

## Steps of a Scientific Investigation

**Prediction** – a forecast about what may happen in some future situation. It is based on the application of scientific principles and factual information.

**Hypothesis** – a predication about the relationship between variables.

**Experiment** – a fair test driven by a hypothesis with which only one variable is compared.

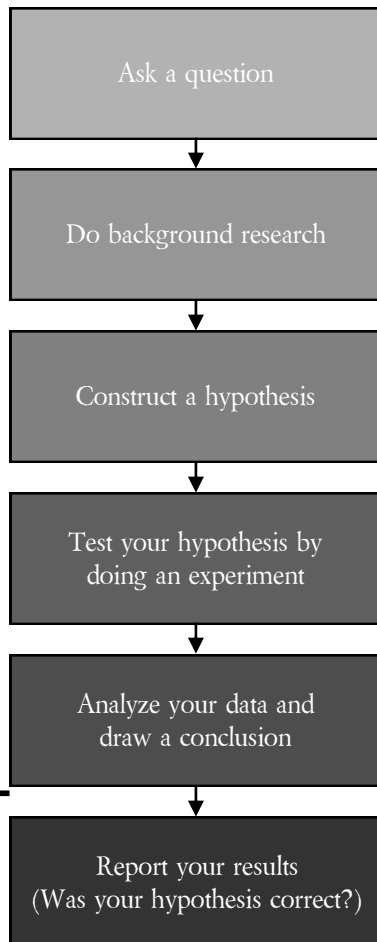
**Observations** – provides a clear description of exactly what is observed and nothing more.

People conducting investigations need to understand the difference between what is seen and what is an inference.

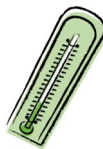
**Inference** – a conclusion based on evidence about events that have already occurred. Accurate observations and evidence are necessary to draw realistic and possible conclusions.



## Steps in the Scientific Method



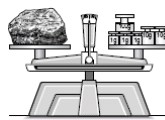
## Scientific Measuring Tools



**THERMOMETER**—a tool that measures temperature



**RULER, YARD STICK, METER STICK**— tool used to measure length, height, or width of an object.



**BALANCE, PAN SCALE** —a tool that measures the mass (how much matter) of an object



**GRADUATED CYLINDER**— tool used to measure liquid volume (amount of liquid)

## Scientific Measuring Units

Meters, Yards, Feet, Inches, and Centimeters

measures length

Pounds, Ounces, Tons, Grams, and Kilograms

measures weight

Fahrenheit and Celsius

measures temperature

Fluid Ounces, Cups, Milliliters, and Liters

measures capacity

# SOL 4.2&4.3- Forces, Motion, and Energy

**POSITION**—described by the relative location of another object. Tracing and measuring an object's position over time can describe its motion.

**SPEED**—Describes how fast an object is moving

**FORCE**—Any push or pull that causes an object to stop, change speed, or direction.

**FRICTION**—The resistance of motion (often creates HEAT)

The greater the force, the greater the change in motion. The bigger the object, the less effect a force will have upon it.



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Electrical Energy can be transformed into heat, light, or mechanical energy.

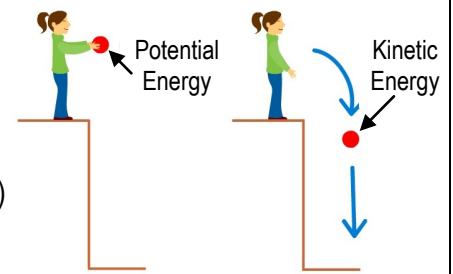


Electricity causes the small metal in a light bulb to heat up and give off light (heat and light energy)



Electricity causes the blades to turn (mechanical energy)

**POTENTIAL ENERGY**—"Stored Energy" (an object is not in motion)



**KINETIC ENERGY**—"Motion Energy" (an object that is in motion.)

## STATIC ELECTRICITY

Atoms—tiny material within all objects. Within atoms are protons (+ charge), electrons (- charge), and neutrons (no charge)



Rubbing together certain items causes static electricity.

Static electricity in the clouds is seen as lightning.



**CURRENT ELECTRICITY**—continuous flow of electrons

**CIRCUIT**—the path of electric current



**OPEN CIRCUIT**—does not allow electricity to flow (like an open bridge)

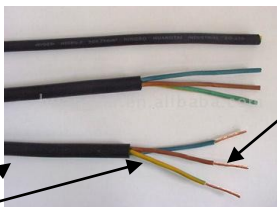


**CLOSED CIRCUIT**—allows electricity to flow (like a closed bridge)

**CONDUCTORS**—materials that allow electricity to pass through such as metal (wires)

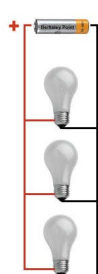
**INSULATORS**—materials that DO NOT allow electricity to pass through such as rubber, plastic, and wood

The rubber or plastic around the wires are **INSULATORS** so that it is safe to touch the wires (and no fires get started!)

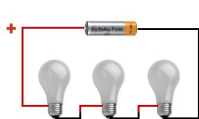


The copper wires are **CONDUCTORS** to carry the electricity through the wire

**PARALLEL CIRCUIT**—has more than one pathway so that if one light goes out, the other circuit light stays on



**SERIES CIRCUIT**—Has only one path. If one light goes out, they all go out.

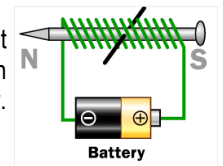


## MAGNETISM

Certain metals such as Iron, Nickel, and Cobalt are magnetic

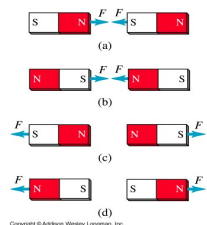


**ELECTROMAGNET**—a non-permanent magnet created by wrapping a wire around certain iron materials (nail). Discovered by Michael Faraday.



**MAGNETIC POLES**—The strongest point on a magnet (usually North and South)

**MAGNETIC FIELD**—the lines of force extended from the poles of a magnet in an arched pattern showing where the magnetic force occurs.



When you put magnetic poles together...

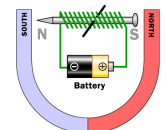
**Like charges REPEL** (push against)

**Opposite charges ATTRACT** (come together)

## FAMOUS SCIENTISTS



**Michael Faraday**—Invented the electromagnet which is a non permanent but powerful magnet.



**Benjamin Franklin**—Discovered lightning (electricity) during a kite and key experiment.

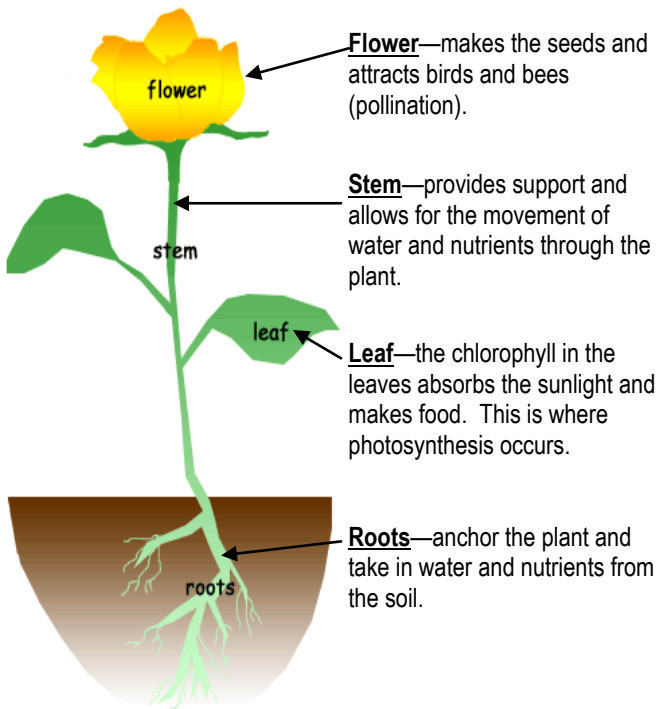


**Thomas Edison**—Inventor of the light bulb

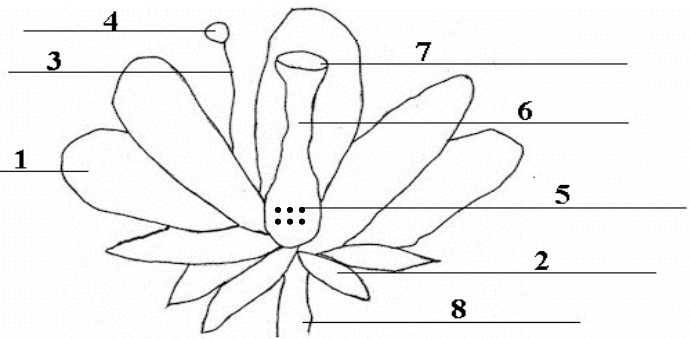


The plant kingdom is divided into **TWO** groups:

- **Plants with seeds** (trees, flowers, green plants)
- **Plants with spores** (ferns and mosses)



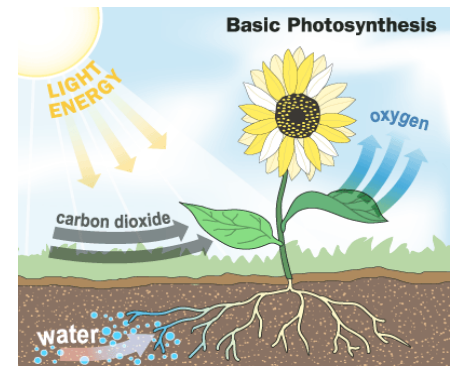
## PARTS OF A FLOWER



1. **Petal**—the colorful scented part of the flower that attracts birds and bees so that pollination can occur
2. **Sepal**—the small leaves that protect the developing flower.
3. **Stamen**—the male part of the flower involved in reproduction
4. **Pollen**—the orange/yellow dusty substance produced by the stamen (which is carried around during pollination)
5. **Seeds/Ovule**—these form in the ovary after being fertilized by the pollen
6. **Pistil**—the female part of the flower involved in reproduction
7. **Stigma**—the sticky uppermost part of the pistil
8. **Stem**—gives support to the flower and transports nutrients and water

## PHOTOSYNTHESIS

The process by which the plant uses the sun's energy, carbon dioxide, and water to make food (glucose and oxygen)



## POLLINATION

**Pollination**—the transfer of pollen from the stamen to the stigma. Pollination is part of the reproductive process of flowering plants.

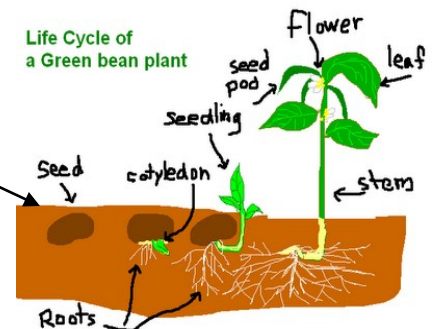


Birds and bees land on a flower and pollen clings to their bodies. When the birds and bees visit other flowers, they spread the pollen.

Once a flower gets the right pollen, new seeds will start to grow and the flowers will reproduce.

**DORMANCY**—the period of suspended life process brought on by change in the environment.

For example, a seed will stay **DORMANT** until it gets what it needs to start growing. Most seeds need sunlight, water, and soil to start growing.



**CHLOROPHYLL**—the green pigment (color) in the plant. Chlorophyll is used during photosynthesis to make food for the plant.

# SOL 4.5- Living Systems

## ANIMAL ADAPTATIONS

In order for animals to survive they much adapt to their individual and environmental needs. Animals can have **STRUCTURAL ADAPTATIONS** and/or **BEHAVIORAL ADAPTATIONS**.

**STRUCTURAL ADAPTATIONS**—Physical attributes that help animals meet a life need. Examples— camouflage, monkey's tail and turtle shell.



**BEHAVIORAL ADAPTATIONS**—certain types of activities animals perform, which help them meet a life need. Examples— migration and hibernation.

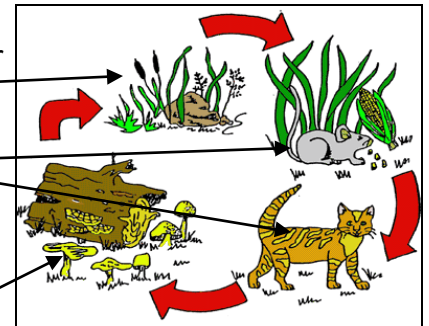


## FOOD CHAINS

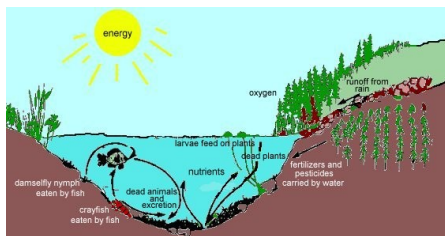
**PRODUCERS**—organisms that get their energy directly from the sun (can make their own food) (plants). Producers are often the start of the food chain.

**CONSUMERS**—organisms that get their energy from other plants and animals (cannot make their own food).

**DECOMPOSERS**—organisms that use dead and decaying organisms and animals



**HABITAT**—the place in which an animal or plant naturally lives. Remember that an animal or plant needs food, water, shelter, and space to live. The size of the habitat depends on the organism's need.



**ORGANISM**—any living thing

**ECOSYSTEM**—the ways living things interact with other living and non-living things



**COMMUNITY**—a group of organisms that share an environment

**LIFE CYCLE**—the various stages of life (egg, tadpole, frog)

## NICHE

A **NICHE** (rhymes with “ditch” or “leash”, depending on how you say it) is the function (job) that an organism performs in the food web of that community.



The vulture's **NICHE** is to clean up the dead animals. That is the service it provides to the community. If there were no animals to clean up, there would be a mess.

The zebra's **NICHE** was to eat the grass. If the zebras and other animals didn't eat the grass, the grass would grow too tall.

The lion's **NICHE** is to keep the population of other animals balanced. If the lions didn't kill zebras and other animals, there would be too many.

## HUMAN IMPACT ON ECOSYSTEMS

Humans have a MAJOR Impact on ecosystems but it is up to the humans to decide if the impact is POSITIVE or NEGATIVE



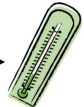

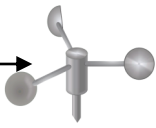
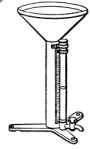

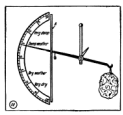
**POSITIVE**



**NEGATIVE**



# SOL 4.6- Weather

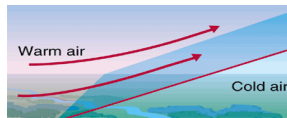
<u>WEATHER TERMS</u>	<u>MEASURED WITH...</u>	<u>WEATHER TOOLS</u>
<b>TEMPERATURE</b> —the measure of the amount of heat energy in the atmosphere	⇒	<b>THERMOMETER</b> → 
<b>AIR PRESSURE</b> —the weight of the air, which is determined by several factors including the temperature	⇒	<b>BAROMETER</b> → 
<b>WIND SPEED</b> —how fast the wind is blowing	⇒	<b>ANEMOMETER</b> → 
<b>PRECIPITATION</b> —the amount of water that falls from the sky	⇒	<b>RAIN GAUGE</b> → 
<b>WIND DIRECTION</b> —The direction in which the wind blows	⇒	<b>WIND VANE</b> → 
<b>HUMIDITY</b> —the amount of moisture in the air	⇒	<b>HYGROMETER</b> → 



Meteorologists, like me, use weather instruments to predict weather

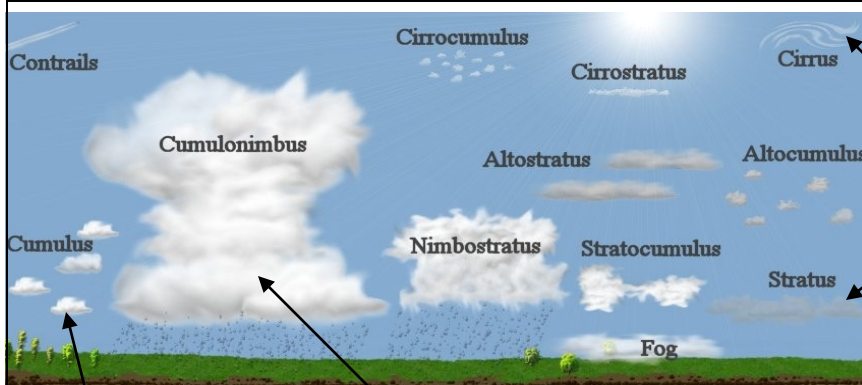
There are 4 types of precipitation: rain, snow, sleet, and hail. Snow, rain, and sleet are based on the temperature in the atmosphere.

**WEATHER FRONTS**—the boundary between air masses of different temperature and humidity



**HIGH PRESSURE**—fair weather and light winds

**LOW PRESSURE**—cloudy/rainy with strong winds



## CLOUD TYPES

**CIRRUS**—feathery clouds usually associated with fair weather but often indicates rain or snowfall in several hours

**STRATUS**—gray, smooth clouds that cover the whole sky and block all sunlight. Light rain and drizzle usually occur.

**CUMULUS**—white, fluffy clouds with flat bottom usually indicating fair weather

**CUMULONIMBUS**—dark, tall, billowing cloud that produces rain and thunderstorms

## EXTREME STORMS

**THUNDERSTORMS**—a common storm with rain, thunder, and lightning



**HURRICANES**—a storm that forms over water with heavy winds



**TORNADOES**—a violent wind storm with a rotating column



## EARTH

- Third planet from the sun
- 150 km from the sun
- 1 of the 4 Rocky Inner Planets
- Oxygen-rich atmosphere
- 75% water
- Has life



## SUN

- Average-sized yellow star
- 100x the size of the Earth
- 4.6 billion years old
- Made of gas and helium



## MOON

- Small, rocky satellite
- 3/4 the diameter of Earth
- 1/8 the mass of Earth
- Extreme temperatures
- No atmosphere, water, or life

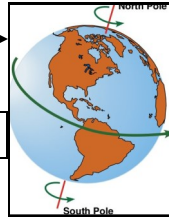


## ROTATION AND REVOLUTION

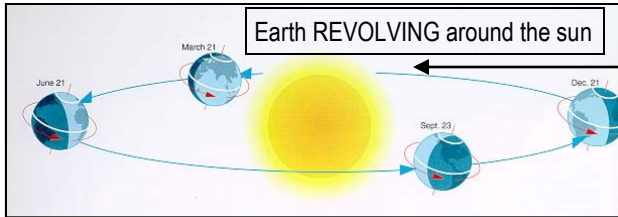
**ROTATION**—a spinning motion

- It takes the Earth 24 hours (1 day and 1 night) to rotate)

Earth ROTATING on it's axis



Earth REVOLVING around the sun

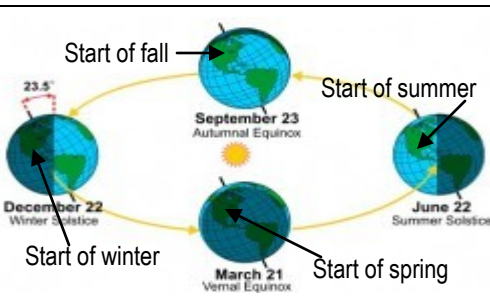
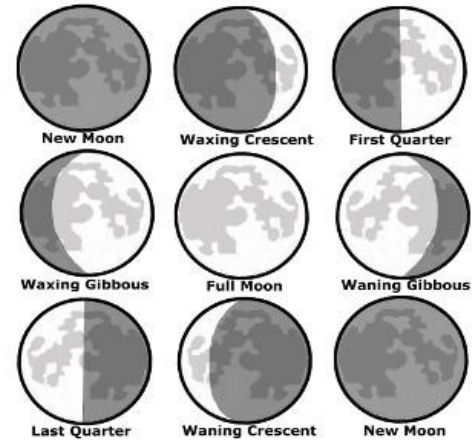
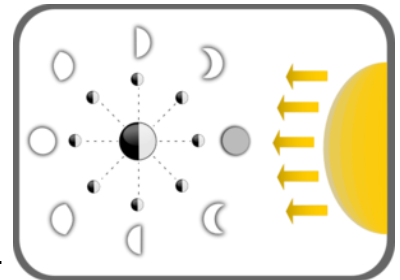


**REVOLUTION**—an object moving in a circular motion around another object

- It takes the Earth 365 days (1 year) to revolve around the Sun
- It takes the Moon 28 days (1 month) to revolve around the Earth

## MOON PHASES

The phases of the moon are caused by its position relative to the Earth and the Sun.



We have SEASONS because the Earth is *tilted* and because it revolves around the sun.

We have warmer temperatures when our continent is facing and closest to the sun. When it is not, we have colder temperatures

Long ago, Scientists argued about the universe...



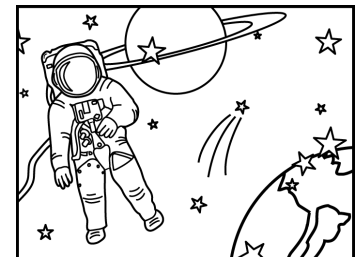
We believe the EARTH is the center of the universe!!



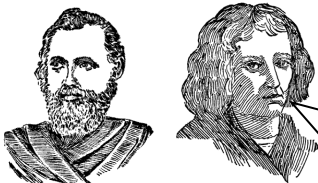
Aristotle & Ptolemy

Thanks to NASA and their Apollo missions, we now have a much greater understanding of space.

Astronauts bring back moon samples to help us learn.



Our understanding of the sun, moon, and solar system continues to grow and change with new scientific discoveries.



Galileo & Copernicus

We believe that the SUN is the center of the Universe!!



Virginia is rich in a wide variety of material resources including forests, arable (farmable) land, coal, sand, and aggregates (rocks), wildlife and aquatic organisms, clean water and air, and beautiful scenery.

## Land Resources

### NATURAL vs. CULTIVATED FORESTS



**CULTIVATED FORESTS**—a forest designed specifically for the planting of products

**NATURAL FORESTS**—a forest that has grown naturally, without any help from humans

\*Both Natural and Cultivated forests are a widespread resource in Virginia\*

Virginia's soil and land support a great variety of life, provide space for many economic activities, and offer a variety of recreational opportunities.

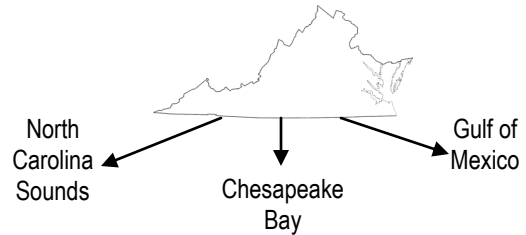


## Water Resources

### WATERSHED

**WATERSHED**—an area over which surface water flows to a single collection place

Virginia has 3 watersheds!



Other water resources include groundwater, lakes, reservoirs, rivers, bays, and oceans. Plants and animals that live in these aquatic habitats are also used as resources.



Chesapeake Bay

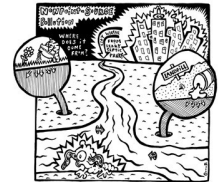


Potomac River



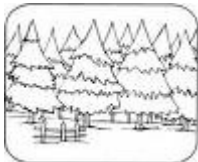
### "We all live Downstream"

Environmental programs that want to save and preserve the watersheds often use this phrase. If a neighbor litters, the trash must go somewhere eventually. Since rivers are always flowing, the trash goes into the river and then travels to another location and pollutes the water.



## Natural Resources

Trees, water, and sand



## Man-Made Resources

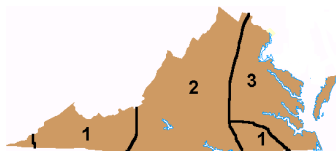
Paper, logs, and bleach



# INTRODUCTION TO VIRGINIA STUDIES

## Refrigerator Card for SOL Home Review

**What were the three major American Indian language groups found in Virginia?** (VS.2d)



1) Iroquoian Languages	Spoken in southwestern Virginia and in southern Virginia near what is today North Carolina. The Cherokee were part of this group.
2) Siouan Languages	Spoken primarily in the Piedmont region. The Monacan were part of this group.
3) Algonquian Language	Spoken primarily in the Tidewater region. The Powhatan were part of this group.

**How did the native peoples and the English interact?** (VS.3g)

Captain John Smith initiated trading relationships with the native peoples.



**Why did the relationship between the Jamestown settlers and the native peoples change?**

The native peoples traded mainly with the English in exchange for tools, pots, and copper for jewelry.



**The native peoples contributed to the survival of the Jamestown settlers by:**

- 1) Powhatan, chief of many tribes, provided leadership to his people and taught the settlers survival skills
- 2) Pocahontas, daughter of Powhatan, served as a contact between the native peoples and the English.
- 3) The native peoples showed the settlers how to plant corn and tobacco.



**Over time, the native peoples realized the English settlement would continue to grow.**

**The native peoples came to see the settlers as invaders who would take over their land.**



**Fall Line** (VS.2b): The natural border between the Coastal Plain (Tidewater) and Piedmont Regions, where waterfall prevent further travel on the river.

**Lake Drummond** (VS.2c) Located in the Coastal Plain (Tidewater) region; Shallow natural lake surrounded by the Dismal Swamp

**Dismal Swamp** (VS.2c) Located in the Coastal Plain (Tidewater) region; Variety of wildlife. George Washington explored and surveyed the Dismal Swamp.

**FIVE GEOGRAPHIC REGIONS OF VIRGINIA** (VS.2b, VS.10b)  
**How do the five geographic regions differ and where are they located?**

**Coastal Plain (Tidewater):** flat land located near Atlantic Ocean and Chesapeake Bay (includes the Eastern Shore); east of the Fall Line

- **Products** - seafood, peanuts
- **Industries** - shipbuilding, tourism, military bases



**Piedmont:** land at the foot of mountains; rolling hills west of the Fall Line

- **Products** - tobacco products, information technology
- **Industries** - technology, Federal and state government, farming, horse industry

**Blue Ridge Mountains:** old, rounded mountains that are part of Appalachian Mountain system. They are located between the Piedmont and Valley and Ridge regions and are a source of many rivers.

- **Products** - apples
- **Industries** - recreation, farming



**Valley and Ridge:** includes the Great Valley of Virginia and other valleys separated by ridges. (The Blue Ridge Mountains and the Valley and Ridge Regions are part of the Appalachian Mountain system.) They are located west of the Blue Ridge Mountains.

- **Products** - poultry, apples, dairy, beef
- **Industries** - farming



**Appalachian Plateau:** (area of elevated land that is flat on top); located in Southwest Virginia; only a small part of plateau is located in Virginia

- **Products** - coal
- **Industries** - coal mining



**What is a peninsula?** (VS.2c) A piece of land bordered by water on three sides.

- The Eastern Shore is a peninsula bordered by the Chesapeake Bay to the west and the Atlantic Ocean to the east.
- The Chesapeake Bay separates the Eastern Shore from the mainland of Virginia.
- The four major rivers that flow into the Chesapeake Bay are separated by peninsulas.

**Which water features were important to the early history of Virginia?** (VS.2c)

- **Potomac River**  
Flows into the Chesapeake Bay  
Alexandria is located along Potomac River
- **Rappahannock River**  
Flows into the Chesapeake Bay  
Fredericksburg is located on Rappahannock River.
- **James River**  
Flows into the Chesapeake Bay  
Richmond and Jamestown are located along the James River.
- **York River**  
Flows into the Chesapeake Bay  
Yorktown is located along the York River.

Many early Virginia cities developed along the Fall Line, the natural border between the Coastal Plain (Tidewater) and Piedmont regions where the land rises sharply and where the waterfalls prevent further travel on the river.

**Each river was a source of food and provided a pathway for exploration and settlement.**

**Relative Location** (VS.2a)

Location of places can be described in relative terms. Relative location may be described using terms that show connections between two places such as, "next to," "near," and "bordering."

**Which states border Virginia?**



**What bodies of water border Virginia?**

- Atlantic Ocean** (VS.2c)  
Provided transportation links between Virginia and other places (e.g., Europe, Africa, and the Caribbean)
- Chesapeake Bay** (VS.2c)  
Provided a safe harbor and was a source of food and transportation



**Why are native peoples called Indians?** (VS.2d)



**Christopher Columbus** called the people he found in the lands he explored “Indians” because he thought he was in the Indies (near China).



**Artifacts** such as arrowheads, pottery, and other tools that have been found tell a lot about the people who lived in Virginia. There is evidence that American Indians lived in all areas of the state.

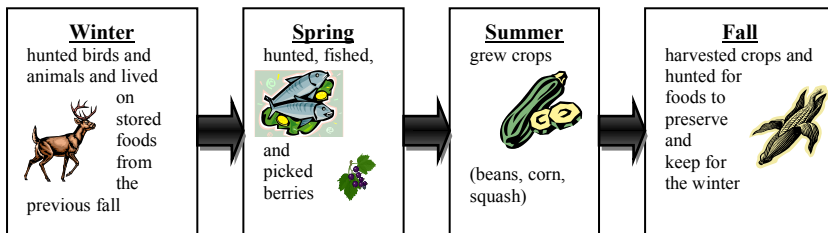
**Virginia’s American Indians worked with the environment and the climate to meet their basic needs. Virginia Indian cultures have changed over time.** (VS.2e)

Environmental Connections:

- Forests, which had a variety of trees, cover most of the land. Virginia’s Indians are referred to as Eastern Woodland Indians.
- Animal skins (deerskin) were used for clothing.
- Shelter was made from materials around them.
- The kinds of food they ate, the clothing they wore, and the shelters they had depended upon the seasons.



The climate in Virginia is relatively mild with distinct seasons - spring, summer, fall, and winter - resulting in a variety of vegetation. (VS.2e)



**Today, most native peoples live like other Americans. Virginia Indian cultures have changed over time.**



**Why is archaeology important?** (VS.2f)

Archaeology is another way that helps people understand the past. Archaeologists study all kinds of material evidence left from people of the past. Findings change the understanding of history. Recent archaeological digs have recovered new material evidence about Werowocomoco and historic Jamestown.

**What was Werowocomoco?**

Werowocomoco was a large Indian town used by Indian leaders for several hundred years before the English settlers came. It was the headquarters of the leader, Powhatan, in 1607.



Drawn by John Smith

**What was Jamestown?**

Jamestown became the first permanent English settlement in North America. Archaeologists have discovered the site of the original fort. The recovered artifacts give archaeologists clues about the interactions of English, Africans, and Indians in Virginia.



**American Indians have lived in Virginia for thousands of years. Today, eight American Indian tribes are recognized by the Commonwealth of Virginia:** (VS.2g)

- **Coastal Plain (Tidewater) Region:** Chickahominy Tribe; Eastern Chickahominy Tribe; Mattaponi Tribe; Nansemond Tribe; Pamunkey Tribe; Rappahannock Tribe; Upper Mattaponi Tribe
- **Piedmont Region:** Monacan Tribe

*American Indians, who trace their family history back to before 1607, continue to live in all parts of Virginia today.*

**JAMESTOWN, VIRGINIA**

The first permanent English settlement in America was Jamestown, founded in 1607 as an economic venture.

**What were the reasons for English colonization in America?** (VS.3a)

- England wanted to establish an American colony to increase its wealth and power.
- England hoped to find silver and gold in America.
- An American settlement would furnish raw materials that could not be grown or obtained in England, while opening new markets for trade.

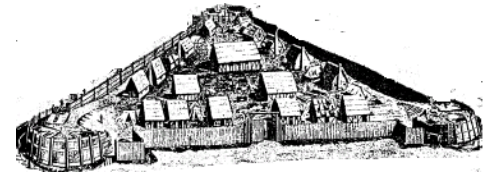
**What were the reasons why the Jamestown settlers came to America?** (VS.3a)



- Jamestown was primarily an economic venture.
- The stockholders of the Virginia Company of London financed the settlement of Jamestown.

**Where is Jamestown located?** (VS.3b)

When the settlers arrived in 1607, Jamestown was located on a narrow peninsula bordered on three sides by the James River. Today, Jamestown is located on an island in the James River.



**Why did the settlers choose the site at Jamestown?** (VS.3b)

- Instructions told the settlers to go inland and find a suitable place for their colony.
- The location could easily be defended from Spanish attack by sea.
- The water along the shore was deep enough for ships to dock.
- They believed they had a good supply of fresh water.

**Importance of the Virginia charters** (VS.3c)

The King of England had the power to grant charters allowing settlement in North America.

He granted charters to the Virginia Company of London to:

- establish a settlement in North America, and
- extend English rights to the settlers.

As Jamestown grew, the system of government evolved.(VS.3d)

In 1619, the governor of Virginia called a meeting of the **General Assembly**.

The *General Assembly* included:

- the governor
- the governor’s council
- two representatives (called “burgesses”) from each of the divisions of Virginia. (At that time, only certain free adult men had a right to take part.)



By the 1640s, the burgesses became a separate legislative body called the **House of Burgesses**.

They met separately from the Governor’s Council as one of the two legislative bodies of the General Assembly.



**The English settlers found life in Jamestown harder than they expected.**

**What hardships did the Jamestown settlers face?** (VS.3f)

- The site they chose to live on was marshy and lacked safe drinking water.
- The settlers lacked some skills necessary to provide for themselves.
- Many settlers died of starvation and disease.



**What changes took place that resulted in survival of the settlers?**

- arrival of supply ships
- forced work program and strong leadership of Captain John Smith
- emphasis on agriculture ensured survival of the colony.

**What effect did agriculture have on the Virginia colony?** (VS.4a)

The economy of the Virginia colony depended on agriculture as a primary source of wealth.



Tobacco became the most profitable agricultural product and was sold in England as a cash crop.



**Why was the House of Burgesses important?**

The Virginia House of Burgesses was the first elected legislative body in English America giving settlers the opportunity to control their own government.

The current Virginia General Assembly dates from the establishment of the House of Burgesses at Jamestown in 1619.

**What was the impact of the arrival of Africans and women to the Jamestown settlement?** (VS.3e)

Portuguese sailors captured African men and women from what is present-day Angola. The status of these early African men and women as either servants or slaves in Virginia is unknown.

Africans arrived in Jamestown against their will in 1619.



**Impact:** The arrival of Africans made it possible to expand tobacco economy.  
**Impact:** The arrival of additional women in 1620 made it possible for more settlers to establish families and a permanent settlement at Jamestown.



**cash crop:** a crop that is grown to sell for money rather than for use by the growers

**How did agriculture in the Virginia colony influence the institution of slavery?**

The successful planting of tobacco depended on a steady and inexpensive source of labor.



- African men, women and children were brought to the colony against their will to work as slaves on the plantations.

**Migration and living in new areas caused people to adapt old customs to their new environment. Although a colony of England, Virginia developed a unique culture. The culture of colonial Virginia reflected beliefs, customs, and architecture of Europeans, Africans and American Indians living in those areas.** (VS.4b)

Whenever people settle an area, they change the culture and landscape to reflect their beliefs, customs, and architecture of their culture.

**Examples of architecture that reflect different cultures include:**



**Where did the various cultural groups settle?**

- The English and other Europeans settled primarily in Coastal Plain (Tidewater) and Piedmont regions.
- Germans and Scots-Irish settled primarily in the Shenandoah Valley, which was along the migration route.
- Africans were settled primarily in the Coastal Plain (Tidewater) and Piedmont regions, where tobacco agriculture required a great deal of labor.
- Prior to the arrival of the settlers, American Indians lived throughout Virginia. After the settlers arrived, most were forced inland.

**Place names reflecting culture: Richmond (English) and Roanoke (American Indian)**

**Relocation of Virginia's Capital from Jamestown to Williamsburg (VS.4c)**  
**A variety of factors explain the reasons for moving Virginia's capital.**

**What were some reasons why the capital was moved from Jamestown to Williamsburg?**

- Jamestown's drinking water was contaminated by seepage of salt water.
- Unhealthy living conditions caused diseases.
- Fire destroyed wooden and brick buildings at Jamestown.



**What were some reasons why the capital was moved from Williamsburg to Richmond?**

- Population was moving westward.
- Richmond was a more central location.
- Moving to Richmond increased the distance from attack by the British.



**Money was not often used in the early Virginia colony. What forms of exchange were used in the Virginia colony? (VS.4d)**

- Few people had paper money and coins to use to buy goods and services.
- Barter was commonly used instead of money.
- Tobacco was used as money. A tobacco farmer could use his tobacco to pay for goods and services.
- Farmers and other consumers could also buy good and services on credit and pay their debts when their crops were harvested and sold.



**Barter was commonly used instead of money. Colonial Virginia had no banks.**

**England became Great Britain in early 1700s.**

**Terms to Know (VS.4d)**

• **money:** a medium of exchange (currency which includes coins and paper bills)

• **barter:** trading/ exchanging of goods and services without the use of money

• **credit:** buying a good or service now and paying for it later

• **debt:** a good or service owed to another

• **saving:** money put away to save or to spend at a later time



**How was everyday life different for whites, enslaved African Americans, and free African Americans in colonial Virginia? (VS.4e)**

Most white Virginians made their living from the land as small farmers. A few owned large farms (plantations.)

Most enslaved African Americans worked tobacco, crops and livestock.

Enslaved African Americans had no rights.



Many free African Americans owned their own business and property, but were denied most rights.

**How did resources influence the food, housing, and clothing in colonial Virginia? (VS.4e)**

Resources were used in colonial Virginia to produce the goods and services that the people needed. People depended on natural, human, and capital resources to produce the goods and services they needed.



**Food:**

- Food choices were limited
- Meals were made of local produce and meats



**Housing:**

- Most people lived in one-room homes with dirt floors
- Some people (farmers) lived in large houses

**Clothing:**

- Households made their own clothes
- Most clothing was made of cotton, wool and leather

**The Declaration of Independence gave reasons for independence and ideas for self-government. (VS.5a)**

The Declaration of Independence states:

- the authority to govern belongs to the people rather than to kings
- all people are created equal and have rights to life, liberty, and the pursuit of happiness.



**Thomas Jefferson authored the Declaration of Independence.**

**How did the colonists ideas about government differ from those of the British Parliament? (VS.5a)**

**Parliament**

- Parliament believed it had legal authority in the colonies.
- Parliament believed it had the right to tax the colonies.

**Colonists**

- Colonists believed their local assemblies had legal authority.
- Colonists believed they should not be taxed since they had no representation in Parliament.




**Who was Jack Jouett? (VS.5c)**

He rode on horseback through the backwoods of Virginia to Charlottesville to warn Thomas Jefferson, then governor of Virginia, that the British were coming to arrest him and members of the General Assembly.

**REVOLUTIONARY WAR (VS.5b)**

**What contributions did Virginians make during the Revolutionary War era?**

Varied roles of whites, enslaved African Americans, free African Americans and American Indians in the Revolutionary War era:

Patriot	Neutral	Loyalist
Virginians who served in the Continental Army and fought for independence leading to the British surrender at Yorktown.	Virginians who did not take sides with either Great Britain or the Continental Army.	Virginians who remained loyal to Great Britain. 



Some enslaved African Americans fought for a better chance of freedom and some free African Americans fought for independence in the American Revolution.

Many American Indians fought alongside both the Virginia patriots and the British.

Women took on more responsibility to support the war effort.

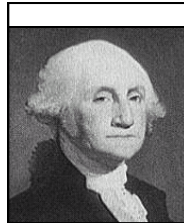
James Lafayette, an enslaved African American from Virginia, served in the Continental Army and successfully requested his freedom after the war.

George Washington provided military leadership by serving as commander-in-chief of the Continental Army.

Thomas Jefferson provided political leadership by expressing the reasons for colonial independence from Great Britain in the Declaration of Independence.



Patrick Henry inspired patriots from other colonies when he spoke out against taxation without representation by saying, "... Give me liberty or give me death."



**George Washington (VS.6a)**

- George Washington, a Virginian, was elected as the first President of the United States of America.
- He provided the strong leadership needed to help the young country and provided a model of leadership for future presidents.

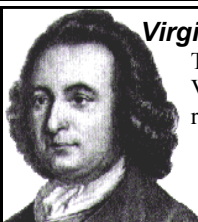
• **He is often called the "Father of Our Country."**



**James Madison (VS.6a)**

- James Madison, a Virginian, believed in the importance of having a United States constitution.
- He kept detailed notes during the Constitutional Convention.
- His skills at compromise helped the delegates reach agreement during the difficult process of writing the Constitution of the United States of America.

• **This earned him the title "Father of the Constitution."**



**Virginia Declaration of Rights (VS.6a)**

The Virginia Declaration of Rights states that all Virginians have many rights, including freedom of religion and freedom of the press.

- **George Mason wrote the Virginia Declaration of Rights**

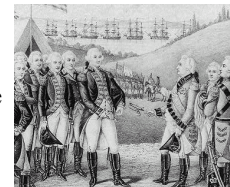
**Virginia Statute for Religious Freedom (VS.6a)**

The Virginia Statute for Religious Freedom states that all people should be free to worship as they please.

- **Thomas Jefferson wrote the Virginia Statute for Religious Freedom.**

**What was the importance of the American victory at Yorktown? (VS.5c)**

- The last major battle of the Revolutionary War was fought at Yorktown.
- The American victory at Yorktown resulted in the surrender of the British army, which led to an end to the war.



**BATTLE OF GREAT BRIDGE (VS.5c)**

**What was the importance of the Battle of Great Bridge?**

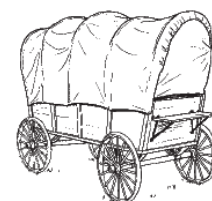
It was the first land battle of the American Revolution fought in Virginia. The American victory forced the British colonial governor to flee the City of Norfolk.

**What geographic factors influenced Virginians to move to the western frontier of Virginia and beyond? (VS.6c)**



After the American Revolution, Virginia's agricultural base began to change, and as a result, large numbers of Virginians moved west and to the deep South to find better farmland and new opportunities.

- Tobacco farming was hard on the soil, causing many farmers to look west and south for new land to farm.
- Virginians migrated into western territories looking for large areas of land and new opportunities. As Virginians moved, they took their traditions, ideas, and cultures with them.



- Settlers crossed the Appalachian Mountains through the Cumberland Gap as they migrated to new lands in the west.

Differences between the Northern and Southern States that led to the Civil War (VS.7a)	
North	South
Economy was more industrialized.	Economy was agricultural and relied more on slave labor.
Northern states wanted the new states created out of the western territory to be "free states."	Southern states wanted the new states created out of the western territory to be "slave states."

**Events leading to secession and Civil War:**

Abolitionists campaigned to end slavery.

Nat Turner led a revolt against plantation owners in Virginia.



Harriet Tubman supported a secret route that escaped enslaved African Americans took; it became known as the "Underground Railroad."



John Brown led a raid on the United States Armory (Arsenal) at Harpers Ferry, Virginia. He was trying to start a slave rebellion. He was captured and hanged.

**Why did Virginia secede from the Union?(VS.7a)**

After Abraham Lincoln was elected President of the United States in 1860, some southern states seceded from the Union and formed the "Confederate States of America." Later, Virginia seceded and joined them.



**How did West Virginia become a state? (VS.7a)**

> Conflict grew between the eastern counties of Virginia that relied on slavery and western counties that did not favor slavery.

> Many disagreements between the two regions of the state led to the formation of West Virginia.



**What major Civil War battles were fought in Virginia? (VS.7b)**

The first Battle of Bull Run (or Manassas) was the first major clash of the Civil War. Confederate



General Thomas "Stonewall" Jackson played a major role in the battle.



Fredericksburg: General Robert E. Lee, Commander of the Army of Northern Virginia, defeated Union troops at Fredericksburg, Virginia.

Richmond: The Confederate capital fell to General Ulysses S. Grant and was burned (by Southerners) near the end of the war.

Monitor (Union ship) and the Merrimack (Confederate ship): Lincoln used the Union Navy to blockade southern ports. An important sea battle between the Monitor (Union) and the Merrimack (Confederate), two iron-clad ships, took place in Virginia waters near Norfolk and Hampton. The battle was fought to a draw.

Appomattox Court House: The Civil War ended at Appomattox Court House, Virginia, where Confederate General Robert E. Lee surrendered his Confederate army surrendered to Union General Ulysses S. Grant in April 1865.

**How were whites, enslaved African Americans, free African Americans, and American Indians affected by the Civil War? (VS.7c)**

- Most white Virginians supported the Confederacy.
- The Confederacy relied on enslaved African Americans to raise crops and provide labor for the army.
- Some free African Americans felt their limited rights could best be protected by supporting the Confederacy.
- Most American Indians did not take sides during the Civil War.

**Reconstruction:** The period following the Civil War in which Congress passed laws designed to rebuild the country and bring the southern states back into the Union. (VS.8a)

**What were some of the problems Virginians faced during the period of Reconstruction?**

Millions of freed African Americans needed housing, education, clothing, food, and jobs.



Richmond, Virginia (1865)

Virginia's economy was in ruins:

- Money had no value.
- Banks were closed.
- Railroads, bridge, plantations, and crops were destroyed.

**What measures were taken to resolve problems?**

- The Freedmen's Bureau was a government agency that provided food, schools, and medical care for freed African Americans and others in Virginia.
- Sharecropping was a system common in Virginia after the war in which freed men and poor white farmers rented land from a landowner by promising to pay the owner with a share of the crop.

**"Jim Crow" Laws (VS.8b)**

During Reconstruction, African Americans began to have power in Virginia's government, and men of all races could vote.

**After Reconstruction, these gains were lost when "Jim Crow" laws established segregation or separation of the races and reinforced prejudices held by whites.**

**Ways "Jim Crow" laws affected the lives of African Americans and American Indians:**

- Unfair poll taxes and voting tests were established to keep African Americans from voting.
- African Americans found it very difficult to vote or hold public office.
- African Americans were forced to use separate poor quality services such as drinking fountains, restrooms and restaurants.
- African American and white children attended separate schools.
- "Jim Crow" laws had an effect on American Indians.

**Terms to Know**

**Segregation:** the separation of people, usually based on race or religion (VS.8b)

**Discrimination:** an unfair difference in the treatment of people (VS.8b)

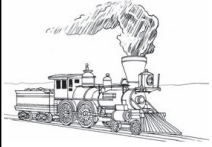


**Desegregation:** Abolishment of racial segregation (VS.9c)

**Integration:** Full equality of all races in the use of public facilities (VS.9c)

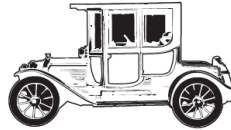


**Virginia began to grow in many areas after the Civil War and Reconstruction. Virginia's cities grew with people, businesses, and factories.** (VS.8c)



**What changes took place in Virginia to boost the economic growth?**

- Railroads were a key to the expansion of business, agriculture, and industry. They facilitated the growth of small towns to cities.
- Other parts of Virginia grew as other industries developed. Coal deposits were discovered in Tazewell County.
- The need for more and better roads increased.
- Tobacco farming and tobacco products became important Virginia industries.



**During the early 20th century, agriculture began to change.** (VS.9a)  
**Why did Virginia change from an agricultural to an industrial society?**

- Virginia's old systems of farming were old and no longer effective.
- Crop prices were low.



**What caused Virginia's cities to grow?**

- People moved from rural to urban areas for economic opportunities.
- Technological developments in transportation, roads, railroads, and streetcars helped cities grow.
- Coal mining spurred the growth of



Virginia towns and cities as people moved from the countryside to find jobs.

**In the late 20th Century and the early 21st century, Northern Virginia and the Coast Plan (Tidewater) region have grown due to computer technology.**

**Woodrow Wilson and George C. Marshall** (VS.9b)

- Woodrow Wilson was a 20th century president who wrote a plan for world peace.
- George C. Marshall was a military leader who created an economic plan to ensure world peace.

**What changes occurred in Virginia as a result of the Civil Rights Movement?** (VS.9c)

- The United States Supreme Court ruled in 1954 (*Brown v. Board of Education*) that "separate but equal" public schools were unconstitutional. All public schools, including those in Virginia, were ordered to desegregate.



**Massive Resistance:**

- Virginia's government established a policy of Massive Resistance, which fought to "resist" the integration of public schools.
- Some schools were closed to avoid integration.
- The policy of Massive Resistance failed, and Virginia's public schools were integrated.
- Harry F. Byrd, Sr., led a Massive Resistance movement against the desegregation of public schools.

**After World War II, African Americans demanded equal treatment and the recognition of their rights as American citizens.**

**As a result of the Civil Rights Movement, laws were passed that made racial discrimination illegal.**

**Contributions of Citizens** (VS.9d)

**Any individuals made social, political, and economic contributions to Virginia live in the 20th and 21st centuries.**



**Maggie L. Walker** was the first African American woman to establish and become a bank president in the United States.

**Harry F. Byrd, Sr.**, as governor, was known for "Pay as You Go" policy for road improvements, and he modernized Virginia state government.



**Oliver W. Hill, Sr.** was a lawyer and civil rights leader who worked for equal rights of African Americans. He played a key role in the *Brown v. Board of Education* decision.



**Arthur R. Ashe, Jr.**, was the first African American winner of a major men's tennis singles championship. He was also an author and eloquent spokesperson for social change.



**A. Linwood Holton, Jr.**, as governor of Virginia, promoted racial equality, and appointed more African Americans and women to positions in state government than previous governors.



**L. Douglas Wilder**, as governor of Virginia, was the first African American to be elected a state governor in the United States.



**Three Branches of Government** (VS.10a)

**What are the three branches of government in Virginia and what are the powers of each branch?**

- The General Assembly is the legislative branch.
  - Makes state laws
  - Divided into two parts - the Senate and the House of Delegates



- The governor heads the executive branch.
  - Makes sure that state laws are carried out
- The court system is the judicial branch.
  - Decides cases about people accused of breaking the law and whether or not a law agrees with Virginia's constitution.



**VIRGINIA TODAY** (VS.10c)

**How have advances in transportation facilitated migration and economic growth?**



Richmond, Virginia (2007)

Virginia's transportation system (highways, railroads, and air transportation) moves raw materials to factories and finished products to markets.

Virginia exports agricultural and manufactured products, including tobacco, poultry, coal, and large ships.

**How have advances in communication and technology helped the economy grow?**

Virginia has a large number of communication and other technology industries.

**In what ways is Virginia a part of the United States economy?** Tourism is a major part of Virginia's economy.

Because many federal workers live and/or work in Virginia, the federal government has a significant impact on Virginia's economy.

# Challenging Vocabulary for Virginia Studies

<p><b>VS.2a</b> bay bordering landforms ocean relative location</p> <p><b>VS.2b</b> Fall Line flat land lake mountain piedmont plateau peninsula physical geography region ridge river rolling hills source swamp valley water features watershed</p> <p><b>VS.2c</b> exploration food source lake pathway peninsula river river flow swamp transportation link water features watershed</p> <p><b>VS.2d</b> arrowheads artifacts Indians Indies language groups pottery tribe</p> <p><b>VS.2e</b> animal skins basic needs characteristics climate culture deerskin depend upon environment forest harvest interact past relate season shelter vegetation</p> <p><b>VS.2f</b> archaeology artifact</p>	<p>evidence interactions material original permanent</p> <p><b>VS.2g</b> Commonwealth current recognized trace tribe</p> <p><b>VS.3a</b> colonization competition economic venture empire expansion financed</p> <p><b>VS.3b</b> defend dock fresh water island locate narrow sea site Spanish Empire supply</p> <p><b>VS.3c</b> charter English rights establish extended grant king settlement</p> <p><b>VS.3d</b> burgess citizen divisions elected evolved General Assembly government governor Governor's Council House of Burgesses legislature one legislative body representative separately system</p> <p><b>VS.3e</b> additional against their will Angola arrival diverse economy expand</p>	<p>impact permanent Portuguese servant slave status</p> <p><b>VS.3f</b> agriculture drinking water ensure expected faced hardship lacked leadership marshy provide for skills starvation supply ship survival</p> <p><b>VS.3g</b> chief contributed copper harmony initiated invaders leather native positive relationship</p> <p><b>VS.4a</b> agriculture cash crop dependence effect encouraged inexpensive institution of slavery labor plantation planting primary reliable source steady transformed wealth</p> <p><b>VS.4b</b> adapt architecture beliefs culture customs European origin homeland landscape migration reflect unique worship</p> <p><b>VS.4c</b> capital contaminated destroyed</p>	<p>drinking water elevation factors geographic factors moved relocation salt water unhealthy variety central location distance westward</p> <p><b>VS.4d</b> bank barter coins consumer credit debit exchange forms goods and services harvested money paper money saving tobacco</p> <p><b>VS.4e</b> capital resources denied dirt floor enslaved African American everyday life free African American households human resources large farmer livestock natural resources rights small farmer whites</p> <p><b>VS.5a</b> England Great Britain govern legal authority Parliament representation tax</p> <p><b>VS.5b</b> commander-in-chief Continental Army contribution independence liberty patriots representation request roles surrender</p> <p><b>VS.5c</b> battle capture</p>	<p>horseback key member victory</p> <p><b>VS.6a</b> compromise constitution constitutional government delegates earned title father model process young country</p> <p><b>VS.6b</b> basis declaration freedom of religion freedom of press influence please press rights statute worship</p> <p><b>VS.6c</b> Cumberland Gap frontier gap hard on the soil ideas influenced look west &amp; south opportunities territories traditions western</p> <p><b>VS.7a</b> abolition armory arsenal conflict creation economic differences free state industrialized rebellion resolve revolt seceded secret slave state succession territory Underground Railroad</p> <p><b>VS.7b</b> Army of Northern Virginia blockade clash commander draw fought iron-clad</p>	<p><b>VS.8a</b> freed Freedman's Bureau government agency measures rebuilding reconstruction ruins serious problem sharecropping</p> <p><b>VS.8b</b> discrimination drinking fountain gains hold public office Jim Crow poll tax prejudice race religion restroom rights segregation voting test</p> <p><b>VS.8c</b> boost cities coal developed expansion facilitated factory industry livelihood railroad stimulated technology transportation</p> <p><b>VS.9a</b> effective federal jobs industrialized modernized rural society streetcars transition urban</p> <p><b>VS.9b</b> impact international leader national world nation</p> <p><b>VS.9c</b> avoid Brown v. Board of Education desegregation discrimination economic contributions eloquent equality</p>	<p>improvements integration massive resistance movement public facilities public school racial resist segregation separate but equal social contribution treatment</p> <p><b>VS.9d</b> contributions economic eloquent spokesperson key role Pay as You Go political promote racial equality social tennis singles</p> <p><b>VS.10a</b> branches executive branch General Assembly House of Delegates judicial branch legislative branch Senate</p> <p><b>VS.10b</b> beef coal dairy farming federal and state government horse industry industries information technology military bases poultry products recreation seafood shipbuilding textiles tourism</p> <p><b>VS.10c</b> advances communication exports federal workers global economy prosperity raw materials</p>
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**Scientific Investigation 4.1**

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**The Steps of the Scientific Method**

**Prediction** – a forecast about what may happen in some future situation. It is based on the application of scientific principles and factual information.

**Hypothesis** – a predication about the relationship between variables.

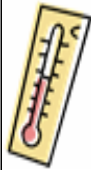
**Experiment** – a fair test driven by a hypothesis with which only one variable is compared.

**Observations** – One of provide a clear description of exactly what is observed and nothing more. Those conducting investigations need to understand the difference between *what is seen* and what is an inference.

**Inference** – a conclusion based on evident about events that have already occurred. Accurate observations and evidence are necessary to draw realistic and plausible conclusions.

**Scientific Measuring Tools**

**Scales/Balance**–  
measures mass and  
weight



**Thermometer**  
measures  
temperature

**Ruler/Meter Stick**–  
measures length



**Beaker/Graduated  
Cylinder** –  
measures capacity

**Scientific Measuring Units**

**Meters & Inches**  
measures length

**Pounds & Ounces**  
measures weight

**Fahrenheit & Celsius**  
measures temperature

**Fluid Ounces & Cups**  
measures capacity



**Weather (SOL 4.6)**

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# Weather Terms

**Temperature** - the measure of the amount of heat energy in the atmosphere.

**Air Pressure** - the weight of the air, which is determined by several factors including the temperature.

**Wind Speed** - How fast the wind is blowing

**Precipitation** - The amount of water, which falls from the sky.

**Wind Direction** - The direction in which the wind blows.

**Humidity** - The amount of moisture in the air.

# Weather Tools



Thermometer measures temperature



Barometer measures Air Pressure

Anemometer measures Wind Speed

Rain Gauge measures Precipitation

Wind Vane measures Wind Direction

Hygrometer measures Humidity



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Meteorologist, like me, use weather instruments to predict weather patterns.

**A front is the boundary between air masses of different temperature and humidity.**

Different atmospheric conditions produce the four types of precipitation: rain, snow, sleet, and hail.

High Pressure: fair weather light winds

Low Pressure: cloudy with strong winds

# Four Cloud Types

## Cirrus

A feathery clouds usually associated with fair weather, but often indicates rain or snowfall in several hours

## Stratus

A gray smooth cloud that covers the whole sky and blocks all sunlight. Light rain and drizzle usually occur.

## Cumulus

A white fluffy cloud with a flat bottom usually indicating fair weather.

## Cumulonimbus

A dark tall billowing cloud that produces rain and thunderstorms.

EXTREME atmospheric conditions creates a variety of storms:

### Thunderstorms:

a common storm with winds rain, thunder, and lightning.



### Hurricanes:

a storm which forms over water with heavy winds.



### Tornadoes:

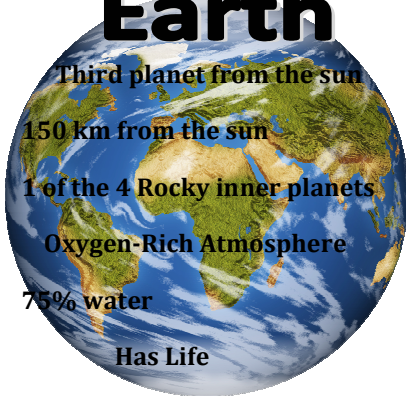
a violent storm with a rotating column.



Space (4.7)

Created by Jennie M. Carr - Rockingham County Public Schools - 2010

# Earth



- Third planet from the sun
- 150 km from the sun
- 1 of the 4 Rocky inner planets
- Oxygen-Rich Atmosphere
- 75% water
- Has Life

# Sun



- Average-sized yellow star
- 110x the size of Earth
- 4.6 Billion Years Old
- Made of gas & helium

# Moon



- Small Rocky Satellite
- 1/4 the diameter of Earth
- 1/8 the mass of Earth
- Extreme Temperatures
- No atmosphere, Water, or Life

## Rotation & Revolution

**Rotation:** a spinning motion

It takes the Earth **24 hours** (1 day and 1 night) to rotate

**Revolution** - an object moving in a circular motion around another object.

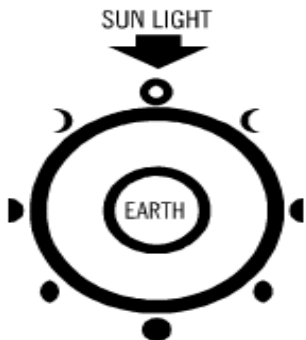
It takes the Earth **365 days** (1 year) to revolve around the Sun

It takes the Moon **28 days** (1 month) to revolve around the Earth



We have 4 seasons because the Earth is

**TILTED!**



The phases of the moon are caused by its position relative to the Earth and the Sun. The phases of the moon include the new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, last quarter, and waning crescent.

The NASA Apollo missions added greatly to our understanding of space.



We believe the EARTH is the center of the universe!



Aristotle & Ptolemy

We believe the SUN is the center of the universe!



Galileo & Copernicus

Astronauts bring back moon samples to help us learn. Our understanding of the sun, moon, and other solar system continues to change with new scientific discoveries.

**Natural Resources 4.8**

Created by Jennie M. Carr - Rockingham County Public Schools - 2010

Virginia is rich in a wide variety of material resources including forests, arable (farmable) land, coal, sand and aggregates (rocks), wildlife and aquatic organism, clean water and air, and beautiful scenery.

# Land Resources

# Water Resources

**Natural vs. Cultivated Forests**

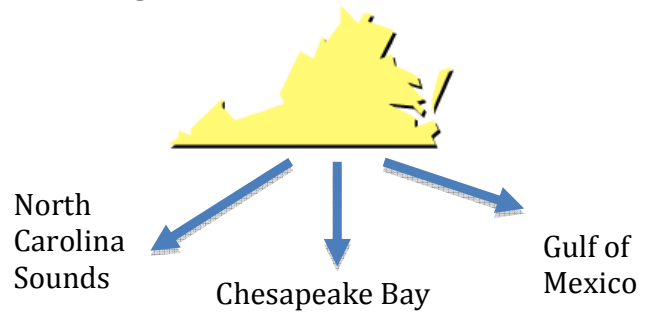


**Cultivated Forests** - a forest designed specifically for the planting of products.

\*Both Natural and Cultivated forest are a widespread resources in Virginia.

**Watershed:** an area over which surface water flows to a single collection place.

Virginia has 3 watersheds!



Other water resources include groundwater, lakes, reservoirs, rivers, bays, and oceans.



Virginia's soil and land support a great variety of life, provide space for many economic activities, and offer a variety of recreational opportunities.

# "We all live Downstream"

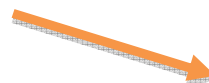
Environmental programs that want to save and preserve the watersheds often use this phrase. If a neighbor litters the trash must go somewhere eventually. Since rivers are always flowing, the trash goes into the river and then travels to another location and pollutes the water.

## Natural Resources

## Man-Made Resources



Trees, Water, Sand



Paper, Logs, Bleach

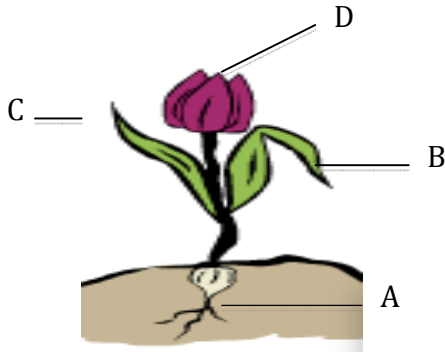
**Life Processes (SOL 4.4)**

Created by Jennie M. Carr - Rockingham County Public Schools 2010

The plant kingdom is divided into **TWO** groups:

**Plants with Seeds** (Trees, flowers, green plants)

**Plants with Spores** (Ferns and mosses)

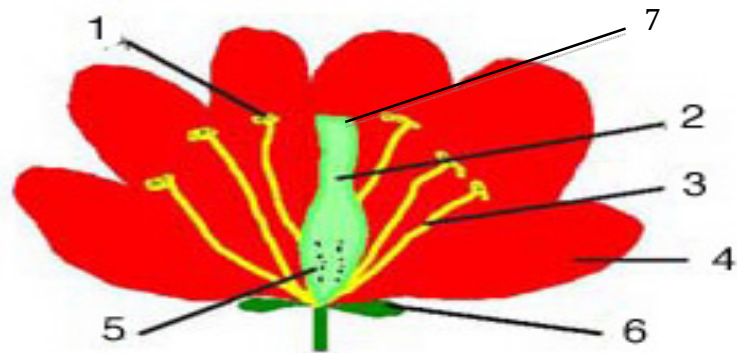


**Plant Parts & Functions**

- A. Roots - anchor the plant, take water and nutrients from the soil.
- B. Stem - provides support and allows the movement of water and nutrients through the plant.
- C. Leaves- the chlorophyll in the leaves absorbs the sunlight and makes food. This is where photosynthesis occurs.
- D. Flower- makes the seeds and attracts birds and bees.

**Flower Parts & Functions**

1. Pollen – the orange dusty substance produced by the stamen.
2. Pistil – The female part of the flower involved in reproduction.
3. Stamen – The male part of the flower involved in reproduction.
4. Petal – The colorful scented part of the flower that attracts birds and bees.
5. Seeds/Ovule – These form in the ovary after being fertilized by the pollen.
6. Sepal – The small leaves that protect the developing flower.
7. Stigma – The sticky uppermost part of the pistil.



Carbon  
Dioxide



Oxygen

**Photosynthesis** – The process by which the plant uses the sun’s energy, carbon dioxide, and water to make food (glucose and oxygen)



Birds, Bees, Water, and Wind help flowers pollinate.



**Pollination** – The transfer of pollen from the stamen to the stigma. Pollination is part of the reproductive process of flowering plants.

**Dormancy** – The period of suspended life process brought on by change in the environment

**Chlorophyll** – The green pigment in the plant, which is used during photosynthesis.



Living Systems (SOL 4.5)

Created by Jennie M. Carr - Rockingham County Public Schools - 2010

In order for animals to survive they must adapt to their individual and environmental needs. Animals can have structural adaptations and behavioral adaptations

# Animal Adaptations



**Structural Adaptations** – Physical attributes that help animals meet a life need.  
Examples: Camouflage & Turtle Shell



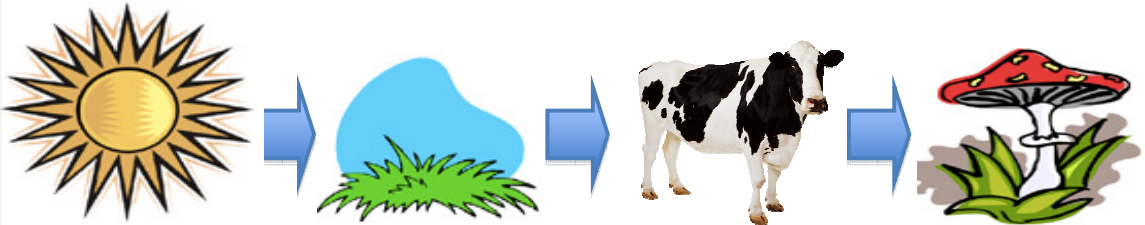
**Behavioral Adaptations** – Certain types of activities animals perform, which help them meet a life need. Examples: Migration & Hibernation



The organization of a community is based on the utilization of the energy from the sun within a given ecosystem. The greatest amount of energy in a community is in the producers. The community is also defined by the interrelated niches within it.

## Food Chain

Energy is passed from the sun to a producer to consumer to decomposer.



### Other Living Systems Vocabulary:

**Habitat** – the place in which an animal or plant naturally lives, which provides food, water, shelter, and space. The size of the habitat depends on the organism’s need.

**Organism** – any living thing

**Ecosystem** – the ways living things interact with other living things and non-living things.

**Community** – a group of organisms that share an environment

**Life Cycle** – The various stages of life (egg, tadpole, frog)

### Niches? What is a Niche?

(Pronounced like leash or ditch) the function that an organism performs in the food web of that community. It also includes everything the organism does and needs in its environment. No two types of organisms can occupy exactly the same niche in a community. During an animal’s life cycle, its niche can change.

Humans have a major impact on ecosystems



Positive Effects



Negative Effects

# SCIENCE REFRIGERATOR CARDS FOR HOME REVIEW

# GRADE 4

## Force, Motion, and Energy (SOL 4.2 - 4.3)

Created by Jennie M. Carr - Rockingham County Public Schools - 2010

**Position** – Described by the relative location of another object. Tracing and measuring an object’s position over time can describe its motion.



**Speed** – Describes how fast an object is moving

**Force** – Any push or pull that causes an object to stop, change speed, or directions



**Friction** – The resistance of motion/ HEAT

The greater the force, the greater the change in motion. The bigger the object, the less effect a force will have upon it.

Electrical energy can be transformed in to heat, light, or mechanical energy.



**Kinetic Energy**  
“Motion Energy”  
an object that is in motion.

**Potential Energy**  
“Stored Energy”  
an object that is not in motion.



### Static Electricity

**Atoms** – Tiny material within all objects  
Within atoms are protons (+ charge), electrons (- charge), and neutrons (no charge).

The rubbing together of certain objects causes static electricity.

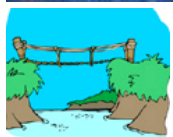
**Lightning** – The static discharge between objects.

### Current Electricity – Continuous flow of electrons



**Circuit** – The path of an electric current

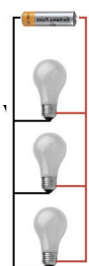
**Open Circuit** (Like an Open Bridge) does not allow electricity to flow!



**Closed Circuit** (Like a closed bridge) allows electricity to flow!

**Conductors** – an object that allows electricity to pass through. Examples of Conductors: Metal

**Insulators** – an object that DOES NOT allow electricity to pass. Examples of Insulators: Rubber, Plastic, Wood



**Parallel Circuit:** Has more than one pathway. If one light goes out, the other circuit light stay on.

**Series Circuit:** Has only one path. If one light goes out, they all go out.



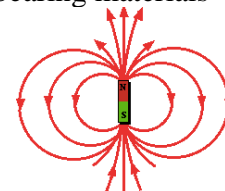
### Magnetism



Certain metals such as Iron, Nickel, and Cobalt (INC) are magnetic.

Electromagnet – a non-permanent magnet created by wrapping a wire around certain iron –bearing materials (nail) discovered by Michael Faraday

Magnetic Poles – The stronger point of a magnet (usually north and south)



Magnetic Field – the lines of force extended from the poles of a magnet in an arched pattern defining the area over which a magnetic force occurs.

What happens when you put magnetic poles together?

**Like Charges = Repel**

(South & South)	N	S	S	N
(North & North)	S	N	N	S

**Opposite Charges = Attract**

N	S	N	S	North & South)
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### Who are the famous scientists for magnets and electricity?

#### Michael Faraday

Invented the non-permanent Yet, powerful electromagnet



#### Benjamin Franklin

Discovered lightning during kite and key experiment



#### Thomas Edison

Inventor of the light bulb

