

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.

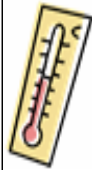
Experiment – a fair test driven by a hypothesis with which only one variable is compared.

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

SCIENCE REFRIGERATOR CARDS FOR HOME REVIEW

GRADE 4

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

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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

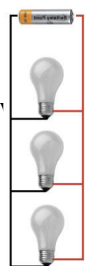
Open Circuit (Like an Open Bridge) does not allow electricity to flow!



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.



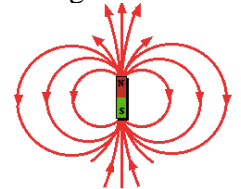
Magnetism



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



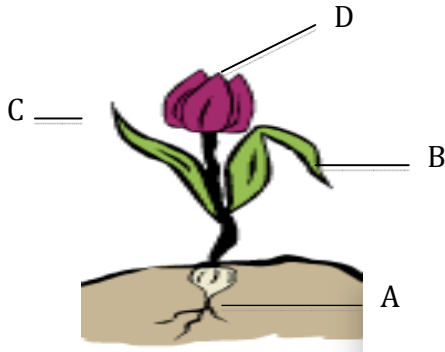
Life Processes (SOL 4.4)

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

Plants with Seeds (Trees, flowers, green plants)

Plants with Spores (Ferns and mosses)

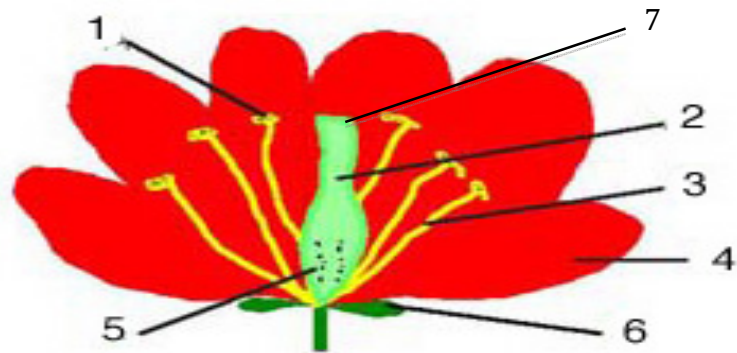


Plant Parts & Functions

- 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)

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



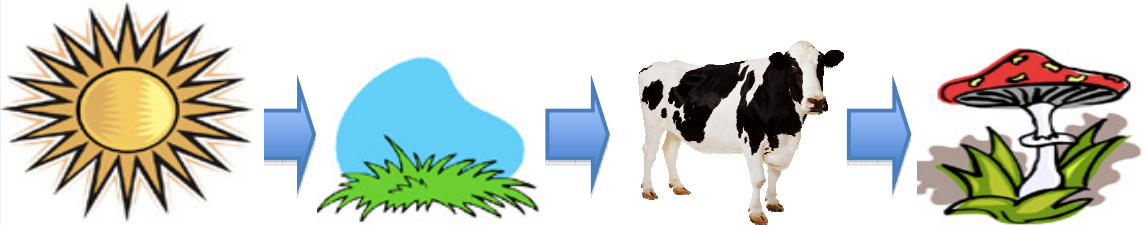
Behavioral Adaptations – Certain types of activities animals perform, which help them meet a life need. Examples: Migration & Hibernation



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

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



F
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T

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



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

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:

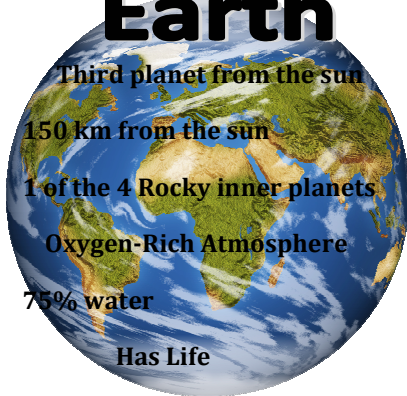
a violent storm with a rotating column.



Space (4.7)

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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.

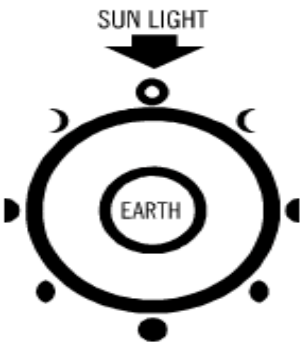
It takes the Earth **365 days** (1 year) to revolve around the Sun

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!



We believe the SUN is the center of the universe!



Aristotle & Ptolemy



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

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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

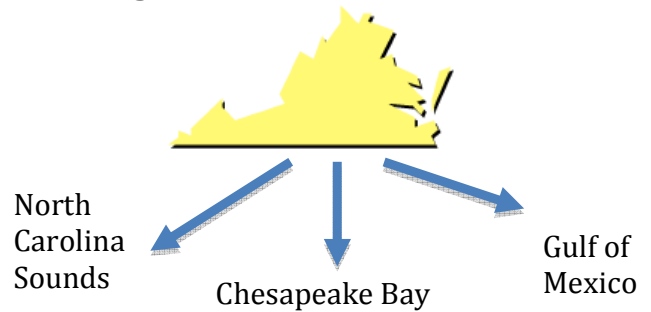


Cultivated Forests - a forest designed specifically for the planting of products.

*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"

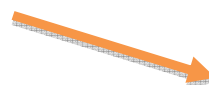
Environmental programs that want to save and preserve the watersheds often use this phrase. If a neighbor litters the trash must go somewhere eventually. Since rivers are always flowing, the trash goes into the river and then travels to another location and pollutes the water.

Natural Resources

Man-Made Resources



Trees, Water, Sand



Paper, Logs, Bleach