

# Layers of Learning

## Year One - Unit Fourteen

Includes fun, hands-on projects in  
History - Geography - Science - The Arts



**Ancient Africa - Africa - Bonding - African Tales**

Michelle Copher & Karen Loutzenhiser



# LAYERS OF LEARNING

## YEAR ONE • UNIT FOURTEEN

ANCIENT AFRICA  
AFRICA  
BONDING  
AFRICAN TALES

HooDoo Publishing  
United States of America  
©2014 Layers of Learning  
Copies of maps or activities may be made for a particular family or classroom.

If you wish to reproduce or print excerpts of this publication, please contact us at [contact@layers-of-learning.com](mailto:contact@layers-of-learning.com) for permission. Thank you for respecting copyright laws.





# LAYERS OF LEARNING INTRODUCTION

This is part of a series of units in the Layers of Learning homeschool curriculum, including the subjects of history, geography, science, and the arts. Children from 1<sup>st</sup> through 12<sup>th</sup> can participate in the same curriculum at the same time - family school style.

The units are intended to be used in order as the basis of a complete curriculum (once you add in a systematic math, reading, and writing program). You begin with Year 1 Unit 1 no matter what ages your children are. Spend about 2 weeks on each unit. You pick and choose the activities within the unit that appeal to you and read the books from the book list that are available to you or find others on the same topic from your library. We highly recommend that you use the timeline in every history section as the backbone. Then flesh out your learning with reading and activities that highlight the topics you think are the most important.

Alternatively, you can use the units as activity ideas to supplement another curriculum in any order you wish. You can still use them with all ages of children at the same time.

When you've finished with Year One, move on to Year Two, Year Three, and Year Four. Then begin again with Year One and work your way through the years again. Now your children will be older, reading more involved books, and writing more in depth. When you have completed the sequence for the second time, you start again on it for the third and final time. If your student began with Layers of Learning in 1<sup>st</sup> grade and stayed with it all the way through she would go through the four year rotation three times, firmly cementing the information in her mind in ever increasing depth. At each level you should expect increasing amounts of outside reading and writing. High schoolers in particular should be reading extensively, and if possible, participating in discussion groups.

😊 😊 😊 These icons will guide you in spotting activities and books that are appropriate for the age of child you are working with. But if you think an activity is too juvenile or too difficult for your kids, adjust accordingly. The icons are not there as rules, just guides.

😊 GRADES 1-4

😊 GRADES 5-8

😊 GRADES 9-12

Within each unit we share:

- EXPLORATIONS, activities relating to the topic;
- EXPERIMENTS, usually associated with science topics;
- EXPEDITIONS, field trips;
- EXPLANATIONS, teacher helps or educational philosophies.

In the sidebars we also include Additional Layers, Famous Folks, Fabulous Facts, On the Web, and other extra related topics that can take you off on tangents, exploring the world and your interests with a bit more freedom. The curriculum will always be there to pull you back on track when you're ready.

You can learn more about how to use this curriculum at [www.layers-of-learning.com/layers-of-learning-program/](http://www.layers-of-learning.com/layers-of-learning-program/)

## UNIT FOURTEEN

ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

*Education is the most powerful weapon which you can use to change the world.*

*-Nelson Mandela*

	<b>LIBRARY LIST:</b>
HISTORY	<p>Search for: Ancient Africa, Bantu, Nubia, Kush, Nok, Axum, Aksum, Ethiopia history</p> <p>☺ <u>Step Back in Time To Ancient Kush</u> by K.N. Chimbiri. An information and activity book in one. Kids will learn about ancient Kush as they connect dots, open flaps, and search for hidden pictures.</p> <p>☺ ☺ <u>African Beginnings</u> by James Haskins and Kathleen Benson. An illustrated picture book covering eleven African civilizations in chronological order.</p> <p>☺ ☺ <u>Ancient Africa: Modern Rhymes About Ancient Times</u> by Susan Altman and Susan Lechner. Uses poetry to teach facts about ancient African Kingdoms. Great for creating mental “hooks” to hang history on.</p> <p>☺ <u>Sub-Saharan Africa</u> by Lisa Zamosky. The first few chapters cover ancient times, followed by medieval kingdoms.</p> <p>☺ <u>The Ancient African Kingdom of Kush</u> by Pamela Service.</p> <p>☺ <u>The Ancient Kushites</u> by Liz Sonneborn. Great coverage of a civilization rarely spoken of.</p> <p>☺ <u>Ancient Nubia: Egypt's Rival in Africa</u> by David O'Connor. Covers society, government, and traditions of the Nubians plus over 300 images of Nubian artifacts and maps.</p> <p>☺ <u>Ancient African Civilizations: Kush and Axum</u> by Stanley Burnstein, ed. This is a collection of primary and secondary accounts from the ancient world. These documents are the source of much of what we know about Kush and Axum. Use as a reference.</p>
GEOGRAPHY	<p>Search for: Africa</p> <p>☺ <u>Africa</u> by David Perterson. Part of a series covering each continent, this book explains the landscape, weather and people. If you want to get the whole series in one, purchase <u>National Geographic Beginner's World Atlas</u>.</p> <p>☺ ☺ <u>Africa is Not A Country</u> by Margy Burns Knight. This colorful and fun book briefly highlights each of the fifty-three countries of Africa, underlining how they each have unique histories and cultures.</p> <p>☺ ☺ <u>Africa</u> by Mel Friedman.</p> <p>☺ ☺ <u>Look What Came From Africa</u> by Miles Harvey. Covers music, food, animals, fashion, art, and more things originating from Africa.</p> <p>☺ ☺ <u>Growing Up In Africa</u> by Les and Genny Nuckolls. Novel of two girls and their adventures as they grow up in Africa. Learn about the continent and some of its animals, people, and culture. Well written and entertaining, a perfect read-aloud.</p>

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

SCIENCE	<p>Search for: chemical bonding, crystals. Hardly anyone writes books for kids about chemical bonding . . . we're flabbergasted. Anyway, you'll have to rely on encyclopedias and experiment books.</p> <p>☺ ☺ ☹ <u>Snow Crystals</u> by W.A. Bentley and W.J. Humphreys. Over 2,000 photos of snow crystals.</p> <p>☺ <u>Chemical Bonding: 100 Kinds of Atoms Make Everything</u> by Professor Ima Kook. A young girl has a dream all about pieces sticking together. When she wakes up her mother explains the dream is all about atoms bonding into molecules.</p> <p>☺ ☺ <u>Crystal Mining</u> by Toysmith. Chip crystals out of plaster, just like miners. Hint: use water to soften the plaster before beginning to dig away.</p> <p>☺ <u>Crystal Growing</u> an activity kit from Smithsonian. Grow three different gem-like crystals.</p> <p>☺ <u>Chemistry</u> by Ann Newmark. From DK Publishers, this is a visually amazing book. Tons of pictures aid younger kids in understanding the detailed descriptions of technical chemical concepts. Covers much more than bonding, use it for all your chemistry studies in the middle grades.</p> <p>☹ <u>Chemical Structure and Bonding</u> by Roger L. Dekock and Harry B. Gray. Basic chemical theory about bonds, on an advanced high school or basic college level. For serious chemistry students.</p> <p>☹ <u>Six Easy Pieces</u> by Richard Feynman. A series of six lectures from one of the most brilliant (and funny) physicists of the 20<sup>th</sup> century to a freshman college physics class. The first chapter is all about atoms, their structure, and how they bond.</p>
THE ARTS	<p>Search For: African Folk Tales, Anansi the Spider, Ananse, Brer Rabbit, Uncle Remus</p> <p>☺ ☺ <u>Anansi and The Moss-Covered Rock</u> by Eric Kimmell. Anansi is a spider who is constantly out to trick all his animal friends. My favorite of all Anansi books, they each tell a compelling and traditional trickster tale. The Eric Kimmell versions are charming.</p> <p>☺ ☺ <u>Anansi and The Talking Melon</u> by Eric Kimmell.</p> <p>☺ ☺ <u>Anansi and the Magic Stick</u> by Eric Kimmell.</p> <p>☺ ☺ <u>Anansi the Spider: A Tale from the Ashanti</u> by Gerald McDermott. Traditional Anansi trickster tale with traditional African style illustrations.</p> <p>☺ ☺ ☹ <u>Pot of Wisdom: Ananse Stories</u> by Adwoa Badoe. These 10 Ananse stories are told by an author from Ghana.</p> <p>☺ ☺ <u>Aunt Nancy and The Bothersome Visitors</u> by Phyllis Root. In the Aunt Nancy books, Aunt Nancy must use her wit to overcome her struggles.</p> <p>☺ ☺ <u>Aunt Nancy and Cousin Lazybones</u> by Phyllis Root. Aunt Nancy must hatch a plan to get her lazy cousin out before he drives her crazy.</p> <p>☺ ☺ <u>The Complete Tales of Uncle Remus</u> by Joel Chandler Harris and Richard Chase.</p> <p>☺ ☺ <u>The Tortoise and the Tree</u> by Janina Domanska. A Bantu folktale about helping others.</p> <p>☺ ☺ <u>The Name of the Tree</u> by Celia Barker Lottridge. A Bantu folktale about persistence.</p>

## HISTORY: ANCIENT AFRICA

### Teaching Tip

Some of the books we recommend may not match your worldview. For some subjects the resources are extremely limited and we must make do with what we have. Ancient Africa is definitely one of those hard-to-find subjects. We recommend you do your best to read the books you assign your kids before they do, so you can either veto them or explain your own beliefs when they disagree with the author's point of view.

### Additional Layer

Today Africa is still “dark” in some ways.

Take a look at this map of Earth at night:



Fewer people from Africa, percentage wise, have access to computers and the internet than on other continents.

And in news coverage Africa is talked about less than any other continent on Earth. The U.S., France, and Iraq are top.

Europeans called Africa “the dark continent.” They were sure it was a scary place, full of savages and threatening terrain. In truth, Africa has been home to a number of advanced civilizations. Many of the great ancient civilizations have long been buried in the sand, but some we do know of. In fact, some ancient civilizations are still flourishing today. The Egyptian people have been in existence for thousands of years. We cover Egypt in detail in another unit, so here we will focus on the other African peoples.



*Pyramids from the kingdom of Kush, now a UNESCO World Heritage site.*

How do we know about civilizations that have long been lost to the sands of time? Archeology and artifacts are an important key to this knowledge. You'll find a African mask coloring sheet in the printables section to color while you discuss artifacts. In Africa we also have the benefit of griots, historical storytellers who have been passing down African history in a great, long-lasting oral tradition. Griots memorize the family history and stories of everyone in a village going back centuries. West African history, in particular, has been shared through the stories of griots.

Possibly the oldest African civilization was Kush, just upriver from ancient Egypt. Kush was followed by the kingdom of Axum. In West Africa the Nok were an ancient highly developed civilization. The other aspect of ancient Africa we'll learn about is the migration of the Bantu people. The Bantu were an ethnic group, not a kingdom or civilization.

### 🌞 🌱 🌍 EXPLORATION: Timeline of Ancient Africa

These ancient dates are all approximate. You will find printable timeline squares at the end of this unit.

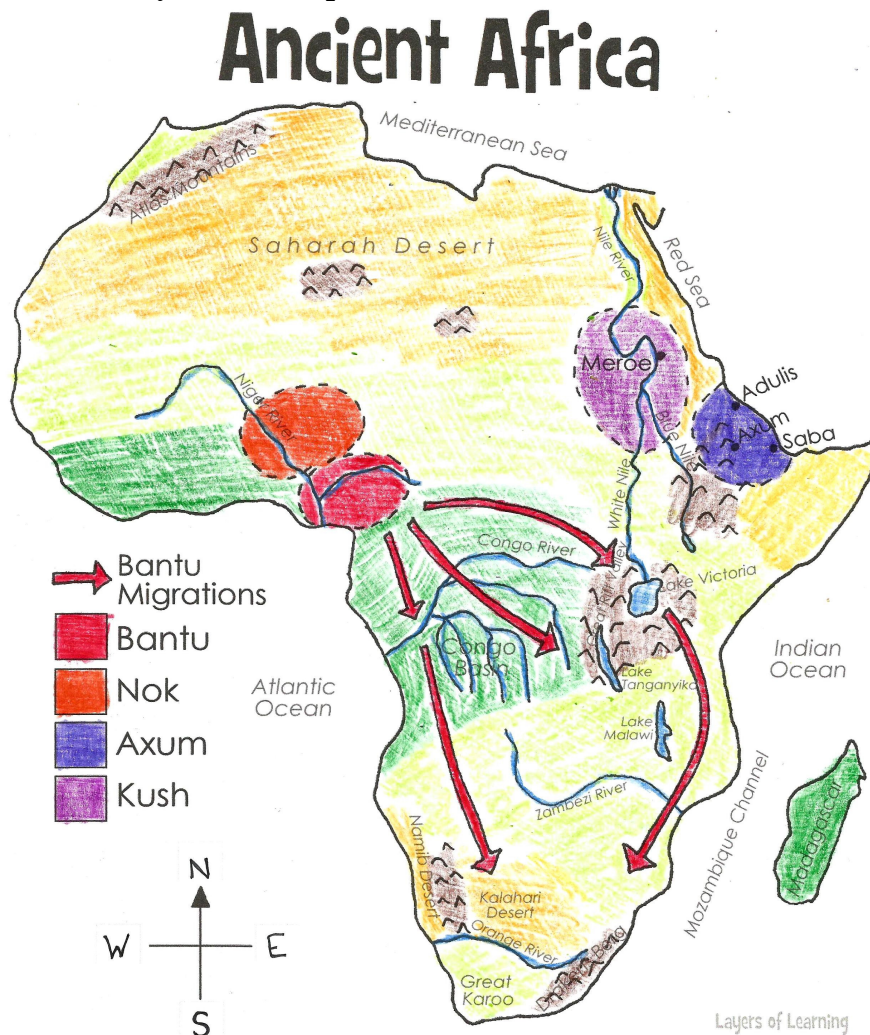


# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

- 4000 BC Saharan grasslands turn to desert
- 1550 BC Kush conquered and ruled by Egypt
- 1100 BC Kush regains independence
- 715 BC Kush conquers and rules Egypt
- 664 BC Assyrians take Egypt from Kush
- 590 BC Meroe becomes the capital city of Kush
- 500 BC- 200 AD Nok people at their height
- 300 BC Bantu migration begins
- 100 AD-700 AD Kingdom of Axum at its height
- 340 AD Christian religion adopted by King Ezana of Axum
- 350 AD Axum defeats Kush

## 🟡 🟢 🟣 EXPLORATION: Ancient Africa Map

Make a map of ancient Africa. Use the Ancient Africa map from the end of this unit. Color each of the known kingdoms: Kush, Axum, Nok, and the Bantu homeland and migration routes. Include a key and a compass rose.



## Additional Layer

Axum was the first sub-Saharan African kingdom to issue its own currency. Most of the little guys just used the currency of their bigger neighbors, like Rome or Persia. Axum, however, was a big player. They controlled the Indian trade route with Rome. Their coins have writing in both Greek, which the educated could read, write, and speak, and in their own language, Ge'ez.



Photograph by PHGCOM, and shared on Wikimedia Commons.

## The Pyramids of Meroe

... were smaller and had steeper sides than the Egyptian pyramids to the north.



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Fabulous Fact

The Kushites left behind written records, carved in stone. They wrote in a language we call Meroitic. Unfortunately, no one yet knows how to read Meroitic, so most of our information about Kush comes from archeology and the accounts of other civilizations who came into contact with the Kushites. It's too bad that the people who knew of the Kushites and wrote about them were enemies, like the Egyptians, or poorly informed, like the Greeks.

## Fabulous Fact

The name "Ethiopia" comes from an ancient Greek name for the Nubian region. It meant "burnt face," probably because of the darkness of the people's skin.

## Famous Folks

King Piye of Kush successfully invaded Egypt, founding the 25<sup>th</sup> dynasty, which lasted for 100 years, at which point the Kushites were pushed back south into their own land.

## 🌞 🌱 🌿 EXPLORATION: Griots

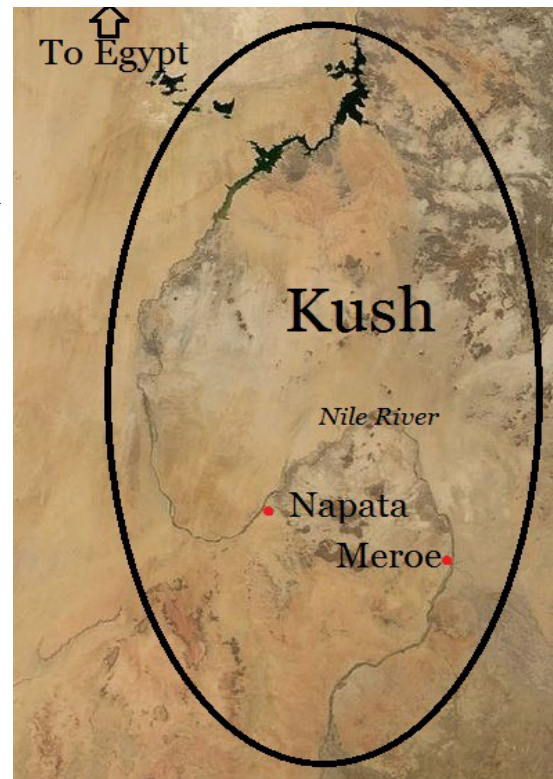
Griots memorized hours and hours worth of information about all kinds of facts and stories related to their family and village history. Try your hand at it. Create a pedigree chart that includes you, your parents, your grandparents, and your great grandparents. If you know of any, learn a short tale about each one of those people. Practice the information until you can tell about these people without any notes or help. Now just imagine learning centuries of information!

## 🌞 🌱 🌿 EXPLORATION: Kush

There was a group of ancient Africans known as the Kush who lived just to the south of Egypt. We know a little about Kush because they interacted so much with Egypt, first being conquered by them and then conquering Egypt in turn. The Kushites built cities, had armies and a king and queen, and traded across the Middle East and into India as well as into the interior of Africa. They were a civilized, learned people. They made iron tools which they traded all over the known world, mining the iron in the mountains of their homeland. When their kings and queens died they were buried under steep sided pyramids, like the ones in Egypt, though the Kush pyramids may have been first. Kush was part of a geographic area called Nubia, where several small kingdoms existed, Kush becoming the most powerful of these.

Kush's military strength lay with their archers. They had much to protect; gold mines, ivory, iron working, and incense were precious materials they traded all over the world.

Make a quiver and fill it with arrows. Each arrow should be labeled with one of the great resources or facts about ancient Kush. Make the quiver from construction paper and the arrows from straws. Place



*This is a map of the kingdom of Kush built on a satellite image from NASA. Now this area is dry and desolate, but anciently it was much wetter and there were woodlands and fields.*



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

masking tape on each straw naming a fact or resource about Kush. Add arrow tips and feathers made from construction paper. Here are some things to put on your arrows:

- iron ore
- iron tools
- incense
- gold mines
- jewelry
- ivory
- pyramids
- mighty archers

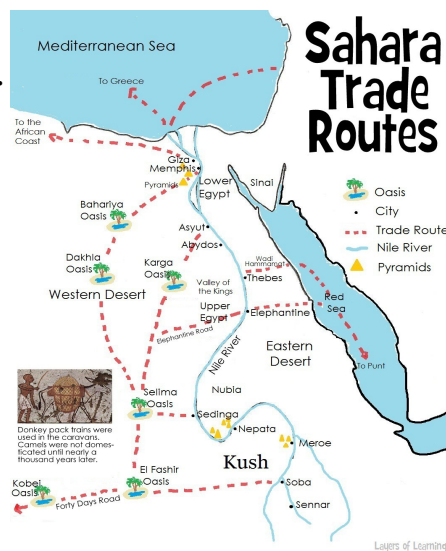
As you learn more about Kush you can add more arrows to your quiver.

## ☺ ☹ **EXPLORATION: Sahara Caravan**

Most of Africa south of the Sahara desert was cut off from Northern Africa and Europe by the Sahara Desert. The biggest desert in the world, it covers 3.3 million square miles! It is desolate, with very little plant and animal life. In ancient times it is likely that the Sahara was less desolate. It has become drier, sandier, and less fertile over time. Still, it was probably always too dry for large populations to live and farm on. Most likely there were nomadic herding tribes in the Sahara.

There were also caravans that traveled the desert for trade, but there was no easy way for people and information to travel across the barrier of the desert. If the rewards were great enough though, people would travel the desert paths in trade. They brought gold north from the Nok kingdoms and salt south from the central Sahara region. But it was in Kush that the ancient Saharan trade routes flourished.

The people of Kush traded their ivory, gold, and iron for Egyptian cotton and grain. Print out the trade route map from the end of this unit. Glue it onto thin cardboard, as from a cereal box. Then cut it out into puzzle pieces. Have the kids put together the puzzle while you talk about the trade routes.



## **Fabulous Fact**



Early caravans used donkeys. It wasn't until the 700's AD that camels were domesticated and used for desert travel.

## **Additional Layer**

People used to graze goats, sheep, and cattle in what is now the vast expanse of the Sahara Desert.



These cave paintings show people with animals that no longer live in this region.

Back then these were grasslands like the African savanna is now.

Find out how a region becomes a desert. How does long term climate change affect life on Earth?

## **On the Web**

Search You Tube for the BBC "Lost Kingdoms of Africa" series. The first episode is about Nubia, but there are others you'll want to watch too.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Fabulous Fact



The Nok culture was first discovered when tin miners uncovered terra cotta statues like this one from the ground near Nok, Nigeria (the culture got its name from the nearby village). Besides the statues, evidence has been found of iron smelting works.

## Writer's Workshop

No one knows what the Nok terra cotta figures were used for. They come in all sizes, some nearly life size. They depict men, women, children, animals and many with physical deformities or diseases. They are very detailed including hairstyles, facial expressions, and body postures.

Were they used to honor the dead? As burial markers or for religious worship? As finials on the roofs of houses?

Write your theory down in your writer's notebook.

## EXPLORATION: The Nok

The other ancient African kingdoms we know very little about. There are probably many we know absolutely nothing about. Just a few decades ago evidence was found of a people who lived in what is now Nigeria. Modern archaeologists have called them Nok, though that is not what they called themselves. We know only a few things about them: they knew how to smelt and form iron into tools and weapons. They made pottery, and they lived in cities and farmed. There are no written records that have been found of these people.

Without records, the stories and history of entire civilizations are forgotten. Create a memory book for yourself. Start with a binder and add some special pictures, school work that you've made, and some written stories of your life. Write down some of your favorite things, what makes you happy and sad, and what a day in your life is like. Keep adding to it as time goes on so you can have a written history of your own life that will be remembered.

## EXPLORATION: The Christian King of Axum

Further south from Kush we know of the kingdom of Axum, which came to power after the Kingdom of Kush was already in decline. The Kingdom of Axum became wealthy through trade with India, Arabia, and the Roman Empire. The people of Axum lived in nice houses in large bustling prosperous cities. They most likely did read and write, but we have none of their writings, so we know little about them. We do know that the King of Axum became a Christian around 320 AD. The land of Axum, now known as Ethiopia, has been Christian ever since.

Create a booklet. Write the story of the first Christian King in Africa on the pages of the booklet, and then illustrate it:

*Two Syrian boys, Frumentius and Aedesius, were aboard a trading ship on the Red Sea when it was seized! The boys escaped and were taken to the King of Axum, King Ella Amida. He was smitten by the boys and decided to take them in as part of his family. He gave them their freedom and many important jobs to do. Not long afterward, King Ella Amida suddenly died. He had only one son, a little baby boy named Ezana. Ezana was not big enough to take his father's throne, so his mother asked Frumentius and Aedesius to continue doing their jobs at court until her son was old enough to rule. Frumentius was especially loyal, helpful, and honest. He was a Christian and taught Ezana about Christianity. He sought out Christian traders and eventually became a bishop as well. Because Frumentius had*



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

*been such a kind, good advisor and had taught Ezana about Christ, Ezana joined the church and made Christianity the official state religion. He minted coins with crosses on them and taught his people what it means to be a Christian. That area of Africa is still predominantly Christian to this day.*

## 🌻 🌿 🌺 **EXPLORATION: Bantu**

The last of the African peoples that we know anything about are the Bantu. They were not a kingdom, but an ethnic group with similar cultures in their widespread settlements and cities. They were farmers that lived along the Niger River, but for an unknown reason these people began to migrate in groups, and slowly over a period of centuries they spread to the south and east over much of Africa. They were farmers who lived a tribal lifestyle in grass and clay huts. They herded animals, hunted, and grew crops. The Bantu people eventually mixed with whatever people were already in those lands and became later peoples like the Swahili on the eastern coast of Africa.

The evidence for their migration is almost entirely in the languages spoken by the people of Africa. They are so remarkably similar that linguists believe many of them diverged as little as five hundred years ago.

We do know that the Bantu were farmers, unlike everyone else on the southern portion of the continent. This meant they had a larger population and probably a more developed culture, giving them ascendancy over the tribes they came in contact with. Their language and their culture permeated everywhere they touched. This migration is probably one of the most influential movements of its kind on Earth.

Today the descendants of the Bantu speakers live in a multitude of lands with extremely varied habits and cultures, but they all have strong oral traditions that give clues to the real history of their past ancestors. They point to northern lands as their near-mythical homeland, an area that would now be in the vicinity of northern Cameroon and Nigeria. They believed in one supreme creator God and in ancestors who lived on in spirit form after death and who could be called upon as intermediaries between the living and the divine. Many of their societies were matrilineal, overseen by wise women, with property and family names passing through the female line. Because they were settled while their neighbors were mobile, the Bantu learned to fortify and conceal their villages. They also tended to build on highlands rather than open plains as the open plains were the territory of the nomadic herders.

## **Ge'ez**

One of the few truly African written languages was Ge'ez of the Axumite kingdom. Here is an excerpt from Genesis written with the characters of Ge'ez.

እኩሃ፡ለእመ፡ወሰዳማ፡ዓቦቶ፡  
ለራሱ፡ልዩ፡ወጸር፡ጌ፡በቃሉ፡ወበ  
ክዩ፡ወዓደሉ፡ለራሱ፡ል፡ከመ፡  
ወልጹ፡እጎቱ፡ለላባ፡ወእቱ፡ወ  
ከመ፡ወልጹ፡ርብቃ፡ወእቱ፡  
ወሮጸት፡ራሱ፡ወልጹ፡ደዳቶ፡  
ለእቡሃ፡ከጓተ፡ነገረውሰባ፡  
ስምዳሎታሉ፡ከመ፡ዓቦቶ፡ወ  
ልጹ፡ርብቃ፡እጎቱ፡ሮጸ፡ወተቀ  
በሎ፡ወሐቀ፡ወሰዳማ፡ወወሰ  
ጹ፡ቤቶ፡ወነገሮ፡ለላባ፡ከሎ፡  
ከጓተ፡ነገረው፡ጌ፡ሎ፡ለባ፡ለ  
ዓቦቶ፡እም፡ዐጽም፡ወእም  
ከሐገዩ፡እንቱ፡ወነበረ፡መስሊሴ  
ሁ፡ሠላሳ፡መዋሰላው፡  
ወጌሴ፡ሎ፡ለባ፡ለዓቦቶ፡እ  
ስመ፡እኩሃ፡እንቱ፡ኢትት፡ነጹ፡  
ለተ፡በክ፡ጓግረ፡ዐስበክ፡መ  
ጓት፡ወእቱ፡ወዐቱ፡ለላባ፡ከል  
ሊ፡ለዋልጹ፡ከማ፡ለእንቱትል

## **Fabulous Fact**

The word “Bantu” means the people, or humans.

In South Africa, because the term was used by the Apartheid government, it became derogatory and is no longer used there.

## **Fabulous Fact**

There are about 250 Bantu languages in which people can more or less understand one another. There are nearly 500 Bantu languages which linguists believe are related.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Additional Layer

Bantu words that have entered the English lexicon:

Safari from Swahili, a Bantu root language

Mambo (the Cuban music form) from Kakongo, a central African language based on Bantu

Mamba (a venomous African snake) from a Swahili word

Kwanzaa (the holiday) based on a Swahili word meaning “first fruits”

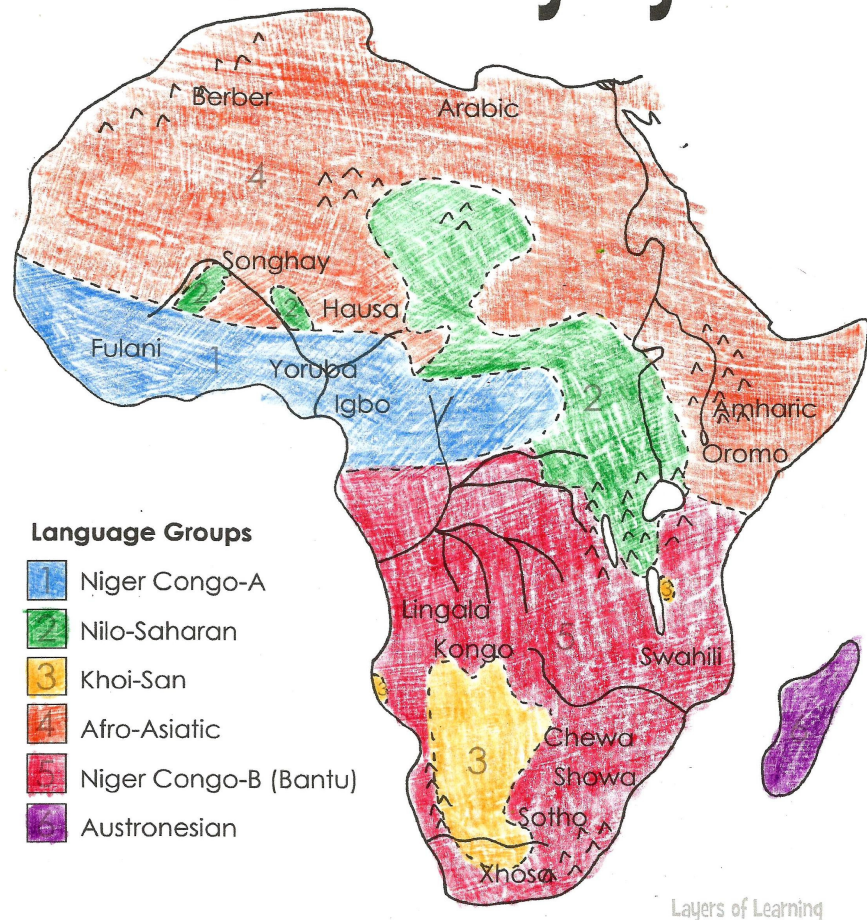
Jumbo the name of an 18<sup>th</sup> century circus and zoo elephant, the name was taken from a Swahili word

Impala a gazelle of the African plains, the name comes from a Zulu word

Chimpanzee is a luba-kasai word from the Congo, based on Bantu

Use the African Languages map from the end of this unit to mark where the Bantu language groups ended up in Africa. Some of the major languages from Africa are written on the map in their general locations.

## African Languages



## Additional Layer

The Bantu word for God in many languages has the same root word that means sky. The Bantu believe that God lives in the sky. Many of their creation myths speak of a time when God was closer to the earth, but the behavior of men, who God created, drove him further off, both physically and emotionally.

## EXPLORATION: Bantu Creation Myth

The creation myth of the Bantu people goes like this:

*In the beginning there was only darkness, water, and the great god Bumba. One day Bumba, in pain from a stomach ache, vomited up the sun. The sun dried up some of the water, leaving land. Still in pain, Bumba vomited up the moon, the stars, and then some animals: the leopard, the crocodile, the turtle, and, finally, some men, one of whom, Yoko Lima was white like Bumba.*

Write out the parts of the story on pages in a booklet and illustrate pictures of the Bantu creation myth. Discuss similarities and differences between other versions of the creation of the world.



## GEOGRAPHY: AFRICA

Africa is the second largest continent after Asia and lies across the equator. It has diverse landscapes from deserts and mountains to deep dense jungles and broad grasslands. The eastern side of Africa is split by a huge fissure that runs from Israel and the Dead Sea through the Rift Valley. A series of lakes and valleys have formed in this rift.

The north of Africa is covered with the Sahara Desert, except for a strip of land along the Mediterranean coast. The southern end of Africa is also desert. In between, heavy rain fall created a dense jungle in the Congo Basin. The rest of central Africa is covered with grassland called savanna.

### 😊 😊 EXPLORATION: Cookie Map

Make a cookie map of Africa. You need sugar cookie dough, frosting, chocolate chips, green dyed coconut, yellow dyed sugar, sprinkles, and small candies. To dye sugar or coconut, place the desired amount in a plastic bowl with a lid along with a few drops of liquid food coloring. Shake the sweets around until they're completely coated.

As often as we make maps, we're always game for a fun approach to them. To start out our study of Africa we created an edible map.



*We started with the basic physical features shown here and kept adding more and more to our map as we discovered new things in our atlas.*

The kids carefully shaped a sugar cookie dough continent while referencing our atlas. While it baked and cooled, we read about the various regions within Africa and studied our Children's Atlas. We used various colors of frosting, colored coconut (savannah), yellow sugar (deserts), flower sprinkles (coral reefs), green sprinkles (mangroves), blue frosting for bodies of water, pink sugar (Cape of Good Hope), and chocolate chip mountains. Saltwater taffy bits became the great pyramids.

### Memorization Station

Begin to memorize the countries of Africa. It's not absolutely necessary that kids have it down perfectly, but a great deal of familiarity is desired. When they hear Kenya or Sierra Leone they should at least recognize that these countries are in Africa.

Use geography songs CD's for easy memorization.

### Africa Really IS Big

Be sure you look at Africa on a globe and not just on a flat world map. Africa on a map looks pretty small, roughly the size of Greenland. The reality is quite different.

### Additional Layer

It's hard to talk about Africa without mentioning slavery. Almost every people on Earth of every skin color and race have been enslaved at some point, but African slavery (because of its recent history) deserves a harder look. In certain parts of Africa slavery is still alive today.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

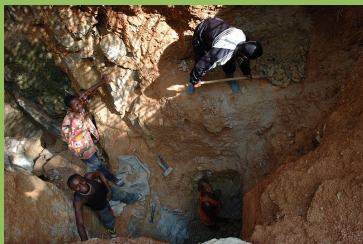
## We Love Your Projects!

Send us pictures of any of the projects you've done using Layers of Learning so we can feature them on our website.

[contact@layers-of-learning.com](mailto:contact@layers-of-learning.com)

## Additional Layer

Africa is ripe with natural resources like diamonds, oil, gold, copper, rare earth elements, timber, salt, coal, coffee, cotton, rubber, spices, and more. Yet much of Africa is rife with poverty. The DR Congo is one of the poorest nations on Earth, but it has one of the richest collections of natural resources. Read more about Congo and see if you can find out why they experience poverty amid plenty.



*Mining with hand tools*

## Africa Report

Use the printable continent research form from the printables page at [www.Layers-of-Learning.com](http://www.Layers-of-Learning.com) to begin a report on Africa.

Our focus was primarily on regions, geographical features, and landmarks, but you could use another candy to include cities and political references if you'd like too. If you have several children you could give each one a separate lump of cookie dough to make individual Africa maps. One could create a landmark map, one a political map, one an elevation map, and one a biomes map of Africa. It would make for an interesting discussion as you compare each map.

While the kids ate our map I read them stories about kids who live in Africa from *Children Just Like Me* by Anabel and Barnabas Kindersley. We followed it all up with a discussion comparing the kids' lives and experiences versus our own.



You can create edible maps of anywhere in the world. The hands-on project gives you plenty of time for learning and discussion while you're working away at crafting the map.

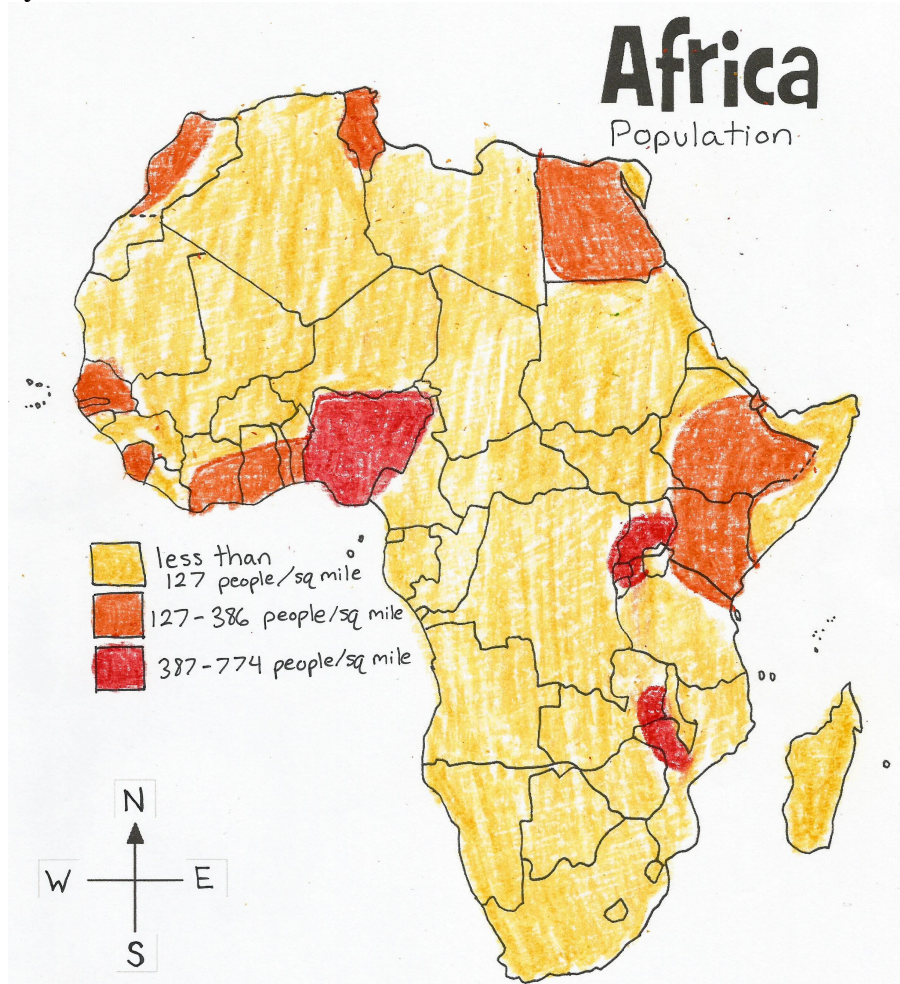
## 😊 😊 😊 EXPLORATION: African Population Map

Use the Africa map from the end of this unit to make a population map of Africa. Use a student atlas and three shades of the same color. Africa has one of the least dense populations in the world, but is growing rapidly. The darkest shade is the most populated



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

and the lightest shade is the least populated. Be sure to make a key.



## ☺ ☹ ☹ **EXPLORATION: African Countries**

Use a student atlas and the outline map of African countries at the end of the unit to label all the countries of Africa. For the youngest kids so much writing may be daunting. You can type up the African country names, print them and cut them out to glue onto the map instead or choose a few countries to highlight. We've also included a map with the countries already labeled.

Dashed lines are disputed borders. Older kids can label major cities and seas and oceans as well.

You might also consider coloring and labeling the regions of Africa as shown in the following map.

We've actually included several maps of Africa. Some have natural features and some are only country outlines. Some are labeled and some are not. Take your pick.

## **Additional Layer**

Traditional African music with its strong drum beats and make-me-want-to-dance rhythms was the basis for western music such as reggae, blues, jazz, rock 'n roll, samba, and hip hop.



*Photo by Emilio Labrador and shared under cc license.*

## **An Old Joke With a New Punchline**

Pick a number between 1 and 10.

Multiply it by 9.

If it's a 2 digit number, add them together.

Now subtract 5.

Map the result to a letter of the alphabet, where A=1, B=2 and so on.

Think of a country which begins with that letter.

Take the second letter of the country and think of an animal which begins with that letter.

Most people come up with an elephant from Denmark, but if your kids know Africa they'll come up with a jaguar from Djibouti.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Additional Layer



The map above shows the rough distribution of major religions in Africa.

## Fabulous Facts

Africa has 54 countries, including newly formed South Sudan (July 9, 2011).

The largest city in Africa is Cairo, Egypt with a population of 17 million.

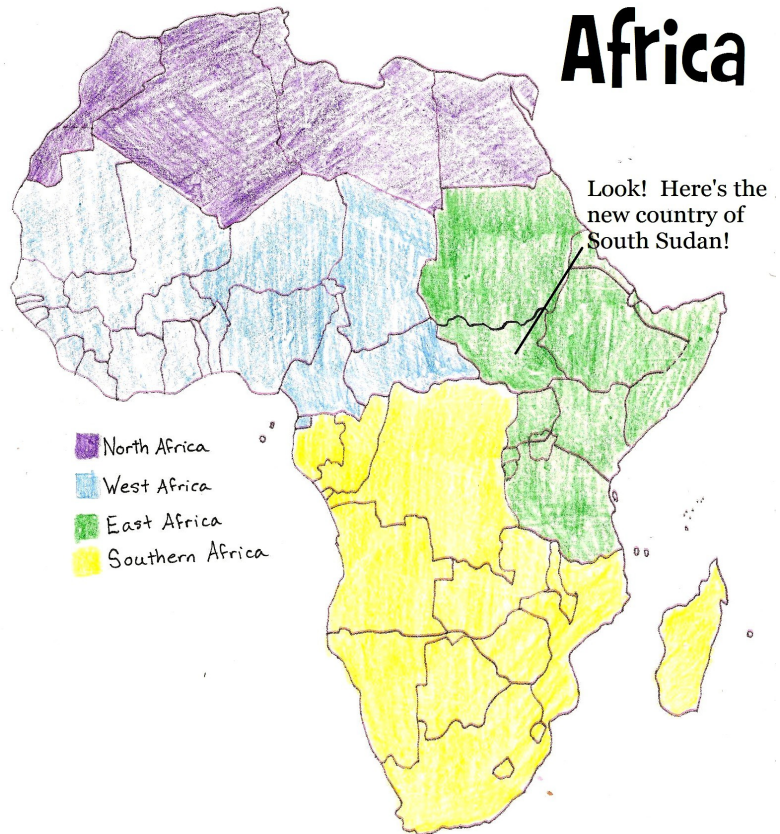
Africa has reached a population of around 1 billion.

Soccer is the most popular sport in Africa, with professional teams and players signing on with European teams.



The highest mountain in Africa is Kilimanjaro, which is snow covered in spite of being nearly on the equator.

## Africa



## ☺ ☹ ☹ EXPEDITION: Travel Planner

Visit a travel agent in your town and get information about a country in Africa to visit. Find out what there is to see and how much your trip would cost. Make up an itinerary. When you get home make a poster out of your brochures and other information you got about your country and present it to family or friends.

## EXPLANATION: Trip To Africa

We've been studying Africa lately, but I don't have it in me to travel there with the kiddos, so instead we went on an "armchair expedition." Just write out some little plane tickets (or train or bus or boat tickets depending on your destination). If you want you can have them pack a little bag of things they may need for the "trip" (snacks always make this concept a bigger hit with the kids!) Load all your little passengers on to the couch and let them watch a video of your destination. I love the Planet Earth series by the Discovery Channel. A & E did an excellent series that toured each of the 50 states. Your local library will likely also be an excellent source for geography videos. I have my kids write down little notes of things they saw that they didn't know before, or



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

interesting things about the place that they thought were cool. They like to have tiny notebooks in their trip bags to write on. After our armchair expedition we talk about all we saw and sometimes make a map or do a project about the video.

For our Africa study we watched "Deserts" from the Planet Earth Series, and have been working on a desert section of our Africa lapbooks. This is the cheapest, easiest trip to the Sahara Desert you could ever take your kids on!

*Karen*

## **EXPLANATION: Being Jane**

Despite my constant attempts to have school time full of activities, creativity, and learning fun, sometimes I still just can't seem to keep my kids' attention. We've spent the past few weeks learning about Africa and just had a few little tidbits to finish up. I could tell they were drifting. I could sense small minds wandering. All the hands-on stuff I had planned and it still wasn't cutting it! I looked down at our lesson on Jane Goodall and knew it needed something more. So I ran upstairs and grabbed a hat, my coat, a pair of binoculars, and a monkey puppet. When I came back to the school room I was no longer Mom . . . I became Jane Goodall.



I introduced myself in my best British accent (my best is really sad by the way) and told just a bit about who I was. I also introduced my chimp and let the kids pat him on the head. They asked questions, we chatted, I managed to naturally squeeze in all the bits of information from my lesson plan, and voila – mission accomplished! Bringing our lesson to life made all the difference!

*Karen*

## **Teaching Tip**

Karen loves hands on stuff and activities with the kids. Michelle, not so much. We have different styles and that's okay. Karen's kids do lots of crafts and lots of writing. Michelle's kids read like crazy, do maps and timelines, and really get into math and science.

We both do some of each of those areas, but our focuses are different, because we are different. Don't try to squeeze your style into someone else's agenda or opinion of the "best" way to teach kids.

Be yourself and maximize your strengths. You'll be much happier and stave off the burn-out much longer.

## **Famous Folks**

Look up information about one of these famous Africans to find out what they did:

Nelson Mandela

Kofi Annan

Desmond Tutu

Wangari Maathai

Jomo Kenyatta

Ferdinand Chavier

Chris Barnard

Princess Elizabeth of  
Toro

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Adapt It

Okay, you don't have a four wheeler, a trailer, or ten acres to go on Safari. So adapt it. Do a walking safari in your backyard, a nearby park, or through your house. The kids will love keeping their eyes out for the next exotic plant or animal no matter the setting.

## Additional Layer

African animals are very popular in zoos. If there's a zoo near you go see them in person.

## Writer's Workshop

After the activity older kids could pick one of the animals and do a more complete report. Have some books from the library on hand for them to use.

## Additional Layer

Make "cameras" out of small jello boxes and black paint to take on your safari.

## Additional Layer

Talk about the concept of threatened and endangered species since many of the African savanna animals fit in these categories.

## 🌞 🌿 EXPEDITION: Backyard Savanna Safari

When studying biomes of Africa take an imaginary trip to the savanna of Africa. I (Michelle) did this activity with my kids ranging in age from 11 to 4 (Nathan drove the four wheeler while I walked along behind).



Before the activity I found information on several plants and animals of Africa and printed out pictures from the Internet of them. Then I placed them along a trail we have on our property. You can do this in a park or your backyard or even inside your house if you like.

The kids all climbed into the back of a trailer behind our four wheeler and we went on safari. They spotted the "animals" along the way and we stopped at each one to discuss a few interesting facts about them. It was completely fun, kept their attention, and they learned.

Here are the African wildlife we highlighted:

- Zebra: smaller than a horse, barks instead of neighing, lives in herds of up to 10,000 individuals
- Lion: males have manes, live in prides, males protect and the females hunt and raise the cubs
- Nigricaps Ant: live in acacia trees, when the tree is disturbed the ants attack with poisonous bites, they fight other ant colonies for control of the tree
- Giraffe: up to 18 feet tall, babies are born 6 feet tall, live about 25 years, females live in herds, males roam around looking for females



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

- Gazelle: eats shrubs, grasses, and trees, gets eaten by almost everything else
- Acacia Tree: thorny, good at drought survival, sap is used as a remedy for many ailments
- Baobab Tree: leafless 9 months of the year, produces monkey bread fruit, Arab tale that the devil plucked up the tree and stuffed it back in the ground top first
- Bermuda Grass: drought resistant, early succession plant (comes back first after a fire)
- Elephant Grass: up to 10 feet tall, grows mostly along rivers
- Elephant: largest land animal, lives up to 70 years, lives in groups with a female leader
- Black Mamba: aggressive and deadly snake
- Baboon: monkey that lives on the ground, eats fruits and bugs, lives up to 45 years

There are many, many more savanna plants and animals to choose from.

## 😊 😊 😊 **EXPLORATION: Mancala**

The game of Mancala is an old African game still played across the continent. You can buy Mancala sets at a store where games are sold. Try it out.

## 😊 😊 😊 **EXPLORATION: A Taste of Africa**

Some fruits that grow in Africa include figs, jujube, breadnut, bananas, papaya, avocado, oranges, peaches, apricots, mangoes, watermelon and pineapple. Some of these fruits are African in origin and others have been brought to Africa by other people. Have an African taste testing and try some out.

## 😊 😊 **EXPLORATION: Senufo Cloth Painting**

The Senufo people of West Africa's Ivory Coast are renowned for their cloth paintings. They believe their artwork has special meaning and helps protect them in their daily lives. Design motifs usually include birds, snakes, fish, frogs, crocodiles, and turtles as seen from above or from the side, covered with lots of geometric patterns. The Senufo people thought all animals had spirits and often



## **Additional Layer**

Throughout many areas of the world and across time, people have expressed themselves artistically. What can you learn about our similarities as people of many different cultures by looking at our art?

## **Additional Layer**

The Senufo people are also known for their masks and pottery.



The people tend to be either farmers or artisans. Being an artisan is a highly respected job, and art is highly valued. They have gone from traditional, value-based Senufo art to commercialism for tourists since World War II.

If you were an artist at heart, would you rather create for the sake of creating, or would you rather create to get paid?

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Additional Layer

Look for African countries in the news as you do your Africa unit. Often events in Africa will make the front page. Discuss the current events with your kids. Find the places on the map and talk about why we would care about something happening halfway around the world.

outlined them with a thick band of yellow to represent that kind of energy. Lastly, the background was colored whatever color they wanted.

Traditionally their cloth paintings were then sewn into clothing. Hunters and dancers both used them in their attire to bring them luck and good fortune. Today the cloth paintings are still made, but they aren't made into clothes anymore. Now they are sold to tourists!

Tyler created this turtle with an amazing energy spirit outline and bright blue background. He was meticulous with his shell designs. He did this with a black sharpie marker, colored tempera paints, and white fabric.

Elizabeth decided to create a turtle with lots of geometric details and a dark background. The contrast between the yellow spirit energy and the dark background really makes her picture pop!



## Additional Layer

What significance does line play in Senufo art? Can you spot different kinds of lines within it?

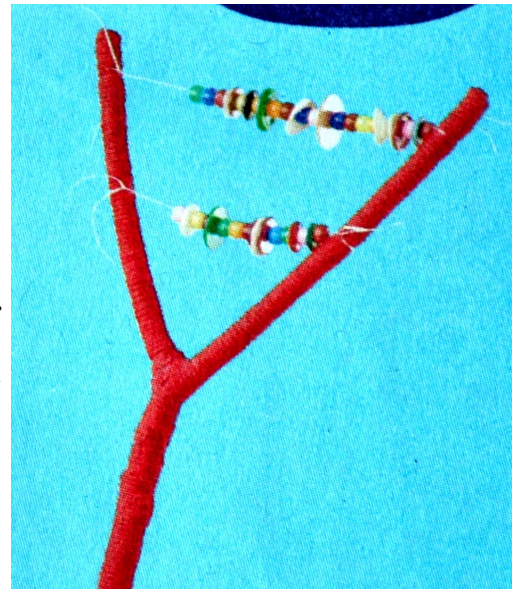
What effect do the contrasting colors have? How would the picture feel if it were done in all cool or all warm colors instead of the combination?

What simple shapes can you spot on the turtle pictures? Do you see organic shapes? Geometric shapes?

Did you notice how adding repeating lines gave the turtle shells texture? This is implied texture – it looks textured, but if you touched it, it would feel flat and smooth.

## 😊 😊 EXPLORATION: Y Rattle

Based on ancient sistrum rattles, you can make a Y rattle. Start with a Y shaped twig and spread glue all over it. Wrap the yarn over every inch of the stick. Use doubled over pieces of dental floss and tie one end on to the branch, thread buttons or beads on to the floss, then tie off the other end on the other Y of the branch. You can add as many of these strands as you'd like. Shake the rattle!



## SCIENCE: BONDING

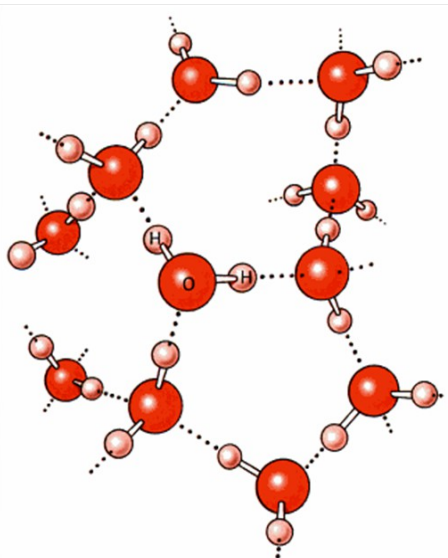
Atoms join each other to make molecules and compounds. When they hook together we call this bonding. There are four types of bonds: ionic, covalent, hydrogen, and metallic. Ionic bonds involve atoms with opposite charges combining together to neutralize the charge. An atom with an extra electron would be negatively charged and might join up with an atom which is short an electron (positively charged).

Ionic bonds are formed between metals and non-metals. Covalent bonds are formed between two non-metals. Looking at the periodic table, you can see why. The atoms on the left side, the metals, have fewer electrons in their outer shell. They are ready and willing to give up an electron in order to be stable. The non-metals though are nearly full and would rather steal an electron from a metal or share with another non-metal.

Hydrogen bonds are unique because they're really not two atoms bonding to form a molecule, they're two molecules attracted to one another because there is a negative charge on one and a positively charged hydrogen on the other. In the above picture of water molecules you can see the hydrogen bonds portrayed as dotted lines between the molecules of water.

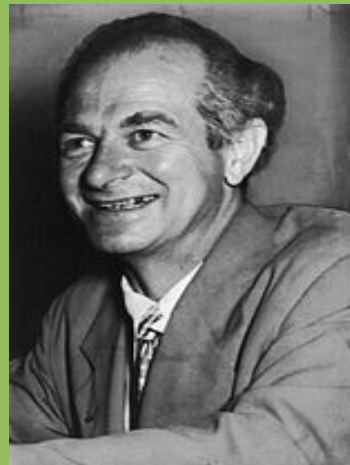
When metal atoms bond together they do not share or give up electrons with other atoms, but all of the metal atoms in the group share all of the electrons. The electrons sort of form a shifting cloud that flows freely around and through the whole mass of atoms. This is precisely why metals are flexible, conductive, and strong.

Whenever chemicals bond they bond in certain patterns that are consistent within the molecule. This pattern can be easily seen in large crystals. The same pattern that exists on the molecular level is the pattern that evidences itself on the macro level, or on the level at which you can see with your own eyes.



*Water molecules loosely bonded to one another by charges, making water a liquid and determining the six-sided structure of ice crystals.*

### Famous Folks



Linus Pauling was an American chemist and chemical physicist responsible for much of our modern understanding about how chemical bonds work. He was one of the greatest scientists in the history of the world.

### Fabulous Fact

There are four attractive forces that we know of in the universe. They are gravity, electromagnetic, strong, and weak. The strong and weak forces are both much, much stronger than either gravity or electromagnetic forces, but they only operate on tiny scales inside the nucleus of an atom. The truth is that people don't really understand what many of these forces are or how they work, we can only observe their effects.



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Fabulous Fact

Uranium is the largest atom found in nature. It has seven shells to hold all its 92 electrons. Larger shells, further from the nucleus, can hold more than eight electrons, up to 32.

The ability to hold more than eight electrons in upper shells explains why the periodic table balloons in period four from eight elements to eighteen and then again at period six to thirty-two elements in a row.

## Teaching Tip

Keep a few children's encyclopedias on various subjects on hand to fill in all the blanks left when authors focus only on pet topics or think information is too difficult for kids.

Our favorite for science is the *DK Encyclopedia of Science*. It is arranged topically, so all the chemistry is in one section, all the ecology stuff is in another and so on.

## Fabulous Fact

All bonds are, in fact, a combination of ionic and covalent. They lie along a continuum, rather than being an either or situation.

## EXPLORATION: Bonding With You Tube

Search You Tube for a video of covalent and ionic bonding. There are several very good ones. This one from Mr. Anderson is excellent: <http://youtu.be/7DjsD7Hcd9U>.

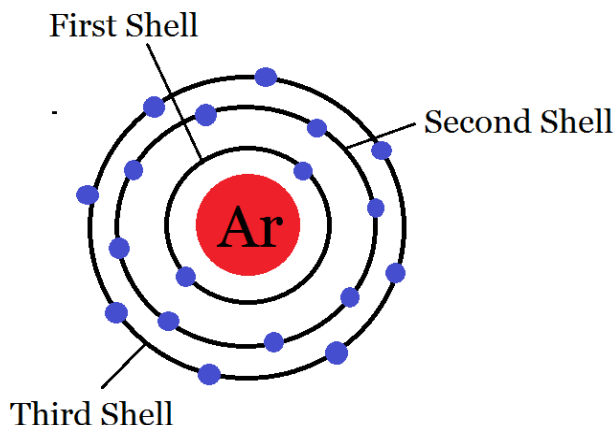
And this one with "Dogs Teaching Chemistry" is fabulous for younger kids: [http://youtu.be/\\_M9khs87xQ8](http://youtu.be/_M9khs87xQ8).

## EXPLORATION: Shells and Levels

Electrons create a sort of cloud around the nucleus as they zoom about in space. But they don't all fit in a single plane or zone. They have to orbit at different levels in order to have room to move about. An exact number of electrons fits in each of these levels or "shells." The first shell, closest to the nucleus, holds up to two electrons. The second shell holds up to eight electrons. The third shell also holds up to eight electrons. The fourth shells and higher can hold even more, but if an atom has eight in its outer shell it is stable and happy. The further from the nucleus an electron is, the higher its energy (this isn't quite true, but for the sake of this explanation it will do). Chemistry is only concerned with the outermost shell of an atom because it is the outer shell that exchanges or shares electrons.

So when we talk of an atom having six electrons in its outer shell we mean it has six electrons ready and willing to react. The lower shells, buried deep, are not exposed to reactions, at least in most cases (there are always exceptions to every rule it seems).

The atom below shows Argon, a noble gas. Argon is in the third period and has three shells. Second period elements have two shells, first period elements have one shell and so on. Argon has a full eight, or as chemists and physicists say, a full octet, in its outer shell. That is why Argon does not react and why that whole group on the far right hand side of the table are called the noble gases.



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

The picture of Argon above is a super simplified view of an atom. If you could actually see an atom of Argon you would not see a nucleus with electrons orbiting in regular paths like planets around a sun. Besides that, the nucleus is much too large. To draw it to scale would require about a square mile of paper. But the picture is useful to illustrate electron orbitals.

In Unit 1-12 we provided worksheets, links, and where to go for more information on the structure of atoms for older kids. You can go back and grab the worksheets and information if you'd like.

For now just practice drawing some of the elements in periods one through three. Remember, there are two electrons in the first orbital and eight in each orbital after that until your electrons are used up.

We include a printable Periodic Table of the Elements at the end of this unit.

## 🌞 🌍 🌊 **EXPLORATION: Electron Configuration**

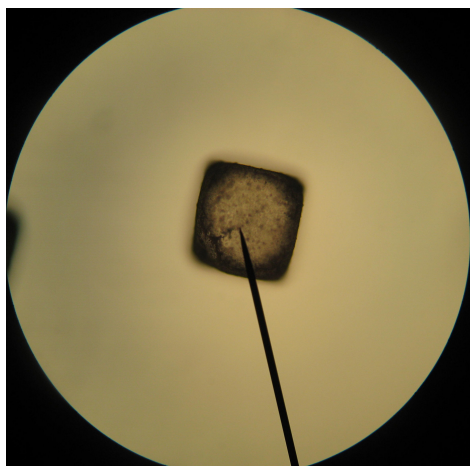
Use the worksheet from the end of this unit to practice making electron configurations. Follow the instructions on the worksheet.

You can also try quizzing the kids with “what if” questions. What if I add an extra neutron, now what do I have? (isotope) What if I add another proton, now what do I have? (A new element) What if I take away an electron? (ion) What If I combine this element with another? (molecule)

## 😊 😊 🌊 **EXPERIMENT: Ionic Table Salt**

A very common ionic bond is found in table salt. The chemical formula of table salt is  $\text{Na}^+\text{Cl}^-$ . The positive and negative symbols in the formula name indicate the charge.

Find Na and Cl on the periodic table of the elements (at the end of this unit). Where are they located? Remember that the columns indicate the number of electrons in the outer shell of the atom. Sodium, on the far left of the periodic table, has one electron in its outer shell. Chlorine, one column in on the right



## **Fabulous Fact**

You're breathing Argon right now. It makes up about .93% of the atmosphere by volume. It is obtained by industry from the air.

Argon is used in making “neon” signs, it is inside all the incandescent light bulbs you buy, it is used in medicine, and you can find it cooling your everyday sidewinder missile.



## **Additional Layer**

Because of modern machinery and mining technology, salt is abundant and cheap today. But in earlier ages salt was valuable and much more expensive. Salt was one of the major commodities mined and traded in the Sahara. In the Middle Ages and probably earlier, Europeans who were captured or kidnapped at sea were often sent to the Sahara salt mines where a prisoner might last six months. There are still slaves in the salt mines in the middle of the Sahara. Find out more.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Additional Layer

Salt was pivotal in these historical events:

Indian independence from Britain.

Egyptian funeral offerings.

The founding of the city of Salzburg, Germany.

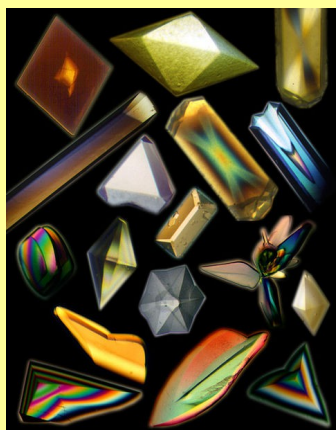
The Assyrian method of total warfare wherein they salted the earth.

The prominence of the city of Liverpool, England.

The Empire of Poland was based on salt, and so was its fall.

The Romans, the French, the Germans, and the British all taxed or controlled salt.

## Fabulous Fact



We tend to think of crystals as minerals or perhaps ice, but these crystals are proteins grown in space on MIR and the Space Shuttle.

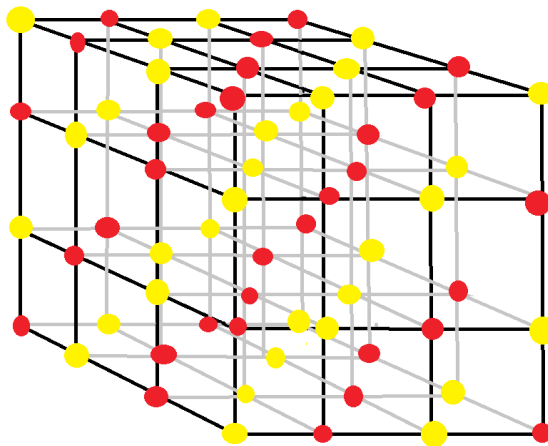
*Photograph by NASA*

hand side, has seven electrons in its outer shell. The sodium will easily give up its one electron to have a balanced and full outer shell and the chlorine will greedily gobble up sodium's extra electron, so each becomes a charged particle. When these types of charged bonds are formed we call it an ionic bond. What else can you tell about Na and Cl based on the periodic table?

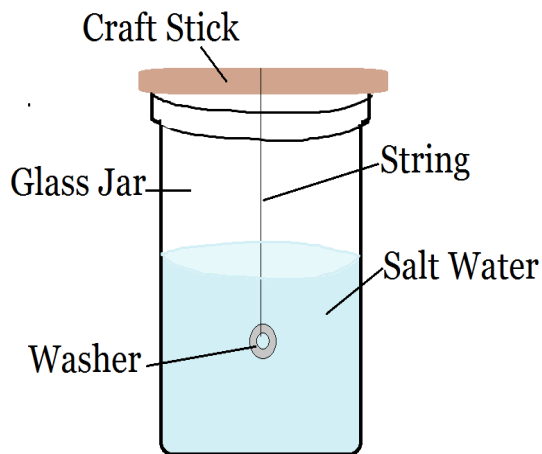
Look at salt crystals under a microscope to observe their shape.

Then make a model of a salt crystals bonds. Use balls of clay to represent the atoms of chlorine and sodium and toothpicks to represent the bonds.

The salt crystals you pour from your shaker have been crushed. You can make big beautiful salt crystals too.



1. Heat two cups of water in a small sauce pan on the stove until it is nearly boiling.
2. Stir in table salt until no more will dissolve.
3. Carefully pour your hot salt solution into a glass jar so that none of the undissolved salt gets in.
4. Hang a string into the center of the solution. It helps to tie a weight onto the string like a washer (make sure it's clean). The upper side of the string should be tied to a pencil or craft stick which rests across the top of the jar.
5. Set the jar in a cool, low light, level area where it can remain undisturbed for several days up to a week.



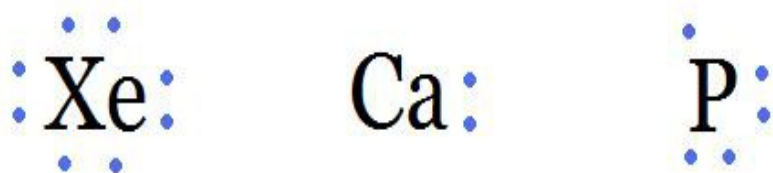
# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

You can try different conditions for your salt crystals. What if you used non-iodized salt? Sea salt? Distilled water instead of tap water? (Hint: the fewer impurities the better your salt crystals will be.)

Tip: If you're in a hurry you can make salt crystals in an afternoon by pouring a bit of the salt water out onto a coffee filter placed on a plate. As the water evaporates salt crystals will form, but the crystals will be much smaller than those formed in the jar.

## 😊 😊 😊 **EXPLORATION: Lewis Dot Structures**

Chemists draw pictures to represent chemical bonding. They call them Lewis dot structures. You only draw the electrons in the outer shell of an atom, and you show how these electrons are either shared or donated. Here is a Lewis dot structure for three different elements:



Xenon (Xe), a noble gas, has eight electrons in its outer shell. It does not want any more. The noble gases are nonreactive because their outer shells are full. Calcium (Ca) is a metal and has only two electrons in its outer shell. It is very reactive and likely to want to give up those electrons to be stable. Phosphorus is a non-metal and has five electrons in its outer shell. It will either steal electrons from a metal atom or share with another non-metal to satisfy its needs.

Practice making Lewis dot structures for a half dozen or so of the elements. Remember you can tell how many electrons are in the outer shell just by looking at which group (vertical column) of the periodic table it is in. At the end of this unit there is a worksheet to practice making Lewis Dot structures. Answers follow the practice worksheet.

## 😊 **EXPLORATION: Lewis Dot Bonding**

Older kids can now use Lewis Dot Structures to show the bonding of molecules. When atoms bond to form molecules only the valence electrons, the ones shown on the Lewis Dot diagrams, are involved in the chemical reaction.

## **Additional Layer**

Snowflakes are crystals of ice. They are always six sided, because water molecules are six sided. When they freeze in the upper atmosphere they make six sided patterns. A man named Wilson Bently photographed and documented thousands of snowflakes, no two alike. You can read more about him in a book called *Snowflake Bently* by Jaquelin Briggs Martin.



## **Additional Layer**

Certain kinds of radios and watches run using crystals. Do a little research and find out how. Then get a simple crystal radio kit and build your own.



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Famous Folks

Gilbert Lewis, an American chemist, was the first to talk about valence electrons. He discovered covalent bonds and brought us the Lewis dot diagram, an aid to understanding bonding.



## Fabulous Fact

When two elements bond their nature is completely changed. For example, pure sodium is a shiny, highly explosive grayish colored metal. Chlorine is a yellow, highly toxic and corrosive gas. But when combined they make table salt, a substance vital for life.

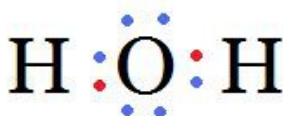


Watch this video of sodium and chlorine reacting to form an ionic bond. Then see how hydrogen and oxygen form a covalent bond:

<http://youtu.be/yjge1WdCFPs>

Below you can see how some common molecules share or donate their electrons to create bonds. Remember in covalent bonds, electrons are shared. In ionic bonds they are donated. There is a worksheet for older kids to practice at the end of this unit.

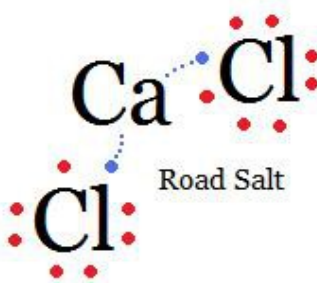
## COVALENT BONDS



Water



Hydrogen Gas



Road Salt

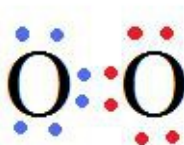


Table Salt

In reality, pure ionic bonds do not exist in nature, but are partially covalent, in order to maintain stability and because the electric charges would be too great.

In addition to single bonds as shown above there are also double and triple bonds, where more than one electron is shared in a bond.

## DOUBLE AND TRIPLE BONDS



Oxygen



Acetylene



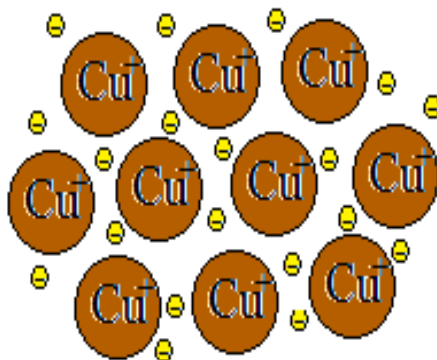
# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## ☺ ☹ ☹ **EXPLORATION: Metallic Bond Model**

Metals love to share. In a metallic bonds all the atoms share all the electrons in a flowing constantly moving mass. In a solid metal the nucleus of each atom is fixed, but the electrons are mobile. This is exactly why metals conduct electricity.

Remember electricity is flowing electrons. It is also why metals can be pounded into shapes.

We call this property malleability. Metals also are usually magnetic or can be magnetized, since those electrons can move and line up like soldiers in a row. And finally, metals are ductile, meaning they can be stretched into thin wires, because their atoms flow around one another so well.



Make a model of metallic bonding. You just need a zip top plastic sandwich bag, some round decorator sprinkles and marshmallows. Fill the plastic bag with marshmallows until they're packed in there –not squished, but cozy. Then sprinkle in a whole bunch of colored decorator sprinkles.

The marshmallows, representing the metal nuclei, are basically fixed as you turn the bag over and around, but the sprinkles, representing the electrons, flow and pour through the marshmallows. You could pour the marshmallow/sprinkle mixture into any shape of container and achieve the same result. Metals can also be poured or pounded into any shape without compromising their structure or properties.

'You can take this example a step further by explaining that most metals, both in nature and in human usage, are mixed. For example, steel is made of iron, carbon (a non-metal that gives structure and strength to the iron), and sometimes another metal like tungsten or manganese. When metals are mixed like this we call it an alloy. Alloys can be useful because adding in a second metal changes the way the metal as a whole is structured.

You can show alloys in your metal model by adding in a second color of marshmallow to represent the second metal. All of the electrons are shared as before. Often though, the two metals will have very different sizes of nuclei. To show a different sized metal atom, use big marshmallows and mini marshmallows mixed or use chocolate candies and mini marshmallows.

## **Additional Layer**



Crystals are found naturally in rocks. Quartz is one of the most common crystals geologists study within rocks. Try to find out how many colors of quartz crystals there are. You may even be able to find some quartz crystals on a granite building (or even a granite counter top) in your town.

## **Additional Layer**

Do some research and find out whether you're most likely to find crystals growing in igneous, sedimentary, or metamorphic rock. Why?

## **Fabulous Fact**

In general, covalently bonded molecules make liquids or gases since the bond does not attract the two molecules to each other as in ionic bonding. This allows the two atoms to flow around one another and prevents the different molecules in the mass from being attracted to one another as well. Ionic bonding involves lots of charges and attractions and usually results in solids.

## Additional Layer

Many precious gems like diamonds, rubies, sapphires, and emeralds are crystals that are considered very valuable. Part of the reason they were so valuable is that they were difficult to find in nature. Now chemists can actually make them in a laboratory. Why do you think they are still valuable today even though they aren't as rare as they once were?



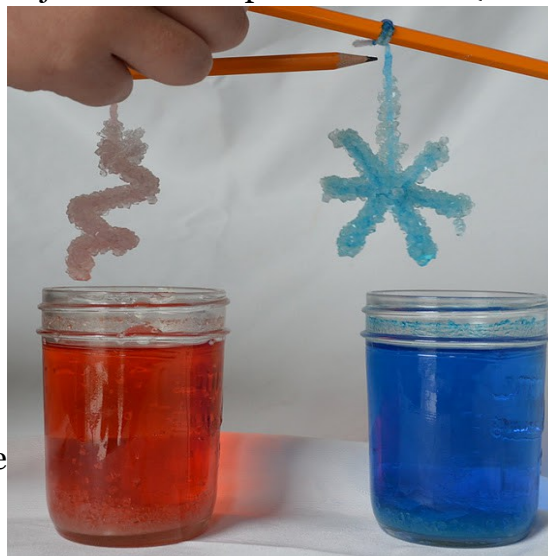
This is an uncut emerald. You can see the hexagonal structure, a structure which goes back to the molecular level.

## ☺ ☺ EXPERIMENT: Crystal Grower

Growing crystals from Borax and water is really easy, and quicker than you'd think. First, gather these things: a pipe cleaner cut into 3 equal pieces, a string, a pencil, a jar (wide mouth works best), some Borax (found near laundry soap), and boiling water.

Now twist the pipe cleaners together in the center to make a snowflake shape, spiral, or any other shape you'd like. Tie one end of the string to your shape and the other end to the pencil. It should be the right length that your snowflake will hang into the jar with the pencil resting on the jar mouth.

Next, fill the jar with boiling water. Add Borax a tablespoon at a time, stirring it with each tablespoon until it dissolves. You'll end up using about 3 tablespoons of Borax for every cup of boiling water, but you want to add it just one tablespoon at a time. (If you want to make a colored snowflake, add food coloring to the boiling water too.) Once your Borax is dissolved you're ready to hang the pipe cleaner formation down into it, suspended by the pencil at the top. Let it sit overnight and don't touch or bump it. The next day you'll have a beautiful crystal snowflake that won't melt away!



The chemical name and formula for the Borax in your laundry room is:

Borax decahydrate:  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$

When you combine it with water to make crystals, you aren't changing the chemical formula. No reaction is taking place, but the Borax crystals do dissolve and then re-form on the pipe cleaner. When they re-form they have space to make their crystal structure.

When certain liquids and gases cool they lose water, and crystals are formed. Their molecules fit neatly together in a tight pattern. No matter the size of the crystal, all crystals that are made up of the same substances will have the same shape. Sugar crystals are slanted at each end and oblong in shape while salt crystals are shaped like cubes.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## 🌞 🌱 🌿 EXPERIMENT: Crystal Detective

Try growing a salt crystal, a sugar crystal, and a Borax crystal side by side. Which one takes the longest? Can you identify the different shapes within the crystals? If they are unlabeled, can you tell which is which? Make drawings and diagrams of your findings.



## 🌞 🌱 EXPLORATION: Periodic Table Valence Electrons

Do this activity if you don't have time or energy for any of the others in this unit. It covers all the basics that you need to know, especially if you watch the video.

If you didn't already grab it for one of the above activities, print out the Periodic Table of the Elements from the end of this unit. We learned about the Periodic Table in Unit 1-13. But this Periodic Table has the columns with the valence electron numbers labeled.

Explain how you can tell how many electrons are in the upper shell of an element just by looking at the Periodic Table. An explanation is on the table itself. We also recommend this video: <http://youtu.be/yADrWdNTWEc>. Then have the kids color each of the numbered (not the metals) columns of the table a different color.

## Explanation

My kids get so sick of practicing their spelling words all the time, so we try to throw in some fun to kick the practicing up a notch. Here are a few ways to change spelling up a bit:

Write down rhyming words for as many of your spelling words as you can.

Draw a picture of each of your words.

Spelling Tic-Tac-Toe (if student spells word correctly they get to put up either X or O)

Spelling Train (write a spelling word, then come up with a word that begins with the last letter of the word and write it down)

Rainbow Spelling (write your words in 3 colors)

Write your words in sand (or a salt box)

Write your words with a flashlight in the dark

Paint your words with water and a Q-tip or watercolors

Spell words with scrabble tiles

Spell your words using Alphabits

*Karen*



## THE ARTS: AFRICAN FOLK TALES

### Definition

A folktale is any story generally told within a culture and passed down principally by word of mouth. Fairy tales, moral tales, religious stories, myths, and legends can all fall under this broad heading.

### Importing Tales

African tales have been spread through the world, mostly due to the slave trade. In America these tales took the form of Br'er Rabbit tales and later Aunt Nancy stories. Br'er Rabbit is a trickster like many tricksters in African tales. Aunt Nancy is a corruption of "Anansi." Her tales are the spider's tales told with people instead of animals.

### Additional Layer

Many of the African tales are very similar to the Native American tales where a trickster, like raven, fox, or coyote, is the main character. Because of this similarity there are some opposing viewpoints about where American trickster tales originated—perhaps they're a combination of two cultures. How American.

Most of the stories from Africa that we have today have been passed down in an oral tradition. This just means that they've been told over and over again rather than written down. Civilizations passed on their stories, their history, and their traditions through their storytellers, who memorized them word for word and recounted them over the generations. Sometimes the storytellers were just people passing the stories on to their friends and family, and sometimes they were griots, people who had the job of telling stories to preserve history. You can read more about griots in the history section of this unit.



Stories that have been told out loud over and over through the years are called folk tales. "Folk" just means people; people told the stories again and again. There are often a lot of versions of the same folk tale, because with each retelling the story can change just a little. Often, though not always, folk tales have some kind of moral or lesson. They were often used not only to entertain, but also to teach good behavior. Some folk tales also tell the stories of how things came to be.

In this unit you get to mix and match stories with explorations. First, choose some African folk tales to read. Folk tales are often fun read-alouds, because they were meant to be told out loud. Next, choose some explorations to go along with the tales you've read. You might do a lot of explorations focusing on just one tale, or read many tales and choose an exploration to go with each.

Here are some suggestions for folk tales from Africa. Do a Google search to find the tales, or go to <http://www.layers-of-learning.com/african-folk-tales-for-kids/> for simple versions of some of the stories. You can also visit your local library and

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

search for a book of African folk tales. Most of the book projects will work with any folk tale you choose.

- The Forgotten Treasure
- The Gift of a Cow Tail Switch
- Why Turtle Lives in Water
- Spider and the Honey Tree
- Black Snake and the Eggs
- The Chief Who Was No Fool
- The Elephant Tusk
- Why Anansi Has Eight Thin Legs
- Where Anansi Got His Stories
- Any Anansi, Aunt Nancy, and Brer Rabbit stories

## 😊 😊 😊 **EXPLORATION: The Modern Moral**

Folk tales, as well as many other stories, are often told to teach us something. After you read the story, discuss what the moral is, or what we may learn from it. Write the moral of the story at the top of a horizontal sheet of paper. Make a vertical fold down the center of the paper, dividing the page into halves. On the first half, illustrate a scene from the story that portrays the moral. On the second half, illustrate a modern day scene from your life and time in which the moral applies.

## 😊 😊 **EXPLORATION: Flat Characters**

Because folk tales were told out loud and are typically so short, the characters are generally very simple. We call these flat characters because there isn't a lot of dimension to them; they have extremely good or extremely bad qualities, and never a mix of good and bad as most real-life people typically have. The villain is likely not only unkind, but also greedy, selfish, and dishonorable. Likewise, the hero or heroine is quintessentially good; the hero is courageous, kind, intelligent, and full of integrity. They are predictable. These exaggerations make it easier to decipher the moral of the story. It also helps us quickly decide just how the character will act in any situation.

Make a list of each character in the folk tale. Next to the name compile a list of all the characteristics you see in each of the characters. Circle the ones that have either all positive or all negative characteristics as we would expect from a folk tale character.

## 😊 😊 **EXPLORATION: Lucky Number Three**

The number three is common in folk tales. You'll often have three characters, three events, three tasks, or other instances of the

### **Additional Layer**

Learn what modern country your tale came from. Color a map of that country, putting in major landscape features and cities.

### **Additional Layer**

In one tale Br'er Rabbit gets stuck to a doll made of tar, a "tar baby." The more he struggles and fights against it the worse he is stuck.

A "tar baby" has come to mean any problem that gets worse the more you fight it.

Can you think of any problems like that? Some can be personal problems; some may be problems that affect your state, your nation, or the whole world.

Unfortunately, the term has also come to have racial overtones in some parts of the world as people referred to those with a dark skin as "tar babies."



*Br'er Rabbit and the Tar Baby by E.W. Kemble, 1904*

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Additional Layer

Act out a play of a story you read. Make simple costumes or use toys, models or crafts to tell the story theatrically with parts assigned to different actors. Practice using emotion and expression. Practice memorizing lines, or do it as a reader's theater.

## Writer's Workshop

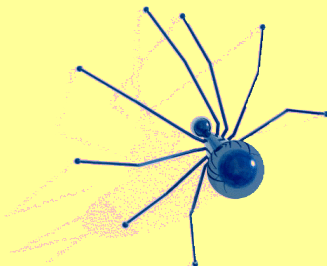
Write your own animal folk tale with a moral.



## On The Web

Visit You Tube and search for “Anansi Stories.” Try variations of the spelling of Anansi:

Anancy  
Anazi  
Ananse  
Nanzi



number three. Search through some of the African folk tales you read and find instances of the number three.

## EXPLORATION: Miserably Ever After

One of the characteristics of folk tales is that they always end “right.” The good guy wins, morality is rewarded, bad guys are punished, and all is happily ever after. Using any of the folk tales you've read, re-write the ending to be a miserably ever after tale – one where everything goes horribly wrong at the end.

## EXPLORATION: Animals Abound

African folk tales, in particular, use a lot of animals as characters. The communities and storytellers from the region would likely have had a lot more interaction with wild animals than we are used to. The stories reflect a culture where animals abound. The natural world is very much a part of everyday life in many regions of the continent. In the tales, we meet jaguars, snakes, monkeys, lions, giraffes, zebras, crocodiles, and more.



*Miss Fox holding Br'er Rabbit by the collar by Joel Chandler Harris, from Uncle Remus His Songs and His Sayings, 1899*

Storytellers gave the animals human characteristics in order to teach lessons and illustrate the virtues and foibles of humankind. Choose a folk tale that has animal characters and make a sketch of each character in the story. You can find simple how to draw tutorials online for just about any animal you can imagine. Around the character's picture write a description of the human characteristics you observe. Are they valiant? Selfish? Wealthy?



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

Stubborn? Compassionate? Smart? Use all the words that you can to describe each character.

## 😊 😊 😊 **EXPEDITION: The Zoo**

There's something magical about seeing a character come to life. Disney has monopolized on this idea completely in its theme parks. Something special happens when a little girl has read about Cinderella and then the character comes to life. A visit to the zoo can create a bit of this magic. Read the African folk tales together, and then go see the “characters” on a trip to the zoo. Take pictures, talk about the stories and characters, and learn more about each animal.

## **EXPLANATION: Helping Us See Differently**

A good story entertains us, but a great story helps us see the world differently somehow. It changes us. It often makes us have a more open mind, increased compassion, or a desire for greater integrity within ourselves. On a childlike level, African folk tales served this purpose. They were moral tales, with the intent to instill virtuous desires in listeners. You may want to read each folk tale, and then apply it to the kid's world and experiences. For example, if a child is facing some difficulty, a tough choice, or a hardship, ask how the hero might have handled it. Help the kids see what the story can teach them about their own lives.

## 😊 😊 😊 **EXPLORATION: African Landscape**

The settings of African folk tales would have been the settings most familiar to the people who listened to the stories. Vast, open savannahs, dry plains that haven't seen rain in years, muddy streams, thick jungles, and hills slick with mud during the rainy season. Make a setting box. Start with an open shoebox tipped up on its side, and then decorate it to look like the setting in the story. Draw or paint the walls of all the surfaces so you create a complete tiny world inside your shoe box. You can even use real natural items, like sand or grass glued to the bottom, real little plants hanging down as vines, or water in a clay pot for a pond.

## 😊 😊 😊 **EXPLORATION: Carrying On A Culture**

Many African folk tales have traveled outside of Africa. Mostly because of the prevalent slave trade from Africa to other lands, the stories and culture of the African peoples were brought across the globe. A character that is easy to trace is Anansi the Spider. Anansi always teaches us lessons with his tricks. His trickster tales have traveled to the Caribbean Islands, Haiti (where he is known as Ti Malice), and the southeastern United States (where Anansi tales are told as Aunt Nancy stories).

## **Additional Layer**

There are hundreds of African folk tales from many different cultures. Look up others and tell those as well. Anansi figures in many Nigerian folk tales, but there are lots of other animals as well.

## **Additional Layer**

Select one of the animals that are featured in a tale you've read during this unit.

Perhaps you'll learn more about spiders. Read some books from the library. Find some around your house or in your garden. Examine them and their webs.

Learn more about turtles. Read books. Look up which types of turtles live in Nigeria.



*African helmeted turtle*

Find out facts about the animal. Learn where they live and how they survive. Do the personified characteristics in the tales seem to fit the animal you chose? Write a report about the animal, and then pair it with the tale for a complete project.

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## Why Read Tales From Africa?

Learning about stories from other cultures helps you connect with the people of those places. You begin to understand how they think about the world we all live in.

Amazingly, people can be in the same situation or see the same events unfolding and interpret them completely differently. Stepping outside our own worldview and seeing the world from another's eyes brings understanding, not only of the other people's world, but of our own as well. It's like stepping outside your body and looking at yourself from another person's eyes.

With your kids, talk about the way the stories view the world as compared to the way you see things. You don't have to agree with it, but you should attempt to understand it.

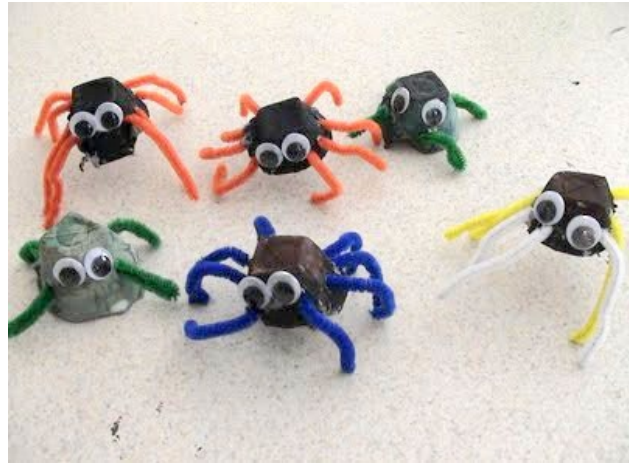


Read and compare some of these different versions of stories about Anansi the Spider. Find the locations for each of the stories on a map and discuss how the story may have been transmitted across the globe.

## ☺ ☻ EXPLORATION: Anansi Spiders

Folk tales are a great way to learn more about a culture from either a historical or modern perspective.

Here's a project using an African folk tale from Nigeria, called *Anansi and Turtle*.



It's a moral tale somewhat like Aesop's Fables. Anansi is a spider, who figures in many Nigerian tales. First, we looked up Africa and Nigeria on our globe, then I told the kids the story, which you can find here:

([http://www.motherlandnigeria.com/stories/anansi\\_and\\_turtle.html](http://www.motherlandnigeria.com/stories/anansi_and_turtle.html)). Then we made spiders.

Here's how to make a spider:

1. Cut apart an egg carton, so each egg cup is separate (you only have to cut as many as you intend to make spiders for)
2. Paint the egg cup black or any other color you wish your spider to be
3. Poke eight holes, around the rim of the egg cup, four on each side, using a sharp pencil or wooden skewer.
4. Thread four pipe cleaners through the holes, so you end up with eight legs. Trim the pipe cleaners to the length you desire.
5. Glue on googly eyes.

You can also make the turtle:

1. Use egg cups again, but this time paint it green.
2. Make four legs using pipe cleaners, poked through holes on the egg cup.
3. Add googly eyes.

Now have your kids re-tell the story, using their figures.

If you want to get really involved you can have the kids create backgrounds for the story, a garden where Anansi lives and a river where Turtle lives.



# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

## 🌞 🌱 🌿 EXPLORATION: The Tortoise and the Hare, Here and There

In the Euro-American version of *The Tortoise and the Hare*, the tortoise wins because of his steadfastness and determination. He will keep going no matter his standing and no matter what it takes. The hare is lazy, which costs him the race in the end. The story is very reflective of the Protestant work ethic, easily seen in the early days of America. It is a story of self-made success and giving your all.

In the African version of the tale, the result is the same, but the reason is different; the tortoise wins because he uses his entire community. He says, "I have called you together because this is a matter that affects not only myself, but the honor of every tortoise. If I win, then the glory will go to our family as a whole; if I lose . . . then we are all disgraced."

So Tortoise recruits his brothers and gives each a number. "Number one, go hide in the bush some fifty feet from the starting line," he tells them, "and number two, some 40 feet beyond that." The plan is for the runner to jump into the bush at the same time the next one jumps out of the bush ahead on the course. This version is not about self-made success at all, but about community and cooperation.

What is something you value? Can you re-write the story of *The Tortoise and the Hare* so it reflects what you value?



## Additional Layer

The original tortoise and hare story is attributed to Aesop. Lord Dunsay's "The True Tale of the Tortoise and Hare" has the tortoise win because the hare realized the whole thing was ridiculous and refused to participate. Later when the community relied on the "faster" tortoise to send warning of a forest fire they all perished.

The African version celebrates community and also the concept of brain over brawn. The tortoise wins through trickery. American Puritan values would not have seen this as smart, but rather as cheating.



*The Tortoise and the Hare* by Jan Wildens (1586-1653)

Coming up next . . .

## Unit 1-15

  
First North Americans  
North America  
Salts - Creative Kids

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

**My Ideas For This Unit:**

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

# ANCIENT AFRICA – AFRICA – BONDING – AFRICAN TALES

**My Ideas For This Unit:**

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

**Title:** \_\_\_\_\_ **Topic:** \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---




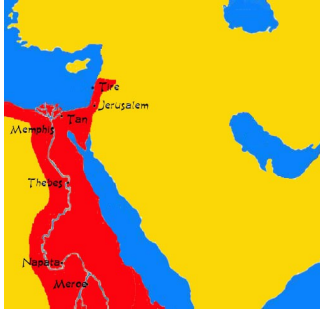



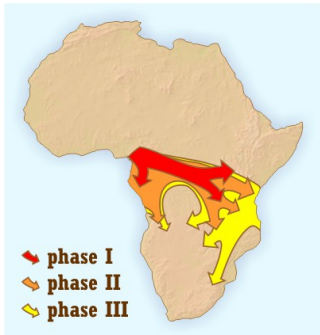

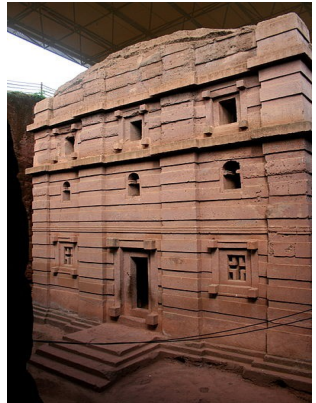



# African Tribal Mask

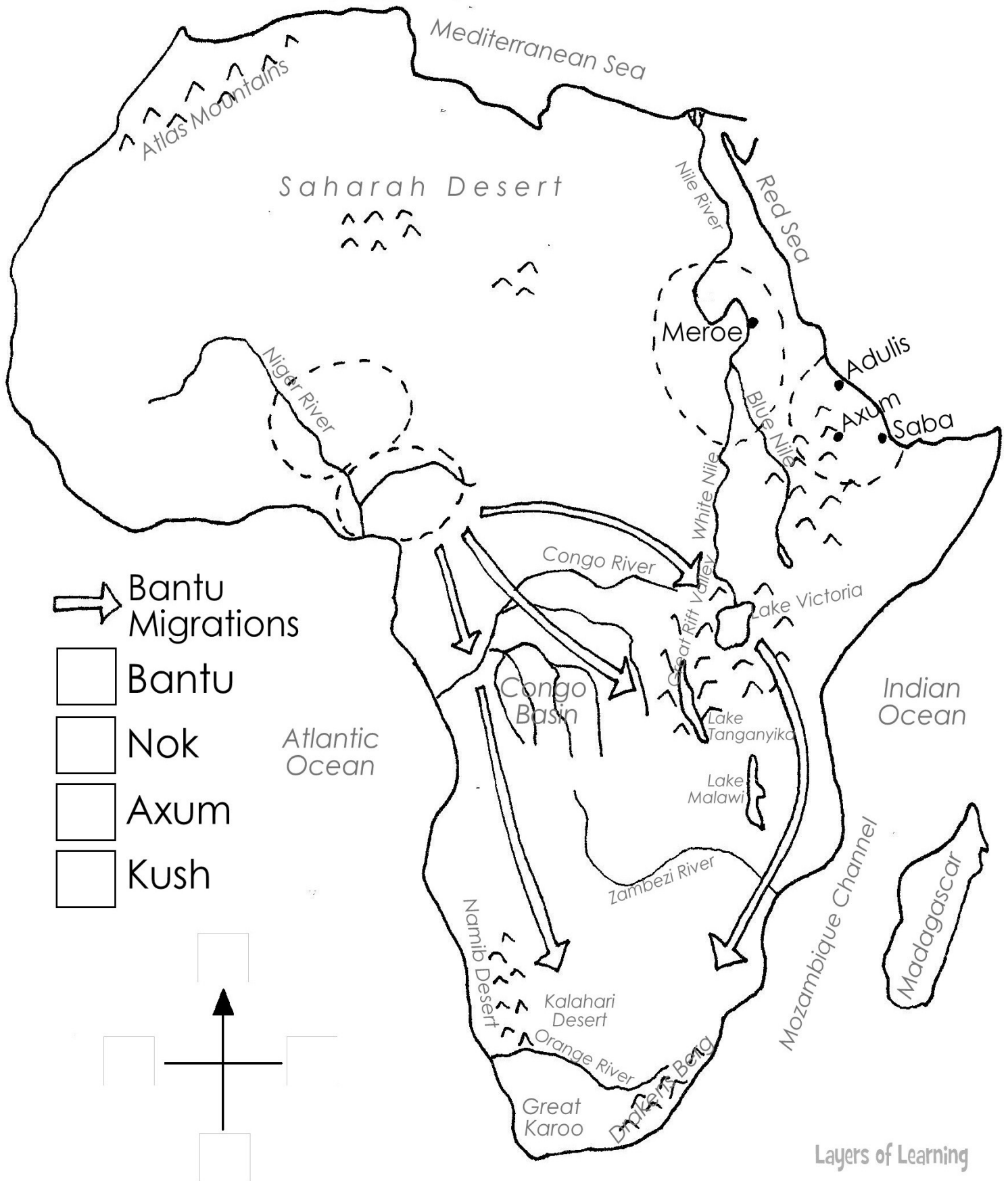
Most African tribal masks are hand-carved from wood. They have been used in spiritual ceremonies for thousands of years. Each tribe had their own specific meanings and significance. Many mask-makers passed on their art and the meanings attached to it to their sons, who continued their trade.



# Ancient Africa: Unit I-14

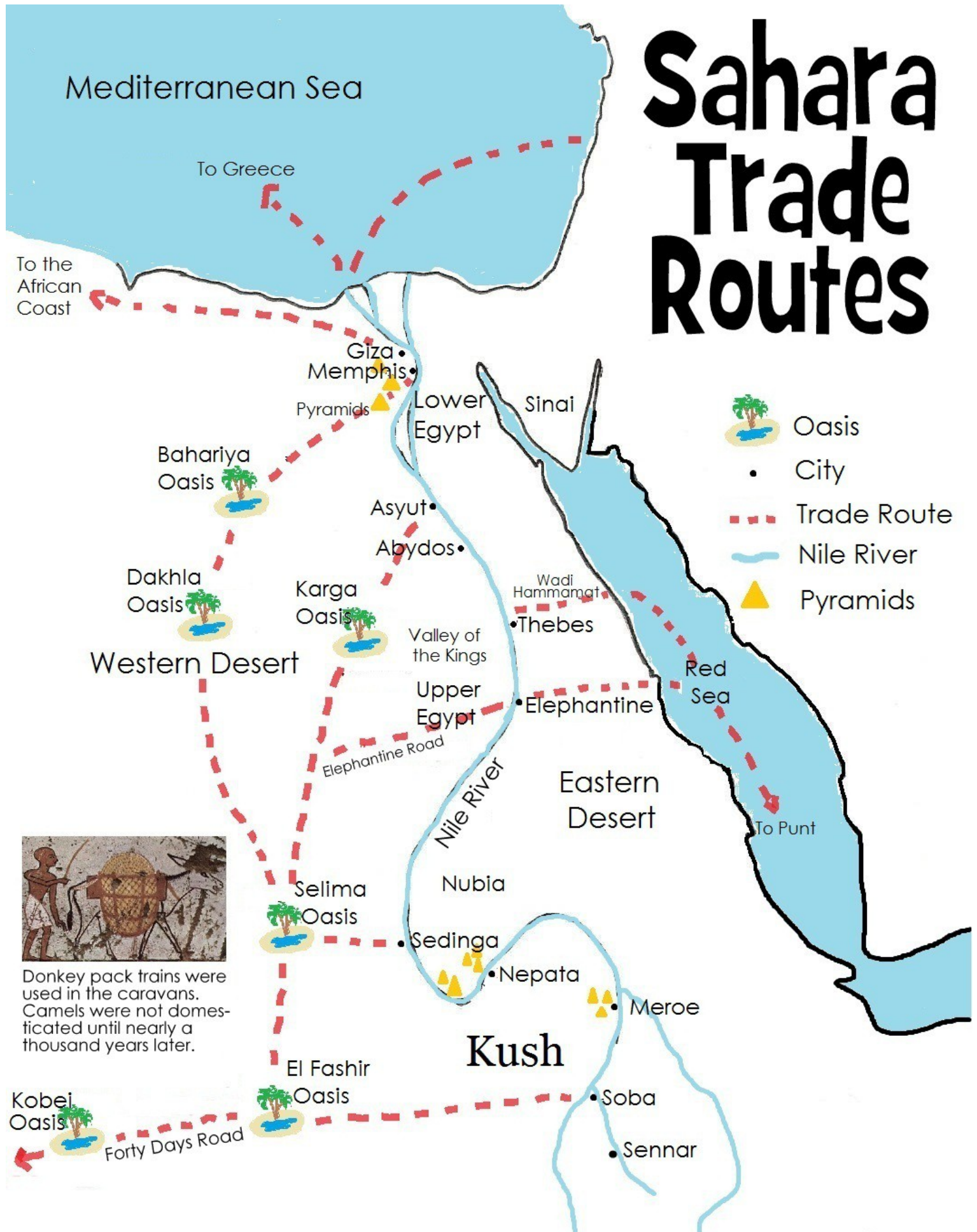
<p><b>4000 BC</b> I-14</p>  <p>Saharan grasslands turn to desert</p>	<p><b>1550 BC</b> I-14</p>  <p>Kush conquered and ruled by Egypt</p>	<p><b>1100 BC</b> I-14</p>  <p>Kush regains independence</p>	<p><b>715 BC</b> I-14</p>  <p>Kush conquers and rules Egypt</p>
<p><b>664 BC</b> I-14</p>  <p>Assyrians take Egypt from Kush</p>	<p><b>590 BC</b> I-14</p>  <p>Meroe becomes the capital city of Kush</p>	<p><b>500BC-200AD</b> I-14</p>  <p>Nok people at their height</p>	<p><b>300 BC</b> I-14</p>  <p>Bantu migration begins</p>
<p><b>100AD-700AD</b> I-14</p>  <p>Kingdom of Axum at its height</p>	<p><b>340 AD</b> I-14</p>  <p>Christian religion adopted by King Ezana of Axum</p>	<p><b>350 AD</b> I-14</p>  <p>Axum defeats Kush</p>	

# Ancient Africa

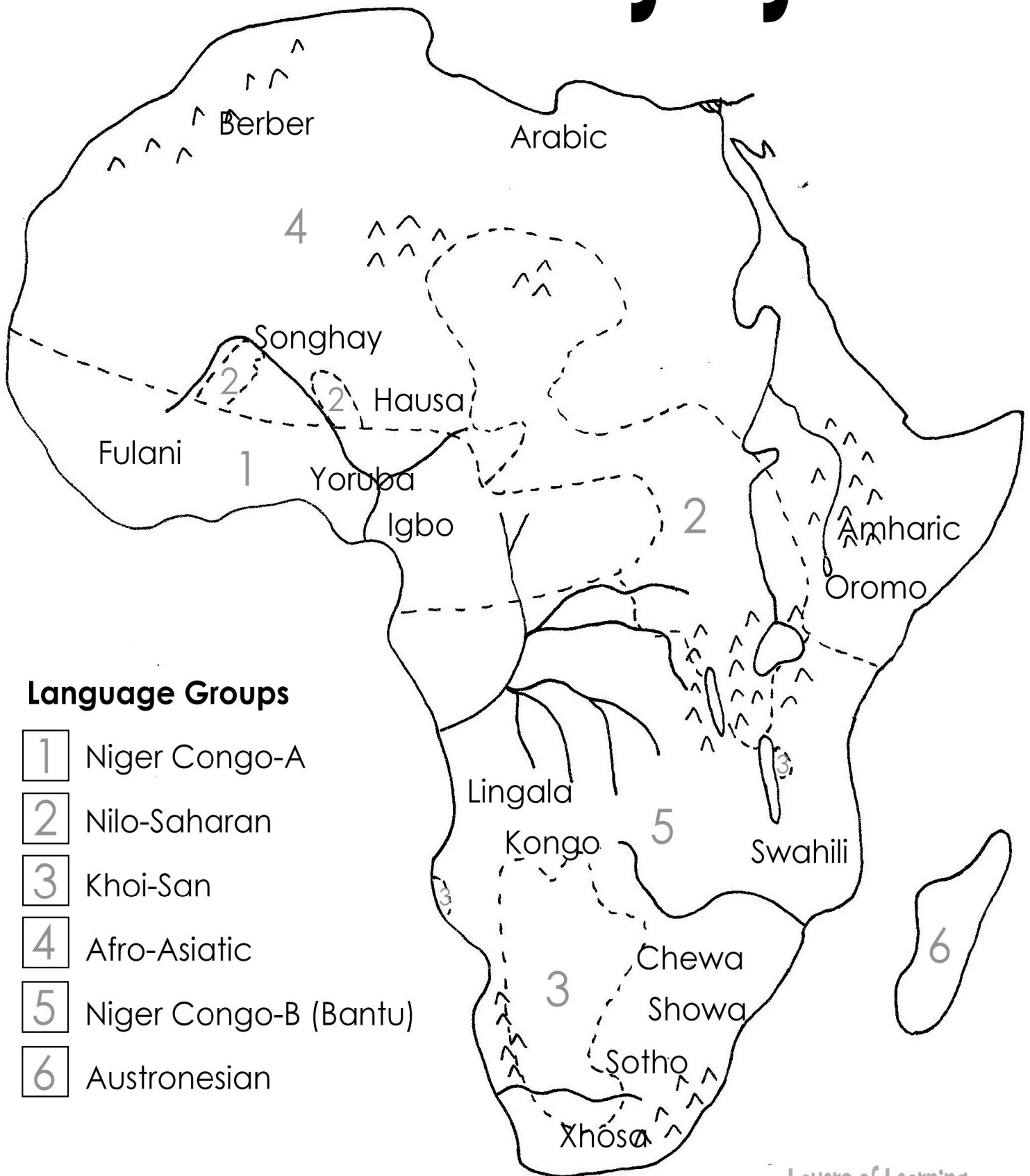




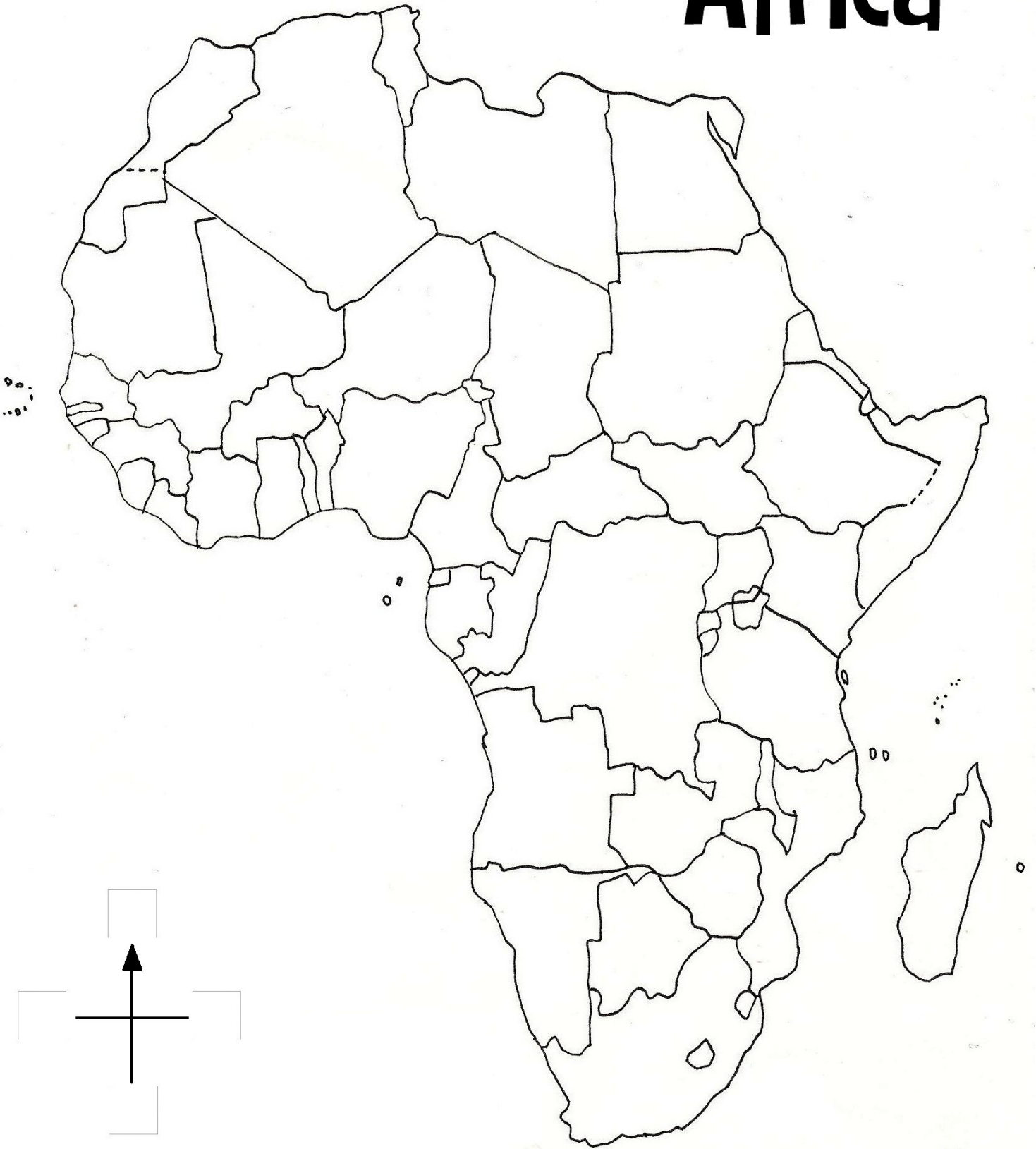
# Sahara Trade Routes



# African Languages



# Africa

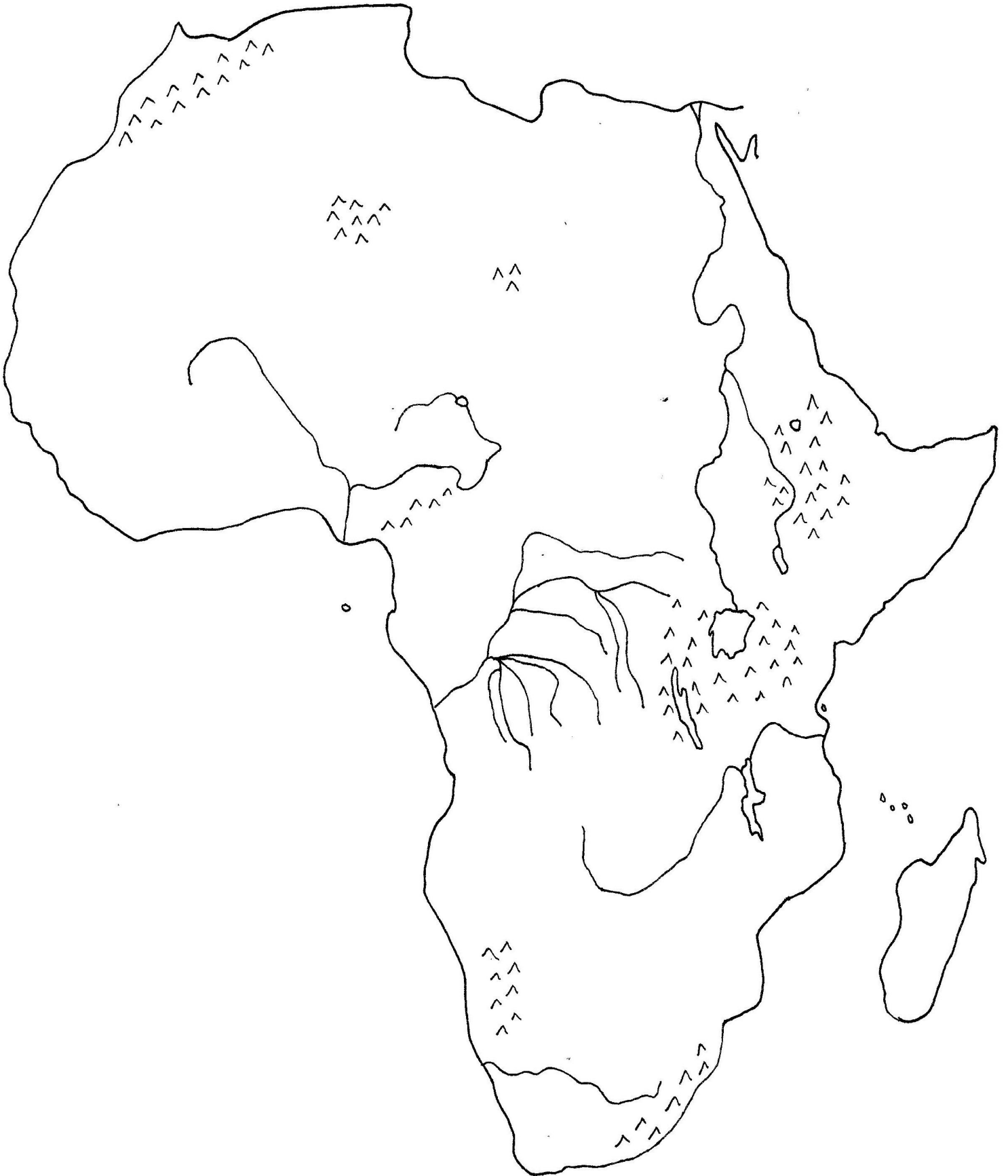




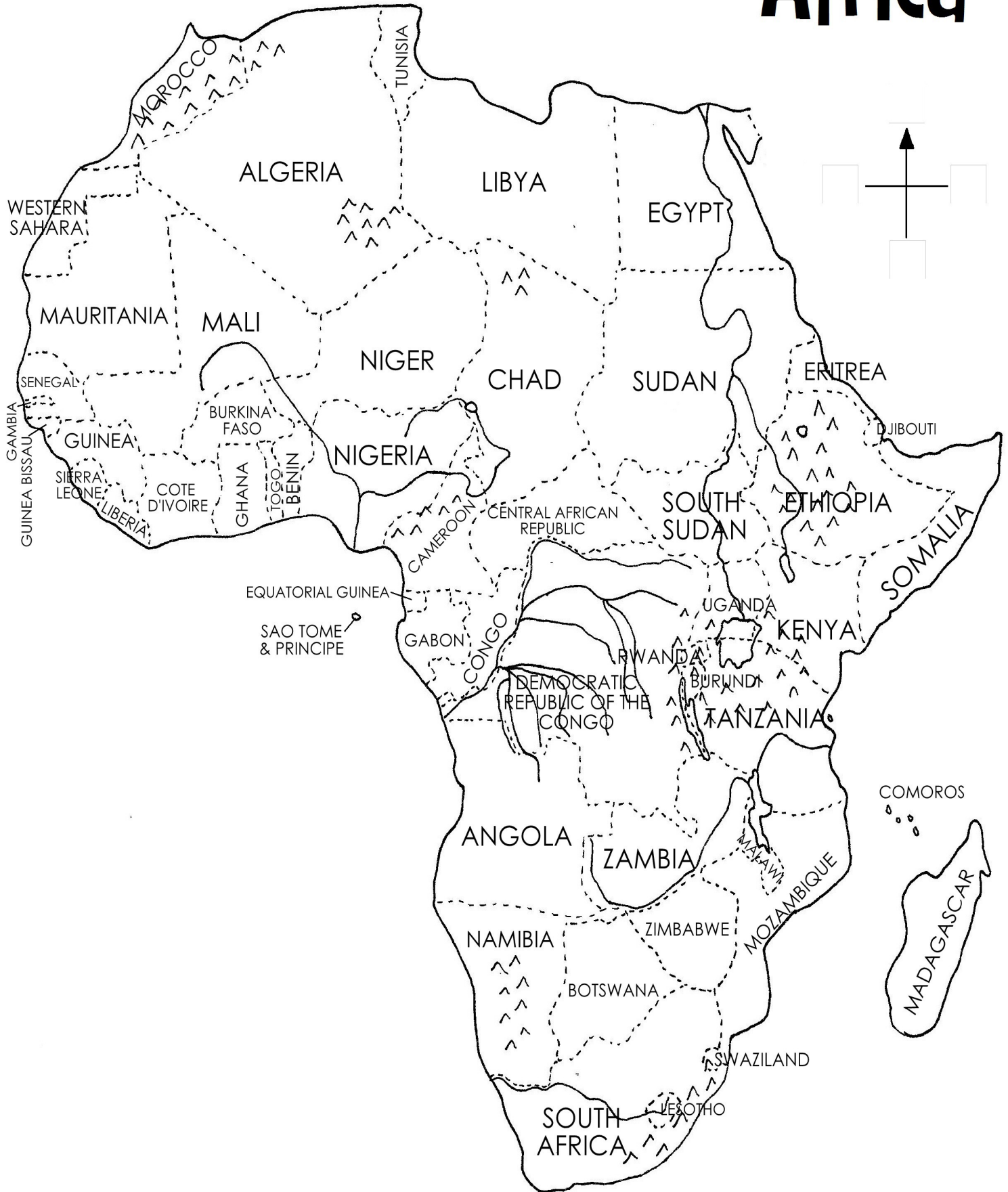
# Africa



# Africa

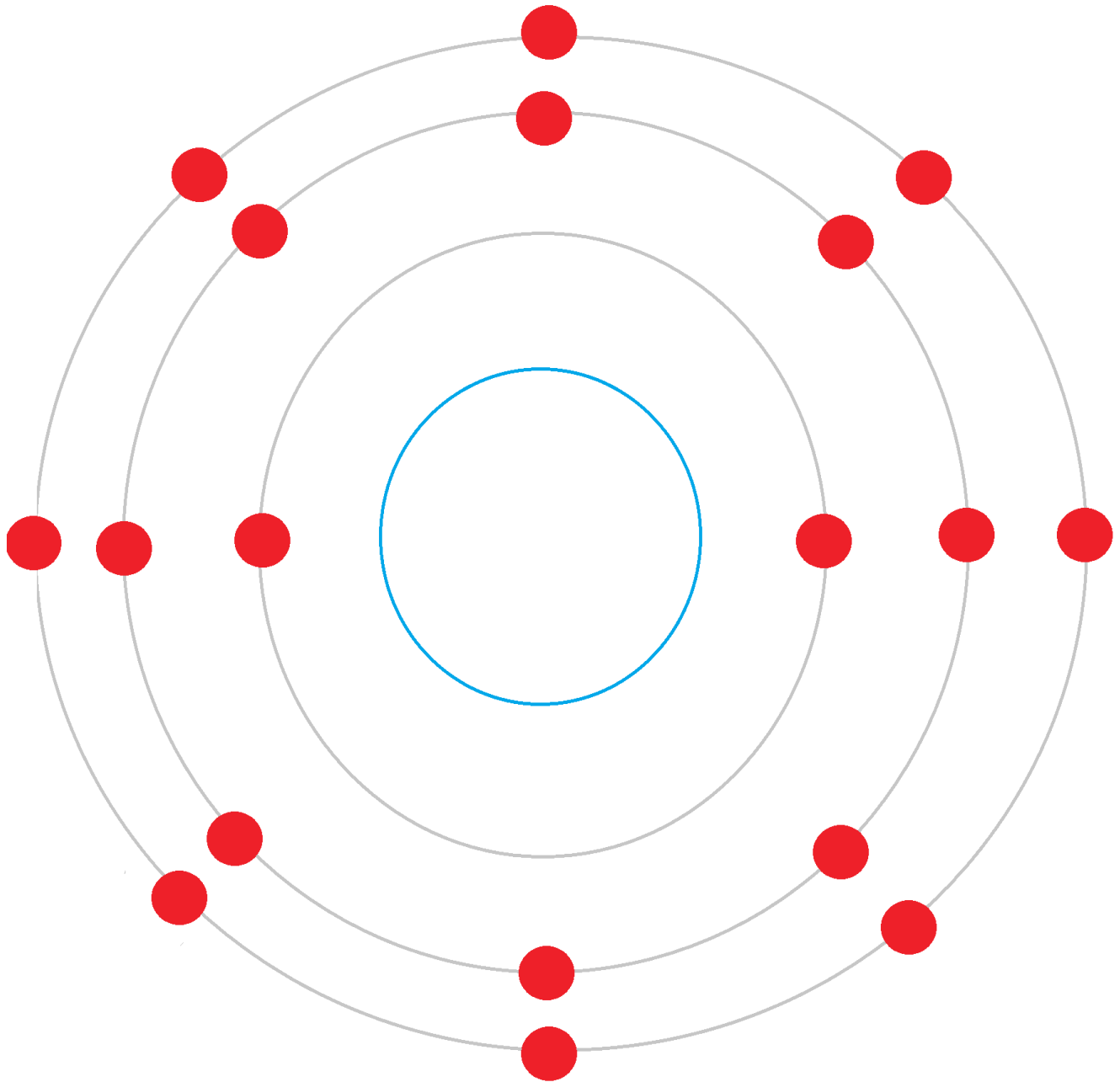


# Africa





# Electron Configuration Worksheet



Choose an element from the first three periods of the periodic table and use the periodic table to determine how many electrons, neutrons, and protons it has. Use colored mini marshmallows to fill in the proper space on the diagram. For example, for carbon you would place six pink marshmallows in the center to represent protons, six yellow in the center to represent neutrons and six green on the red electron spaces to represent the electrons. The inner rings are always filled before the outer rings.

# Periodic Table of the Elements

8

# Periodic Table of the Elements

The number of valence electrons for each group is shown at the top of the column for that group. The valence electrons are the number of electrons available for bonding.

The metals in this center section have a "d" orbital on the highest energy level. This makes them behave differently from the numbered columns above, which have "s" or "p" orbitals on their upper energy levels. Because of this we won't use the metals in Lewis dot diagrams or in bonding exercises.

1	2											2
H Hydrogen 1.0												He Helium 4.0
3	4											9
Li Lithium 6.9	Be Beryllium 9.0											F Fluorine 19.0
11	12											17
Na Sodium 23.0	Mg Magnesium 24.3											Cl Chlorine 35.5
19	20	21	22	23	24	25	26	27	28	29	30	35
K Potassium 39.1	Ca Calcium 40.1	Sc Scandium 45.0	Ti Titanium 47.9	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.9	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Br Bromine 79.9
37	38	39	40	41	42	43	44	45	46	47	48	53
Rb Rubidium 85.5	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium 99	Ru Ruthenium 101.0	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	I Iodine 126.9
55	56	Lanthanides 57-71		72	73	74	75	76	77	78	79	85
Cs Cesium 132.9	Ba Barium 137.3			Hf Hafnium 178.5	Ta Tantalum 180.9	W Tungsten 183.9	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	At Astatine 211
87	88	Actinides 89-103		104	105	106	107	108	109	110	111	117
Fr Francium 223.0	Ra Radium 226.0			Rf Rutherfordium 267	Db Dubnium 268	Sg Seaborgium 271	Bh Bohrium 272	Hs Hassium 270	Mt Meitnerium 276	Ds Darmstadtium 281	Cn Copernicium 285	Uus Ununseptium 294
												118
												Uuo Ununoctium 294

The number of valence electrons for each group is shown at the top of the column for that group. The valence electrons are the number of electrons available for bonding.

The metals in this center section have a "d" orbital on the highest energy level. This makes them behave differently from the numbered columns above, which have "s" or "p" orbitals on their upper energy levels. Because of this we won't use the metals in Lewis dot diagrams or in bonding exercises.

57 <b>La</b> Lanthanum 138.9	58 <b>Ce</b> Cerium 140.1	59 <b>Pr</b> Praseodymium 140.9	60 <b>Nd</b> Neodymium 144.2	61 <b>Pm</b> Promethium 145	62 <b>Sm</b> Samarium 150.4	63 <b>Eu</b> Europium 152.0	64 <b>Gd</b> Gadolinium 157.3	65 <b>Tb</b> Terbium 158.9	66 <b>Dy</b> Dysprosium 162.5	67 <b>Ho</b> Holmium 164.0	68 <b>Er</b> Erbium 167.3	69 <b>Tm</b> Thulium 168.9	70 <b>Yb</b> Ytterbium 173.0	71 <b>Lu</b> Lutetium 175.0
89 <b>Ac</b> Actinium 227.0	90 <b>Th</b> Thorium 232.0	91 <b>Pa</b> Protactinium 231.0	92 <b>U</b> Uranium 238.0	93 <b>Np</b> Neptunium 237	94 <b>Pu</b> Plutonium 242	95 <b>Am</b> Americium 243	96 <b>Cm</b> Curium 247	97 <b>Bk</b> Berkelium 247	98 <b>Cf</b> Californium 251	99 <b>Es</b> Einsteinium 254	100 <b>Fm</b> Fermium 253	101 <b>Mendelevium</b> 256	102 <b>Nobelium</b> 254	103 <b>Lr</b> Lawrencium 257

# Lewis Dots For Individual Atoms

Use the Periodic Table to find the number of valence electrons each element has. Put dots around the chemical symbol, one to a side, then two to a side until the electrons are used up. How many blank spaces are left? How many more electrons does each element need to have a full octet?

He

Ga

Na

C

Po

N

K

F

O

Ba

As

I



# Lewis Dots For Individual Atoms

Use the Periodic Table to find the number of Valence Electrons each element has. Put dot around the chemical symbol, one to a side, then two to a side until the electrons are used up. How many blank spaces are left? How many more electrons does each element need to have a full octet?

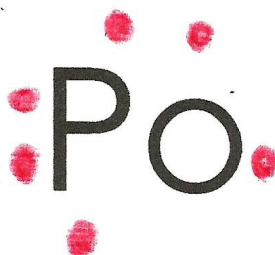
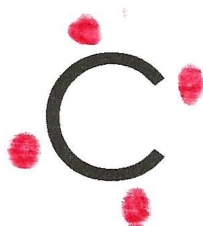


2 electrons

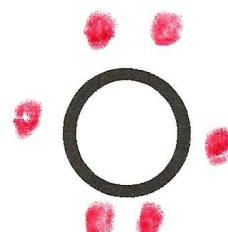
Helium has only an "s" orbital so it is full and stable with only two valence electrons.



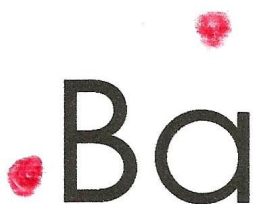
3 electrons



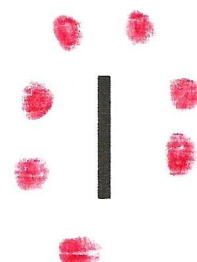
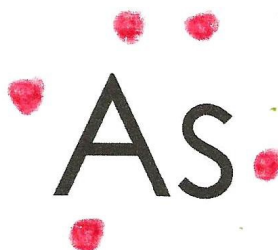
7 electrons



6 electrons



2 electrons



# Lewis Dot Diagrams

Complete the Lewis Dot Diagrams for the bonds between these molecules. Color code the dots to match each type of molecule.

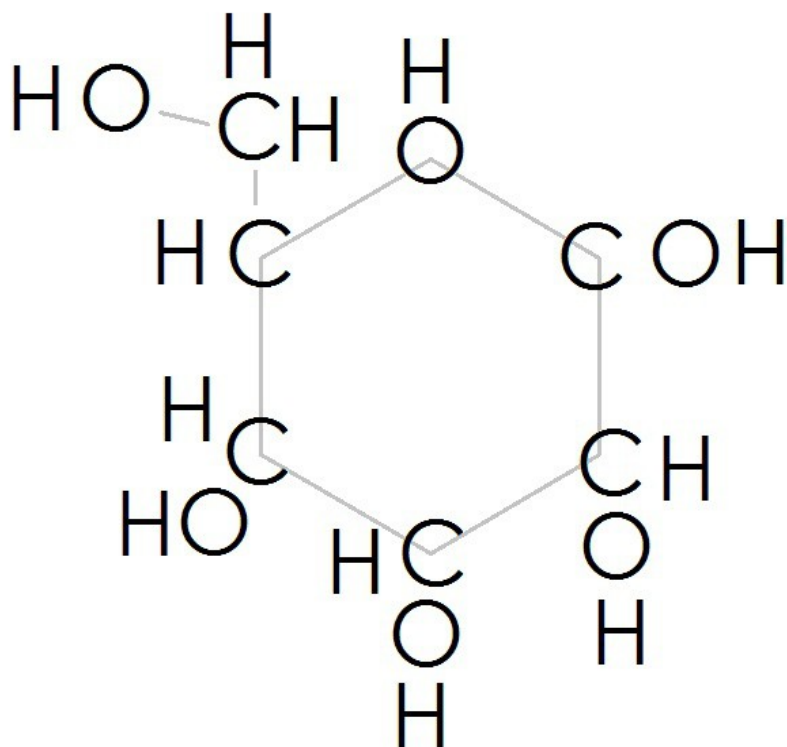
1. Hydrogen Chloride (HCl)



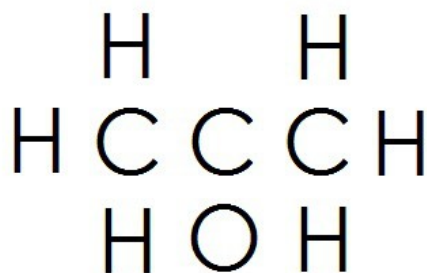
2. Butane (C<sub>4</sub>H<sub>10</sub>)



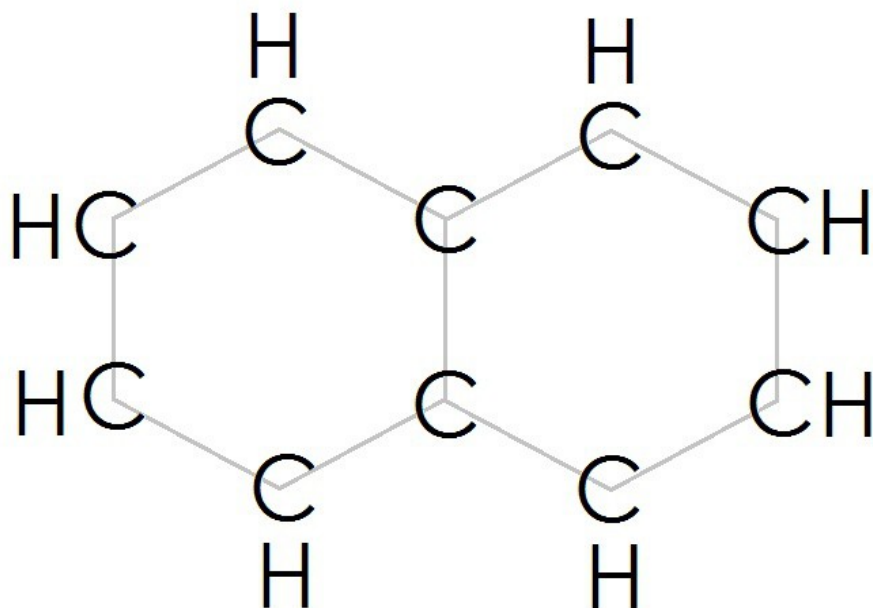
4. Glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)



3. Acetone (CH<sub>3</sub>COCH<sub>3</sub>)



5. Napthalene (C<sub>10</sub>H<sub>8</sub>)



# Lewis Dot Diagrams Answers

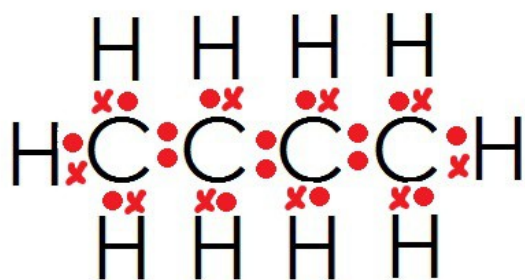
Here are the answers to the Lewis Dot Diagram worksheet with some explanations.

## 1. Hydrogen Chloride (HCl)



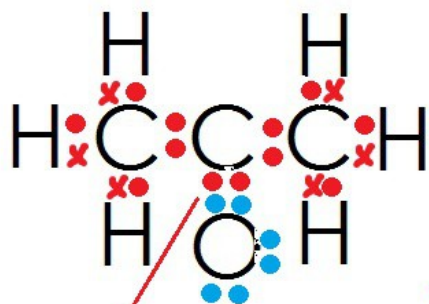
Hydrogen has one valence electron and wants two to be filled. Chlorine has seven valence electrons and wants eight to be filled.

## 2. Butane (C<sub>4</sub>H<sub>10</sub>)



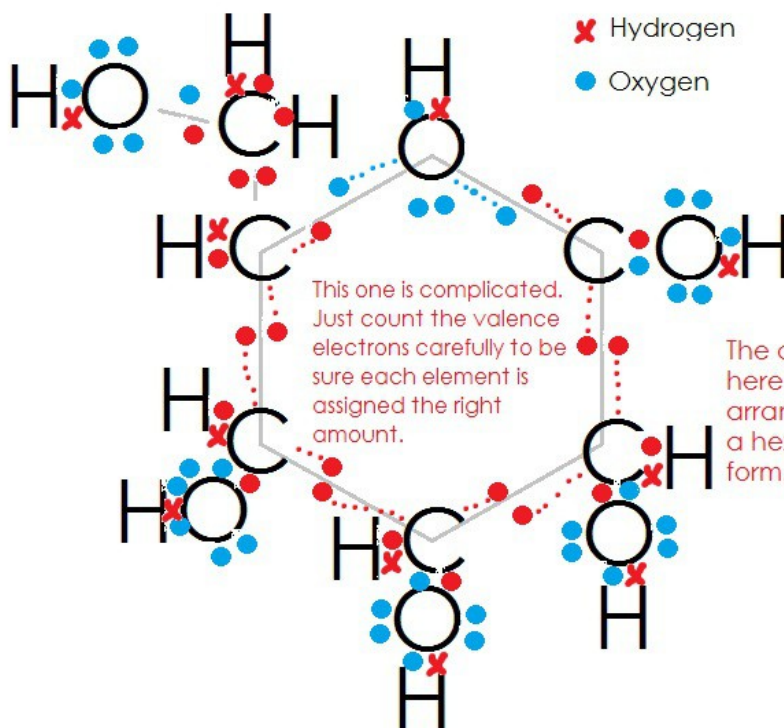
Carbon has four valence electrons. It often pairs with hydrogen to make long chains.

## 3. Acetone (CH<sub>3</sub>COCH<sub>3</sub>)



Oxygen and carbon form a double bond here, each contributing two electrons.

## 4. Glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)



We assigned our elements each a symbol/color:

● Carbon

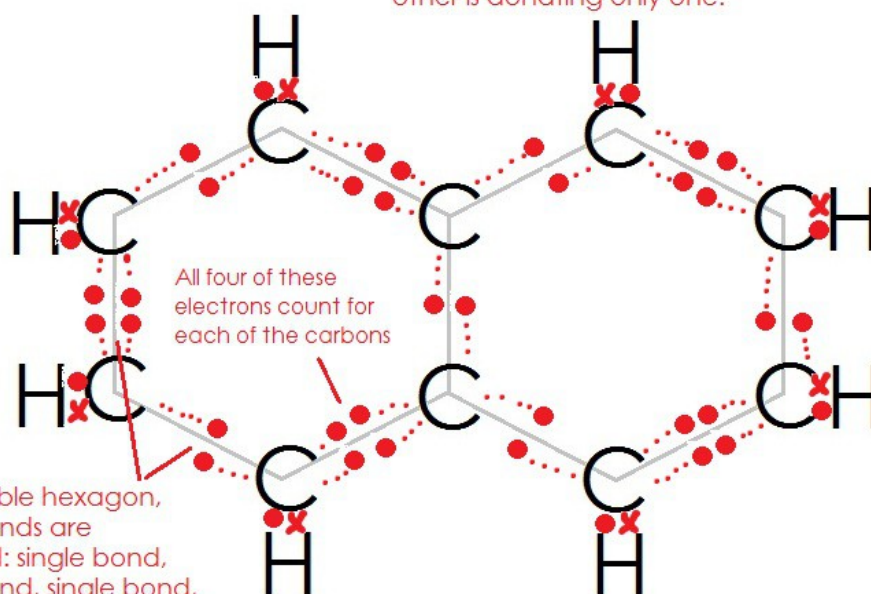
× Hydrogen

● Oxygen

This one is complicated. Just count the valence electrons carefully to be sure each element is assigned the right amount.

The carbons here are arranged in a hexagonal form.

## 5. Napthalene (C<sub>10</sub>H<sub>8</sub>)



Double bonds (and triple bonds) are always shared equally. An element will never give up three electrons while the other is donating only one.

All four of these electrons count for each of the carbons

In this double hexagon, double bonds are alternated: single bond, double bond, single bond, double bond...

Hydrogens are super versatile, having one electron and needing only one electron.



# ABOUT THE AUTHORS

Karen & Michelle . . .  
Mothers, sisters, teachers, women who are passionate  
about educating kids.  
We are dedicated to lifelong learning.



Karen, a mother of four, who has homeschooled her kids for more than eight years with her husband, Bob, has a bachelor's degree in child development with an emphasis in education. She lives in Utah where she gardens, teaches piano, and plays an excruciating number of board games with her kids. Karen is our resident Arts expert and English guru {most necessary as Michelle regularly and carelessly mangles the English language and occasionally steps over the bounds of polite society}.

Michelle and her husband, Cameron, homeschooling now for over a decade, teach their six boys on their ten acres in beautiful Idaho country. Michelle earned a bachelor's in biology, making her the resident Science expert, though she is mocked by her friends for being the *Botanist with the Black Thumb of Death*. She also is the go-to for History and Government. She believes in staying up late, hot chocolate, and a no whining policy. We both pitch in on Geography, in case you were wondering, and are on a continual quest for knowledge.

*Visit our constantly updated blog for tons of free ideas,  
free printables, and more cool stuff for sale:*

[www.Layers-of-Learning.com](http://www.Layers-of-Learning.com)