deposition may not break down rocks into smaller pieces
- Erosion may use wind to move objects, unlike deposition

Page Three:

Check your child's work!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Sands of Time"

The following list will give you the most important items to review for your activity today!

The process of breaking down something like a rock into smaller pieces is called weathering.

Sands of time

Children will model the process of erosion with this simple activity.

Materials:

Two film canisters
Two sugar cubes
Ruler
Pencil
Two different kinds of sandpaper (one rough and one fine)

Activity:

1) Line the inside of each film canister with a different kind of sandpaper.
2) On a flat surface, balance the ruler onto the pencil forming a "see-saw". Place one sugar cube on either side of the ruler until they are perfectly balanced. Record where each of the sugar cubes are located on the ruler for future use.
3) Ask the child which kind of sandpaper do they think can "erode the sugar cube" the fastest. Place one sugar cube into each of the film canisters and have the child shake both of them for one minute.
4) Remove the sugar cubes from each canister and place them onto the same places on the ruler.
5) The sugar cube that was eroded more will be lighter and will be lifted higher on the ruler/balance! Ask the child if their predictions were correct.

Explanation:

The process of breaking down something like a rock into smaller pieces is called weathering. By shaking the sugar cube, the child was modeling the effect of wind and rain rubbing against a rock. Like the sandpaper to the sugar cube, wind and rain can chip away at the surface of rock too.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Weathering the Ice"

The following will give you the most important items to review for your activity today!

As water freezes, it expands. If this water is located within cracks of rocks, and it is allowed to freeze, this expansion can cause a massive amount of physical weathering to mountains, rocks, sidewalks, etc. In simple terms, the freezing water pushes against the sides of rocks with such force, that it can cause the rock to crack.

ESP Activity: Weathering the Ice

Children will identify the power of water.

Materials:

Empty plastic bottle
Freezer (or a cold day)
Water
Measuring tape

Activity:

1) Place about two inches of water into an empty bottle.
2) Measure the height of the water in four places on the bottle and take an average to determine the height.
3) Place the bottle into the freezer until it is completely frozen.
4) Remove the bottle and measure the bottle in the same four locations. Take an average and record the results.
5) Increase the volume of water in the bottle for experimentation.

Explanation:

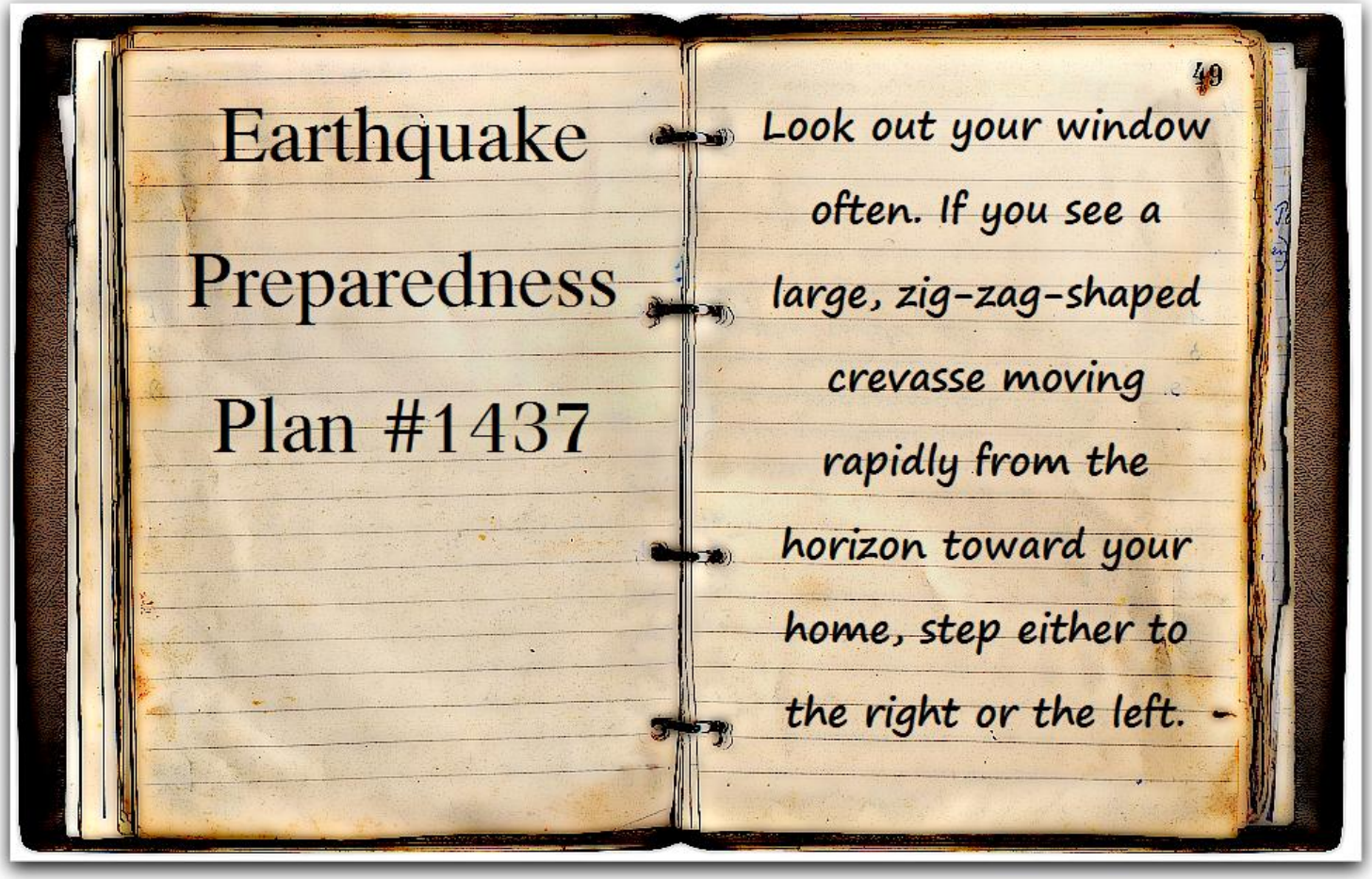
It is a known fact that as water freezes, it expands. If this water is located within cracks of rocks, and it is allowed to freeze, this expansion can cause a massive amount of physical weathering to mountains, rocks, sidewalks, etc. In simple terms, the freezing water pushes against the sides of rocks with such force, that it can cause the rock to crack. This type of weathering breaks rocks into smaller pieces, which then provides more exposed surface area for chemical weathering to occur (such as from rain, acid rain, etc.).

Independent variable: Amount of water
Dependent variable: Height of the ice
Hypothesis:

If the AMOUNT OF WATER is (increased/decreased), then the HEIGHT OF THE ICE will (increase/decrease).

WEEK 18:

Plate tectonics



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Potatoes
Fine tipped, permanent marker
Sharp knife

Three candy bars (Snickers, Milky Way, etc.)
Paper towels

You and your child(ren) will be covering the following Science Standards this week:

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.

Definitions:

Destructive forces	("dee-struck-tiv"); forces like weathering and erosion which break things down
Constructive forces	("kon-struck-tiv"); forces like deposition that act to build new land forms
Magma	molten rock
Tectonic plates	large pieces of the earth's crust that fit together like a jigsaw puzzle and float on top of our mantle
Convergent boundaries	("kon-vur-gent") ; Areas where two tectonic plates are crashing together
Divergent boundaries	("die-vur-gent"); areas where two tectonic plates begin to move away from each other
Transform boundaries	Places on the earth where tectonic plates slide past each other

Sample Questions to ask after your child finishes their reading for Day One:

Describe some examples of destructive and constructive forces.

Weathering and erosion are examples of destructive forces; deposition is an example of a constructive force

What are tectonic plates and how do they move?

Tectonic plates are large pieces of the earth's crust that float on top of the magma within our mantle.

Which type of boundary would you typically not find volcanoes?

Transform boundaries typically do not produce volcanoes.

What is the energy source that keeps magma a fluid?

The heat from the core continually melts rock within our mantle.

Answers to Worksheet Questions for Day One:

Page one:

2-constructive forces
5-convergent boundaries
1- destructive forces
6-divergent boundaries
3-magma
4-tectonic plates
7-transform boundaries

Page Two:

ACROSS
2 transform boundaries
3 destructive forces
4 tectonic plates
6 convergent boundaries
7 divergent boundaries

DOWN
1 constructive forces
5 magma

Page three:

Answers may vary; your child should provide information similar to:

The heat from the core of the earth keeps melting the rock inside the mantle. It is also agreed by many scientists that the magma within the mantle moves just like warmed air moves in the atmosphere by convection. The hot magma moves upwards, away from the core until it reaches the tectonic plates. It is much cooler here, so the magma cools down and sinks back deeper into the magma where it can be reheated! This causes the magma to always be in motion, like a cycle.

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Potato Plates"

The following will give you the most important items to review for your activity today!

The crust of the Earth including the continents is made of "plates" which are linked together like a jigsaw puzzle. These solid, but lightweight plates "float" on top of the fluid layer underneath, where the hotter magma is found. And so these plates move about 2 inches per year. Earthquakes and volcanoes are typically found where these plates fit together.

Potato Plates

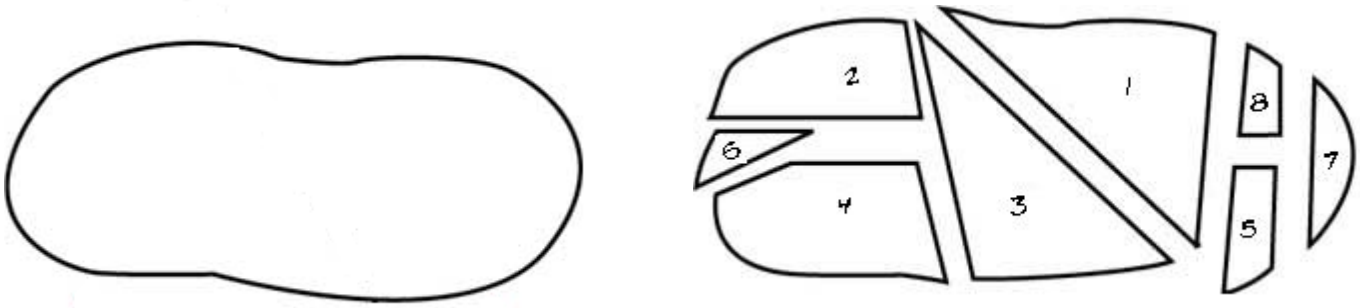
Children will put together a puzzle that models the tectonic plates of the earth.

Materials:

Potatoes
Fine tipped, permanent marker
Sharp knife (this should be only used by a parent! Be careful!)

Activity:

1) Have a parent carve a potato into eight different sections as follows:



2) Use the marker to place a number on each of the pieces.
3) Scramble up the pieces in a bowl and have the child attempt to put them back together!
4) When completed, inform the child that the each piece of the puzzle represents one "plate" found on the earth. The information within the "explanation" section of this lesson will prove to be helpful in your discussion.

Explanation:

Even numbers (2,4,6,8) represent Northern Hemisphere land masses. Odd numbers (1,3,5,7) represent land masses mostly in the Southern Hemisphere:

1) Africa
2) Eurasia
3) South America
4) North America
5) Antarctica
6) Greenland
7) Australia
8) India

The crust of the Earth including the continents is made of "plates" which are linked together like a jigsaw puzzle. These solid, but lightweight plates "float" on top of the fluid layer underneath, where the hotter magma is found. And so these plates move about 2 inches per year. Earthquakes and volcanoes are typically found where these plates fit together.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Candy Bar Tectonics"

The following will give you the most important items to review for your activity today!

As tectonic plates move they cause different situations to occur. In some places two plates move apart from each other; this is a diverging plate boundary. In other areas, two plates move together; this is a converging plate boundary. Finally plates can also slide past each other horizontally. This is called a transform plate boundary.

Candy Bar Tectonics

Children will illustrate plate tectonics using candy bars.

Materials:

Three candy bars such as Snickers or Milky Way
Paper towels

Activity:

1) Have the children wash their hands before starting this activity.
2) They should use a fingernail to make a few breaks in the "crust" or top of the candy bar.
3) To demonstrate divergent boundaries, have them gently pull on the edges of the candy bar. They will notice that the "plates" move apart to reveal the caramel/nuts or “mantle”.
4) To demonstrate a transform boundary, have the children push the plates back together, then slide one half of the candy bar forward and the other backwards.
5) To demonstrate a convergent boundary, have them push on both ends of the candy bar to squeeze it together.
6) They should notice the plates colliding and possible see one slide over the top of another.
7) During each movement of the candy bar, have the child describe what they observe with the “crust”: where are the cracks forming? Does the “crust” seem to raise up or sink?

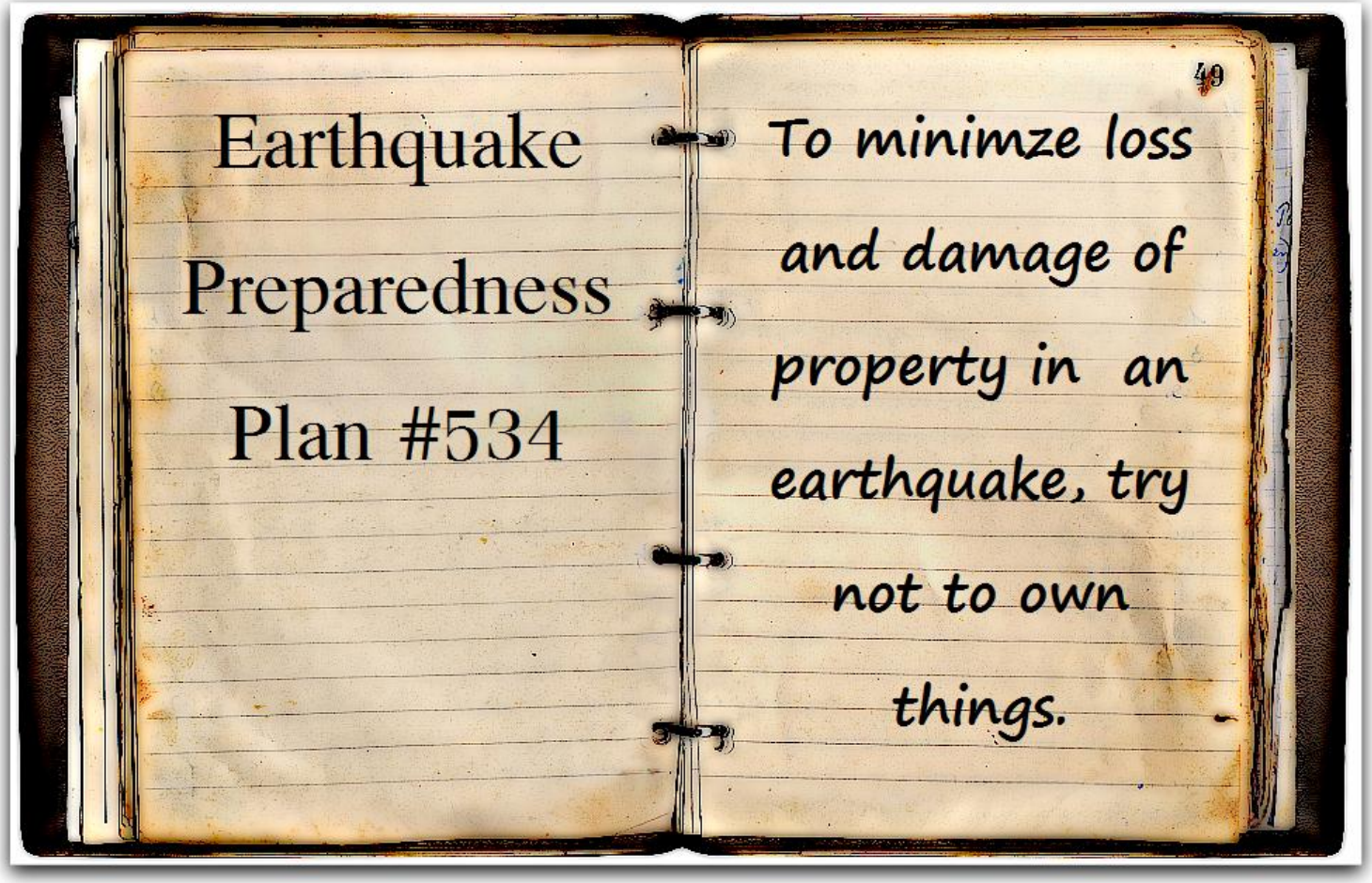
Explanation:

As tectonic plates move they cause different situations to occur. in some places two plates move apart from each other; this is a diverging plate boundary. In other areas, two plates move together; this is a converging plate boundary. Finally plates can also slide past each other horizontally. This is called a transform plate boundary.

Plate movement generates stress in the rocks at plate boundaries. The type of stress is different at each type of plate boundary. At converging plate boundaries rocks are squeezed (compression), at diverging plate boundaries they are stretched (tension or extension), and at transform boundaries they are pushed past each other (shear). Because the plates are rigid rock, they resist this motion until they break, creating earthquakes. The compression at converging plate boundaries also creates mountains; all of the world's large mountain ranges formed at this type of boundary.

WEEK 19:

Earthquakes



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Metal or heavy plastic pan--full-sized loaf pans work fine
Sand
Water
A smooth brick
A rubber mallet
A car and a driver
A felt-tipped pen
Lined pad of paper
Measuring tape

You and your child(ren) will be covering the following Science Standards this week:

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

Tectonic plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions.

Definitions:

Earthquake	a vibration (think of a vibration as a "shaking") that moves through the earth's crust.
Vibration	("vi-bray-shun"); a shaking motion
Faults	huge cracks in the earth's crust
Seismologists	("size-maul-o-jists"); scientists who study earthquakes
Seismic waves	the energy that spreads through the earth's crust during an earthquake
Tsunami	("soo-nam-ee"); very large and fast waves in the ocean caused by underwater earthquakes

Sample Questions to ask after your child finishes their reading for Day One:

Why is the energy that spreads through the earth's crust during an earthquake called a "wave"?

The energy that moves through the earth during an earthquake is similar to waves in a body of water.

Where would you find most earthquakes?

Most earthquakes take place near faults in the earth's crust.

what is one thing that seismologists have not been able to do?

Seismologists cannot predict when an earthquake is going to happen.

How is a large truck on the road similar to an earthquake?

The energy a large truck gives off into the ground as it moves on the street spreads out in all directions in waves. When these waves hit your house, this energy may cause your house to shake, just like an earthquake!

Answers to Worksheet Questions for Day One:

Page One:

1) earthquake
2) vibration
3) faults
4) seismologists
5) seismic waves
6) tsunami

Page Two:

1) C
2) B
3) C
4) A
5) B
6) A

Page Three:

Answers may vary; check your child's work!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Liquefying the Earth

The following list will give you the most important items to review for your activity today!

During an earthquake, the ground is shaken very quickly. This causes huge problems for buildings that are built on this land.

Liquefying the Earth

Children will witness how the earth can move during an earthquake.

Materials:

Metal or heavy plastic pan (full-sized loaf pans work fine)
Sand
Water
A smooth brick
A rubber mallet

Activity:

1) Fill the pan at least ¾ full of sand.
2) Put the pan on a table. Then pour in water to just below the surface of the sand. If you have standing water on the surface of the sand, you have added too much!
3) Stand the brick up into the wet sand, like a building, with the smallest side of the brick resting on the bottom.
4) Have the child very gently tap the side of the pan with a mallet several times and notice what happens to the sand and the brick.
5) After a few taps, the sand probably started to move around a bit which caused the brick to fall down!

Explanation:

The tapping of the container resembles the effect of an earthquake on the ground. During an earthquake, the ground is shaken very quickly. This causes huge problems for buildings that are built on this land.

In this exercise, the ground went through "liquefaction". This means that the relatively solid ground started to act more like a liquid because of all of the shaking. In other words, when solid ground turns into jelly... the buildings underneath can easy fall down!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Four-Wheeled Earthquake"

The following will give you the most important items to review for your activity today!

The power of an earthquake is measured by a scale called the Richter scale. A moveable arm containing a writing device is placed onto a strip of moving paper. During an earthquake, the moveable arm "twitches" causing the straight line that was being created to become erratic. A simple measurement of how far the line moved from the original position determines the strength of the earthquake.

ESP Activity: Four-wheeled Earthquake

Children will become a human seismograph.

Materials:

A car and a driver
A felt-tipped pen
Lined pad of paper
Measuring tape

Activity:

1) As a passenger in a car, extend the pad of paper against the dashboard.
2) With your other hand, place the felt tip onto the surface of the paper and start to slowly move the pen line across the surface of the paper in a straight line.
3) As you hit a bump, your hand will move up and down, causing spikes to form on the straight line.
4) Measure the height of the peaks and/or valleys created from the straight line when you return home.
5) Repeat this procedure on roads that are farther away from your home for experimentation.

Explanation:

As the car strikes a bump, your inertia continues with the movement of the car **as you should be secured to the car with a seatbelt**. Unfortunately, your arm is not as attached to the car as the rest your body. The car and your body move in the direction of the bump; however, your arm stays at the same height as the Earth. Your pen records this height on the paper much like a seismograph records the magnitude of an earthquake. The scale used to measure an earthquake is known as the Richter scale.

Independent variable: Distance from the home

Dependent variable: Height of the spikes

Hypothesis:

If the DISTANCE FROM THE HOME is (increased/decreased), then the HEIGHT OF THE SPIKES will (increase/decrease).

WEEK 20:

Volcanoes

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Vinegar
Baking Soda
Tall, clear and skinny container (olive jars work well)
Ruler
Tape
Pancake mix
Skillet

Teaspoon
Water
Thermometer
Hot plate/stove
Magnifying glass
Ruler
Glass jar (about the size of a peanut butter jar)

You and your child(ren) will be covering the following Science Standards this week:

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Definitions:

Volcano	any place on a planet where something from the inside of the planet is moving through its crust
Lava	magma that has reached the earth's surface
Volcanic islands	layers of hardened lava from underwater volcanoes that are sticking out of the ocean
Pipe	the path that magma takes from the mantle through the crust
Vent	an opening at the end of a pipe that allows magma to reach the surface of the earth
Extinct volcano	a volcano that has not erupted in recorded history
Dormant volcano	a volcano that has erupted a long time ago
Active volcano	a volcano that erupts all the time

Sample Questions to ask after your child finishes their reading for Day One:

When does magma become lava?

Magma becomes lava when it reaches the surface of the earth.

What causes the cone shape of a volcano?

Layers of dust and ash that fall from the vent cause the cone shape of a volcano to form.

Where are most volcanoes found?

Most volcanoes are found under the ocean.

Why would someone want to live near a volcano?

The soil around a volcano is very good for growing crops.

Answers to Worksheet Questions for Day One:

Page One:

8-active volcano
7-dormant volcano
6-extinct volcano
2-lava
4-pipe
5-vent
3-volcanic islands
1-volcano

Page Two:

ACROSS

1 -dormant volcano
3- pipe
5-volcano
6-volcanic islands
7-extinct volcano

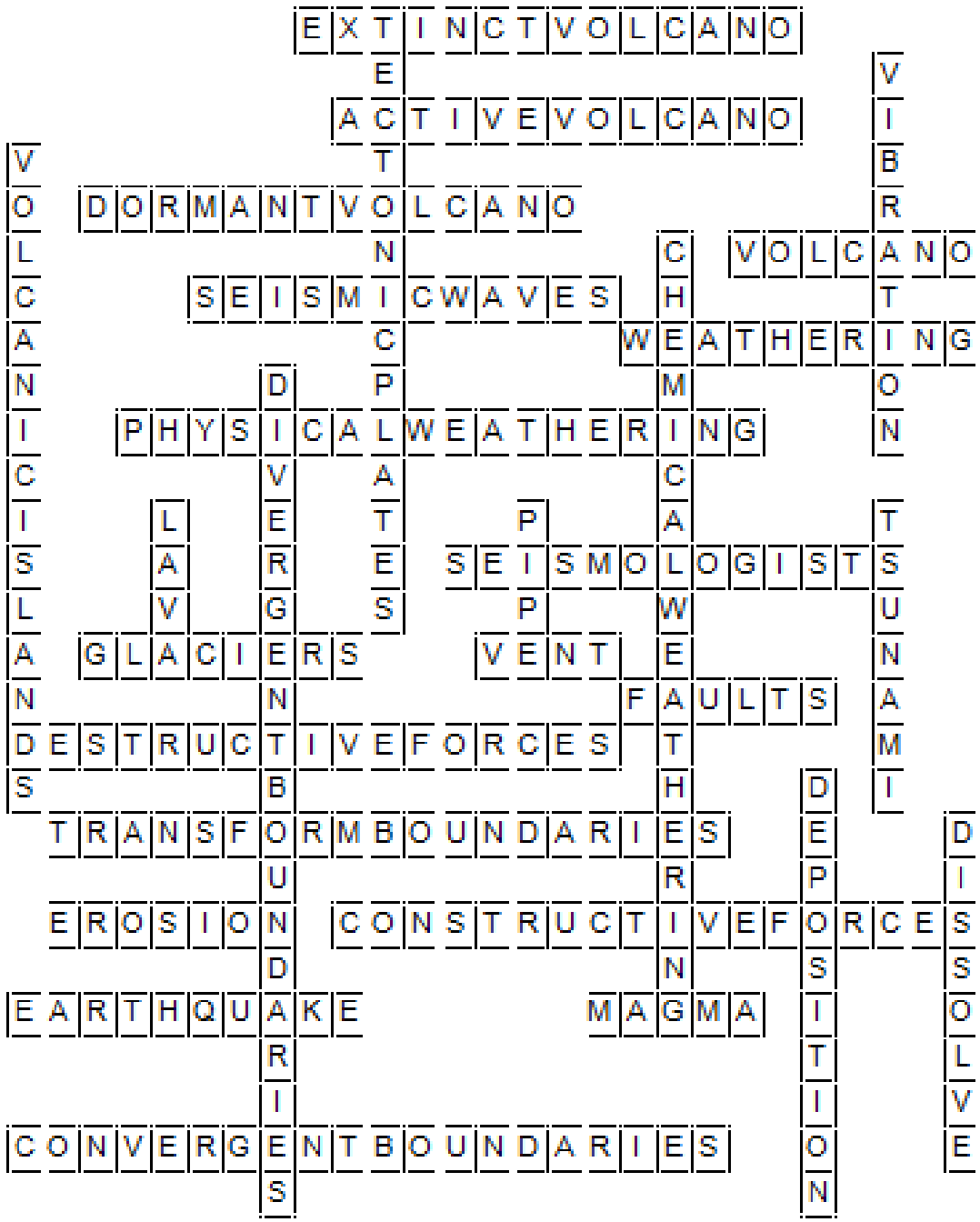
DOWN

2-active volcano
4-lava
6-vent

Page Three:

1) Dormant volcano- a volcano that has erupted a long time ago
2) Extinct volcano- a volcano that has not erupted in recorded history
3) Active volcano-a volcano that erupts all the time

Unit Five Review Answer Key



Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "The Anatomy of a Volcano"

The following list will give you the most important items to review for your activity today!

Large amounts of pressure can be generated as magma travels within the pipe. This pressure is increased a great deal if the vent for the pipe is closed.

ESP Activity: The Anatomy of a Volcano

Children will measure the column of bubbles formed from this simple reaction.

Materials:

Vinegar
Baking Soda
Tape
Tall, clear and skinny container (olive jars work well)
Ruler

Activity:

1) Tape the ruler onto the container so that the kids can measure the distance the foam will rise up from the bottom.
2) Place a small amount of baking soda into the container (The amount will vary depending on the size of the container... test this out before your kids do! Try 1/4 tsp at first!)
3) Pour 1 Tbs of vinegar into the container and measure the height of the foam.
4) Increase the amount of baking soda for experimentation.

Explanation:

The reaction of vinegar and baking soda releases large amounts of carbon dioxide gas. The expansion of gas through the container is easily visible as the molecules of gas expand at a very fast rate! The smaller the diameter of the container, the higher the column of bubbles will rise!

Independent variable: Amount of baking soda
Dependent variable: Height of the bubbles
Hypothesis:

If the AMOUNT OF BAKING SODA is (increased/decreased), then the HEIGHT OF THE BUBBLES will (increase/decrease).

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Pancake Lava"

The following will give you the most important items to review for your activity today!

The rapid cooling of lava produces a massive destructive force in the structure of the newly-made igneous rocks.

Pancake Lava

Children will observe the heating and cooling effect of "lava" during breakfast.

Materials:

Pancake mix
Skillet
Teaspoon
Water
Thermometer
Hot plate/stove
Magnifier
Ruler
Glass jar (about the size of a peanut butter jar)

Activity:

1) Mix together a batch of pancake batter. Place a thermometer in the mixture and record the temperature.
2) Pour the mixture into a cool skillet (you may want to spray the skillet with non-stick spray first!)
3) Measure and record the diameter of the mixture.
4) Transfer the skillet to a hot stove.
5) Have the child observe the changes that take place as the dough heats up. They record the changes in surface texture every two minutes for ten minutes. Remove the skillet from the heat source.
6) Remove the pancake from the skillet and place on a cool plate.
7) Have the child take a new temperature reading of the cooked pancake and record any texture changes every two minutes for twenty minutes.
8) Allow mixture to stand overnight. The next day the child will make a final observation of structural and temperature changes. The diameter of the mixture will be measured and recorded.

Questions to ask the child:

- How does heat affect the mixture?
- What was the temperature of the mixture after ten minutes of heating? How much did it increase over the starting temperature?

- When do bubbles appear in the mixture?
- When does the surface begin to dry?
- How does cooling affect the mixture?
- When did cracking occur in the mixture?
- When did the surface of the mixture appear dry?
- How much did the temperature decrease after 20 minutes of cooling?
- Has the diameter of the mixture changed over the past 24 hours?

Explanation:

Many holes appear as gas comes to the surface and dough lumps rise and fall throughout the mixture. During this time, numerous cracks form near the outer edge of the pancake. This represents the rapid formation of igneous rocks on the surface of the earth. As lava cools and these rocks are formed, the change from liquid to solid causes a destructive force (cracking). Almost everyone has observed this destructive force when you place ice in a glass of water. Over time, the solid ice particles crack, sometimes loudly, as they change into a liquid state. This process is the reverse of igneous rock formation, but it is the same type of force!

In addition, the rising of the gas through the batter represents the convection of heat rising through the lava as well as the movement of lava upwards through the earth.

Unit Five Test

Match the words in the first column to the best available answer in the second column.

____ **active volcano**	1) a natural method that breaks apart large rocks into smaller rocks
____ **chemical weathering**	2) takes place when the weather causes rocks to be worn down, cracked or broken
____ **constructive forces**	3) takes place when acids cause small parts of rock to dissolve
____ **convergent boundaries**	4) melt away
____ **deposition**	5) the moving of rocks and soil to another place
____ **destructive forces**	6) deposits of soil, sand and rocks that have been dropped off by moving water
____ **dissolve**	7) large sheets of ice that slowly slide down a mountain, causing large amounts of erosion
____ **divergent boundaries**	8) forces like weathering and erosion which break things down
____ **dormant volcano**	9) forces like deposition that act to build new land forms
____ **earthquake**	10) molten rock
____ **erosion**	11) large pieces of the Earth's crust that fit together like a jigsaw puzzle and float on top of our mantle
____ **extinct volcano**	12) areas where two tectonic plates are crashing together

___ **faults**	13) areas where two tectonic plates begin to move away from each other
___ **glaciers**	14) Places on the Earth where tectonic plates slide past each other
___ **lava**	15) a vibration (think of a vibration as a "shaking") that moves through the Earth's crust.
___ **magma**	16) a shaking motion
___ **physical weathering**	17) huge cracks in the Earth's crust
___ **pipe**	18) scientists who study earthquakes
___ **seismic waves**	19) the energy that spreads through the Earth's crust during an earthquake
___ **seismologists**	20) very large and fast waves in the ocean caused by underwater earthquakes
___ **tectonic plates**	21) any place on a planet where something from the inside of the planet is moving through its crust
___ **transform boundaries**	22) magma that has reached the Earth's surface
___ **tsunami**	23) layers of hardened lava from underwater volcanoes that are sticking out of the ocean
___ **vent**	24) the path that magma takes from the mantle through the crust
___ **vibration**	25) an opening at the end of a pipe that allows magma o reach the surface of the Earth
___ **volcanic islands**	26) a volcano that has not erupted in recorded history
___ **volcano**	27) a volcano that has erupted a long time ago
___ **weathering**	28) a volcano that erupts all the time

Which one is right? Circle the correct answer.

1. What is needed for chemical weathering to take place?
   a) acid
   b) lava
   c) faults

2. Convergent, divergent and transform boundaries are areas where you would find which of the following?
   a) pipes
   b) faults
   c) vents

3. Which of the following takes the longest amount of time?
   a) earthquake
   b) volcano eruption
   c) weathering and erosion

4. An example of physical weathering would be...
   a) acid dissolving a piece of rock
   b) erosion of the ground
   c) freezing water in cracks of rock

5. Which of the following is a product of a constructive force?
   a) weathering
   b) erosion
   c) deposition

Fill in the blanks in the story below with the following words

Erosion	**Volcanic eruptions**
Weathering	**Tectonic plates**
Earthquakes	**Deposition**

The surface of the Earth changes all the time. Some changes are due to slow processes, such as _____ and _____, and some changes are due to rapid processes, such as _____ and _____.

Land forms are the result of a combination of constructive and destructive forces. Constructive forces include _____, and _____, while destructive forces include _____ and _____.

Unit Five Test Answer Key

Page one:

10-magma
11-tectonic plates
12-convergent boundaries
13-divergent boundaries
14-transform boundaries
15-earthquake
16-vibration
17-faults
18-seismologists
19-seismic waves
1-weathering
20-tsunami
21-volcano
22-lava
23-volcanic islands
24-pipe
25-vent
26-extinct volcano
27-dormant volcano
28-active volcano
2-physical weathering
3-chemical weathering
4-dissolve
5-erosion
6-deposition
7-glaciers
8-destructive forces
9-constructive forces

Page Two:

1) A
2) B
3) C
4) C
5) C

Page three:

The surface of the earth changes. Some changes are due to slow processes, such as **erosion** and **weathering**, and some changes are due to rapid processes, such as **volcanic eruptions** and **earthquakes**.

Land forms are the result of a combination of constructive and destructive forces. Constructive forces include **volcanic eruption**, and **deposition**, while destructive forces include **weathering** and **erosion**.

WEEK 21:

Rocks and Minerals

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

4 cups sugar
2 cups water
Small saucepan
Wooden spoon
Candy thermometer
One small, clean glass jar
Measuring cup
Cotton string

A weight to hang on the string (such as a screw or galvanized washer)
Penny
Paper clip
One brick
Chalk
Old glass jar

You and your child(ren) will be covering the following Science Standards this week:

Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.

Definitions:

Mined	process by which natural resources are removed from the earth
Bedrock	top layer of solid rock beneath the soil
Rock	a mixture of two or more minerals
Mineral	a solid that is made up of a group of the same atoms or molecules
Crystal	a solid material that has all of its molecules lined up, in a pattern
Halite	("hal-ite"); the mineral name for salt
Geology	("gee-aul-o-gee"); the study of the earth and its rocks and minerals
Cleavage	("klee-vuh-j"); flat and smooth sides of a mineral
Fracture	("frak-chur"); rough and jagged sides of a mineral
Streak	("streek"); colored line that remains after a mineral is rubbed against a white object
Luster	the ability of a mineral to shine

Sample Questions to ask after your child finishes their reading for Day One:

Where do we get all of our natural resources?
Everything we use on the earth must be either grown or mined.

What is the difference between a rock and a mineral?
A rock is a collection of two or more minerals fused together.

Do all minerals turn into crystals?
No; if the mineral is not given enough room while it is cooling, its molecules cannot line up perfectly and therefore a crystal cannot be formed.

What are some ways to identify what kind of mineral you have?
By studying the hardness, color, cleavage, fracture, streak, luster and shape of the mineral you can determine what kind of mineral you have.

Answers to Worksheet Questions for Day One:

Page One:

1-mined
10-streak
11-luster
2-bedrock
3-rock
4-mineral
5-crystal
6-halite
7-geology
8-cleavage
9-fracture

Page Two:

Comparison of rocks and minerals

- Both rocks and minerals are found within the earth
- Both are made up of atoms and molecules

Differences between rocks and minerals

- Rocks are made up of minerals
- Splitting minerals in half would result in two halves of equal kinds of atoms and molecules

Page Three:

Answers may vary; check your child's work!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Homegrown Candy"

The following list will give you the most important items to review for your activity today!

The crystallization of minerals into visible structures takes a significant amount of time. This experiment should model this fact easily!

Homegrown Candy

Children will explore how minerals can crystallize.

Materials:

4 cups sugar
2 cups water
Small saucepan
Wooden spoon
Candy thermometer
One small, clean glass jar
Measuring cup
Cotton string
A weight to hang on the string (such as a screw or galvanized washer)

Caution: in order to make your rock candy, you will need to use the stove. The syrup you will make will be very hot. An adult should prepare the syrup solution for the child! Be careful!

Activity:

1) Heat the water in the saucepan until it comes to a boil.
2) Dissolve all of the sugar into the boiling water, stirring continuously until the mixture is clear and reaches a rolling boil.
3) Remove the mixture from the stove and pour it into the jar and cover it with waxed paper.
4) Tie the "weight" to one end of the string. The length of the string should be about 2/3 as long as the jar is deep. Tie the other end of the string onto the pencil.
5) Dip the string into the sugar solution, remove it and let it dry on the waxed paper for a few days.
6) After a few days, gently reinsert the dried string into the sugar solution and let it sit at room temperature for several days. Do not shake the solution at this time!!! Within a week, you should have plenty of crystals growing on your string!

Explanation:

Since the surface of the string is the location where the crystals grow, you need to have "seed crystals" planted on the string to make your rock candy. To make these seed crystals, you needed to soak the string in the sugar solution and allow it to dry. As it dried, small sugar crystals began to grow onto the string. When you reinserted the string back into the solution, these seed crystals allowed larger crystals to begin growing!

With so much sugar dissolved into the water, you created a "supersaturated solution". This means that some of the solid material (sugar) can easily be removed from the water once it evaporates. So... as the sugar solution evaporated, the sugar crystallized very quickly. And since you placed a string that was loaded with seed crystals, it did not take long for more and more sugar to recrystalize once again!!!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Measuring the Strength of our Resources"

The following will give you the most important items to review for your activity today!

Comparing the hardness or scratch resistance of minerals is a basic method used to identify and classify minerals.

Measuring the strength of our resources

Children will interpret the hardness or softness of objects.

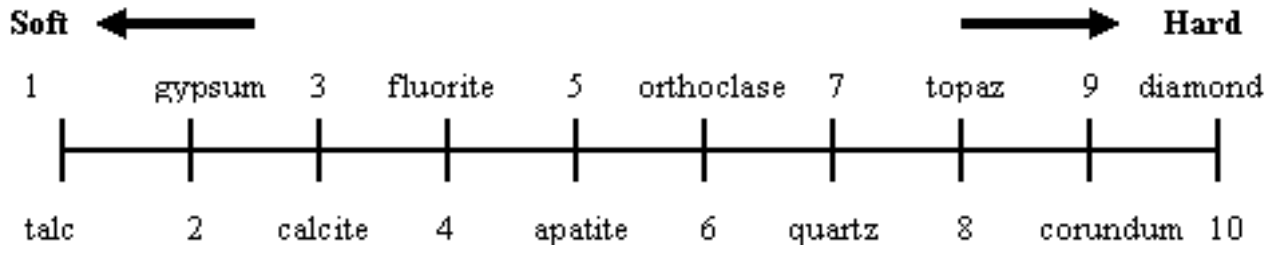
Materials:

Penny
Paper clip
A brick
Chalk
Old glass jar

Activity:

Have the child try to scratch the penny with the paperclip and the paperclip with the penny. The harder paperclip scratches the softer penny. Ask the child which object is harder? They should state that the paperclip is harder.

Inform the child that they will be given several items and will be asked to test 'what scratches what". For example, on the following scale:



#8 Topaz will scratch all of the softer minerals (#1-7)

Provide the child with the penny, a paperclip, a brick and a piece of chalk. Inform them that the brick has already been discovered for them and is already written down on their "hardness scale sheet".

Give the child the "hardness scale sheet" and observe them test the hardness of each object. An adult may choose to scratch the brick with the glass jar as a demonstration for the child. Then, the child may place the glass jar on the "hardness scale sheet" in the appropriate location.

When they are completed, ask them where their fingernail would be placed on this hardness scale. Have them test and see.

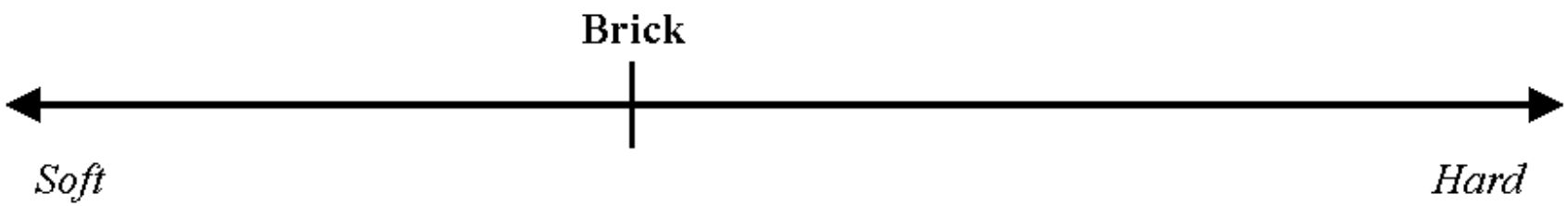
Explanation:

In 1822, Friedrich Mohs, a German mineralogist devised a crude but practical method of comparing hardness or scratch resistance of minerals. It has become universally known as Mohs scale. This activity is a basic method of studying the hardness of minerals in order to identify and classify them for future study.

The following items have been ranked for you in order from softest to hardest:

chalk, fingernail, penny, paperclip, brick and glass jar

Hardness Scale Chart



WEEK 22:

The geology of your home

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Old plate or aluminum pie tin
One paper towel
Epsom salt
Water
Matches (optional)

Large-mouthed glass/plastic jar (about a quart in size)
Enough uncooked rice to fill the container mentioned above (about ¾ full)
One small ball (rubber, ping pong, etc..)

You and your child(ren) will be covering the following Science Standards this week:

Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Definitions:

Processed	method of taking minerals out of a rock
Copper	mineral that can be used in wires
Beryllium	("bur-ill-e-um"); mineral that can be used within a lightbulb to help make it glow
Tungsten	("tung-stin") ;mineral that can be used within a lightbulb to help make it glow
Silica	("cil-ih-kah") ; mineral that can be used in soap and toothpaste
Titanium	("tie-tane-e-um") ; mineral that can be used in soap and toothpaste
Chromium	("kro-me-um"); a mineral you can find in most shiny metal objects
Silver	mineral that can be used in expensive forks, knives and spoons
Aluminum	("a-loom-eh-num"); mineral that can be used to make foil
Iron	a mineral used by your blood to carry oxygen all over your body
Zinc	("zing-k"); a mineral used by your immune system to help you stay healthy
Calcium	("kal-see-um") ; a mineral that helps to build strong bones in your body
Potassium	("po-tass-e-um"); a mineral that helps keep your muscles strong
Phosphate	("foz-fate") ; an important mineral that plants use to grow!

Sample Questions to ask after your child finishes their reading for Day One:

What is a problem that geologists go through when mining for minerals?
Geologists cannot look through rocks and see where all of the minerals are in the earth.

After rock is mined out of the ground, what is the next step in separating its minerals?
Most of the time, rocks must be processed in order to remove minerals from rocks.

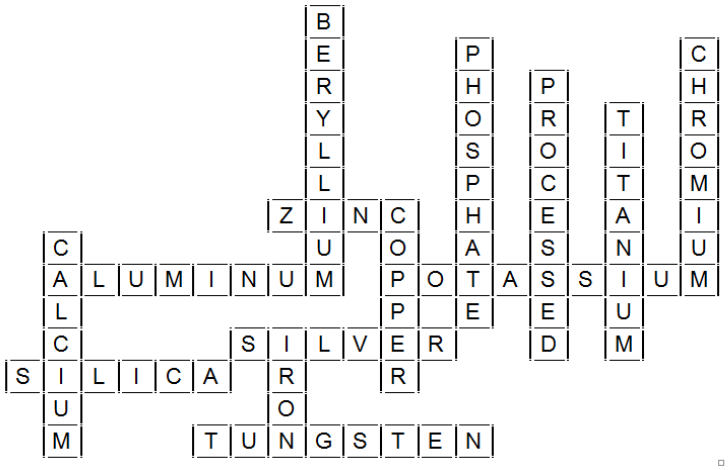
Is it safe to eat minerals?
Our bodies need many different minerals such as iron, zinc and potassium in order to survive. However, we do not need large amounts of these minerals!

Answers to Worksheet Questions for Day One:

Page One:

1) processed
2) copper
3) beryllium
4) tungsten
5) silica
6) titanium
7) chromium
8) silver
9) aluminum
10) iron
11) zinc
12) calcium
13) potassium
14) phosphate

Page Two:



Page Three:

Please check your child's work.

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Petrified Paper"

The following will give you the most important items to review for your activity today!

The properties of an object change when it is exposed to certain minerals.

"Petrified" Paper

Children will explore how the properties of an object changes when it is exposed to certain minerals.

Materials:

Old plate or aluminum pie tin
One paper towel
Epsom salt
Water
Matches (optional)

Activity:

1) Mix a tablespoon of Epsom salt with two tablespoons of water on a plate.
2) Fold a paper towel into quarters and then roll it into the shape of a log. Have the child inspect the "log" before you go to the next step.
3) Place the rolled towel into the salt water on the plate. Allow it to rest there, undisturbed, until it evaporates to dryness. You may want to place it in a warm area to speed this up.
4) Remove the "log" from the plate and have the child inspect it once more. They should notice that it is no longer flexible and it feels much different!
5) (optional) Ask the child if an ordinary paper towel will burn if exposed to a flame.
6) Go outside and, over a BBQ grill or other fireproof structure, place a lighted match under the "petrified" log. It will not burn.

Caution: be very careful with the use of fire. This part of the activity should only be done by an adult. Sorry kids.

Explanation:

The magnesium sulfate that makes up Epsom salt does not actually petrify the paper. It does not dissolve away the paper fiber or replace it in any way. However, it does soak into the paper and crystallize. This gives the paper a more stone-like quality which resists the ability to burn.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "The Brazil Nut Effect"

The following will give you the most important items to review for your activity today!

The size and shape of rocks have a definite impact on the surface of our planet. This is definitely true during the processing of mined rocks. There are many different factors that geologists must study prior to mining for specific minerals.

This model is another example that should reinforce the fact that the earth has a changing face.

The Brazil Nut Effect

Children will create a model for the layers of rock found in the crust.

Materials:

Large-mouthed glass/plastic jar (about a quart in size)
Enough uncooked rice to fill the jar about ¾ full
One small ball (rubber, ping pong, etc..)

Activity:

1) Fill the jar ¾ full with uncooked rice and insert the small ball.
2) Bury the ball as far as you can into the rice. Place the jar onto a table and shake it back and forth many times. In a very short time, the ball will be forced to the top of the rice!

Explanation:

The Brazil nut effect is the action by which large objects end up on the surface when a mixture of smaller objects of different sizes is shaken. It was named the "Brazil nut effect" because when a container of mixed nuts is opened after it has been shaken the large Brazil nuts tend to be on the top!

When shaken, the small objects tend to move upwards through the middle of the container, across the surface and back down along the sides of the container. Any large object that finds its way to the middle of the container will be lifted upwards as well and left on the surface.

As the large object is lifted, smaller objects fill in the holes underneath after each shake... This helps to raise the large object as well. The Brazil nut effect takes place in the Earth too!! Some scientists believe that layers found inside pieces of sandstone (a sedimentary rock) are formed by this amazing effect!

WEEK 23:

Types of Rock

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One-half pound (8 oz.) of milk chocolate bars
6 cups miniature marshmallows
½ cup chopped walnuts (optional)
6 cups crisp rice cereal
½ cup water
1 cup corn syrup
2 cups granulated sugar

1 ¼ cup butter/margarine
1 teaspoon baking soda
Nine small paper cups
Sand
Epsom salt
Water
Old newspapers
Scissors

You and your child(ren) will be covering the following Science Standards this week:

Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.

The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.

Definitions:

Igneous rock	("ig-nee-us"); a type of rock that is formed when molten rock (magma) is cooled and hardened
Granite	("gran-it"); a type of igneous rock that is made up of the minerals quartz, feldspar and mica
Pumice	("pum-iss"); an igneous rock that can float on top of a container of water
Sedimentary rock	("said-eh-men-tary"); a type of rock that is formed from the weathering, erosion and deposition of the earth's crust
Sediments	tiny rocks, mud and sand that is eroded from the earth's crust; used to form sedimentary rocks
Limestone	a type of sedimentary rock used for making concrete, toothpaste, soap, paper and thousands of other items
Metamorphic rock	("met-a-morf-ick"); type of rock that is formed from heat and pressure within the earth
Metamorphosis	("met-a-morf-o-sis"); a change
Marble	a type of metamorphic rock formed from limestone
Shale	a type of sedimentary rock that can be turned into slate (a metamorphic rock) under a lot of heat and pressure
Slate	a type of metamorphic rock formed from shale that can be turned into phylite (a metamorphic rock) under a lot of heat and pressure
Phylite	("fi-light"); a type of metamorphic rock that can be turned into schist (a metamorphic rock) under a lot of heat and pressure
Schist	a type of metamorphc rock that can be turned into gneiss (a metamorphic rock) under a lot of heat and pressure
Gneiss	("neese"); a type of metamorphic rock that is formed from schist

Sample Questions to ask after your child finishes their reading for Day One:

What are three different types of rock?

Igneous, sedimentary and metamorphic

Which of these three types of rock are formed when lava cools?

Igneous

which of these three types of rock are formed under huge amounts of heat and pressure?

Metamorphic

How are sedimentary rocks formed?

Sedimentary rocks are formed from the weathering, erosion and deposition of sediments on the surface of the earth.

Answers to Worksheet Questions for Day One:

Page One:

1- Igneous rock
2-granite
3-pumice
4-Sedimentary rock
5-sediments
6-limestone
7-metamorphic rock
8-metamorphosis
9-marble
10-shale
11-slate
12- phylite
13-schist
14-gneiss

Page Two:

1) C
2) A
3) B
4) A
5) C

Page Three:

1) Shale
2) Slate
3) Phylite
4) Schist
5) Gneiss

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Yummy Geology"

The following list will give you the most important items to review for your activity today!

A conglomerate rock is a form of sedimentary rock. It is made up of bits and pieces of other kinds of rocks that are cemented together with mud and sand.

When melted rock pushes through the earth's crust and cools, it is called igneous rock. Volcanic lava is an example of an igneous rock.

A metamorphic rock is created when heat and pressure change a soft sedimentary rock like limestone into much harder rock – marble.

Yummy Geology

Children will explore the three different kinds of rock in tasty ways.

Materials:

One-half pound of milk chocolate bars
6 cups miniature marshmallows
½ cup chopped walnuts (optional)
6 cups crisp rice cereal
½ cup water
1 cup corn syrup
2 cups granulated sugar
1 ¼ cup butter/margarine
1 teaspoon baking soda

Activity:

Chewy Conglomerates

Inform the child that a conglomerate rock is a form of sedimentary rock. It is made up of bits and pieces of other kinds of rocks that are cemented together with mud and sand.

Ingredients:

One-half pound of milk chocolate bars
1 ½ cups miniature marshmallows
½ cup chopped walnuts (optional)
½ cup crisp rice cereal

Place the chocolate bars in a pan and soften them over a pan of hot water. Remove from heat and stir the chocolate until it is smooth. Fold in the marshmallows, nuts and cereal. Drop by the spoonful onto a buttered cookie sheet. Chill before serving.

Igneous Brittle

Inform the child that when melted rock pushes through the earth's crust and cools, it is called igneous rock. Volcanic lava is an example of an igneous rock.

Ingredients:
½ cup water
1 cup corn syrup
2 cups granulated sugar
1 cup butter/margarine
1 teaspoon baking soda

Combine sugar, water and syrup in the saucepan and heat. Stir the mixture until the sugar dissolves. Add the butter. Stirring constantly, heat the syrup to the hard crack stage – 305 degrees on the candy thermometer or until a small amount forms a crackly candy when dripped into a glass of cold water. Remove from the heat and quickly stir in the baking soda. Pour onto a cookie sheet and spread into a thin layer. Let the candy cool before breaking it apart.

Metamorphic Munchies
Inform the child that a metamorphic rock is created when heat and pressure change a soft sedimentary rock like limestone into much harder rock – marble.

Ingredients:
¼ cup butter/margarine
5 cups crispy rice cereal
4 cups miniature marshmallows

Melt the butter in a saucepan. Add the marshmallows and cook over low heat, stirring the marshmallows until they are melted, and the mixture is syrupy. Remove from the heat and stir in the crisp cereal. Firmly press the warm mixture into the greased pan. When cool, cut the metamorphic munchies into bite-size bits.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Sandstone to Go"

The following will give you the most important items to review for your activity today!

Sandstone is created from eroded sediments on the surface of the Earth (sand, dirt, silt, etc.) that has been compacted over time and cemented together. As layers of these small particles accumulate, minerals remaining from evaporated water act as cementing agents and bind the particles together.

ESP Activity: Sandstone to Go

Students will create and test the hardness of a sample of sandstone.

Materials:

Nine small paper cups
Sand
Epsom salt
Water
Old newspapers
Scissors

Activity:

1) Mix one cup of water with one half cup of epsom salt and stir to dissolve.
2) Fill three of the paper cups with about one inch of sand, another three cups with about one and a half inches and the last three with nearly two inches of sand.
3) Pour just enough salt water into the cups so that the sand is covered and then mix the contents well.
4) Place all nine cups into a windowsill for at least two-three days to dry.
5) Carefully remove the paper cup from the sand and place the "sandstone" onto a piece of newspaper.
6) Cut the remaining newspaper into three inch squares (you can use old playing cards if you like!)
7) Record the number of paper squares you can stack onto the sandstone until it collapses under the weight.

Explanation:

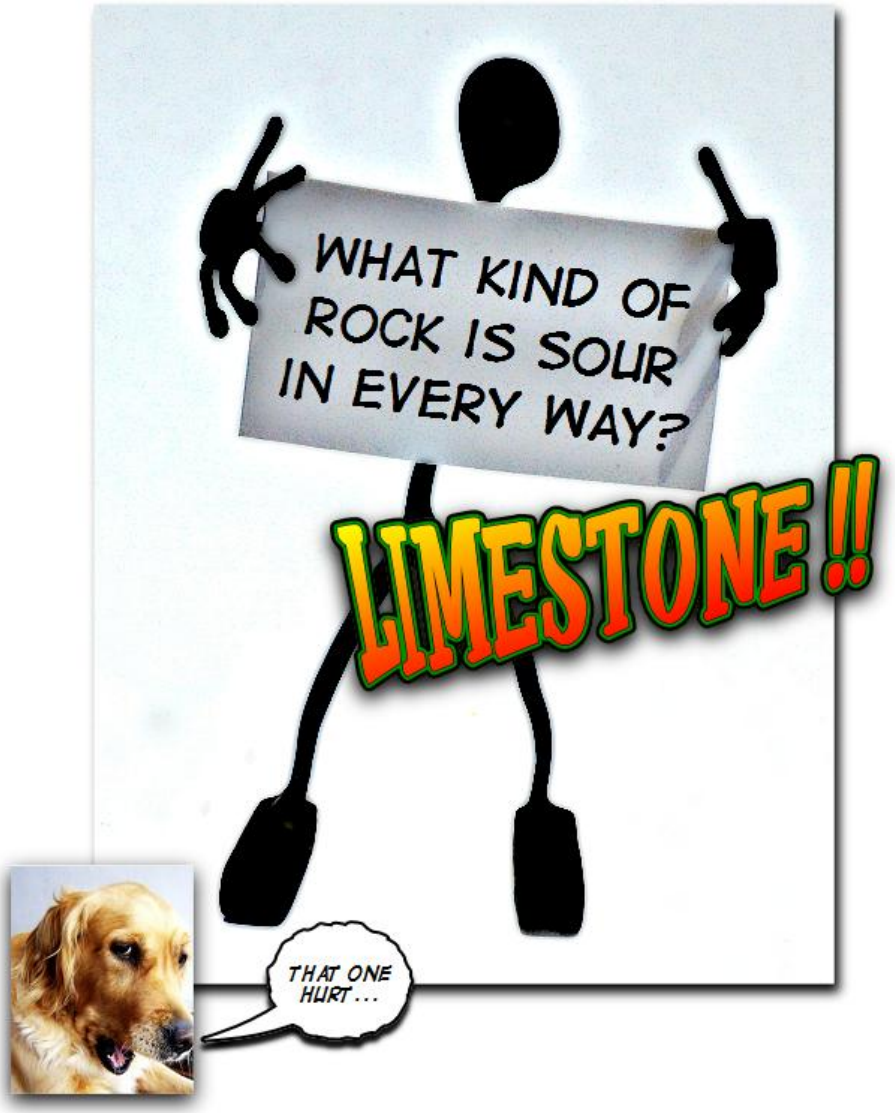
Sandstone is created from eroded sediments on the surface of the Earth (sand, dirt, silt, etc.) that has been compacted over time and cemented together. As layers of these small particles accumulate, minerals remaining from evaporated water act as cementing agents and bind the particles together. The magnesium sulfate (epsom salt) crystallizes between the particles of sand, thereby molding the sand into the shape of the cup.

Independent variable: Amount of sand
Dependent variable: Amount of paper supported by the sandstone
Hypothesis:

If the AMOUNT OF SAND is (increased/decreased), then the AMOUNT OF PAPER SUPPORTED BY THE SANDSTONE will (increase/decrease).

WEEK 24:

The Rock Cycle



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Plate
Syrup or honey
Measuring spoon
Measuring tape

Cup or bowl
Clock with second hand
Microwave oven

You and your child(ren) will be covering the following Science Standards this week:

Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.

Definitions:

Rock cycle	the recycling of rocks (and the minerals inside them)

Sample Questions to ask after your child finishes their reading for Day One:

Can the earth ever run out of rocks and minerals?

No. rocks and minerals may change shape over time, but there will always be a supply of these resources.

How can a sedimentary rock turn into an igneous rock?

If a sedimentary rock is melted and cooled once again, it can be changed into an igneous rock.

Can metamorphic and igneous rocks be turned into sedimentary rocks?

Yes; any rock that can go through weathering and erosion can be turned into sediments which can then be transformed into a sedimentary rock.

How can an igneous rock be turned into a metamorphic rock?

Igneous rocks can be formed deep under the earth because they are made up of cooled magma. If these rocks are melted and squeezed under the earth they can be transformed into metamorphic rocks.

Answers to Worksheet Questions for Day One:

1) Igneous rock changing into sedimentary rock

When melted rock cools, it hardens into a mixture of minerals which makes igneous rock. When igneous rock is on the surface of the earth, it can be broken into smaller pieces by weathering. As these pieces get smaller and smaller, it becomes easier for them to be carried away by moving water and wind. If you remember, these small pieces of rock are known as sediments and they can be carried away through erosion.

As nature erodes the small pieces of igneous rocks, it deposits them in layers on the surface of the earth. Over time, the layers of these sediments at the bottom of the water are turned into sedimentary rocks.

2) Sedimentary rock changing into metamorphic rock

In order for this change to take place, the sedimentary rock must be melted inside the earth. At this point, this magma can be squeezed into a metamorphic rock or it can cool and harden into igneous rock!

3) Metamorphic rock changing into igneous rock

If a metamorphic rock stays buried inside the earth, it can be melted once again into magma. If magma mixes with the right minerals and cools, it can harden into an igneous rock!

Unit Six Test Answer Key

1) mined
2) bedrock
3) rock
4) mineral
5) crystal
6) geology
7) cleavage
8) fracture
9) streak
10) luster
11) igneous rock
12) sedimentary rock
13) sediments
14) metamorphic rock
15) processed
16) rock cycle

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "How fast can my lava flow?"

The following list will give you the most important items to review for your activity today!

Viscosity is known as the resistance of a fluid's ability to flow. More viscous lava causes more explosive eruptions (like those found in the Andes) with lava that flows at a slower rate. Volcanoes with more fluid lava (like those found in Hawaii) have lava flows that have more gentle flows that spread out over a greater distance.

ESP Activity: How fast can my lava flow?

Children will simulate different types of lava flow.

Materials:

Plate
Syrup or honey
Measuring spoon
Measuring tape
Cup or bowl
Clock with second hand
Microwave oven

Activity:

1) Pour approximately one cup of syrup or honey into a bowl.
2) Place 1/4 - 1/8 teaspoon of syrup in the center of the plate.
3) Wait five minutes and record the diameter of the syrup on the plate.
4) Place the bowl of syrup into the microwave for 30-60 seconds.
5) Remove 1/4 - 1/8 teaspoon from the bowl and repeat the experiment.
6) Increase the duration of heating for experimentation.

Explanation:

Thick fluids such as syrup or honey have a greater resistance to flow (known as viscosity) at room temperature. As the liquid is heated up, however, this resistance to flow is decreased. Lava behaves in similar fashion. More viscous lava causes more explosive eruptions (like those found in the Andes) with lava that flows at a slower rate. Volcanoes with more fluid lava (like those found in Hawaii) have lava flows that have more gentle flows that spread out over a greater distance.

Independent variable: Duration of heating
Dependent variable: Diameter of the syrup
Hypothesis:

If the DURATION OF HEATING is (increased/decreased), then the DIAMETER OF THE SYRUP will (increase/decrease).

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Walking Through the Rock Cycle"

The following will give you the most important items to review for your activity today!

Not only is it important to note that the Earth is constantly recycling its rocks and minerals, it is equally important to understand the millions of possible pathways that matter can take as it transforms from one rock into another.

In addition, it is important to note that regardless of the number of times you spend repeating this experiment, a child always spends more time becoming a rock rather than being a particular rock!

Walking through the rock cycle

*Modified from a lesson by Andrew Manning (University of Utah) and from "Rock Roulette" by Stan Schmidt and Courtney Palmer

Children will identify how matter is recycled through time within the rock cycle.

Materials:

ten station cards (provided) one die (pattern provided)

Activity:

1) Spread out the ten station cards throughout the room.
2) Provide the die to the child and direct them to one of the stations.
3) Inform the child to write down the name of the station they are at and roll the die.
4) The child is to travel to the correct station as described by the card.
5) Have the child repeat this activity twenty times. At that time, discuss their recorded journey, looking for patterns and/or cycles.
6) Have the child repeat, once more, a twenty step journey. After recorded each of their twenty steps, ask them if their journey was the same and where they spent most of their time. (More often than not, their paths will be different and they should spend a much longer time **becoming** a rock rather than **being** a rock!)

Explanation:

The rock cycle describes the recycling of Earth materials through time. There are almost endless possibilities for how rocks may move through the cycle as they are subjected to geologic forces over many years.

Station #1 Igneous Rock

You are now an igneous rock in the earth's crust.

1) Stay an igneous rock. Roll again.
2) Stay an igneous rock. Roll again.
3) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. Go to hydrosphere/biosphere.
4) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. You have now become small grains of sand called sediment. Go to sediments.
5) You are surrounded by red hot lava. You get re-melted. Go to magma.
6) You Get pushed to great depths because mountains pile up on top of you. You experience high heat and get re-melted. Go to magma.

Station #2 Volcanic Rock

You are now a volcanic rock on the earth's surface.

1) Stay a volcanic rock. Roll again.
2) Stay a volcanic rock. Roll again.
3) You are broken down by the wind and rain into very small pieces. Go to hydrosphere/biosphere.
4) You are broken down by the wind and rain into small pieces. Go to sediments.
5) Get buried deeply into the earth by sediments. you are get surrounded by red hot lava. You get re-melted. Go to magma.
6) You Get buried deeply by sediments and get pushed to great depths as mountains pile up on top of you. You experience high heat and get re-melted. Go to magma.

Station #3 Sedimentary Rock

You are now a sedimentary rock in the upper part of the Earth's crust.

1) Stay a sedimentary rock. Roll again.
2) You become exposed and broken down by the wind and rain. Go to hydrosphere/biosphere.
3) You become exposed and broken down by the wind and rain. You have now become small grains of sand called sediment. Go to sediments.
4) A magma body intrudes nearby. Experience high heat and pressure get metamorphosed. Go to metamorphic rock.
5) You are surrounded by red hot lava. You get re-melted. Go to magma.
6) Get pushed deep into the earth because mountains pile up on top of you. You experience high heat and pressure and get changed a lot! Go to metamorphic rock.

Station #4
Metamorphic Rock

You are now a metamorphic rock in the earth's crust.

1) Stay a metamorphic rock. Roll again.
2) Stay a metamorphic rock. Roll again.
3) Stay a metamorphic rock. Roll again.
4) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. Go to hydrosphere/biosphere.
5) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. You have now become small grains of sand called sediment. Go to sediments.
6) You are surrounded by red hot lava. You get re-melted. Go to magma.

Station #5 Sediments

You are now sediments at the earth's surface.

1) Stay sediments. Roll again.
2) Stay sediments. Roll again.
3) Stay sediments. Roll again.
4) Get buried deeply by other sediments. Undergo compaction and cementation and become sedimentary rocks. Go to sedimentary rocks.
5) Get buried deeply by other sediments. Undergo compaction and cementation and become sedimentary rocks. Go to sedimentary rocks.
6) Get buried deeply by other sediments. Undergo compaction and cementation and become sedimentary rocks. Go to sedimentary rocks.

Station #6 Magma

You are now magma in the earth's crust.

1) Stay magma. Roll again.
2) Stay magma. Roll again.
3) You cool off while in the crust and become an igneous rock. Go to igneous rock.
4) You cool off while in the crust and become an igneous rock. Go to igneous rock.
5) Get erupted through a volcano! You cool off on the earth's surface. Go to volcanic rock.
6) Get erupted through a volcano! You cool off on the earth's surface. Go to volcanic rock.

Station #7 (Chemical) Sedimentary Rock

You are now a chemically-created sedimentary rock near the earth's surface.

1) Stay a chemical sedimentary rock. Roll again.
2) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. Go to hydrosphere/biosphere.
3) Get pushed up to the surface during an earthquake! You become exposed and broken down by the wind and rain. You have now become small grains of sand called sediment. Go to sediments.
4) Get buried under other sedimentary rocks. You experience high heat and pressure and get changed a lot! Go to metamorphic rock.
5) Get buried under other sedimentary rocks. you are surrounded by red hot lava. You get re-melted. Go to magma.
6) Get pushed deep into the earth because mountains pile up on top of you. You experience high heat and pressure and get changed a lot! Go to metamorphic rock.

Station #8 Mantle Rock

You are a rock found in the earth's mantle.

1) Stay mantle rocks. Roll again.
2) Stay mantle rocks. Roll again.
3) Stay mantle rocks. Roll again.
4) Stay mantle rocks. Roll again.
5) Stay mantle rocks. Roll again.
6) You get partially melted and become magma. You get pushed up through cracks in the ocean floor. After cooling quickly, you form part of the oceanic crust. Go to oceanic crust.

Station #9 Oceanic Crust

You are now a rock that on the bottom of the ocean.

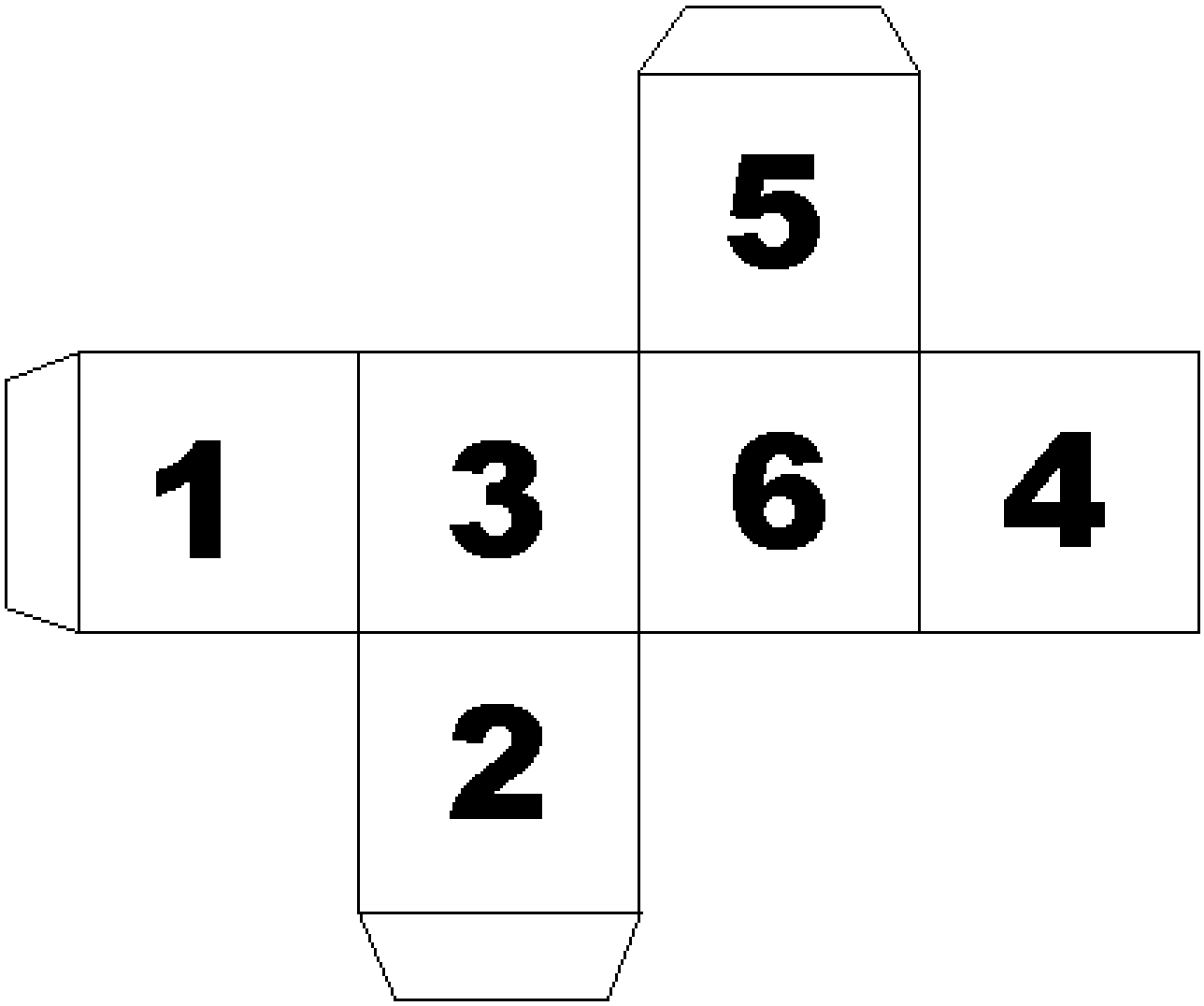
1) Stay oceanic crust. Roll again.
2) Get pushed down into the mantle by an earthquake! Go to mantle rocks.
3) Get pushed down into the mantle by an earthquake! Go to mantle rocks.
4) Get pushed down into the mantle by an earthquake! Go to mantle rocks.
5) Get pushed down into the mantle by an earthquake! You get surrounded by lava that causes you to melt. Go to magma.
6) Get pushed down into the mantle by an earthquake! You get surrounded by lava that causes you to melt. Go to magma.

Station #10
Hydrosphere/Biosphere

You are now very very tiny pieces of rock in an ocean, river, plant, animal, etc.

1) Stay in the hydrosphere/biosphere. Roll again.
2) Stay in the hydrosphere/biosphere. Roll again.
3) Get used by organisms in the ocean as part of their shell. When the organism dies, you rest on the ocean floor and are chemically changed into sedimentary rock. Go to (chemical) sedimentary rock.
4) Get used by organisms in the ocean as part of their shell. When the organism dies, you rest on the ocean floor and are chemically changed into sedimentary rock. Go to (chemical) sedimentary rock.
5) Get used by organisms in the ocean as part of their shell. When the organism dies, you rest on the ocean floor and are chemically changed into sedimentary rock. Go to (chemical) sedimentary rock.
6) Get used by organisms in the ocean as part of their shell. When the organism dies, you rest on the ocean floor and are chemically changed into sedimentary rock. Go to (chemical) sedimentary rock.

Pattern for Die



Unit Six Test

Match the words in the first column to the best available answer in the second column.

____ **mined**	1) process by which natural resources are removed from the Earth
____ **luster**	2) top layer of solid rock beneath the soil
____ **igneous rock**	3) a mixture of two or more minerals
____ **sedimentary rock**	4) a solid that is made up of a group of the same atoms or molecules
____ **sediments**	5) a solid material that has all of its molecules lined up, in a pattern
____ **metamorphic rock**	6) the study of the Earth and its rocks and minerals
____ **metamorphosis**	7) flat and smooth sides of a mineral
____ **processed**	8) rough and jagged sides of a mineral
____ **rock cycle**	9) colored line that remains after a mineral is rubbed against a white object

___ **bedrock**	10) the ability of a mineral to shine
___ **rock**	11) a type of rock that is formed when molten rock (magma) is cooled and hardened
___ **mineral**	12) a type of rock that is formed from the weathering, erosion and deposition of the Earth's crust
___ **crystal**	13) tiny rocks, mud and sand that is eroded from the Earth's crust; used to form sedimentary rocks
___ **geology**	14) type of rock that is formed from heat and pressure within the Earth
___ **cleavage**	15) a change
___ **fracture**	16) method of taking minerals out of a rock
___ **streak**	17) The recycling of rocks (and the minerals inside them)

Which one is right? Circle the correct answer.

1. Which of the following is false?
   a) rocks are made up of two or more minerals
   b) minerals are made up of two or more rocks
   c) minerals may be formed into the shape of crystals

2. After mining for rocks, what is the next step in getting to the minerals?
   a) weathering
   b) processing
   c) erosion

3. Ways to identify the type of rock you have include…
   a) cleavage, streak, fracture and hardness
   b) luster, smell, streak and cleavage
   c) cleavage, streak, taste and hardness

4. Sedimentary rocks are formed by which of the following?
   a) deposition of sediments
   b) weathering and erosion
   c) deposition of crystals

5. The rock cycle describes how rocks are…
   a) processed
   b) mined
   c) recycled

6. Everything in our lives is either…
   a) grown and processed
   b) mined and grown
   c) processed and mined

Three friends went walking on a beach. They looked closely at the sand and noticed it was made up of small pieces of rock. Each of them had different ideas as to where the sand came from.

Sam: "I think the sand came from mountains and other landforms."

Joe: "I think the sand came from rocks on the ocean floor."

Nancy: "I think the sand came from undersea mountains and other faults in the ocean."

Which friend do you agree with and why? Explain how you think the sand was formed and ended up on the beach.

Unit Six Test Answer Key

Page 1:

1- mined
2-bedrock
3-rock
4- mineral
5- crystal
6-geology
7-cleavage
8-fracture
9-streak
10- luster
11-igneous rock
12-sedimentary rock
13- sediments
14-metamorphic rock
15-metamorphosis
16- processed
17-rock cycle

Page 2:

1) B
2) B
3) A
4) A
5) C
6) B

Page 3:

Sam is the best choice. Beach sand is formed from the weathering of rock from surfaces on the earth. Erosion carries these sediments to the ocean where they end up being washed up on the beach.

WEEK 25:

Intro to Soil

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Large dish pan
Drinking glass shorter than the pan
Plastic wrap
Several clean marbles
Masking tape
Muddy water

Soil sample of sand, silt, clay and gravel mixed together
1 quart jar
Alum (optional)
Water

You and your child(ren) will be covering the following Science Standards this week:

Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.

Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.

Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.

Definitions:

Soil	a mixture of minerals and biotic material found on the outside of our crust which is responsible for all plants to grow
Biotic resources	living or dead organisms
Decomposers	organisms that break down dead organisms into smaller pieces
Parent material	original layer of bedrock in an area; responsible for providing most of the minerals within the soil
Topography	("toe-pog-gra-fee"); the shape of the land

Sample Questions to ask after your child finishes their reading for Day One:

What two things make up soil?

Minerals and biotic material make up our soil.

Where does parent material come from?

Parent material are layers of deposited sediments from the processes of weathering and erosion.

Why does it take so much time to make soil?

The creation of sediments from weathering take a long time to accomplish. In addition, the changing climate of an area affects the number and amounts of erosion, plants and animals, all which affect the formation of soil.

Why is the soil on the side of a mountain so thin?

Erosion carries most of the soil down the side of the mountain very quickly.

Answers to Worksheet Questions for Day One:

Page One:

2-biotic resources
3-decomposers
4-parent material
1-soil
5-topography

Page Two:

Check your child's work!

Page Three:

Answers will vary. The following information will be helpful:

Parent material - Parent material is the original layer of bedrock in an area. Over large amounts of time, this bedrock goes through weathering and erosion. This weathering provides most of the minerals that are found within the layers of sediment that form on top of itself.

Climate - The different ways that parent material can go through weathering and erosion can affect the kind of soil in that area! This means the different seasons, changes in temperature every day and the amount of rain and snow all affect the kind of soil you can find in an area!

Organisms - Some organisms mix soil together as they dig holes in the soil. Leaves from trees fall to the ground where Decomposers mix the dead biotic material with the soil. The roots of plants move soil around too! Even small plants, like grass, move a huge amount of soil!

Topography - As you know, the earth is not flat! There are many hills and mountains on our planet. The shape of the land affects the kinds of soil you find in these areas.

Time - It takes a great deal of time for soil to form...

The weathering of parent material does not happen very fast!
The climates of areas can change over long periods of time.
The organisms living in an area are determined by the changes in its topography and climate!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Purifying Water"

The following list will give you the most important items to review for your activity today!

The use of evaporation to purify water is a very simple method of obtaining water that is taught by most survival experts.

In order to be 100% certain of the purity of your sample (since you are probably not in a life-or-death situation), you will want to boil your water... just to be certain!

Purifying water

Children will create a solar still to purify muddy water.

Materials:

Large dish pan
Drinking glass shorter than the pan
Plastic wrap
Several clean marbles
Masking tape
Muddy water

Activity:

1) Put about 2 inches of muddy water into the large dish pan and place the drinking glass in its center. You may need a few of the marbles inside the drinking glass to weigh it down.
2) Cover the pan with the plastic wrap, leaving a little slack. You may need to use the masking tape to keep the plastic in place.
3) Put a marble in the center of the plastic wrap so that there is a slight dip in the plastic over the drinking cup. The plastic should not touch the cup.
4) Place this device in direct sunlight. Over several hours, water that condenses on the plastic will drip into the cup.

Explanation:

This device uses the natural process of evaporation and condensation to purify water. As the sun heats the muddy water, it turns into vapor. This leaves the mud behind! The vapor comes into contact with the plastic covering and condenses back into liquid form. Gravity pulls the droplets downward, until it drips into the drinking glass. The water that falls into the glass has been purified! But, just to be certain, do not drink this water until you have boiled it and allowed it to cool!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Soil Shake"

The following will give you the most important items to review for your activity today!

Most soils are made up of a collection of sand, silt, clay and gravel. These particles that make up soil are grouped according to size:

Clay *= less than 0.002 mm*
Silt *= 0.002 to 0.06 mm*
Sand *= 0.06 to 2.0 mm*
Gravel *= greater than 2.0 mm*

Gravel, being denser than the other particles, will settle on the bottom first. The next largest particle, sand, will settle on top of the gravel and so on.

Soil shake

Children will study different soil types

Materials:

1 quart jar
Water
Alum (optional)
Soil sample of sand, silt, clay and gravel mixed together

Activity:

This activity will not work with most potting soil. Potting soil is made up of mostly organic matter. This activity is designed to determine soil texture by evaluating soil (mineral) particle size.

1) Place 1 inch of each type of soil into the quart jar. Add water until the jar is 2/3 - 3/4 full. Add one teaspoon of alum (optional!!! Alum is a water softener, found on the spice aisle of most grocery stores; it does help the soil settle faster, but it is not necessary)
2) Shake the jar vigorously until all the particles have been sufficiently wet and separated by the water, about 2 minutes.
3) Set the jar down and allow the soil to settle.
4) After 1 minute measure the amount of soil on the bottom of the jar. Record this information
5) Allow the sample to settle for 3 to 4 hours, then measure again and record the level of the silt. This is your second layer. This would be a good time to explain that soil pieces, are comprised of different size particles.
6) The rest of the soil (or clay particles) may take the next couple of days to a week to settle depending on the amount of clay in the sample.

Explanation:

Most soils are made up of a collection of sand, silt, clay and gravel. These particles that make up soil are grouped according to size:

Clay = less than 0.002 mm
Silt = 0.002 to 0.06 mm
Sand = 0.06 to 2.0 mm
Gravel = greater than 2.0 mm

Gravel, being denser than the other particles, will settle on the bottom first. The next largest particle, sand, will settle on top of the gravel and so on.

WEEK 26:

Soil: Digging deeper

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One clear container (about one cup)
One spoon
Small bag of candy coated chocolate (with or without nuts)
Small container of pudding (chocolate or butterscotch)
Small bag of gummy worms
Colored sprinkles
Two or three chocolate sandwich cookies, crushed
Paper and pencil
One cup of gravel, sand and clay
One plastic/glass container
Water
Measuring cup
Sawdust and flour (optional)

You and your child(ren) will be covering the following Science Standards this week:

Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.

Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.

Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.

Definitions:

Soil horizon	different layers in the soil which are stacked on top of each other
Soil profile	all of the layers in the soil in a particular area
Topsoil	the soil horizons on the top of a soil profile
Subsoil	soil horizon directly below the topsoil
Humus	layer of "dead stuff" that is found inside topsoil which is always decomposing into smaller pieces
Soil texture	("tecks-ture"); appearance of soil based on the size of the minerals found within it
Sandy	type of soil which contains the largest pieces of minerals (sand)
Silt	type of soil which contains medium-sized pieces of minerals
Clay	type of soil which contains the smallest pieces of minerals

Sample Questions to ask after your child finishes their reading for Day One:

Which is larger: A soil horizon or a soil profile?
A soil profile is larger. It is made up of layers of soil horizons.

Which type of soil horizon has the best soil to grow crops?
Topsoil is the best soil horizon to grow crops.

What is the best combination of soil to grow plants?
A mixture of silty soil and humus is the best combination to grow plants.

What is the worst kind of soil texture for growing plants?
Clay is the worst soil texture for growing plants.

Answers to Worksheet Questions for Day One:

Page one:

9- clay
5-humus
7-sandy
8-silty
1-soil horizon
2-soil profile
6-soil texture
4-subsoil
3-topsoil

Page two:

1) C
2) A
3) B
4) A
5) B
6) A

Page three:

Location #1: clay soil
Location #2: sandy soil
Location #3: a mixture of sand, soil and clay

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Better Recipe for Soil"

The following list will give you the most important items to review for your activity today!

The layers of the soil begin with the topsoil (naturally, on top) and the parent material (usually consisting of large slabs of rock) on the bottom. The subsoil is found between these two layers.

A better recipe for soil...

Children will create a model for soil.

Materials:

One clear container (about one cup in volume)
One spoon
Small bag of candy coated chocolate (with or without nuts)
Small container of pudding (chocolate or butterscotch)
Small bag of gummy worms
Colored sprinkles
Two or three chocolate sandwich cookies, crushed
Paper and pencil

Activity:

1) Review the layers of soil with the child in their proper order:
   Topsoil, subsoil, parent material
2) Instruct the child to create their own soil horizon by adding a scoopful of candy-coated chocolates to the bottom of the container. Next, add a layer of pudding followed by the cookie crumbs, sprinkles and the gummy worm.
3) Ask the child to draw their soil horizon on their paper. Each layer should be labeled. In addition, ask them why a gummy worm and sprinkles were placed in their horizon?

Explanation:

The parent material in this soil horizon would be the candy-coated chocolates. Most parent material is made up of very large slabs of rock that are sandwiched together... just like the candy!

On top of the parent material, the subsoil can be found. This layer of soil contains fine pieces of rock and minerals that look and feel very much like clay. The pudding resembles the subsoil as both items do not have many cracks and other openings in their structure.

On top of the subsoil you find the topsoil. The cookie crumbs resemble the topsoil very well. Unlike the subsoil, this layer contains many cracks and openings... just like the crushed cookies!

The sprinkles are added to the horizon to model the tiny organisms that live inside the soil. Most of these organisms are found in the topsoil, as are many different kinds of worms. This is why you placed a gummy worm onto your topsoil as well (plus, it makes it taste so much better!)

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Tight Spaces"

The following will give you the most important items to review for your activity today!

It is a common misconception that solid rock is actually solid. Even within "solid rock" there are millions of little cracks in its surface.

ESP Activity: Tight Spaces

Porosity of rock will be examined in this activity.

Materials:

One cup of gravel, sand and clay
One plastic/glass container
Water
Measuring cup
Sawdust and flour (optional)

Activity:

1) Place the cup of gravel into the container.
2) Measure one cup of water and pour this water into the container until it reaches the top of the gravel.
3) Record the amount of water that you used to fill the container. If you need more water, refill the measuring cup again.
4) For experimentation, repeat this experiment with the sand and clay.

Explanation

It is a common misconception that solid rock is actually solid. Even within "solid rock" there are millions of little cracks in its surface. It would take a considerable amount of time to prove this to you. Therefore, you are using three different substances that each contains a different amount of "empty space" between each particle. The gravel will have the largest spaces between each particle and should be able to hold more water than the sand or clay.

If you do not have a cup of clay just lying around, mix together four parts of sawdust (you can get a bucketful for free at most large hardware stores) with three parts flour and two parts water. Together, these three substances will make suitable clay. If left alone for a couple of days, it will harden nicely!

Independent variable: Size of the particles
Dependent variable: Amount of water to be held
Hypothesis:

If the SIZE OF THE PARTICLES is (increased/decreased), then the AMOUNT OF WATER TO BE HELD will (increase/decrease).

WEEK 27:

Life inside the soil

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Two or three Baked Potatoes - halved
Small plastic "baggies"
Toothpicks
Magnifying lens (optional)
Soup can with both ends removed
Wire mesh (small amount from an old screen door)

Jar
Spoon
Water
Paper towels
Magnifying glass

You and your child(ren) will be covering the following Science Standards this week:

Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.

Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.

Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.

Definitions:

Bacteria	tiny organisms that can be found within soil; responsible for decomposing biotic material
Symbiosis	("sim-by-o-sis"); the ability of different kinds of organisms to work together in order to survive
Fixing nitrogen	the ability of a bacteria to turn the nitrogen gas in the soil into form that a plant can use
Amoeba	("ah-me-bah"); organism (called a "protozoa") which lives inside a thin covering of water around a tiny piece of soil and eats bacteria
Fungus	("fun-guy"); organism in the soil which decomposes biotic material; much larger than bacteria
Earthworms	organisms which move through the soil by swallowing soil, along with its bacteria and amoeba

Sample Questions to ask after your child finishes their reading for Day One:

What is the most important organism for our soil?
Bacteria are the most important organism for our soil.

How do bacteria and plants go through symbiosis?
Some bacteria can "fix nitrogen" in the soil for the plant to use.

What keeps bacteria from eating up all the nutrients in soil?
Organisms called amoeba live in the soil and eat bacteria in great numbers.

Why is it good for bacteria to be eaten by an earthworm?
The inside of an earthworm is a great place for bacteria to grow.

Answers to Worksheet Questions for Day One:

Page one:

6-earthworms
4-amoeba
1-bacteria
3-fixing nitrogen
5-fungus
2-symbiosis

Page two:

ACROSS	DOWN
1-amoeba	2-bacteria
5-fixing nitrogen	3-earthworms
6-symbiosis	4-fungi

Page three:

Comparisons between bacteria and fungi

- Both have a symbiotic relationship with plants
- Both can be found in soil

Differences between bacteria and fungi

- There is much more bacteria than fungi in the soil
- Bacteria can fix nitrogen

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Baked Potato Trap"

The following list will give you the most important items to review for your activity today!

Potatoes are made of mostly starch, a storehouse for carbohydrates.

These carbohydrates are an excellent food source for invertebrates and can be used to "lure" these small organisms into a trap.

A Baked Potato Trap

Children will create a trap to collect invertebrates.

Materials:

Two or three Baked Potatoes - halved
Small plastic "baggies"
Toothpicks
Magnifying lens (optional)

Activity:

1) Prepare baked potatoes and place cut side down outside on a area of moist soil.
2) Repeat in well-drained and/or dry soil.
3) Allow the potatoes to remain undisturbed for 24-48 hours.
4) Remove potato carefully from the soil and examine. (invertebrates may have penetrated interior of potato - use toothpick to look for them!)
5) Use hand lenses to observe the organisms.
6) Ask the child if there appears to be any differences in the types of organisms found at each site. Allow them to explain why they believe these differences exist. (Answers will vary. Focus on the ability of organisms to move easily through the moist soil as compared to the dry or well-drained soil.)

Explanation:

The starch found within the potato is an excellent food source for invertebrates. Most organisms will be discovered in the moist soil due to the presence of water which provides a necessary resource for survival and a means of transportation for invertebrates.

Other foods can be used to “bait” invertebrates in the soil. Once captured, older students may be asked to classify the specimens according to color, shape, size, etc...

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Critters Under your Feet"

The following will give you the most important items to review for your activity today!

The device you will build in this activity is known as a Berlese funnel. It works by driving the organisms from the soil as they move away from the heat and light of the sun. As these organisms tunnel deeper into the soil, they fall through the wire mesh and into the jar.

Critters under your Feet

Children will create a simple device to find small soil animals.

Materials:

Soup can with both ends removed
Wire mesh (small amount from an old screen door)
Jar
Spoon
Water
Paper towels
Magnifying glass

Activity:

1) Dampen several paper towels with water and use them to line the bottom of a jar.
2) Rest a funnel in the mouth of the jar. Insert a small round piece of mesh into the funnel mouth.
3) Place the can onto the wire mesh and insert several spoonfuls of soil into the can.
4) Leave this device in full sunlight for a day or two.
5) Look for small creatures on the paper towels at this time with your magnifying glass.

Explanation:

This device is known as a Berlese funnel. It works by driving the organisms from the soil as they move away from the heat and light of the sun. As these organisms tunnel deeper into the soil, they fall through the wire mesh and into the jar. If you find small animals that look like pieces of moving thread, you have found organisms called nematodes. You can try this activity with all different kinds of soil. You can even use frozen soil in the wintertime as well!!! Many soil animals hibernate during this period.

WEEK 28:

Protecting our soil

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Sand
Newspaper
Empty jar (about the size of a small pickle jar)
Shoebox lid (any lid of similar size/shape will work)
Drinking cup
Water
Red, grape or orange soda
One generous scoop of Vanilla ice cream

Clear soda pop
Small gummy bears, chocolate chips, crushed cookies, cereal, crushed ice or other material to represent sand and gravel
Cake decoration sprinkles
Drinking straw
Clear plastic cup
Ice Cream scoop
Spoon

You and your child(ren) will be covering the following Science Standards this week:

Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.

The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Definitions:

Land clearing	the movement of land to create new buildings
Pollution	("pole-loo-shun"); an unwanted item or items that can be found in the air, water or soil
Salination	when an area of soil becomes very full of salt
Windbreak	a row of trees planted on the edge of a farm; roots of trees do a very good job in holding the topsoil together and the trees themselves block wind from eroding the field
Terracing	("tare-a-cing"); method of cutting many different flattened layers into the ground to form a pyramid shape
Harvest	to pick crops
Terraces	the flattened layers of land created by terracing
Contour plowing	("kon-tour"); to dig small trenches or valleys into the soil around a hill in order to plant seeds
Cover crops	plants that are grown on unused areas of land

Sample Questions to ask after your child finishes their reading for Day One:

How are trees important in protecting our soil?
Tree roots hold topsoil together which prevents wind and water from eroding the land.

How can evaporation affect the amount of salt in the land?
When water is evaporated from the ground, the chemicals in the soil are left behind.

How would you plant your crops if your land had many small hills?
Contour plowing would be the best way to plant seeds on land with many small hills.

What is the importance of cover crops?
The leaves and roots of small plants grown over unused farmland protect the soil by holding it together.

Answers to Worksheet Questions for Day One:

Page One:

8-contour plowing
9-cover crops
6-harvest
1-land clearing
2-pollution
3-salination
7-terraces
5-terracing
4-windbreak

Page Two:

Terraces - the flattened layers of land created by terracing
Salination - When an area of soil becomes very full of salt
Pollution - an unwanted item or items that can be found in the air, water or soil
Cover crops - plants that are grown on unused areas of land

Page Three:

Answers will vary; however, the following information should be present:

If a farmer's field is full of small hills, terracing may not be the best way to protect the soil. In this case, the farmer may want to try contour plowing ("kon-tour"). To "plow" a field means to dig small trenches or valleys into the soil in order to plant seeds. This creates rows in a field where plants can be harvested from later in the year.

When a farmer uses contour plowing, he plows around the small hill. Imagine putting on a large bead necklace. It goes over your head and rests on your shoulders, right? Now imagine putting on another necklace, and another, and another! All of these necklaces follow the "contours" of your body. This is what happens in contour plowing... the rows of crops can be followed around the small hill... just like the bead necklaces can be followed around your neck and shoulders! These rows slow down water from running downhill! By slowing down the moving water, a farmer can protect the soil by slowing down erosion!

Unit Seven Review Answer Key

1) amoeba
2) bacteria
3) biotic resources
4) clay
5) contour plowing
6) cover crops
7) decomposers
8) earthworms
9) fixing nitrogen
10) fungus
11) harvest
12) humus
13) land clearing
14) parent material
15) pollution
16) salination
17) sandy
18) silty
19) soil
20) soil horizon
21) soil profile
22) soil texture
23) subsoil
24) symbiosis
25) terraces
26) terracing
27) topography
28) topsoil
29) windbreak

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Wearing Down the Planet..."

The following list will give you the most important items to review for your activity today!

Once rock has been broken up by weathering the small pieces can be moved by water, ice, wind, or gravity. Everything that happens to cause rocks to be carried away is called erosion.

The natural process of erosion may work slowly, but it is very destructive! Over time, erosion can wear away a mountain until it is level with the plain!

Wearing down the planet…

Children will explore several models of erosion.

Materials:

Sand
Newspaper
Empty jar (about the size of a small pickle jar)
Shoebox lid (any lid of similar size/shape will work)
Drinking cup
Water

Activity:

#1: Sand Dunes

Place sand in a pile outside and blow gently onto the pile. Observe what happens. What happens when you blow on the sand? If you blew long enough, could the entire pile be moved? Yes it could!!!

#2: Windblown Deposits

Place the box lid on the center of the newspaper outside. Fill the small empty jar with sand and place it inside the box lid near the center. Blow gently on the sand, increase the strength of your breath until sand is being thrown from the jar. Continue blowing for 5 to 10 seconds at this rate. Now Examine the sand in the newspaper by rubbing your finger over it. Do the same to the material trapped in the box lid.

You should notice that the sand on the newspaper is much finer than the sand trapped in the lid.

#3: Water Erosion

Find a spot of bare dry earth. Pour a cupful of water on it. Repeat on the same spot, but this time hold the cup from as high a distance as possible. Ask the child how the earth changed from the first cup of water as compared to the second cup of water?

Explanation:

Once rock has been broken up by weathering the small pieces can be moved by water, ice, wind, or gravity. Everything that happens to cause rocks to be carried away is called erosion. The natural process of erosion may work slowly, but it is very destructive! Over time, erosion can wear away a mountain until it is level with the plain!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Earth Parfaits"

The following will give you the most important items to review for your activity today!

Groundwater is water that is found underground in the cracks and spaces in soil, sand and rock. Groundwater is stored in--and moves slowly through--layers of soil, sand and rocks.

Earth Parfaits

Children will create an edible model of our groundwater supply.

Materials:

Red, grape or orange soda
One generous scoop of vanilla ice cream
Clear soda pop
Cake decoration sprinkles
Small gummy bears, chocolate chips, crushed cookies, cereal, crushed ice or other material to represent sand and gravel
Drinking straw
Clear plastic cup
Ice Cream scoop
Spoon

Activity:

1) Fill a clear plastic cup 1/3 full with gummy bears, chocolate chips, or crushed ice (represents gravels and soils)
2) Add enough clear soda to just cover the candy/ice.
3) Add a layer of ice cream to serve as a "cap" over the water-filled aquifer. Under the ground, this "cap' would most likely be a large slab of rock that keeps the water from escaping through the crust.
4) Now add more "sand/gravel" on top of the "cap."
5) Colored sprinkles represent soils and should be sprinkled over the top to create the porous top layer (top soil).
6) Now add the colored soda (this represents contamination.) Watch what happens when it is poured on the top of the "aquifer." Point out that the same thing happens when contaminants are spilled on the earth's surface.
7) Drill a well into the center of your model using a drinking straw.
8) Slowly begin to pump the well by sucking on the straw. Watch the decline in the water table (the layer of clear soda on the bottom.)
9) Notice how the contaminants can get sucked into the well area and end up in the groundwater by leaking through the "cap."
10) You can now simulate rain by adding more clear soda over your model.

Explanation:

When rain falls to the ground it never stops moving. Some of it flows along the surface to streams or lakes, some of it is used by plants, some evaporates and returns to the atmosphere, and some sinks into the ground.
Groundwater is water that is found underground in the cracks and spaces in soil, sand and rock. Groundwater is stored in--and moves slowly through--layers of soil, sand and rocks.

Pollution can readily sink into groundwater supplies. Groundwater can be polluted by landfills, septic tanks, leaky underground gas tanks, and from overuse of fertilizers and pesticides. If groundwater becomes polluted, it will no longer be safe to drink.

Unit Seven Test

Match the words in the first column to the best available answer in the second column.

___**soil**	1) a mixture of minerals and biotic material found on the outside of our crust which is responsible for all plants to grow
___**humus**	2) living or dead organisms
___**soil texture**	3) organisms that break down dead organisms into smaller pieces
___**sandy**	4) original layer of bedrock in an area; responsible for providing most of the minerals within the soil
___**silty**	5) the shape of the land
___**clay**	6) different layers in the soil which are stacked on top of each other
___**bacteria**	7) all of the layers in the soil in a particular area
___**symbiosis**	8) the soil horizons on the top of a soil profile
___**fixing nitrogen**	9) soil horizon directly below the topsoil
___**amoeba**	10) layer of "dead stuff" that is found inside topsoil which is always decomposing into smaller pieces
___**fungus**	11) appearance of soil based on the size of the minerals found within it
___**biotic resources**	12) type of soil which contains the largest pieces of minerals (sand)
___**earthworms**	13) type of soil which contains medium-sized pieces of minerals

___**land clearing**	14) type of soil which contains the smallest pieces of minerals
___**pollution**	15) tiny organisms that can be found within soil; responsible for decomposing biotic material
___**salination**	16) the ability of different kinds of organisms to work together in order to survive
___**windbreak**	17) the ability of a bacteria to turn the nitrogen gas in the soil into form that a plant can use
___**terracing**	18) organism (called a "protozoa") which lives inside a thin covering of water around a tiny piece of soil and eats bacteria
___**harvest**	19) organism in the soil which decomposes biotic material; much larger than bacteria
___**terraces**	20) organisms which move through the soil by swallowing soil, along with its bacteria and amoeba
___**contour plowing**	21) the movement of land to create new buildings
___**cover crops**	22) an unwanted item or items that can be found in the air, water or soil
___**decomposers**	23) When an area of soil becomes very full of salt
___**parent material**	24) a row of trees planted on the edge of a farm
___**topography**	25) method of cutting many different flattened layers into the ground to form a pyramid shape
___**soil horizon**	26) to pick crops
___**soil profile**	27) the flattened layers of land created by terracing
___**topsoil**	28) to dig small trenches or valleys into the soil around a hill in order to plant seeds
___**subsoil**	29) plants that are grown on unused areas of land

Which one is right? Circle the correct answer.

1. Which is larger?

a) soil texture
b) soil horizon
c) soil profile

2. Which of these is the most important organism for our soil?

a) amoeba
b) earthworms
c) bacteria

3. Which two of these items make up soil?

a) bacteria and humus
b) minerals and biotic material
c) topsoil and parent material

4. It takes a long time to make soil because...

a) the creation of sediments from weathering take a long time
b) decomposers are so small
c) there is so much erosion on the planet

5. Trees protect our soil because...

a) trees provide nutrients into the soil
b) tree leaves keep the surface of the Earth cooler
c) trees hold onto the soil to prevent erosion

6. Where would you find the most humus in soil?

a) topsoil
b) the soil horizon below the topsoil
c) subsoil

How might soil erosion affect people?

Unit Seven Test Answer Key

Page one:

1-soil
10-humus
11-soil texture
12-sandy
13-silty
14-clay
15-bacteria
16-symbiosis
17-fixing nitrogen
18-amoeba
19-fungus
2-biotic resources
20-earthworms
21-land clearing
22-pollution
23-salination
24-windbreak
25-terracing
26-harvest
27-terraces
28-contour plowing
29-cover crops
3-decomposers
4-parent material
5-topography
6-soil horizon
7-soil profile
8-topsoil
9-subsoil

Page two:

1) C
2) C
3) B
4) A
5) C
6) A

Page three:

Answers will vary. Accept all reasonable answers which may include the following:

Loss of topsoil in which crops are grown

Creation of rills, or channels, which are difficult or impossible to cultivate

Turbid, or muddy, streams and rivers (which reduces the ability of fish to obtain oxygen)

Sedimentation (which causes streams to become shallower-and, thus, warmer, which may cause coldwater fish, such as trout, to disappear

WEEK 29:

Earth's systems

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Seven or eight clear plastic salad trays
(you can find these at deli's,
supermarkets, etc...)
Permanent marker
Scissors
Tape

Photocopier (optional)
metal baking pan will work fine
Two sheets of newspaper
plastic wrap that is much larger than the
size of the baking pan

You and your child(ren) will be covering the following Science Standards this week:

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Definitions:

Classify	to put into groups
Lithosphere	("lith-ohs-fear"); sphere of the earth which contains all of the solid land (rocks, minerals and soil) that can be found on the earth's crust
Atmosphere	("at-mohs-fear"); sphere which contains all of the wind, gases and storms in the air
Hydrosphere	("high-drohs-fear"); sphere which contains all of the water in the earth whether in the air, on land or in the sea
Biosphere	("bi-ohs-fear"); sphere which contains all of the living organisms on the planet
Sphere	a category made by scientists to describe four different areas of the earth - living organisms, solid earth, liquid water and all of the gases
System	a collection of all spheres which work together in any area of the earth

Sample Questions to ask after your child finishes their reading for Day One:

What would you study if you were looking at the lithosphere?
All aspects of the solid earth is part of the lithosphere.

Why do you think scientists classified all of the earth into spheres?
By placing the earth into separate groups, it is easier to understand how they all work together.

Which sphere(s) would you find living organisms?
You can find living organisms in the hydrosphere, atmosphere and the lithosphere.

Provide one example of how you work within each of the four spheres.
Answers will vary.

Answers to Worksheet Questions for Day One:

Page one:

3-atmosphere
5- biosphere
1- classify
4-hydrosphere
2-lithosphere
7-system
6-sphere

Page two:

Check your child's work!

Page three:

Answers will vary!

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "3D Salad Tray Maps"

The following list will give you the most important items to review for your activity today!

A topographic map is used to give the viewer an idea of the elevation for a specific area of land. The lines within a topographic map are called contour lines. Each line represents a change in the elevation of the map.

3D Salad Tray Maps

Children will create 3-d model of a topographic map.

Materials:

Permanent marker
Scissors
Tape
Island outline (provided)
Photocopier (optional)
Seven or eight clear plastic salad trays (you can find these at deli's, supermarkets, etc...)

Activity:

1) You will want to cut out the outline of the island found on the map with this activity.

   Parents: You may need to help your child with this part!!! It is very important that you cut this island picture out so that it can be secured within several different salad trays in the very same position. For example... if the salad tray has a square-shaped flat bottom that is clear, you will want to cut out the island picture in the same shape and dimensions as the tray!

2) After acquiring the plastic salad trays, make certain that the entire island can fit within the flat bottom of the clear tray. If it is too large, you may need to reduce the image with the help of a photocopier.
3) Secure your cut-out island face down onto the flat bottom of the tray with tape. Be certain that the lines on the picture are facing outside the tray.
4) Turn the tray over and, using the permanent marker, trace the outline of the island onto the outside of the tray.
5) Remove the island picture from this first tray. Then, fasten the picture in the same way to a second salad tray. This time, you will want to trace the outline of the line that is closest to the outside of the island.
6) Remove the island picture and repeat this again with the remaining salad trays. Each tray should contain the outline of the closest line until you reach the innermost (and smallest) line on the island.

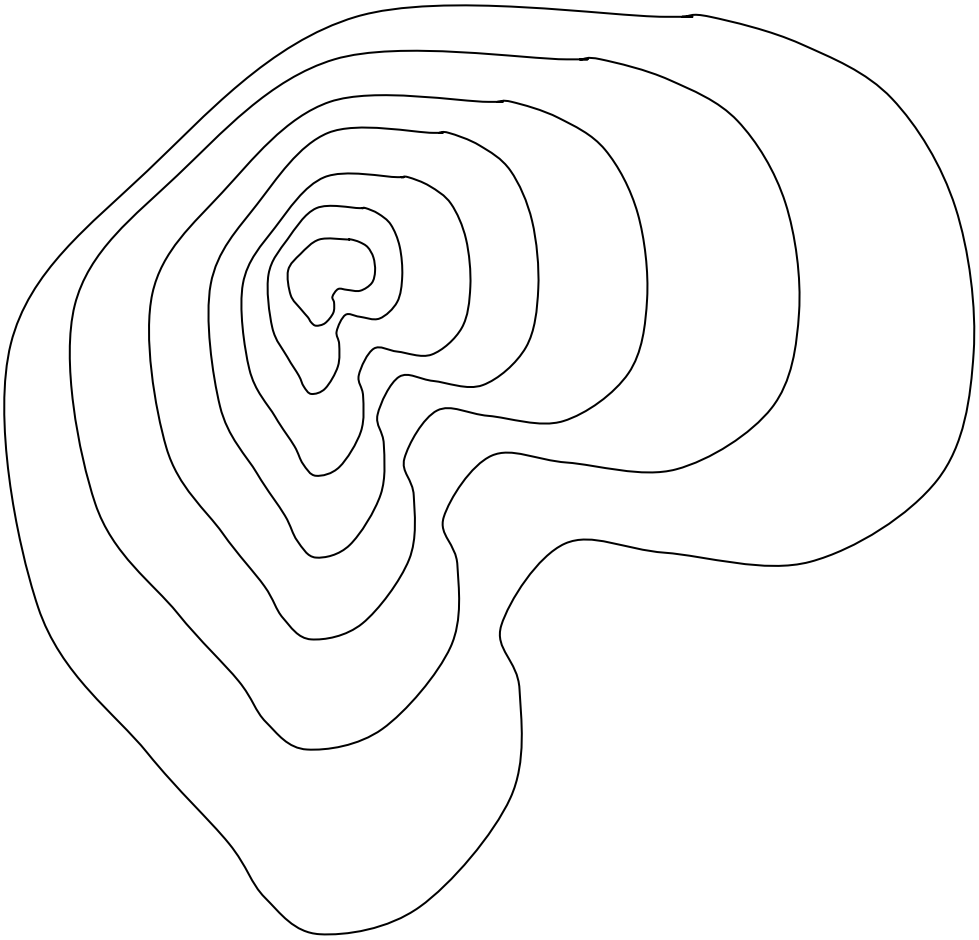
7) At this time you should have seven salad trays with seven differently sized outlines drawn onto each of them. Now you will need to stack these trays beginning with the largest outline on the bottom. As you stack the trays, you will see that a 3-d outline of the island will begin to form as you look at your stack of seven plates.

Explanation:

The island "map" that you have been tracing is a very basic example of a topographic map. A topographic map is used to give the viewer an idea of the elevation for a specific area of land. Unfortunately, a topographic map is only two-dimensional. The map you have created with the salad trays actually shows you the different elevations within the island.

The lines within the island picture are called contour lines. Each line represents a change in the elevation of the island. The smallest shape that you see inside the island represents the highest point of the area. The second largest shape can be found at a lower elevation and so on. With the help of a real topographic map of your area and a few enlarged pictures with a photocopier, you can create a 3-d topographic map of your own area.

Island Outline



Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Water on the Go"

The following will give you the most important items to review for your activity today!

A watershed is the area of land where all of the water drains to the same place – this includes water that flows on the surface and water located underground. Watersheds come in all shapes and sizes.

Watersheds cross county, state and national boundaries. All of earth's spheres interact within watersheds as they drain into streams, rivers and eventually, lakes. The introduction of pollution into any one of these systems can possibly be transported throughout the entire environment!

Water on the go!

The child will recognize that bodies of water are the end product of drainage from watersheds.

Materials:

Metal baking pan will work fine
Two sheets of newspaper
Spray bottle
One book
Baby powder
Food coloring
Plastic wrap that is much larger than the size of the baking pan

Activity:

1) Crumple each sheet of newspaper separately and place them next to each other at one end of the container. Try to vary the shape of the two.
2) Place the sheet of plastic over the crumpled newspaper, causing it to form hills over the high places, and streams and rivers in the low places. Put a book under the end of the container with the newspaper, which will allow water to flow down the streams and rivers and collect in the lake at the front of the container. The sides of the plastic sheet should be placed down into the container.
   The plastic sheet represents the ground surface covering the watershed. Looking at the watershed model, try to guess where the main rivers will flow. Now, it's time to put the model to the test.
3) Spray several pumps of water from the spray bottle on the model. Notice that each stream has its own watershed (the area that drains into it) and that the entire model is a larger watershed because all the water eventually flows into the pool at the bottom of the container.
4) Count the number of small watersheds. The model now represents a clean watershed. Let's add some pollutants.
5) Sprinkle a little baby powder over the model. The baby powder represents a variety of pollutants, including oil, road salt, animal

manure, excess fertilizers, pesticides, tiny particles of soil and other harmful materials.

6) Rapidly spray nine pumps of water over the upper portion of the watershed.
7) Observe the way in which the pollutants are carried by the water and the end condition of the lake.
8) Repeat if necessary.

Explanation:

A watershed is the area of land where all of the water drains to the same place – this includes water that flows on the surface and water located underground. Watersheds come in all shapes and sizes. They cross county, state and national boundaries. All of earth's spheres interact within watersheds as they drain into streams, rivers and eventually, lakes. The introduction of pollution into any one of these systems can possibly be transported throughout the entire environment!

WEEK 30:

Events in our spheres (part 1)

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One shoe box trimmed to two (2) inches deep, v-notched at one end, and completely lined with plastic wrap
Sprinkling can or containers (re-cycled plastic pop bottles with holes poked into the bottom)
Measuring cups
Ruler

Sod (indoor/outdoor carpet and terry cloth all work as substitutes)
Soil (enough for the five trays to be filled with the same soil)
Pinecones
Bucket of water
Foil-lined baking sheet
Oven

You and your child(ren) will be covering the following Science Standards this week:

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Definitions:

Events	changes in any of earth's spheres
Cycle	a pattern that can happen over and over again
Balance	an equal amount of two opposite items
Flow	the movement of an object

Sample Questions to ask after your child finishes their reading for Day One:

What is an example of a cycle on the Earth?
Answers will vary; examples include the water and rock cycles.

How does the Earth balance itself within the environment?
Answers will vary; every aspect of the earth is in balance with each other which includes biotic and non-biotic factors.

Would an earthquake be an example of an "event"? Why or why not?
An earthquake would be an example of an event because it causes changes within at least one of Earth's spheres.

What questions do scientists ask themselves when they study an event?
How could the Earth's spheres cause an event to take place? And what are the effects of the event on each of the Earth's spheres?

Answers to Worksheet Questions for Day One:

Page one:

3-balance
1-events
4- flow
2- cycle

Page two:

It is important to note that the answers in this week's review are predictions by the child. These answers are to be reviewed, but not graded for now! Keep these predictions until next week as they will be used in their review!

Although answers will vary, the following examples may help you to work with your child:

Lithosphere and the Hydrosphere

What are the effects of the changes in the lithosphere on the hydrosphere during a flood?	During a flood, a lot of soil (lithosphere) can be carried away to a river (hydrosphere) where it makes the water very muddy.

Lithosphere and the Biosphere

What are the effects of the changes in the lithosphere on the biosphere during a flood?	During a flood, the erosion of the soil (lithosphere) can destroy much of the plants (biosphere) in an area.

Lithosphere and the Atmosphere

What are the effects of the changes in the lithosphere on the atmosphere during a flood?	The atmosphere can produce many fronts to move over an area. This causes more rain and flooding which damages the soil (lithosphere).

Hydrosphere and the Biosphere

What are the effects of the changes in the hydrosphere on the biosphere during a flood?	Large amounts of water (hydrosphere) can hurt or kill many plants and animals (biosphere).

Hydrosphere and the Atmosphere

What are the effects of the changes in the hydrosphere on the atmosphere during a flood?	Large amounts of water vapor (hydrosphere) can condense and turn into many rain clouds as they move through the air (atmosphere).

Biosphere and the Atmosphere

What are the effects of the changes in the biosphere on the atmosphere during a flood?	Strong winds (atmosphere) that take place during heavy rains can destroy many plants in an area (biosphere).

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Keeping the Farm from Washing Away"

The following will give you the most important items to review for your activity today!

Soil erosion is an on-going and natural process--a process which has been greatly accelerated in many locations throughout the world during the last one hundred years of human activity.

Keeping the farm from washing away!

Children will learn different methods of controlling erosion.

Materials:

One shoe box trimmed to two (2) inches deep, v-notched at one end, and completely lined with plastic wrap (plastic should extend several centimeters beyond notched end)
Sprinkling can or containers (re-cycled plastic pop bottles with holes poked into the bottom)
Measuring cups
Ruler
Sod (indoor/outdoor carpet, discarded carpet, and terry cloth all work as substitutes)
Soil (enough for the five trays to be filled with the same soil)
Water
Data chart (provided)

Activity:

1) Fill the box with moist soil about 3 cm deep and pack down tightly.
2) Place the box on an incline with the v-notch at the lower end; place the measuring cup under the v-notch.
3) Sprinkle a measured amount of water on the soil tray from a height of about (12 inches) above the box.

   The same amount of water should be sprinkled during each trial. Pour steadily for five seconds.
4) Let the water in the measuring cups or catch cans settle and measure the height of sediment in the cup. Measure the amount of water that ran off into the measuring cup too. Use the attached data chart to record your information.
5) <u>Repeat this procedure using the following variables:</u>

Fill the box with moist soil about 2 cm deep and then place a layer of sod, carpet, or cloth over the top of the soil and pack down tightly.

Fill the box with moist soil about 3 cm deep and, using your finger, make packed furrows (shallow trenches) across the slope (contouring), i.e., across the short direction of the tray.

Fill the box with moist soil about 3 cm deep and, using your finger, make packed furrows (shallow trenches) up and down the slope, i.e., across the long direction of the tray.

Fill the box with moist soil about 3 cm deep and using a ruler make steps across the slope (terracing), i.e, across the short direction of the tray.

Explanation:

Soil erosion is an on-going and natural process--a process which has been greatly accelerated in many locations throughout the world during the last one hundred years of human activity. We are all familiar with many of the causes of erosion: uncontrolled burning, agricultural practices, logging, recreational activities, highway and home-site construction, and natural phenomena such as landslides. Although erosion is a natural process, responsible for much of the most fertile agricultural land in the world, the Mississippi River valley for instance, and the Amazon Delta, we have learned that erosion can have devastating effects on the environment. The most significant impact of erosion is on aquatic systems. This activity helps demonstrate the erosion process and the impact of erosion on the environment.

Data Table

Volume of water poured in five seconds into each container _____ml

	Tray 1	Tray 2	Tray 3	Tray 4	Tray 5
Treatment	**none**	**sod/carpet**	**contour**	**long trench**	**terrace**
Volume of water that "ran off"					
Amount of sediment that "eroded"					

Which soil condition lost the most soil?

Which soil condition had the greatest amount of runoff?

In which soil condition did the runoff/erosion appear first and in which soil condition did the runoff last the longest?

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Baked Pinecones"

The following will give you the most important items to review for your activity today!

People have always had an undecided attitude towards fire. On the one hand, fire is destructive; unchecked, it consumes everything in its path. On the other hand, fire is necessary for human survival and civilization.

Baked Pinecones

Children will understand the positive and negative effects of forest fires.

Materials:

Pinecones
Bucket of water
Foil-lined baking sheet
Oven

Activity:

Soak the pinecones overnight in a large bucket of water. This will cause the pinecones to close up and force out any bugs that may be hiding inside.

Explain to the child that the extreme heat from a forest fire can be destructive to some organisms, but others need this heat to reproduce themselves. Some kinds of pine trees are like this because their seeds are stored in closed cones for many years until a forest fire kills the parent tree. the cones are opened by the heat and the stored seeds are then released in huge numbers to re-populate the burnt ground.

Explain that fire is necessary to the health of some ecosystems. fires are a valuable and necessary part of forest or grassland ecosystems. For example:

- *A surface fire is one that primarily burns undergrowth and leaf litter.*
- *Surface fires can prevent larger, more serious "crown fires" from occurring.*
- *By burning forest litter, these fires release nutrients present in forest litter that would otherwise decompose very slowly.*
- *Surface fires can also spur the germination of plants, especially conifers such as the giant sequoia, the lodgepole pine, and the jack pine. These trees' pinecones need to be exposed to extreme heat before they can be released from the cone itself and germinate.*
- *Such fires help reduce the number of pathogens and insects.*

- *Surface fires create or help to maintain habitat for animals such as deer, moose, elk, muskrat, woodcock, and quail by burning back or thinning sections of the forest.*
- *Ecosystems such as prairies, savannas, chaparral, and jack pine forests are dependent on periodic fire to maintain them. Otherwise, these ecosystems would be taken over by trees.*
- *Periodic fires can open up sections of the forest canopy, creating an opening for smaller plants that need lots of sunlight to grow; this stimulates diversity in the forest ecosystem.*

Explain that surface fires often occur naturally when lightning strikes a forest and start a fire in a forest or grassland. Recently, foresters and park officials have begun setting fires called "prescribed burns" to mimic these natural fires. Prescribed burns are done to counteract years of fire prevention policy, which called for all fires to be suppressed as quickly as possible.

Now "reopen" the pinecones you have soaked by placing them on a foil lined baking sheet and baking them in a 225 degree oven for about 30-45 minutes.

Explanation:

People have always had an undecided attitude towards fire. On the one hand, fire is destructive; unchecked, it consumes everything in its path. On the other hand, fire is necessary for human survival and civilization.

The 1985 fires in Yellowstone National Park, our nation's oldest and one of its most spectacular national preserves, dramatized this dilemma. Millions of people watched in horror as daily news clips showed the raging fire consuming nearly half of Yellowstone's 2.2 million acres. Still, new growth and increased diversity of species in the aftermath of the fire have affirmed scientists' theories that fire is necessary to the survival and continued vitality of forest ecosystems.

WEEK 31:

Events in our spheres (part 2)

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Two identical glass jars (mason jars work fine)
4 cups cold water
10 ice cubes
One clear plastic bag
Thermometer

White vinegar
As many objects as you can find which include: Chalk, Old seashells, Baking soda, Sugar, Sand, Rocks, Eggshells, etc...
Eyedropper or drinking straw
Glass bowl

You and your child(ren) will be covering the following Science Standards this week:

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Definitions:

Interaction	("in-tur-ack-shun"); when one sphere causes changes in another sphere
Chain reaction	("ree-ack-shun"); a time in which many interactions are taking place

Sample Questions to ask after your child finishes their reading for Day One:

What is the difference between an interaction and a chain reaction?
A chain reaction is a time in which many interactions are taking place.

Why is it important to study interactions among spheres?
Scientists are always trying to see how an event will affect the biosphere.

What is so important about studying why an interaction takes place?
There are so many factors that are affected during an event, the number of interactions between the spheres is huge. Therefore, in order to understand what the impact of an event will be on the environment, we must study why the interaction is taking place so that we do not overlook any hidden factors.

What makes up the Earth's "system"?
All four of the earth's spheres working together make up the Earth's system.

Answers to Worksheet Questions for Day One:

Page One:

1) Interaction
2) Chain reaction

Page Two:

Lithosphere and the Hydrosphere	
What are the effects of the changes in the lithosphere on the hydrosphere during a flood?	During a flood, a lot of soil (lithosphere) can be carried away to a river (hydrosphere) where it makes the water very muddy.

Lithosphere and the Biosphere	
What are the effects of the changes in the lithosphere on the biosphere during a flood?	During a flood, the erosion of the soil (lithosphere) can destroy much of the plants (biosphere) in an area.

Lithosphere and the Atmosphere	
What are the effects of the changes in the lithosphere on the atmosphere during a flood?	The atmosphere can produce many fronts to move over an area. This causes more rain and flooding which damages the soil (lithosphere).

Hydrosphere and the Biosphere

What are the effects of the changes in the hydrosphere on the biosphere during a flood?	Large amounts of water (hydrosphere) can hurt or kill many plants and animals (biosphere).

Hydrosphere and the Atmosphere

What are the effects of the changes in the hydrosphere on the atmosphere during a flood?	Large amounts of water vapor (hydrosphere) can condense and turn into many rain clouds as they move through the air (atmosphere).

Biosphere and the Atmosphere

What are the effects of the changes in the biosphere on the atmosphere during a flood?	Strong winds (atmosphere) that take place during heavy rains can destroy many plants in an area (biosphere).

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Recreating the Greenhouse Effect"

The following list will give you the most important items to review for your activity today!

The greenhouse effect is very important to life on earth. It is not to be confused with any part of the "global warming" debates that are currently taking place.

The greenhouse effect is another event that continuously takes place within our planet and affects all of our spheres!

Recreating the Greenhouse Effect

Children will create a simple model of how the greenhouse effect works.

Materials:

Two identical glass jars (mason jars work fine)
4 cups cold water
10 ice cubes
One clear plastic bag
Thermometer

Activity:

1) Take two identical glass jars each containing about 2 cups of cold water.
2) Add 5 ice cubes to each jar.
3) Wrap one in a plastic bag (this is the greenhouse glass). If you are using mason jars, simply place the lid on one of them.
4) Leave both jars in the sun for one hour.
5) Measure the temperature of the water in each jar.

Explanation:

In bright sunshine, the air inside a greenhouse becomes warm. The greenhouse glass lets in the sun's light energy and some of its heat energy. This heat builds up inside the greenhouse. You just demonstrated the greenhouse effect.

Although the greenhouse effect is not the best way to show how the lithosphere and the hydrosphere work together to keep our planet warm... it does help to show how heat can be stored and moved throughout the spheres. Another version of a greenhouse effect is what happens inside an automobile parked in the sun. The sun's light and heat gets into the vehicle and is trapped inside, like the plastic bag around the jar. The temperature inside a car can get over 120 degrees Fahrenheit (49 degrees Celsius). That is not hot enough to boil water, but it can definitely hurt you if you touch something (like the seatbelt lock) at that temperature.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Corrosive Rainfall"

The following will give you the most important items to review for your activity today!

Acid rain affects the entire earth system as the biosphere, lithosphere, atmosphere and the hydrosphere are all involved with this form of pollution.

Corrosive Rainfall!

Children will create of acid rain.

Materials:

White vinegar
As many objects as you can find which include: Chalk, Old seashells, Baking soda, Sugar, Sand, Rocks, Eggshells, etc...
Eyedropper or drinking straw
Glass bowl

Activity:

1) Put one of the objects in the bowl and place several drops of white vinegar on it.
2) Observe whether bubbles form. If bubbles do form, keep adding vinegar until they stop.

Explanation:

You should have noticed that the chalk, baking soda and sea shells create many more bubbles than the other items. Some rocks, especially limestone, can create many bubbles too. These objects contain the most carbonate out of all the listed materials.

Carbon dioxide is part of the global "carbon cycle," in which carbon travels through the living environment to nonliving things and back again. You can also find carbon in some rocks and minerals, generally combined with oxygen and a metal in a compound called a carbonate. You can identify carbonate-containing materials because they react with acid to give off bubbles of carbon dioxide.

When certain chemicals are dissolved into rain water, it can become a little acidic too! This is what is called “acid rain.” This rainfall can be very damaging to carbonate-containing materials in the environment over long periods of time. This is another example of how the atmosphere, hydrosphere and lithosphere are interconnected.

WEEK 32:

Earth's events: The good, the bad and the ugly

Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Petroleum jelly
Three small pieces (about 3 inch square) of stiff clear plastic
Strips of clear tape or contact paper (optional)
White paper
Magnifying glass
8 oz. of Cool Whip non-dairy topping
Red food coloring

Whisk
Two white, opaque lids that will fit the cool whip containers below
Cool Whip containers
Frosting spreader
Bowl (large enough for 16oz of the topping)
Large spoon
Permanent marker

You and your child(ren) will be covering the following Science Standards this week:

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Definitions:

No new definitions are provided in this chapter. Please instruct your child to review all of the vocabulary for chapters 29-31.

Sample Questions to ask after your child finishes their reading for Day One:

Describe two ways in which an event can be caused?

Events can be either caused by nature while others, like pollution, are caused by humans.

How can a change in climate be good and bad?

A change in climate may force some organisms away from the area; however, this new climate may be better suited for other organisms.

What is one good effect of a forest fire?

Some pinecones cannot open without the heat from a forest fire to bake it and open it up! Once opened, this pinecone can grow into a new tree.

What is an example of an event that can be both good and bad?

Volcanic ash may cover up existing topsoil; however, it does contain a huge amount of nutrients for new soil to form.

Answers to Worksheet Questions for Day One:

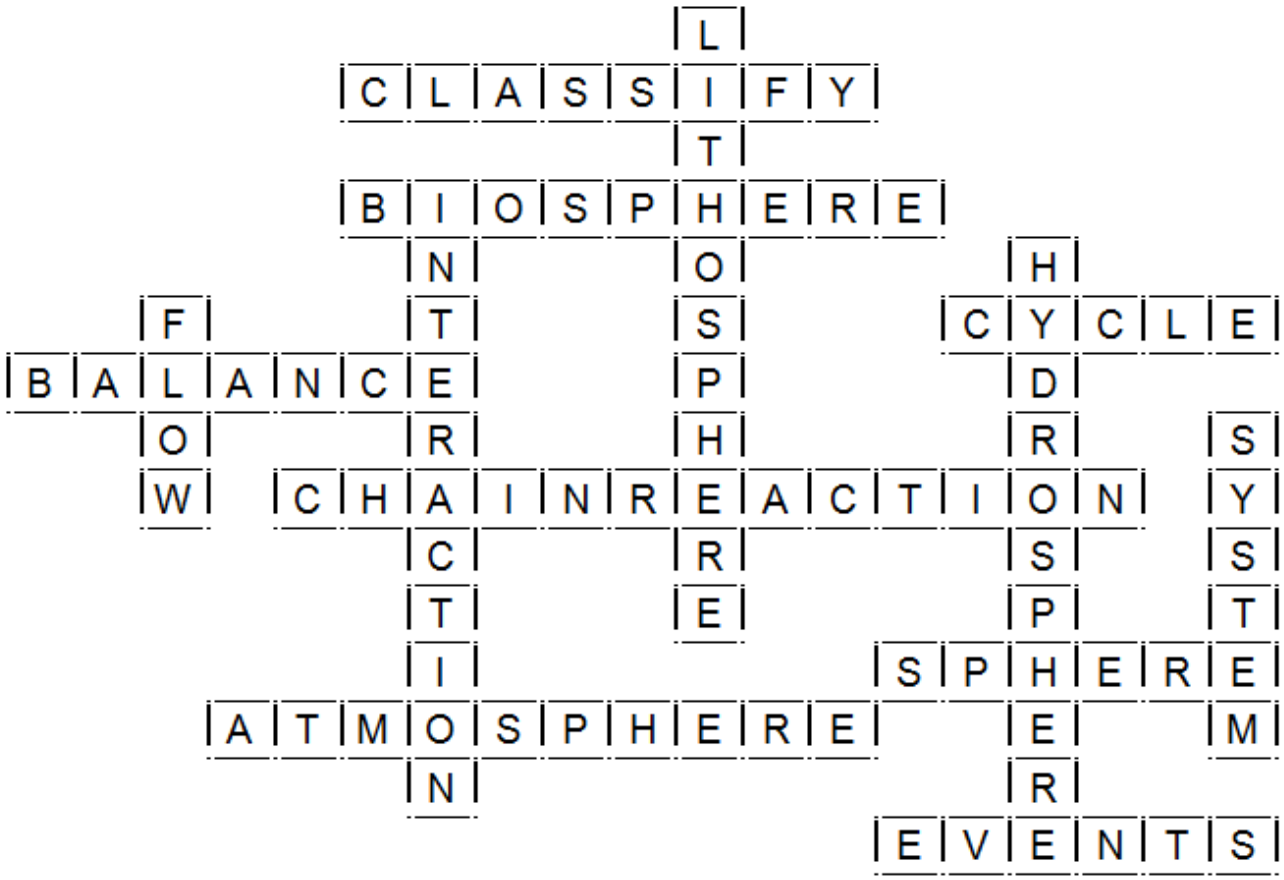
Page One:

1) False; one single **event**, like a flood, can cause a chain reaction of **interactions** with all of these spheres
2) True
3) False; some events, like **volcanoes and earthquakes**, are caused by nature. while other events can be caused by humans.
4) True

Page Two:

1) C
2) C
3) A
4) B
5) A

Unit Eight Review Answer Key



Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Where O' Where Could the Pollution Be?"

The following list will give you the most important items to review for your activity today!

It is next to impossible to understand how much "stuff" is in the air that we breathe! Dust, dirt, hair and other items can easily be found on each of the three collection devices. Some of these items can be damaging to our bodies if too much is inhaled. Luckily, our bodies are armed with a wonderful defense mechanism... snot! That 's right! The mucus that hangs out inside our nose works with our nose hairs to block a lot of the flying debris before it can get into our lungs. Every time you blow your nose, that booger (yuck!) is actually a "vacuum cleaner bag" full of all the junk floating around in the air!

Where o' where could the pollution be?!

Children will study the air quality of their home.

Materials:

Petroleum jelly
Three Small pieces (about 3 inch square) of stiff clear plastic
Strips of clear tape or contact paper (optional)
White paper
Magnifying glass

Activity:

Smear the petroleum jelly onto one side of the stiff clear plastic.
Locate three different locations in your home where the child believe the most air pollution (i.e. dust, hair, etc...) could be found. Place one of the smeared plastic pieces in these areas.
Allow the plastic pieces to remain undisturbed for at least 24 hours.
If household pets or younger, inquisitive young children could disturb the jelly-smeared plastic, you might consider using small pieces of clear tape or contact paper. If you attach these adhesives to a sheet of white paper, it may be easier to locate them!!!
Remove the "collection devices" from where the child placed them. Place them onto a sheet of white paper and use the magnifying glass to examine each of the three items. Which one contained the most "pollution?"

Explanation:

It is next to impossible to understand how much "stuff" is in the air that we breathe!!! Dust, dirt, hair and other items can easily be found on each of the three collection devices. Some of these items can be damaging to our bodies if too much is inhaled. Luckily, our bodies are armed with a wonderful defense mechanism... snot!!! That 's right!!! The mucus that hangs out inside our nose works with our nose hairs to block a lot of the flying debris before it can get into our lungs. Every time you blow your nose, that booger (yuck!) is actually a "vacuum cleaner bag" full of all the junk floating around in the air!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Just a Little of the Top"

The following will give you the most important items to review for your activity today!

The depletion of ozone over Antarctica can affect our own lives. Despite the ongoing debate over the origin of this event, the depletion of ozone over Antarctica has an effect over the entire global community.

Just as with every event, this is a chain reaction that takes place within the earth's system.

Just a Little Off the Top

Children will observe how the depletion of ozone over Antarctica can affect our own lives

Materials:

8 oz. of Cool Whip non-dairy topping
Red food coloring
Whisk
Frosting spreader
A bowl (large enough for 16oz of the topping)
A large spoon
Permanent marker
Outline map (provided)
Two white, opaque lids that will fit the cool whip container from 8 oz. Cool Whip containers

Activity:

1) Use a permanent marker to sketch N. America, S. America, and Antarctica onto the underside of each Cool Whip lid to make each look like the "world".
2) Put half of the topping (4 oz.) and 20-25 drops of the red food coloring into a bowl. Stir it until the color is a uniform pink.
3) Spread half of this pink topping onto one "world" and half onto the other. The topping represents the atmosphere, and the food coloring represents ozone.
4) Set one "world" aside (the control) and then with the other, make a "hole" in the ozone over Antarctica by removing some topping and replace it with white topping.
5) Emphasize that you would not be able to see the hole, but scientific instruments (satellites, etc.) would be able to detect it. The white area represents "the hole" that is present over Antarctica each spring.
6) After showing the child, use the whisk stirrer to mix up the atmosphere until the color is a uniform pink. This represents what happens during the summer months in our atmosphere. During the

winter, the air over Antarctica becomes isolated from the rest of the atmosphere. For months, it swirls around in a giant "vortex"

7) Use the frosting spreader to smooth out the pink topping. Point out that the atmosphere is slightly "less pink" worldwide. Compare the color to the "world" without the ozone hole.

Remember, pink is good because the pink color means ozone is present.

8) Continue to "make a hole in the atmosphere" three more times. Compare the ozone depleted Earth to the one that has experienced no depletion.

Explanation:

Although the mixing of ozone-depleted air with the rest of our atmosphere may not be as simple, or as complete as the type of "dilution" that you've just demonstrated, it is very similar. This is what has caused "nonpolar" depletion of ozone, amounting to about 3 % per decade recently.

Some Ozone Facts

The natural concentration of ozone in the atmosphere is remarkably small. . . If all the ozone molecules were located on the Earth's surface at atmospheric pressure, they would form a layer only 3 mm thick.

British researchers began monitoring ozone levels in 1956. In 1985, British scientists began finding dramatic declines in ozone values over Antarctica each spring. . . a "hole" in the ozone layer where concentrations are depleted by over 50%.

A similar depletion happens over the north polar region each spring, but it has not been intense enough to be called a "hole". The annual hole over Antarctica has grown to be about the size of North America during some years.

ChloroFlouroCarbons (CFCs) were developed in the 1930's. Freon, the most famous CFC, has been used in refrigeration and air conditioning systems.

Each year several factors work together to cause intense ozone depletion over Antarctica (four are listed below). Although the "hole" cannot be seen, over 50% of the ozone is destroyed over this region each Spring (September - November).

The Polar Vortex: During the winter, the air over Antarctica becomes isolated from the rest of the atmosphere. For months, it swirls around in a giant "vortex".

Clouds in the stratosphere: The South Pole is so cold that clouds of ice crystals are present in the stratosphere where ozone is most abundant. These ice crystals are crucial to the depletion of ozone, providing a workbench for the destructive chemistry.

CFCs: Manmade chloroflourocarbons used over past decades ascend to the "ozone layer" where chlorine is freed, and begins its destructive chemistry.

Sunlight: Each spring, sunlight begins to shine on the stratosphere over Antarctica. The sunlight is involved with "breaking apart" the CFC molecules.

Just in case you need a model to create your "worlds"...

Unit Eight Test

Match the words in the first column to the best available answer in the second column.

____ **classify**	1) to put into groups
____ **balance**	2) sphere of the Earth which contains all of the solid land (rocks, minerals and soil) that can be found on the Earth's crust
____ **flow**	3) sphere which contains all of the wind, gases and storms in the air
____ **interaction**	4) sphere which contains all of the water in the Earth whether in the air, on land or in the sea
____ **chain reaction**	5) sphere which contains all of the living organisms on the planet
____ **lithosphere**	6) a category made by scientists to describe four different areas of the Earth - living organisms, solid Earth, liquid water and all of the gases
____ **atmosphere**	7) a collection of all spheres which work together in any area of the Earth
____ **hydrosphere**	8) changes in any of Earth's spheres
____ **biosphere**	9) a pattern that can happen over and over again
____ **sphere**	10) an equal amount of two opposite items
____ **system**	11) the movement of an object
____ **events**	12) when one sphere causes changes in another sphere
____ **cycle**	13) a time in which many interactions are taking place

Which one is right? Circle the correct answer.

1. What is the difference between an interaction and a chain reaction?
   a) an interaction is made up of many chain reactions
   b) a chain reaction is many reactions taking place
   c) a chain reaction is made up of many interactions

2. What would you be studying if you were looking at the lithosphere?
   a) the air
   b) the solid Earth
   c) all of the water on the earth

3. Which of the following would be called an "event"?
   a) tiny meteorites hitting the earth
   b) solar eclipse
   c) earthquake

4. Which sphere would you find all living creatures?
   a) biosphere
   b) hydrosphere
   c) atmosphere

5. Which of the following make up earth's "system"?
   a) biosphere, hydrosphere and atmosphere
   b) biosphere, hydrosphere, atmosphere and lithosphere
   c) biosphere, lithosphere and atmosphere

6. Which of the following is true?
   a) all events are bad
   b) all events are good
   c) events can have good and bad effects

The climate of an island in the ocean has gone through huge changes in the past 30 years. "Climate" is the normal weather pattern of an area over a very long period of time. This island used to be filled with grasslands and forests with plenty of rain all year long. In the past 30 years though, the temperature of this area has gone up a lot! Unfortunately, the amount of rain has gone down a lot too!

What do you think the effects of this change in climate are?

What could be the effects of this climate change on the lithosphere of the island?

What could be the effects of the changes in the lithosphere on the biosphere during this change in climate?

What could be the effects of the changes in the lithosphere on the hydrosphere during a change in climate?

Unit Eight Test Answer Key

Page One:

1-classify
10-balance
11-flow
12-interaction
13-chain reaction
2-lithosphere
3-atmosphere
4-hydrosphere
5-biosphere
6-sphere
7-system
8-events
9-cycle

Page Two:

1) C
2) B
3) C
4) A
5) B
6) C

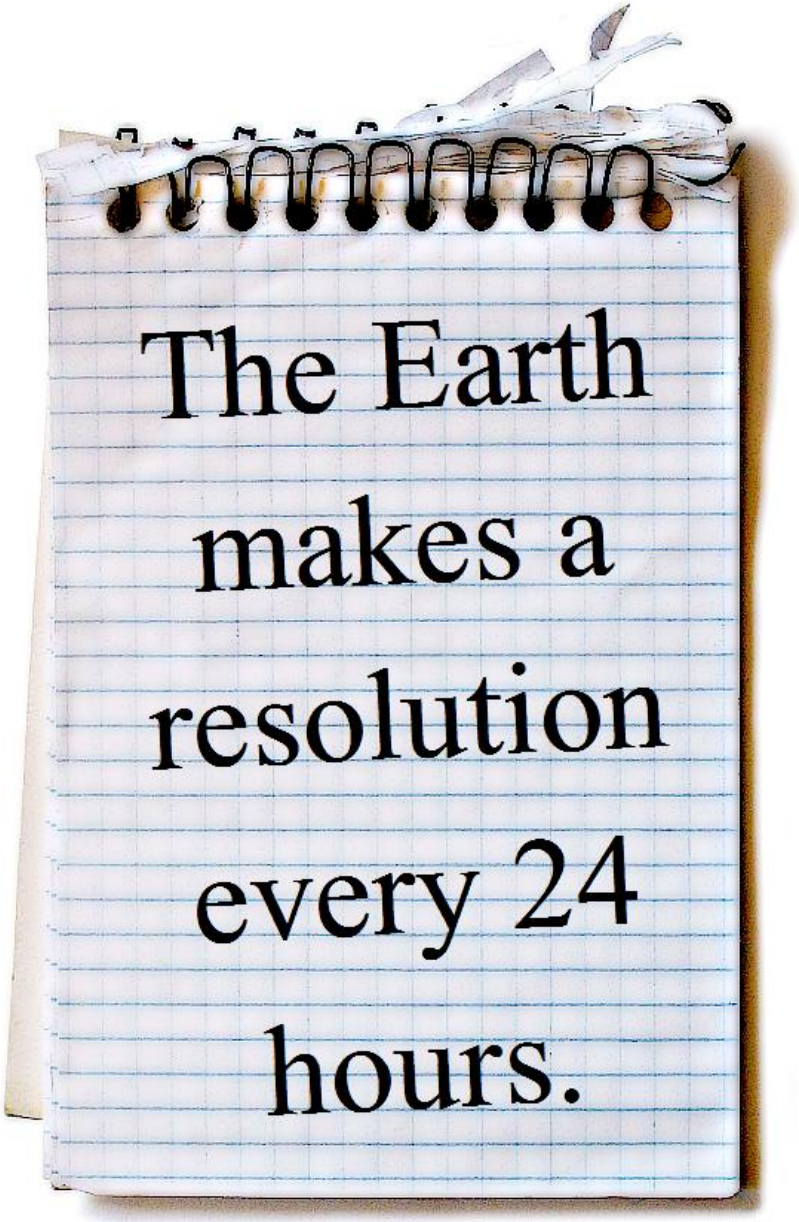
Page Three:

Answers will vary; here are some possible solutions to the problems:

What could be the effects of this climate change on the lithosphere of the island?
Increased temperatures and lower rainfall would mean the island would get much warmer and dryer.
What could be the effects of the changes in the lithosphere on the biosphere during this change in climate?
As this island became warmer and dryer, organisms that were used to living in grasslands and forests may not be able to survive. It is possible that the plants on this island will not survive as well!
What could be the effects of the changes in the lithosphere on the hydrosphere during a change in climate?
Increased temperatures and lower rainfall would mean that there would be smaller amounts of fresh water found in pools and under the ground.

WEEK 33:

Astronomy myths



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Sturdy cardboard square (about 5 inches on each side will work)
String
Paper or plastic cup
Water
Clay or dough
Butter knife

You and your child(ren) will be covering the following Science Standards this week:

The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Sample Questions to ask after your child finishes their reading for Day One:

Why can't you see the stars during the day?
The light from our sun fills the sky and keeps us from seeing the stars.

Is there any time when we can see stars during the day?
Only during a total solar eclipse can we see the brightest stars in the middle of the day.

What causes the stars to appear to move?
The rotation of the earth makes it appear to us that the stars are moving.

Why do we only see one side of the moon?
The moon rotates once for every earth rotation. Therefore, we only see the same side every night.

Answers to Worksheet Questions for Day One:

Page One:

Myth #1: Stars are not out in the daytime

The stars do not disappear during the day! They are still out there! The reason why you can't see the stars is because of our sun. The light from the sun fills our sky and keeps us from seeing the stars.

Myth #2: Stars appear in the same place in the sky every night

Remember, it is the earth that is rotating (spinning like a top) and revolving (moving around the sun). all of this movement makes the stars look like they are moving... But they don't!

Myth #3: The reason why it is hot in the summer is because we are closer to the sun.

Our planet has different seasons because of many different things... but the distance between it and the sun is not one of them! In fact, the earth is closer to the sun during the winter and farther away in the summer!

Myth #4: Half of the moon is always in the dark

The moon is always rotating (yes! It spins like a top just like the earth!) so, there is no side of the moon that is always in the dark!

Myth 5: The moon only shows one face to Earth because it is not rotating

It is true that you only can see one side of the moon. But this is because the moon only shows one face because it rotates once every time it revolves around the earth!

Page Two:

Do not grade your child on these answers. We will look at these answers next week!

1) T
2) T
3) F
4) F

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Force-full Situation"

The following list will give you the most important items to review for your activity today!

An object will remain moving in a straight line forever unless another force acts on it and changes it!

A "Force"ful Situation

Children will explore the "force" that keeps our little planet spinning around.

Materials:

String
Water
Paper or plastic cup
Sturdy cardboard square (about 5 inches on each side will work)

Activity:

1) Attach four pieces of string onto the corners of the cardboard square. You may want to puncture a small hole in each corner to make it easier to tie down.
2) Bring all four pieces of string about 12-16 inches above the cardboard square and tie them together. Attach a 2 foot piece of string where all of the other strings meet. If you hold onto this 2 foot piece of string, the cardboard "platform" should be suspended underneath so that you can place the paper or plastic up on its surface.
3) Go outside on and find an open area as you will soon be swinging the platform into the air.
4) Fill the cup about ¼ full of water.
5) Swing the platform in a circular direction. With practice, the cup will not slide off of the platform.

Explanation:

As the platform goes around in a curve, the cup attempts to move in a direction that is not the same as the platform. Basically, it can fall off very easily. However, as the cup begins to slide on the platform, the platform itself is moving underneath it. This means that the platform moves with the cup, keeping it from falling off. Since the cup always wants to move in a straight line... and right off the platform, we call this movement "centrifugal force". And this movement doesn't just affect spinning trays of water, it also affects every object in the universe that rotates or revolves!

You feel this centrifugal force whenever you turn while moving in a car. Let's say you are driving north in your car. Once you start to turn, let's say east, your body keeps moving towards north. It feels like there is a force that is pushing you in the opposite direction of where your car is going... but this is not true. Your body is still moving in the same straight line, just like the cup on your platform is too! Luckily, both the car and the platform move with us and keep us from sliding off and onto the ground! Ouch!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "It's a matter of perspective..."

The following will give you the most important items to review for your activity today!

The volume of the earth is 64 times larger than the moon. However, it only takes four moons lined up next to each other to equal the diameter of the earth!

It's a Matter of Perspective...

Children will explore the size of the earth and moon using clay.

Materials:

Clay or dough
Butter knife

Activity:

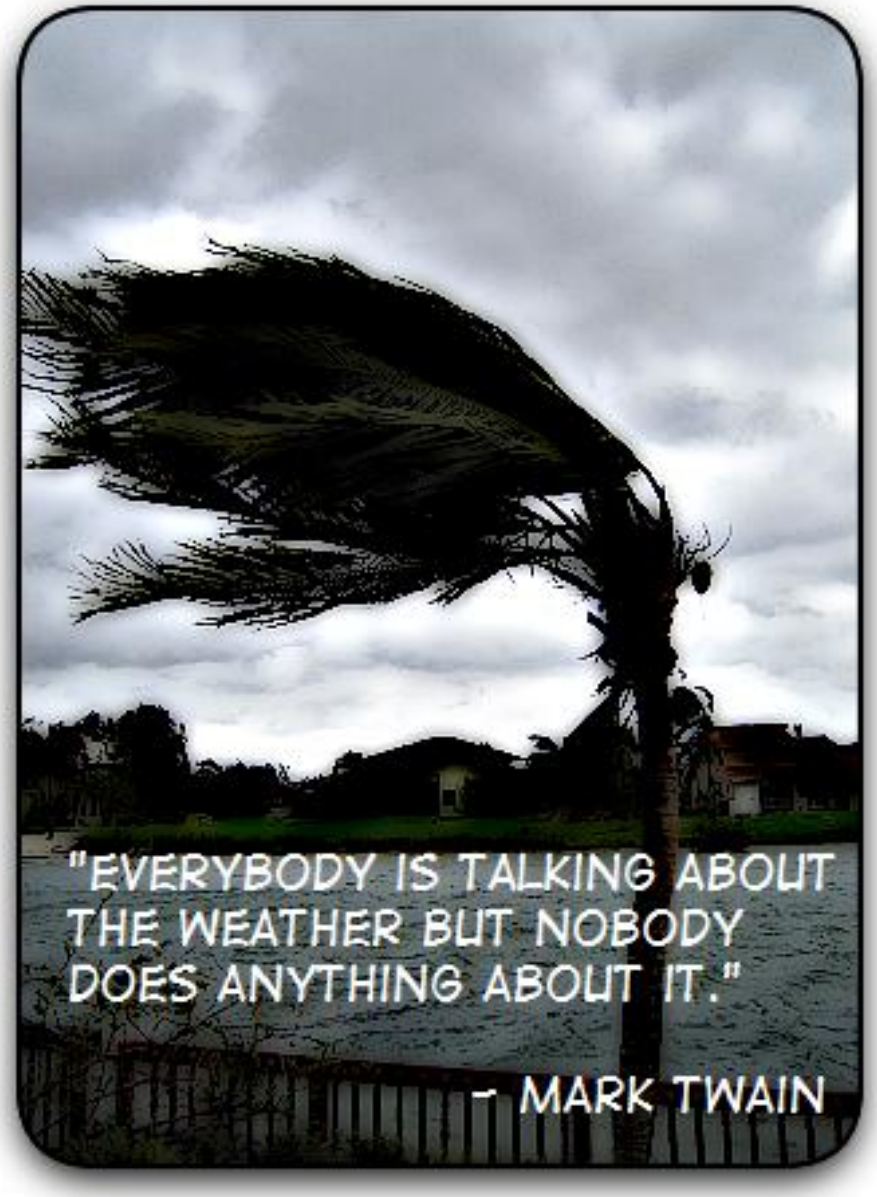
1) Create two identical balls of clay or dough that are four inches in diameter.
2) Identify one of the balls of clay/dough as the Earth. The other ball will be known as the Moon.
3) In real life, the moon is much smaller than the earth. Ask the child to predict how many times you would have to cut the "Moon ball" in half to equal the actual size of the moon. Accept all answers.
4) You can now start making your scale model of the moon by cutting the "Moon ball" in half making two hemispheres. Then cut each hemisphere in half and then cut each of these pieces in half again making eight equal pieces.
5) Now cut each of these pieces in half, then in half again and finally in half a third time. This will give you pieces of clay/dough that are 1/64 the volume of the "Earth." These little pieces will roll up into spheres with 1/4 the radius of the original earth.

Explanation:

To many people it seems very strange that it takes 64 moon balls to assemble one earth... especially when it only take four moons lined up next to each other to equal the diameter of the earth. But this is very true.

WEEK 34:

Weather myths



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Aluminum (or glass) baking pan
Lemonade-flavored powdered drink mix
Sand (enough to fill the pan)
Straws
Glass of water
Misting bottle
pH paper (found with the garden or pool supplies at any WalMart/Target; you will only need 12 strips per child)
Clear plastic bag (zipper style, sandwich size works best)
Measuring spoon
Masking tape
Rubber band or twist-tie
Masking tape

You and your child(ren) will be covering the following Science Standards this week:

Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle."

Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Clouds, formed by the condensation of water vapor, affect weather and climate.

Sample Questions to ask after your child finishes their reading for Day One:

How likely is it to find two snowflakes that look alike?

The chances are very slim to find two snowflakes that are identical; however, it is possible!

How can water be broken down into smaller pieces?

A molecule of water is made up of two atoms of hydrogen and one atom of oxygen. It is possible for all three of these atoms to be separated and used for different things.

Do large raindrops look like teardrops?

No, large raindrops tend to break up into smaller raindrops which have the shape of a round ball.

Why does it rain?

As water droplets within a cloud get heavier they are no longer able to be kept up in the air by wind so they fall to the earth.

Answers to Worksheet Questions for Day One:

Page One:

True-two snowflakes can look the same

True-Raindrops do not look like teardrops

False- The same water goes through the water cycle forever
Water is always being pulled apart and used for other things!

False- Rain falls out of the sky when clouds evaporate
If a cloud, which is made up of liquid or solid water, were to evaporate it would turn into water vapor, not rain!

Page Two:

Do not grade your child on these answers. We will look at these answers next week!

1) T
2) F
3) T
4) F
5) T

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "The Pucker Effect"

The following list will give you the most important items to review for your activity today!

Rainfall can assist in the spreading of pollution across the land. This may take place on the surface of the earth or underneath as groundwater slowly creeps through tiny cracks in our crust.

The Pucker Effect

Children will create a model of groundwater pollution.

Materials:

Aluminum (or glass) baking pan
Lemonade-flavored powdered drink mix
Sand (enough to fill the pan)
Straws
Glass of water
Misting bottle
pH paper

*ph paper is a special tool used by people to determine how much acid can be found in a substance. Any store that provides garden or pool supplies will carry these paper strips. For this activity, you will only need 12 per child.

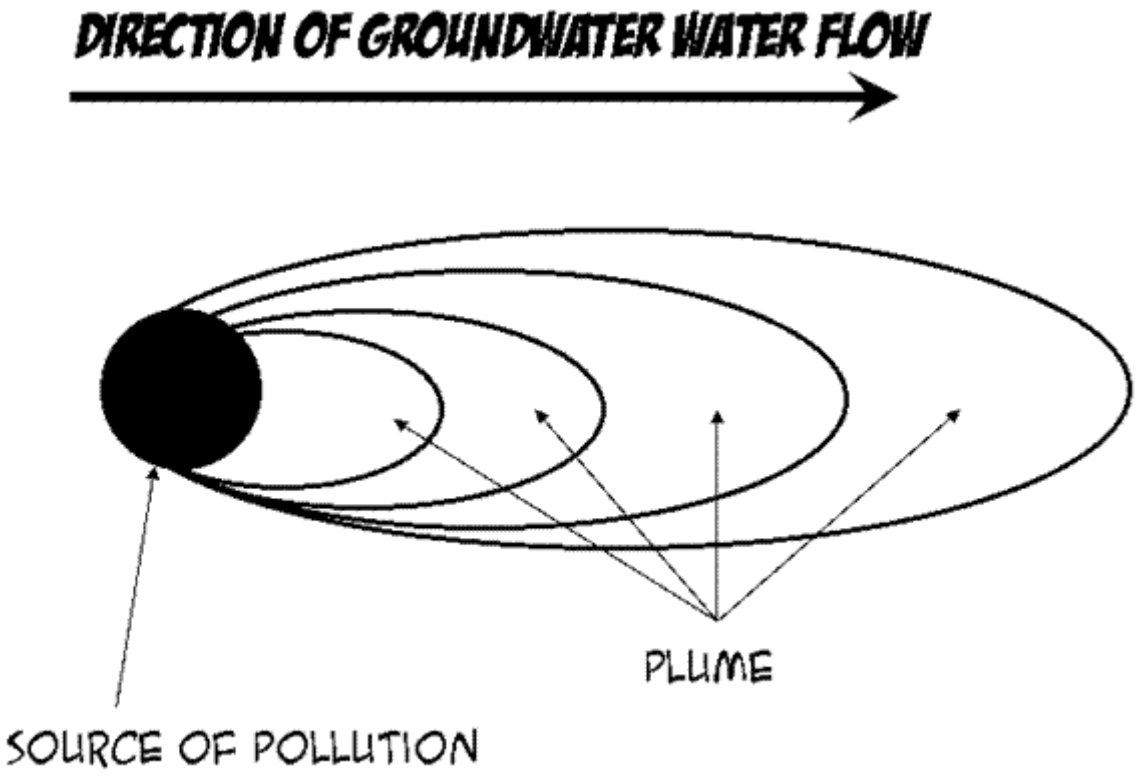
Activity:

1) Fill up the baking pan with sand and spray it with the misting bottle until it is damp.
2) The parent will need to bury about a teaspoon of their "pollution" into the sand by poking a hole into the wet sand, pouring in their lemonade drinking mix and covering up the hole.
3) Place a small book or other objects under one side of the baking pan so that it is resting at an angle.
4) Have the child simulate rainfall on their land by spraying water from the misting bottle until the ground becomes very saturated with water.
5) Instruct the child to see if they can find the hidden "pollution" by carefully inserting a straw through the ground (much like a well) and removing the sand. The child can then place their sand onto one of the ph strips of paper. Should the ph paper turn to an acidic color, you have found traces of the pollution!
6) If the child would like to drill in several different places, be certain to rinse off the straw after every use and to use a fresh ph paper.

Explanation:

It is unlikely that the child will find the exact spot where the pollution was dumped. Instead, they will probably find the runoff from the pollution as the water pulls it downhill. This runoff of pollution that occurs underground is known as a plume... and a plume can become very large! Any time a child drills into the plume, they will find trace amounts of the pollution.

This happens with nearly every clean-up effort involving underground pollution. The source can be an underground gas tank, septic tank or other buried material. Most of the time, we are alerted to the problem of a contaminated water resource once the plume reaches the groundwater! When this happens, scientists can only guess as to where the source of the pollution is coming from! It takes a great deal of resources to uncover the source of a plume. Here is what a plume would look like:



Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Water Cycle in a Bag"

The following will give you the most important items to review for your activity today!

The movement of water throughout the environment is easy to see. Trapping the escape of water within a see-through bag makes this process much simpler!

Water Cycle in a Bag

Children will identify the parts of the water cycle

Materials:

Clear plastic bag (zipper style, sandwich size works best)
Measuring spoon
Rubber band or twist-tie
Masking tape

Activity:

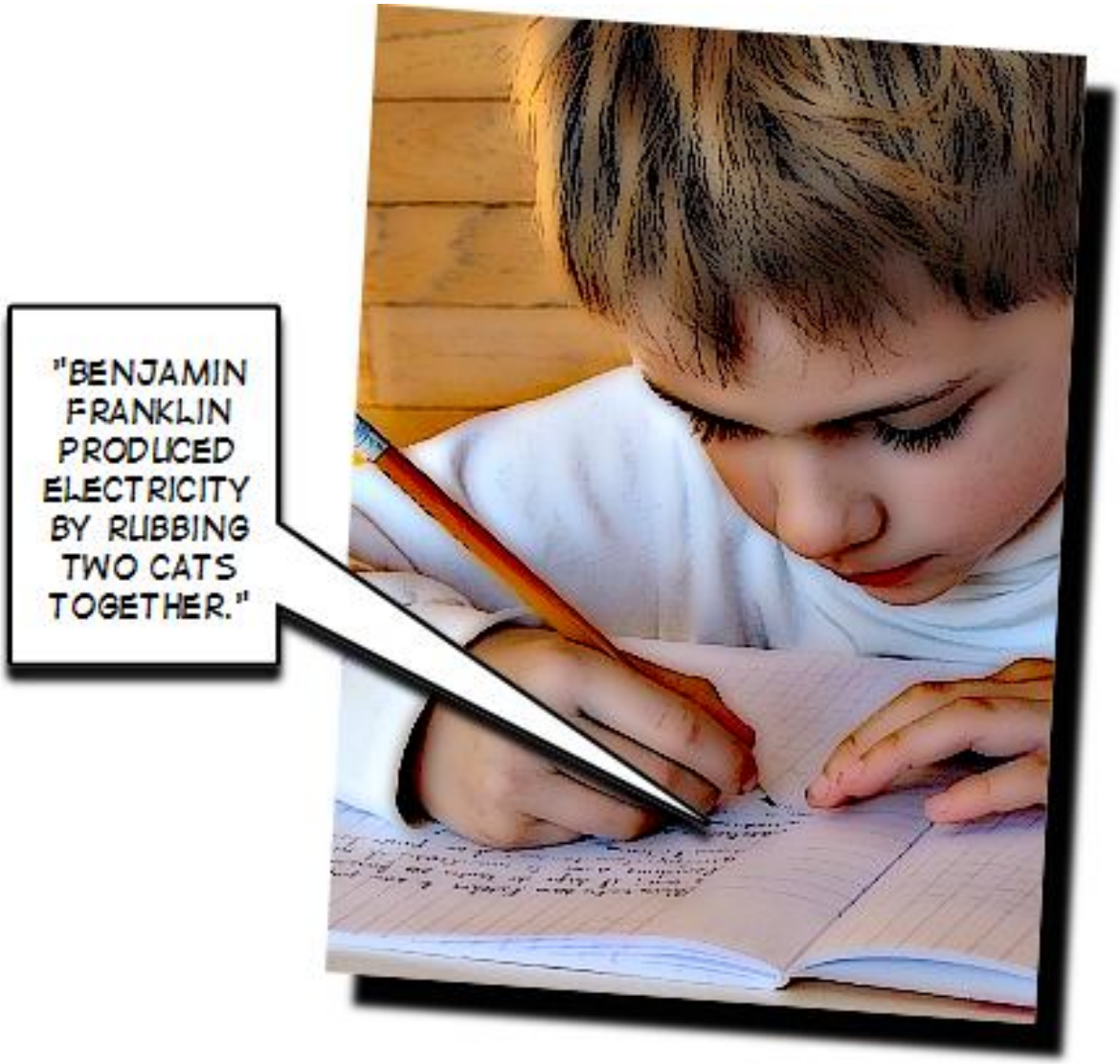
1) Pour 2 teaspoons of water into a clear plastic bag.
2) Blow air inside the bag with your mouth and quickly seal the bag closed with a rubber band, twist-tie, or zipper-closure.
3) Place the bag on a sunny window ledge or tape directly to the window pane. Periodically look at the bag throughout the day. You should begin to see water droplets forming on the top of the baggie as the water begins to evaporate.

Explanation:

Water molecules are constantly on the move in what is called the water cycle. Heat from the sun causes the water to evaporate and become a vapor. As the water vapor cools, it condenses, forming tiny droplets which gather to form clouds. As the droplets get larger, they become heavier causing them to fall to the ground as precipitation (like rain, sleet, or snow). Some of this precipitation joins lakes and streams (called surface water), and some of it soaks into the ground where it becomes groundwater. The process of water soaking into the ground is called infiltration, or recharge.

WEEK 35:

Lightning myths



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

Two small towels
One clear plate (glass or plastic is fine)
Strips of cloth (wool is best, but cotton works well too!)
Salt and pepper

Puffed rice cereal and small pieces of Paper (optional)
Small plastic object like a credit card or a ruler.

You and your child(ren) will be covering the following Science Standards this week:

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

Sample Questions to ask after your child finishes their reading for Day One:

Why do people think wearing rubber shoes protects you from lightning?

Electricity does not pass through rubber very well.

Which travels faster, lightning or thunder?

Light travels much faster than sound; therefore, lightning is much faster than thunder.

How do we know that Benjamin Franklin's kite was not struck by lightning?

If Mr. Franklin's kite was struck by lightning, it is possible that he could have died.

If you see lightning, what should you do?

If you can see lightning, it is safe to go inside and wait for the storm to pass over you.

Answers to Worksheet Questions for Day One:

Page one:

True - Lightning sometimes strikes twice in the same place

False - Rubber shoes or rubber tires on a car protect you from being hurt by lightning
Electricity cannot easily pass through some items, like rubber. However, the amount of energy that is generated from a bolt of lightning is hotter than the surface of the sun. it will easily pass through a think layer of rubber in anyone's shoes.

True - any objects in a storm can get struck by lightning

False - You can tell the distance you are from a thunderstorm by counting one second per mile after the thunder
for every five seconds, the lightning is one mile away

True - Ben Franklin's kite was not struck by lightning

Page two:

1) A
2) C
3) B
4) C
5) B
6) A

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "Lightning in the Home"

The following will give you the most important items to review for your activity today!

The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

"Lightning" in the Home

Children will reproduce a safe model of lightning in their home.

Materials:

Two small towels
One clear plate (glass or plastic is fine)
Strips of cloth (wool is best, but cotton works well too!)
Salt and pepper
Puffed rice cereal and small pieces of paper (optional)

Activity:

1) Roll up both of the towels and place them on top of a sheet of paper a few inches away from each other.
2) Place a teaspoon or two of salt and pepper onto the paper in between the towels.
3) Place the clear glass or plastic on top of the rolled towels. You want to be able to look down through the glass/plastic in order to see the pile of salt and pepper.
4) Rub your cloth onto the surface of the glass/plastic vigorously. Be careful not to break any glass.
5) After several rubs, you should start to see your salt and pepper "dance". You will notice that the grains jump from the paper and stick onto the glass/plastic.
6) If you run your finger onto the surface of the glass/plastic, notice how the grains move. They should fall from the surface of the plate.
7) Try this with small pieces of paper or puffed rice cereal... Both work very well too.

Explanation:

Lightning is an example of the same static electricity that shocks your fingers when you touch a metal door knob after rubbing your feet on a thick carpet. It is also another example of what happens with this activity. As

you rub the plate with your cloth you are moving electrons from the cloth onto the plate. This makes the plate more negatively charged (because electrons have a negative charge.) Since the plate is negatively charged, it attracts the protons (positively charged particles) inside the salt and pepper. This attraction is strong enough to lift the grains off of the paper and onto the plate.

When you run your finger over the glass, you are moving some of these electrons from the plate onto your finger. Without the extra electrons, the grains of salt and pepper fall back to the paper.

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Attractive Water"

The following will give you the most important items to review for your activity today!

Electrically charged things like the plastic attract electrically neutral things like the water. The water rises up against gravity and forms a lump. The lump in the water affects the way the water displays the images it is reflecting.

Attractive Water

Children will use static electricity to move a small amount of water.

Materials:

Any small plastic object like a credit card or a ruler
Container of water

Activity:

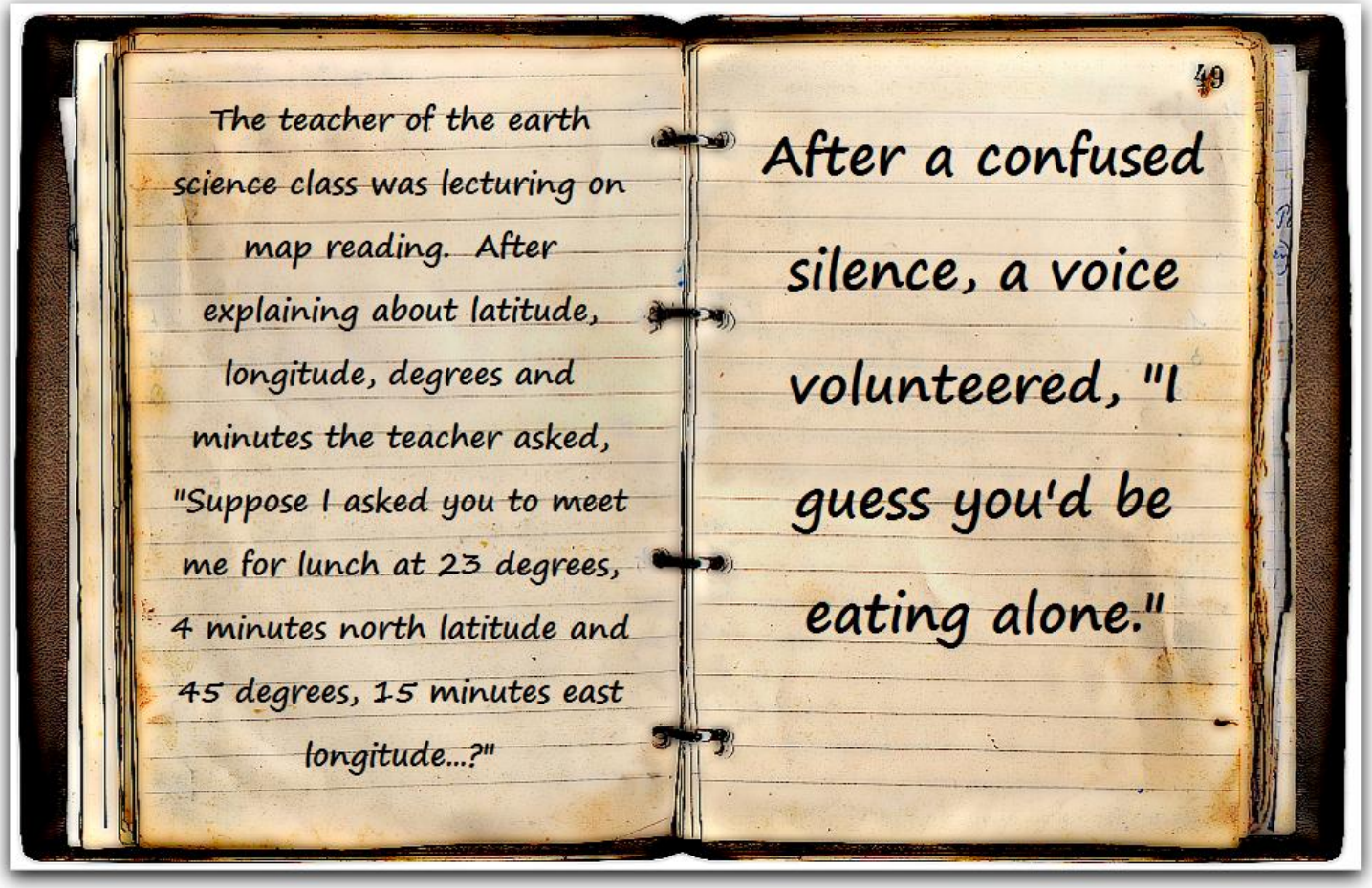
1) Look across the surface of the water and notice the reflections in its surface.
2) Rub the plastic with the wool for at least 15 seconds and bring it near the surface of the water.
3) Notice how the reflections in the water change as the water rise to form a lump under the charged plastic.

Explanation:

Electrically charged things like the plastic attract electrically neutral things like the water. The water rises up against gravity and forms a lump. The lump in the water affects the way the water displays the images it is reflecting.

WEEK 36:

Helping the Earth



Day One

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Find the following materials for Days Two and Three:

One large pinecone
Peanut butter
Birdseed
String

Pencil/paper
Ruler
Kitchen Scale (optional)

You and your child(ren) will be covering the following Science Standards this week:

Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.

Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.

Sample Questions to ask after your child finishes their reading for Day One:

How can you help out the environment by getting a good bag?

Lots of cheap plastic bags end up in the trash. Using one good bag is an excellent way to cut down on our trash.

How can you conserve water?

Take shorter showers. A short shower uses less water than taking a bath.
Don't let the water run while you're washing or rinsing dishes.
Fill a pitcher with tap water and keep it in the refrigerator... instead of running the water until it gets cool enough to drink!
Clean sidewalks and driveways with a broom--not the water hose!

What kinds of objects can be recycled?

Glass, paper, metal and some plastics can be recycled.

What is the biggest myth of all?

One person cannot change the world.

Answers to Worksheet Questions for Day One:

Page One:

1) Turn off the water while brushing your teeth
2) Take shorter showers. A short shower uses less water than taking a bath.
3) Don't let the water run while you're washing or rinsing dishes.
4) Fill a pitcher with tap water and keep it in the refrigerator... instead of running the water until it gets cool enough to drink!
5) Clean sidewalks and driveways with a broom--not the water hose!
6) Buy a good bag
7) Recycle everything you can
8) Plant a tree or a garden

Page Two:

Answers will vary! Check your child's work!

Unit Nine Review Answer Key

1) B
2) B
3) B
4) C
5) B

Day Two

Today, you and your child will:

1) Review Day One with the information found below.
2) Run this week's activity, "A Bird in the Hand..."

The following will give you the most important items to review for your activity today!

This inexpensive birdfeeder is an excellence opportunity to help out your biosphere.

A bird in the hand...

Children will construct a simple bird feeder.

Materials:

One large pinecone
Peanut butter
Birdseed
String

Activity:

1) Tie a few feet of string onto the top of the pinecone.
2) Cover the pinecone with peanut butter. You may need to use a spoon to make it easier!
3) Roll the pinecone in birdseed.
4) Hang the pinecone outside for birds to enjoy!

Explanation:

Who says that you can't make a difference for the biosphere? Simple activities such as these are excellent ways to give a little back to the environment!

If it is possible, try to place your new birdfeeder in an area where you can witness its use!

Day Three

1) Review Day One with the information found below.
2) Run this week's activity, "Junking the Junk Mail"

The following will give you the most important items to review for your activity today!

Simple estimation activities such as this one are a way to turn ordinary trash into a learning experience. If possible, attempt to be placed on the do not contact lists to minimize the trash that is generated.

Junking the Junk Mail

Children will predict the average amount of junk mail they receive.

Materials:

Pencil/paper Ruler Scale (optional)

Activity:

1) Ask the child to predict how much junk mail that your household receives in a given week. This amount can be in the form of:

   The number of letters per week, the height of the stack of letters per week, the weight of the letters per week (This is optional. However, it does give the child a deeper awareness of the problem. You can use postal scales at the post office, kitchen scales, grocery scales, etc...)

2) Have the child write down their predictions.
3) Collect the junk mail for one week. At the end of this time, identify the number of letters, their height when stacked on top of each other and, possibly, their weight!
4) Once you have calculated all of these figures, help the child to determine how much of this "junk mail" their house will receive after one month, one year, ten years, etc...
5) Try to compare the amount that is predicted with something the child can understand. For example, an average sized bag of trash weighs around 35 pounds. How many weeks worth of junk mail would it take to fill up a 35 pound bag of trash?

Explanation:

Since most junk mail ends up inside your trash, have the child predict how much trash is being discarded within your neighborhood. This number can be staggering. Is junk mail an environmental hazard? You bet it is! Some (unofficial) reports state that there are up to four million tons of junk mail sent every year. It is possible to reduce the amount of junk mail you receive by being placed on "Do Not Contact" lists. Contact your local post office or telephone provider to obtain current information as to getting on these lists.

Unit Nine Test

All of these statements are completely false! Explain why they are so wrong.

Stars are not out in the daytime

The same water goes through the water cycle forever...

You can tell the distance you are from a thunderstorm by counting one second per mile after the thunder

Stars appear in the same place in the sky every night

Unit Nine Test Answer Key

False - Stars are not out in the daytime
The stars do not disappear during the day! They are still out there! The reason why you can't see the stars is because of our sun. The light from the sun fills our sky and keeps us from seeing the stars.

False - The same water goes through the water cycle forever
Water is always being pulled apart and used for other things!

False - You can tell the distance you are from a thunderstorm by counting one second per mile after the thunder
For every five seconds, the lightning is one mile away

False - Stars appear in the same place in the sky every night
Remember, it is the earth that is rotating (spinning like a top) and revolving (moving around the sun). All of this movement makes the stars look like they are moving... But they don't!

Glossary

active volcano	a volcano that erupts all the time
air masses	large areas of air with similar temperatures
air pressure	weight of the air pressing down on the Earth
aluminum	("a-loom-eh-num"); mineral that can be used to make foil
amoeba	("ah-me-bah"); organism (called a "protozoa") which lives inside a thin covering of water around a tiny piece of soil and eats bacteria
asteroids	("ast-ur-oids"); large chunks of rock that are floating in space
astronauts	people who travel in outer space
astronomers	("a-straw-no-murs"); scientists who study the universe
atmosphere	("at-mos-fear"); all the gases that make up our air
atmosphere	sphere which contains all of the wind, gases and storms in the air
atom	smallest part of everything in the world
axis	an imaginary line that connects the north and south poles through a planet

bacteria	tiny organisms that can be found within soil; responsible for decomposing biotic material
balance	an equal amount of two opposite items
bedrock	top layer of solid rock beneath the soil
beryllium	("bur-ill-e-um"); mineral that can be used within a lightbulb to help make it glow
biosphere	sphere which contains all of the living organisms on the planet
biotic resources	living or dead organisms
blue moon	the occurrence of two full moons in one month
burn off	when the heat from the sun causes the top of a batch of fog to evaporate
calcium	("kal-see-um") ; a mineral that helps to build strong bones in your body
carbon dioxide	a gas that our bodies breathe out; most of the air around venus and mars contain this gas
cardinal directions	("card-in-all"); north, south, east and west; a set of directions created to help everyone face the same way
ceiling	("see-ling"); the distance between the Earth and the bottom of a cloud
chain reaction	("ree-ack-shun"); a time in which many interactions are taking place
chemical weathering	takes place when acids cause small parts of rock to dissolve
chromium	("kro-me-um"); a mineral you can find in most shiny metal objects

cirrus	clouds that are very high, thin and see-through
classify	to put into groups
clay	type of soil which contains the smallest pieces of minerals
cleavage	("klee-vuh-j"); flat and smooth sides of a mineral
climate	the normal weather for an area over a long period of time (like 30 years!)
clouds	a visible collection of tiny water droplets or frozen ice pieces floating in the air
cold front	type of front that take place when cold air mass runs into a warmer air mass
comet	("cah-met"); a chunk of ice, gases and dust that spins around a sun; a "dirty snowball"
condensation	("con-den-sa-shun"); the ability to turn a gas into a liquid by removing heat
condensation nuclei	("kon-den-sa-shun nuke-lee-eye"); tiny particles of dust, dirt, smoke, etc. that allow water vapor to hold onto before it can condense to form a cloud
conduction	("con-duck-shun"); the transfer of heat between two objects that are touching
constructive forces	("kon-struck-tiv"); forces like deposition that act to build new land forms
contour plowing	("kon-tour"); to dig small trenches or valleys into the soil around a hill in order to plant seeds
convection	("con-duck-shun"); the transfer of heat through a gas or liquid that is in motion

convection currents	areas of warm air rising from the surface of the Earth
convergent boundaries	(“kon-vur-gent”) ; areas where two tectonic plates are crashing together
copper	mineral that can be used in wires
core	the very hot center of the Earth that is made up of different kinds of metals
coriolis effect	("core-ee-o-liss"); the curving motion of our wind around the Earth as it rotates on its axis
corona	a bright ring of light that encircles the moon when it is completely blocking the sun's light within the path of totality
cover crops	plants that are grown on unused areas of land
craters	bowl-shaped holes found on the moons and other terrestrial planets when meteoroids, comets and asteroids smashes into its surface
crescent	"curved shape"
crust	the outside area of our planet
crystal	a solid material that has all of its molecules lined up, in a pattern
cumulus	clouds that have flat bottoms and large, puffy shapes (almost like cotton balls)
cycle	a pattern that can happen over and over again
cyclone	(“sigh-clone”); low pressure area at the center of all storms; the air inside these low pressure areas are spiraling upwards into its center
day	the time it takes for a planet to make one rotation on its axis

decomposers	organisms that break down dead organisms into smaller pieces
deposition	the change of state of a gas directly into a solid; frost is a product of deposition which occurs when the dewpoint falls below the freezing point of water
deposition	deposits of soil, sand and rocks that have been dropped off by moving water
destructive forces	("dee-struck-tiv"); forces like weathering and erosion which break things down
dew	condensed water on objects on the surface of the Earth whose temperature has reached the dewpoint temperature
dewpoint	the temperature in which a gas is able to condense
disk	a round-shaped object
dissolve	melt away
divergent boundaries	("die-vur-gent"); areas where two tectonic plates begin to move away from each other
dormant volcano	a volcano that has erupted a long time ago
Earth	our home planet, the third planet from the sun
earthquake	a vibration (think of a vibration as a "shaking") that moves through the Earth's crust
earthworms	organisms which move through the soil by swallowing soil, along with its bacteria and amoeba
energy	the ability to do work
equator	("ee-quay-tor"); an imaginary line that divides a planet into two equal sides, each of these sides is called a hemisphere

erosion	the moving of rocks and soil to another place
evaporation	("ee-vap-or-a-shun"); the complete separation of molecules from each other from a liquid into a gas
events	changes in any of Earth's spheres
extinct volcano	a volcano that has not erupted in recorded history
faults	huge cracks in the Earth's crust
fixing nitrogen	the ability of a bacteria to turn the nitrogen gas in the soil into form that a plant can use
flow	the movement of an object
fog	a cloud that forms near the ground as the air temperature at the surface cools to the dewpoint temperature
fracture	("frak-chur"); rough and jagged sides of a mineral
freezing	ability of molecules to stick to each other to turn a liquid into a solid by removing heat
front	the area where a cooler air mass and a warmer air mass join
fungus	("fun-guy"); organism in the soil which decomposes biotic material; much larger than bacteria
galaxies	("gal-axe-eez"); a large group of gas, dust and many stars; there are billions of galaxies in the universe
gas giants	planets which do not have much (if any) solid ground at all; the gas giants in our solar system are Jupiter, Saturn, Uranus and Neptune
geologists	("gee-all-o-jists"); scientists who study the Earth
geology	("gee-aul-o-gee"); the study of the Earth and its rocks and minerals
gibbous	"gib-us"; to swell

glaciers	large sheets of ice that slowly slide down a mountain, causing large amounts of erosion
gneiss	("neese"); a type of metamorphic rock that is formed from schist
granite	("gran-it"); a type of igneous rock that is made up of the minerals quartz, feldspar and mica
gravity	("gra-vi-tee"); a force that pulls objects towards each other in space
greenhouse effect	the ability of greenhouse gases like water vapor to absorb and reflect heat from Earth
greenhouse gas	a gas that is able to absorb and reflect some of the heat that is given off from the Earth
h20	the chemical formula for water
halite	("hal-ite"); the mineral name for salt
harvest	to pick crops
hemisphere	("hem-es-fear"); equal sides of a planet, divided by an equator
high air pressure	areas where there is much more air crammed into a small part of the atmosphere
high clouds	clouds with ceilings that are at least 20,000 feet
humidity	("hue-mid-a-tee"); amount of water vapor in the air
humus	layer of "dead stuff" that is found inside topsoil which is always decomposing into smaller pieces
hydrogen	("hi-dro-jen"); the most common chemical found in the known universe
hydrosphere	sphere which contains all of the water in the Earth whether in the air, on land or in the sea

igneous rock	("ig-nee-us"); a type of rock that is formed when molten rock (magma) is cooled and hardened
infrared light	a form of light given off by the sun which we cannot see but can feel as being warm
interaction	("in-tur-ack-shun"); when one sphere causes changes in another sphere
iron	a mineral used by your blood to carry oxygen all over your body
Jupiter	("joo-pit-er"); one of the gas giants in our solar system; the largest planet in our solar system; may have more than 39 moons; the temperature on this planet is about -211°F; most of the gas on this planet is hydrogen
land clearing	the movement of land to create new buildings
lava	magma that has reached the Earth's surface
limestone	a type of sedimentary rock used for making concrete, toothpaste, soap, paper and thousands of other items
lithosphere	sphere of the Earth which contains all of the solid land (rocks, minerals and soil) that can be found on the Earth's crust
low air pressure	areas where there is very little air crammed into a small part of the atmosphere
low clouds	clouds with ceilings under 6,500 feet
lunar day	the time it takes for the moon to rotate once on its axis; 27 days

lunar eclipse	an event in which the Earth gets in between the sun and the moon, causing a shadow that can be seen on the moon
lunar orbit	one complete revolution of the moon around the Earth; approximately 29.5 days; contains all of the lunar phases
luster	the ability of a mineral to shine
magma	molten rock
mantle	large area of the Earth under the crust; this area contains large amount of solid and melted rock
marble	a type of metamorphic rock formed from limestone
Mars	the fourth planet from our sun; the coldest of all the terrestrial planets (about -80°F); known as the "red planet" because of its color; two moons orbit this planet; the air around this planet is filled with carbon dioxide gas
melting	the ability to make molecules slide around each other to make a fluid from a solid by adding heat
Mercury	("mur-cur-ee"); the closest planet to our sun; does not have a moon; it is less than half the size of Earth; it has no air; and, the temperature of the ground reaches 800°F
metamorphic rock	("met-a-morf-ick"); type of rock that is formed from heat and pressure within the Earth
metamorphosis	("met-a-morf-o-sis"); a change
meteor	("meet-ee-or"); "shooting stars" or "falling stars"; falling meteoroids that move so quickly through the air that they get very hot and burn up, leaving a glowing trail behind them in the air

meteorite	("meet-ee-or-ite"); the name given to a meteor that does not burn up in the air and smashes into the ground
meteoroids	("meet-ee-or-oids"); smaller chunks of rock (less than 20 feet long) that float around in space
meteorologists	("me-t-or-ol-o-gist"); scientists who study how the sun warms the Earth which causes our weather
middle clouds	clouds with ceilings between 6,500 and 20,000 feet
Milky Way galaxy	the name of the galaxy that we live in
mined	process by which natural resources are removed from the Earth
mineral	a solid that is made up of a group of the same atoms or molecules
molecule	("maul-ee-koo-el"); two or more atoms joined together
months	measurement of time on Earth that is closely related to the lunar day
moons	large bodies of rock that orbit a planet
Neptune	the last gas giant in our solar system; the eighth planet from the sun; contains at least eleven moons and four rings of ice; most of the gas on this planet is made up of hydrogen and it is very cold...-346°F
north pole	the most northern spot in the northern hemisphere
occluded front	("oh-klu-dead"); type of front in which the cooler air mass from a cold front runs into the cooler air mass inside a warm front
orbit	the movement of an object around a sun

parent material	original layer of bedrock in an area; responsible for providing most of the minerals within the soil
partial eclipse	an incomplete eclipse for all people within the penumbra during a solar eclipse; in this area, part of the sun can still be seen as the moon passes over only part of the sun
path of totality	the path of the moon's shadow during a solar eclipse
penumbra	an incomplete shadow that passes over the Earth during a solar eclipse
phosphate	("foz-fate") ; an important mineral that plants use to grow
phylite	("fi-light"); a type of metamorphic rock that can be turned into schist (a metamorphic rock) under a lot of heat and pressure
physical weathering	takes place when the weather causes rocks to be worn down, cracked or broken
pipe	the path that magma takes from the mantle through the crust
planets	very large round bodies of rock or gas that orbit around stars
Pluto	("plew-tow"); the ninth planet in our solar system; this planet is very small and it is made up of ice and rock
pollution	("pole-loo-shun"); an unwanted item or items that can be found in the air, water or soil
potassium	("po-tass-e-um"); a mineral that helps keep your muscles strong
precipitation	("pre-sip-eh-tay-shun"); falling droplets of liquid water or frozen ice

processed	method of taking minerals out of a rock
pumice	("pum-iss"); an igneous rock that can float on top of a container of water
radiant energy	also known as "light energy"; most of the energy we receive from the sun is a form of radiant energy
radiation	("raid-e-a-shun"); the main transfer of heat from the sun to the Earth
reflects	bounces
revolving	when an object moves around another object (for example… when a planet orbits a sun, it is revolving around the sun)
rock	a mixture of two or more minerals
rock cycle	the recycling of rocks (and the minerals inside them)
rotating	when an object spins around, like a top
salination	When an area of soil becomes very full of salt
sandy	type of soil which contains the largest pieces of minerals (sand)
satellite	any object that orbits a larger object
Saturn	a gas giant within our solar system; the sixth planet from the sun; much larger than Earth; most of the gas found on this planet is hydrogen; contains at least 47 moons and a thick band of seven rings (containing small pieces of ice) that surround the planet; the temperature of this planet is -285°F
schist	a type of metamorphc rock that can be turned into gneiss (a metamorphic rock) under a lot of heat and pressure

season	one of four parts of the year that have (roughly) the same temperature and amount of daylight and nighttime
sedimentary rock	("said-eh-men-tary"); a type of rock that is formed from the weathering, erosion and deposition of the Earth's crust
sediments	tiny rocks, mud and sand that is eroded from the Earth's crust; used to form sedimentary rocks
seismic waves	the energy that spreads through the Earth's crust during an earthquake
seismologists	("size-maul-o-jists"); scientists who study earthquakes
shale	a type of sedimentary rock that can be turned into slate (a metamorphic rock) under a lot of heat and pressure
silica	("cil-ih-kah") ; mineral that can be used in soap and toothpaste
silty	type of soil which contains medium-sized pieces of minerals
silver	mineral that can be used in expensive forks, knives and spoons
slate	a type of metamorphic rock formed from shale that can be turned into phylite (a metamorphic rock) under a lot of heat and pressure
soil	a mixture of minerals and biotic material found on the outside of our crust which is responsible for all plants to grow
soil horizon	different layers in the soil which are stacked on top of each other
soil profile	all of the layers in the soil in a particular area
soil texture	("tecks-ture"); appearance of soil based on the size of the minerals found within it

solar eclipse	an event in which the moon gets in between the sun and the Earth causing a shadow that can be seen on the Earth
solar system	("so-lar sis-tem"); all of the planets, asteroids, meteoroids and comets that orbit a star
south pole	the most southern spot in the southern hemisphere
speed of light	the speed in which light travels from the sun; 186,000 miles per second
sphere	a ball-shaped object (3D)
sphere	a category made by scientists to describe four different areas of the Earth - living organisms, solid Earth, liquid water and all of the gases
stars	huge balls of hot gas that give off a large amount of energy (like heat and light)
states of matter	different forms of matter; a solid, liquid or gas
stationary front	a front that is not moving
stratus	clouds that are long, flat and seem to fill up the sky like a large sheet
streak	("streek"); colored line that remains after a mineral is rubbed against a white object
subsoil	soil horizon directly below the topsoil
summer solstice	the day of the year in the Northern Hemisphere where we receive the most light in one day; this occurs when our orbit around the sun points the northern hemisphere most towards the sun on June 21st
sun	our nearest star

sunrise	the time when the sun can be seen for the first time in the morning
sunset	the time when the sun can no longer be seen at the end of the day
sunspots	small, cooler areas on the sun that appear darker in color
symbiosis	("sim-by-o-sis"); the ability of different kinds of organisms to work together in order to survive
system	a collection of all spheres which work together in any area of the Earth
tectonic plates	large pieces of the Earth's crust that fit together like a jigsaw puzzle and float on top of our mantle
telescope	("tell-eh-scope"); a tool that is used to make faraway objects look closer than they are
terraces	the flattened layers of land created by terracing
terracing	("tare-a-cing"); method of cutting many different flattened layers into the ground to form a pyramid shape
terrestrial planets	("tur-rest-tree-ul"); planets that are "Earth-like" or "made of rock"; in our solar system they would be Mercury, Venus, Earth and Mars
the "great red spot"	A huge storm on Jupiter that has lasted for hundreds of years; this storm looks like a swirling group of red clouds that is larger than the Earth
titanium	("tie-tane-e-um") ; mineral that can be used in soap and toothpaste
topography	("toe-pog-gra-fee"); the shape of the land
topsoil	the soil horizons on the top of a soil profile

transform boundaries	places on the Earth where tectonic plates slide past each other
triton	("try-ton"); a moon which orbits neptune; one of the largest moons in our solar system
tsunami	("soo-nam-ee"); very large and fast waves in the ocean caused by underwater earthquakes
tungsten	("tung-stin") ;mineral that can be used within a lightbulb to help make it glow
umbra	the shadow caused by the moon during a solar eclipse
universe	("yoon-ih-vurse"); a word we use to describe everything that exists...everywhere
Uranus	("yur-ah-nus"); a gas giant within our solar system; the seventh planet in our solar system; contains at least 21 moons and three small rings of ice; the temperature of this planet is -328°F; most of the gas that makes up this planet is hydrogen
vent	an opening at the end of a pipe that allows magma to reach the surface of the Earth
Venus	("vee-nus"); the second planet in our solar system; it is almost the same size as Earth; does not have a moon; surrounded by air that is filled with a gas called carbon dioxide; the temperature of this planet can reach 870°F
vibration	("vi-bray-shun"); a shaking motion
visible light	all of the light that can be seen (i.e. all of the colors of the rainbow)

volcanic islands	layers of hardened lava from underwater volcanoes that are sticking out of the ocean
volcano	any place on a planet where something from the inside of the planet is moving through its crust
waning	occurs when the amount of light reflecting off of the moon is getting smaller
warm front	type of front where a warm air mass is moving into a cold air mass
water cycle	pattern in which water travels throughout the environment
water vapor (steam)	the gaseous state of matter for water
waxing	occurs when the amount of light reflecting off of the moon is growing
weather	our day-to-day patterns of temperature, wind, precipitation, etc.
weathering	a natural method that breaks apart large rocks into smaller rocks
weightlessness	also known as microgravity; a smaller amount of gravity; when astronauts are "floating" in space, gravity is not pulling on them very much, making them "weightless"
wind	air in motion; affected by differences in air pressure as air moves from high pressure areas to low pressure areas
windbreak	a row of trees planted on the edge of a farm; roots of trees do a very good job in holding the topsoil together and the trees themselves block wind from eroding the field
winter solstice	the day of the year in the Northern Hemisphere where we receive the least amount of light in one day; this occurs when our orbit around the sun points the northern hemisphere farthest away from the sun on December 21st

work pushing or pulling something to make it move

year the time it takes for a planet to make one revolution around its sun

zinc ("zing-k"); a mineral used by your immune system to help you stay healthy

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