5th Grade Big Idea Study Guides

Big Ideas 1 & 2 Study Guide: Nature of Science

Types of Scientific Investigations:

Type of Investigation	Description
Model	a representation of an idea, an object, a process, or a system that is used to describe and explain something that cannot be experienced directly.
Simulation	an imitation of the functioning of a system or process
Systematic Observations	documenting descriptive details of events in nature –amounts, sizes, colors, smell, behavior, texture - for example - eclipse observations
Field Studies	studying plants and animals in their natural habitat
Controlled Experiment	an investigation in which scientists control variables and set up a test to answer a question. A controlled experiment must always have a control group (used as a comparison group) and a test group.

ALL types of Scientific Investigation include making **observations** and collecting **evidence.**

Observations:

ALL scientists make observations. An **observation** is information about the natural world that is gathered through one of the five senses. An observation is something you see, hear, taste, touch, or smell.

List 5 Examples of Observations
1.
2.
3.
4.
5.

Evidence

Evidence is information gathered when scientists make systematic observations or set up an experiment to collect and record data. The data recorded is then analyzed by the scientists in order to base conclusions on the evidence collected. The collection of evidence is a critical part of a scientific investigation. Although the scientific method does not always follow a rigidly defined set of steps, a scientific investigation is only valid if it is based on **observations** and **evidence**.

Controlled Experiments

A controlled experiment is different than all other types of scientific investigations because in an experiment, variables are being controlled by the scientist in order to answer a question. A controlled experiment always includes at least two groups - a test group and a control group used for comparison. The control group is identical to the test group except for the one variable changed on purpose (the thing being tested) so that evidence of any difference can be collected. A variable is a factor, condition, or event that can be changed or controlled in order to study or test a hypothesis. There are three classes of variables used in experiments:: the test (independent) variable, the outcome (dependent) variable, and the controlled (constant) variables.

Variable Type	Also Known As	Defined As:
Test Variable	Independent Variable	The one thing that is changed between the test group and control group on purpose. The thing being tested. For example the independent variable in the skittle lab was the temperature of the water.
Outcome Variable	Dependent Variable	The way that we are measuring the difference between the control and test groups - for example the dependent variable in the skittle lab was the speed the outer coat dissolved
Constant Variables	Constants, Controlled Variables	All of the things kept the same in an experiment so that you can trust that any difference between the test group and the control group is because of the independent variable (or thing that is being tested). For example in the skittle lab the color of skittle, amount of skittles, amount of water, type of cup, etc would all be kept the same.

Scientists always complete at least three trials in a controlled experiment. Performing repeated trials helps to ensure that the results of an experiment are reliable. This means that the results are consistent (or similar) in all of the trials performed. A valid experiment controls variables, includes at least three trials and obtains similar results in the three trials. It is important to note that scientific investigations do not follow a rigidly defined set of steps. These investigations follow steps necessary to find an answer to the question being investigated. The table below shows some steps that are often included in the scientific method when carrying out a controlled experiment.

Step	Description
Problem/Purpose	The question being investigated is identified.
Research	Information about the topic is obtained from reputable sources: books, internet (reliable sites), experts, encyclopedias, etc.
Prediction (Hypothesis)	A prediction, based on research, is made about what you think the evidence is going to show. All 5th grade hypotheses should include the words If…. then…. because….
Experiment	Materials are identified and a procedure is developed to test your prediction.. Make sure that you are very specific about the details - amounts, types, colors, etc.so that another scientist could follow your steps. Once you have a good procedure, you should perform your experiment and keep data in a data table.
Analyze Results	Examine the data and look for patterns, trends, consistencies, etc
Conclusion	Compare the results with your hypothesis. Was your hypothesis supported by the evidence? Or did the evidence disprove your hypothesis?

To help fill in these charts students are asked to reflect on three different inquiries from the CRM PowerPoints: Those inquiries are:

- Tennis Ball Lab from Big Ideas 1 & 2 CRM PowerPoint
- Increasing Temperature and Antacid Tablet Reacting Extension of Inquiry Activity from Big Ideas 8 & 9 CRM PowerPoint
- Marble P-SELL Lab from Big Idea 13 CRM PowerPoint

Tennis Ball Lab (from Big Ideas 1 & 2 CRM PowerPoint) - Give examples of:

Predictions	Observations	Inferences

Give Examples of Constant (Controlled) Variables for each lab:

Tennis Ball Lab	Temperature and Tablet Lab	Marble Lab
Same Tennis Ball	Type of Antacid Tablet	Same Marble
Dropped the ball from the same height	Amount of water	Same Ramp Surface
Same Meter Stick	Same Type of Cup	Floor Surface

Give Examples of Independent (Test) Variable for each lab:

Tennis Ball Lab	**Temperature and Tablet Lab**	**Marble Lab**
Floor Surface	Temperature of water	Height of the Ramp

How are the independent variables in any lab similar? The independent variable in any lab is always the one thing that is changed on purpose between the control group and the test group.

Give Examples of Dependent (Outcome) Variable for each lab:

Tennis Ball Lab	**Temperature and Tablet Lab**	**Marble Lab**
Height the Tennis Ball Bounces	Time it takes antacid tablet to complete reaction	Travel time of marble

How are the dependent variables in any lab similar? The dependent variable for any lab is how we are measuring for any differences between the control group and the test group.

Control Group

Why is it important to have a control group in an experiment? A control group is important in an experiment because it allows us to compare the test group with what would normally happen. Without the control group we would not be able to tell if the independent (test) variable makes a difference because we have nothing to compare it to.

Why is it important for a scientific investigation to be replicable by other scientists? If scientists can replicate an investigation and the results obtained by all who replicate are similar then the results are said to be reliable so the results will be more trusted as accurate.

Why is it important for scientists to share findings with other scientists? When scientists share their findings in investigations they are making it possible for others to replicate their investigation to see if they can get similar results. The more the investigation is replicated with similar (consistent) results, the more trusted (reliable) the results become and the more valid the experiment becomes.

Big Ideas 8 and 9 Study Guide: Properties and Changes in Matter

Matter is anything that has mass and volume.

The three states/phases (or forms) of matter include solid, liquid, and gas.

Solids have a definite shape and volume.

Liquids have a definite volume, but no definite shape.

Gases don't have a definite shape or volume.

Fill in the chart. Put yes in the box if it is possible for the state to have the property listed. Put no in the box if it is not possible for the state to have the property.

Property	Solid	Liquid	Gas
Yellow color	**Yes**	**Yes**	**Yes**
Definite shape	**Yes**	**No**	**No**
Definite volume	**Yes**	**Yes**	**No**
Bumpy texture	**Yes**	**No**	**No**
Able to scratch another object	**Yes**	**No**	**No**
Can Break	**Yes**	**No**	**No**
Takes the Shape of its Container	**No**	**Yes**	**Yes**
Clear color	**Yes**	**Yes**	**Yes**
Has mass	**Yes**	**Yes**	**Yes**

How do you know something has dissolved in a liquid? It will evenly mix with a liquid and become part of the liquid

Two things that dissolve in water are sugar and salt.

Two things that DO NOT dissolve in water are flour and sand.

Three ways to speed up the dissolving process are use smaller sized particles (decrease surface area), add heat, and stir/shake.

Two ways to slow down the dissolving process are use larger sized particles (increase surface area), and lower the temperature.

What are some physical properties of matter that you are able to observe?

Mass	Volume	Color	Texture
Temperature	Size	Attraction to Magnets	Hardness

Mass = the amount of matter in a solid, liquid, or gas (how tightly packed the atoms and molecules are)

Mass is measured by a balance scale and gram weights.

Volume = the amount of space taken up by an object or substance.

What are three ways to measure volume?
1. Length times width times height (ruler)
2. Graduated cylinder (liquids)
3. Water displacement with a graduated cylinder or other measuring device (irregularly shaped solids).

Temperature = the amount of heat energy in a substance (how hot or cold something is).

Temperature is measured by a thermometer.

Mixtures of solids can be separated by properties like size, shape, color, and attraction to magnets.

If a substance is dissolved in water (like salt) then it can be separated from the water by evaporating the water.

A mixture of sand and gravel could be separated by particle size using a sieve.

A mixture of gravel and iron nails can be separated by magnetic attraction using a magnet.

A **physical change** is a change of a substance from one form to another without a change in its chemical properties. No new substance is formed.

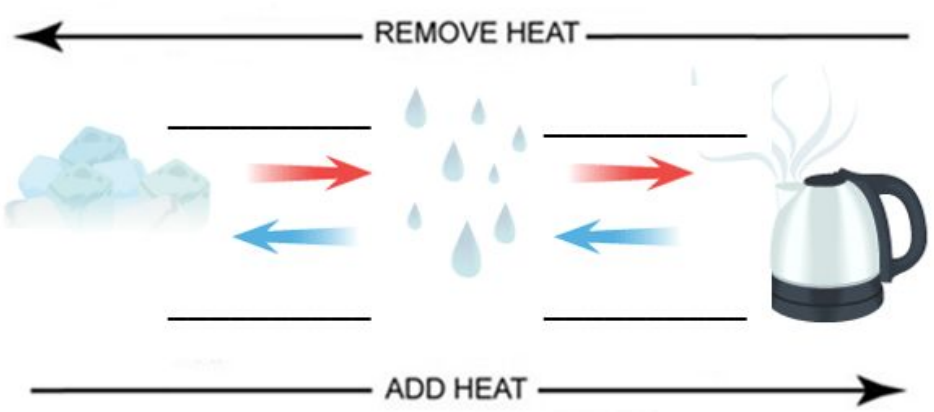
When water freezes, it expands, or spreads out. If water is in a container or pipe when it freezes, it can even cause the container or pipe to burst or break.

A **chemical change** is a process by which substances are changed into different substances with different chemical properties. A new substance is formed.

Adding heat, stirring/shaking, and exposing more surface area cause chemical changes to happen more quickly.

Boiling water is an example of a physical change.

Fill in the blanks on the diagram with the science word that describes the change.



- When water changes from a solid to a liquid it melts.
- When water changes from a liquid to a gas it evaporates.
- When water changes from a gas to a liquid it condenses.
- When water changes from a liquid to a solid it freezes.

As the temperature of a gas increases, so does its volume.

When you increase the temperature of chemical changes, the rate of the reaction increases.

A change of temperature causes water to change states.

Draw a picture showing a balance scale with two boxes of equal mass, but different volume.

Draw a picture showing a balance scale with two objects of equal volume, but different mass.

Place the following words into the t-chart under the type of change the term indicates.

burning	dissolving	rotting	rusting	freezing
crushing	condensing	boiling	cooking	melting
evaporating	decaying	cutting	shattering	digesting

Physical Change	Chemical Change
• Dissolving • Freezing • Crushing • Condensing • Boiling • Melting • Evaporating • Cutting • Shattering	• Burning • Rotting • Rusting • Cooking • Decaying • Digesting

Big Idea 13 Study Guide: Forces and Changes in Motion

Types of Forces

Motion is caused by familiar forces like a push, pull, friction, gravity, and magnetic attraction.

A push is a force that causes an object to move away from the thing pushing it.

A pull is a force that causes an object to move toward the thing pulling it.

Friction is a force which resists motion and can also create heat.

Magnetism is a force that can attract (pull) and repel (push).

Gravity is a force that pulls objects toward the Earth's center. It also keeps planets orbiting the Sun.

Magnetism

When two magnets with the same poles (north and north or south and south) are placed next to each other, they will repel.

When two magnets with opposite poles (north and south) are placed next to each other, they will attract.

Draw a diagram to show what happens when the north pole of a magnet is placed next to the north pole of another magnet.

Draw a diagram to show what happens when the north pole of a magnet is placed next to the south pole of another magnet.

Draw a diagram to show what happens when the south pole of a magnet is placed next to the south pole of another magnet.

Gravity

To overcome the force of gravity, a force must be applied that is greater than gravity's downward pull.

The greater the mass of an object the greater the force needed to overcome the force of gravity.

Motion

When a force is applied to an object, its position may not change, the object may stop moving, start moving, change speed, or change direction.

When an object is in motion it always changes its position and may change its direction.

To put an object in motion, you have to apply a force.

To stop an object's motion, you have to apply a force.

To change an object's direction, you have to apply a force.

To speed up or slow down an object, you have to apply a force.

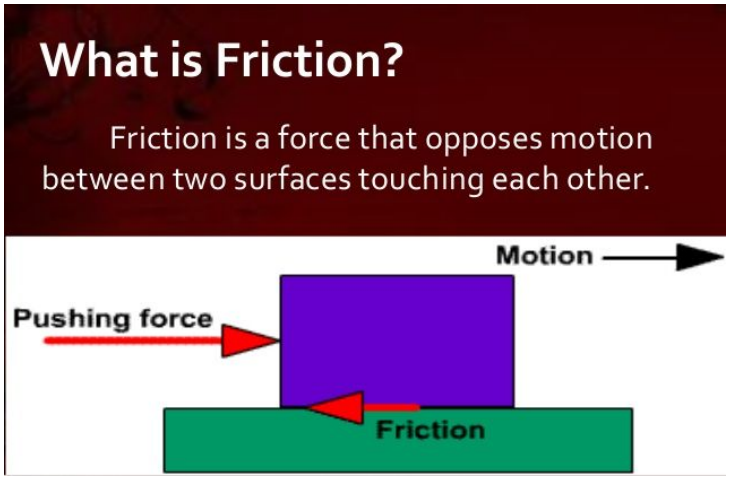
The greater the force applied, the greater the change in motion.

If you apply a greater force, then the object will move farther and with more speed.

If you apply the same amount of force to objects with different mass, then the object with the least amount of mass will travel farther and with more speed.

Speed is the measure of the time it takes an object to travel a specified distance.

Friction



Balanced Forces

When the motion of the object does not change, then the forces are balanced.

An object sitting still will continue to sit still if the forces are balanced.

If forces are balanced then a moving object will continue to move at the same (constant) speed and in the same direction.

Unbalanced Forces

When two forces are pushing from opposite sides, then the pushing side with greater force causes motion that is away from the push. Draw a diagram to illustrate this.

When two forces are pulling from opposite sides, then the pulling side with greater force will cause motion that is toward the pull. Draw a diagram to illustrate this.

Big Ideas 10 and 11 Study Guide: Forms of Energy

Energy

Energy has the ability to cause motion or create change.

Energy is not created or destroyed.

Energy changes/transforms from one form to another.

Some examples of energy causing motion are:

_____

Some examples of energy creating change are:

_____

Forms of Energy

Some basic forms of energy are: sound, heat/thermal, light, mechanical, chemical, and electrical.

Light Energy

Light travels in a straight line until it strikes an object or travels from one material to another (such as traveling from air to water).

When light strikes an object or substance it can reflect (bounce off), absorb (be taken in), or bend (refract).

Light reflecting off of objects is what allows you to see objects in our world. For example, when you look at a yellow bike, the yellow light is bouncing off of the bike into your eyes. All of the other colors that make up white light (red, orange, green, blue, indigo, and violet) are absorbed by the bike.

When light travels from one substance to another, for example from air to water, it changes speed causing it to bend (change direction / refract). We can see an example of this when we place a pencil partially in water and it appears to be bent or broken.

When light strikes a mirror, all of the light is reflected. Draw a picture of light bouncing off of a mirror.

Things that give off light often also give off heat. An example of this is a light bulb in a lamp.

Sound Energy

Sound travels in waves. Sound waves are vibrations in the air around you. We hear a bell ring because the bell causes the air around it to vibrate. These vibrations travel through the air to our eardrum which also vibrates and allows us to hear the bell. Sound travels fastest through solids, then liquids, and slowest through gases.

When sound waves vibrate quickly a high pitch sound is produced.

When sound waves vibrate slowly a low pitch sound is produced.

Heat Energy

Heat, or thermal energy is the amount of energy contained in an object or a substance because of its moving molecules.

Temperature measures how quickly or slowly the molecules are moving. In hotter objects the molecules move quickly, while in colder objects the molecules move slowly.

Heat energy will always find a balance. For example, when a heater is placed in one corner of the room, the heat will spread out to warm the whole room. Heat energy always flows from the hotter object or area to the colder object or area. Heat flow can cause materials to change temperature.

Radiant energy from the sun can heat objects. When the sun is not present heat energy can be lost.

Objects rubbing together (friction) produces heat energy.

Conductors are materials that heat and/or electricity flow through easily. Things that are made of metal are good conductors. Some examples of good conductors are
(answers will vary) wire, paper clip, nail, metal part of an umbrella, etc

Insulators are materials that heat or electricity does NOT flow through easily. Some examples of insulators are
(answers will vary) fabric/cloth, rubber, plastic, wood, etc

Chemical Energy

Chemical energy is energy that is stored in matter that can be released by a chemical reaction.

Food is chemical energy that is released through chemical reactions during digestion.

Batteries contain chemical energy that is changed into electrical energy.

Mechanical Energy

Mechanical Energy is the energy that an object has because of its motion or its position.

A moving car contains mechanical energy because it is moving.

A ball on an inclined plane also contains stored mechanical energy because it has the potential to fall due to its elevated position.

Electrical Energy

Electrical energy is a type of energy which flows through a current.

Electrical energy can be changed into many other forms of energy.

Electrical energy can be transformed into sound energy, light energy, heat energy and mechanical energy.

Item	Original Energy	Primary Energy Transfer	Secondary Energy Transfers
Toaster	Electrical	Heat/Thermal	Light,Sound, Mechanical
Lamp	Electrical	Light	Heat/Thermal
Radio	Electrical	Sound	Light, Heat/Thermal
Fan	Electrical	Mechanical	Sound, Heat/Thermal

The flow of electricity requires a closed circuit. A closed circuit must include: a power source (battery), a conductive path (wire)and the load (item which is being powered).

While an electric current is a continuous flow of electricity created by a closed circuit, static electricity is a quick burst of energy which is produced by charged particles. Lightning is an example of static electricity.

An electrically charged object like a balloon after being rubbed on a sweater will attract an uncharged object. Additionally, an electrically charged object will attract another charged object with the opposite charge(+ and -), but it will repel a charged object with the same charge (+and + or – and -).

Draw a diagram to show what happens when two positively charged objects are next to each other.

Draw a diagram to show what happens when two negatively charged objects are next to each other.

Draw a diagram to show what happens when a positively charged object and a negatively charged object are next to each other.

Draw a diagram to show what happens when an electrically charged object is next to an uncharged object.

Water and air in motion are sources of energy which are able to create motion and cause change.

Hydroelectric power plants capture the energy of falling water to generate electricity. The falling water turns a wheel called a turbine and changes/transforms the mechanical energy of falling water into electrical energy.

Windmills capture the energy of moving air to generate electricity. The moving air turns the blades of the windmill turning a turbine and changing the mechanical energy of the moving air into electrical energy.

Big Idea 5 Study Guide: Earth in Space and Time

Galaxies and Stars:
A galaxy consists of gas, dust, and stars (and objects orbiting the stars such as planets, moons, asteroids and comets) - all held together by gravity.

Earth is part of the Milky Way Galaxy.

Stars are made of gases. The Sun is a star that emits energy - some of which is in the form of light.

Large stars can appear small for these reasons:
1.The star is far away.
2.The star is giving off less light (is not as bright).

Even though it is only a medium sized star, the Sun appears much larger and brighter than all of the other stars in Earth's sky because it is the closest to the Earth.

Planets:
All planets are spheres (round), rotate on an axis, and revolve around a star (in Earth's case the sun).

Characteristic	Inner Planets	Outer Planets
Composition (what it's made of)	Rock and metal (solid)	Gas
Atmosphere	Thin to No Atmosphere	Thick atmospheres
Size	Relatively Small	Much Larger
Position relative to Sun	Closer to Sun	Farther from Sun
Presence of Moons	0-2 Moons	Many Moons
Presence of Rings	No rings	Have rings
Relative Temperature	Hotter	Colder
Length of Year	Shorter	Longer

Rotations and Revolutions:
Earth rotates on its axis once every 24 hours (1 complete day and night). Earth revolves around the sun once every 365 days (1 year). Day & Night is caused by earth's rotation while seasons are caused by its revolution.

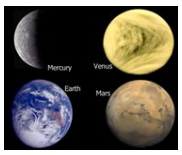
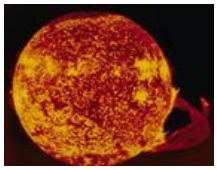
The moon revolves around the Earth once every 29.5 days (approximately 1 month). The moon makes 1 full rotation on its axis with each complete revolution around the Earth. As a result, we only ever see one side of the moon. The moon does not give off light, so we can only see the part of the moon that is illuminated by the sun. Because the lit side of the moon is not always facing earth, we see different amounts of the moon throughout its month-long orbit around Earth (moon phases).

The stars we see from earth change from month to month because we are revolving around the sun. If you look up into the night sky at the same time each year, you will see the same stars because earth is at the same place in its orbit. As the seasons change throughout the year, we can see different stars and constellations.

The seasons on earth happen because of the tilt of the earth on its axis and its revolution around the sun.

The sun, moon, & stars appear to move across the sky from east to west because of earth's rotation.

Space Objects:

Space Object	Characteristics	Image
Asteroid	A solid space object made of rock or metal that is irregularly shaped.	
Comet	A space object made of ice and dust that has a tail when it gets close to the sun.	
Galaxy	Consists of gas, dust, and stars (and any objects orbiting the stars) - all held together by gravity.	
Moon	A natural object that orbits a planet.	
Planet	A round (spherical) space object that rotates on an axis and revolves around a star. Earth is a planet that rotates on its axis and revolves around the Sun.	
Inner Planet	The four planets closest to the Sun (Mercury, Venus, Earth, Mars). Characteristics: solid (made of rock and metal), thin to no atmosphere, small, closer to sun, few to no moons, no rings, relatively hot, relatively short years	
Outer Planet	The four planets farthest from the Sun (Jupiter, Saturn, Uranus, Neptune). Characteristics: made of gas, thick gaseous atmosphere, large, farther from sun, many moons, rings, relatively cold, relatively long years	
Solar System	A system of planets and other bodies that orbits a star.	
Star	A large object in space that is made of gas that produces its own light.	

Big Idea 6 Study Guide: Earth Structures

Minerals

Minerals are naturally occurring, non-living, solids with a definite chemical composition. Minerals can be identified by their individual properties. The table below examines some of the properties we can use to identify or describe a mineral.

Property	Description
Color	Like all objects in our world, when light shines on a mineral some colors bounce off the mineral and other colors are absorbed by the mineral. Our eyes see the color that is bounced off or reflected. Many minerals share the same color so you will have to observe more than just this property in order to identify a mineral.
Hardness	Describes how easily it can be scratched. A mineral is considered harder than another mineral if it can scratch that mineral.
Luster	Describes how a mineral appears when it reflects light (how shiny it is). Words like metallic, earthy, glassy, dull, pearly and waxy can be used to describe this property.
Cleavage	Describes how a mineral breaks apart along smooth surfaces. Mica is a mineral with excellent cleavage.
Streak	Describes the color of the powder the mineral leaves behind when it is rubbed on a streak plate (porcelain tile).

Mineral Properties Song (To the tune of Frère Jacques)

Hardness - Scratch
Hardness - Scratch
Luster - Shine
Luster - Shine
Cleavage - Break
Cleavage - Break
Streak - Powder
Streak - Powder

Rock Song

Metamorphic - Heat and Pressure
Sedimentary - Erosion and Weather
Igneous - Red hot magma - Cooled

Rocks

All rocks are made of minerals. Each rock contains two or more minerals. Rocks are classified by the way that they are formed. The table below describes the three types of rocks.

Type of Rock	How it is Formed	Characteristics Possible	Found	Examples
Igneous	Formed when melted rock, known as magma (lava),cools	● glassy ● gas bubbles ● crystals when cooled slowly	Near volcanoes	pumice obsidian, basalt
Metamorphic	Forms deep in the earth when rock is put under extreme heat and pressure	● ribbon-like layers ● hard ● crystals	Near fault lines, or deep in the earth	slate, schists, marble, gneiss
Sedimentary	Forms on earth's surface when rock is weathered, layered, and cemented together naturally by water	● fossils (remains of dead plants & animals) ● visible layers ● visible pieces of different sizes & types of rock and sediment	Near water	conglomerate shale, sandstone, limestone

Weathering and Erosion - Change the surface of Earth slowly

Process	Definition	Agents That Can Cause Each Process
Weathering	The breaking down of rock by various agents on earth.	water, wind, ice (glaciers), temperature change, plants
Erosion	The moving of sediment (rock) to new places by various agents on earth	water, wind, ice (glaciers), gravity

Some things that cause rapid changes to earth's surface are - earthquakes, volcanoes, landslides, avalanches, floods, tsunamis.

Renewable and Nonrenewable Resources

	Definition	Examples	Examples in Florida
Renewable Resources	A resource that can be remade fairly easily.	wind, solar, water /hydropower, tides, fruit, vegetables, wood, biofuel /ethanol, cotton	water, wind, solar energy, orange trees
Non-renewable Resources	A resource that can't be easily remade.	fossil fuels (coal, oil & natural gas), phosphate deposits, limestone, silicon	phosphate, oil, limestone, silicon

Big Idea 7 Study Guide: Earth Systems and Patterns

Water Cycle

The water cycle is the continuous process in which water moves from earth's surface to the atmosphere and back again.

The sun powers the water cycle.

The ocean is an integral part of the water cycle. It's connected to all water by evaporation and precipitation.

Process	Description of the Process	State
Evaporation	The sun's energy changes water from a liquid to a gas.	Water is a gas
Condensation	The atmosphere cools down the water vapor (gas) and changes it back to a liquid.	Water is a liquid
Precipitation	Falling back to earth's surface once large enough droplets have formed during condensation	Rain - water as a liquid Snow - water as a solid Sleet - water as a solid-liquid mix Hail - water as a solid

Weather

The condition of the atmosphere at a given place and time.

Factors that Determine Weather

Factor	Definition and Measurement Tool	Description
Air Temperature	Thermal (heat) energy in the air. Thermometer – Degrees Fahrenheit or Degrees Celsius	• The unequal heating of the atmosphere of earth by the sun causes the air temperature to differ by location. • Land heats and cools faster than water. This means that air over land areas has more extreme temperature changes – higher maximum temperatures and lower minimum temperatures. • Air over water has less extreme temperature changes – the air temperature is more moderate, or closer to the average. • Clouds may also affect the air temperature. During the day, they may reflect the sun's rays away from the surface of earth making the air temperature cooler. At night, clouds may keep the heat from the sun trapped close to the surface of earth making the air temperature stay warm.

Air Pressure	Weight of the air pushing down Measured with a barometer	• Air pressure is the measure of the weight of the gases in the atmosphere pushing down on us. • Air pressure decreases as the altitude increases. • High air pressure brings clear, sunny skies • Low air pressure brings more evaporation, cloud formation, higher humidity and precipitation. • Warm air rising pushes down with less force creating an area of low pressure. • Cold air sinking pushes down with more force creating an area of high pressure.
Humidity	Amount of water vapor in the air Measured with a hygrometer	• Humidity is the amount of water vapor in the air. • Warm air can hold more water vapor than cold air. • When the humidity is high, it is more likely that the area will have clouds and precipitation because the air contains more moisture (water vapor). • If the humidity is low, the air is drier.
Wind Speed and Direction	**Wind speed** – how fast or slow the wind is blowing. Measured with an anemometer **Wind Direction** – where the wind is coming from and going to Measured with a wind vane	• Air moves from areas of high pressure to areas of low pressure making wind. • The speed of the wind and the direction from which it is coming affects the weather in an area. • If wind is traveling from over a land mass, the air it carries with it will be drier. • If wind is traveling from over water, the air it carries will be wetter containing more water vapor. • If wind is traveling from a warm place, like the equator, it carries warm air with it. • If wind is traveling from a cold place, like the north or south pole, it carries cold air with it.
Precipitation	Water falling back to earth's surface Measured with a rain gauge	• Types of precipitation include rain, snow, sleet, and hail. • See table below for more detail

Precipitation

Precipitation can occur in four forms including rain, snow, sleet, and hail.

Type of Precipitation	Temperature	State/Description
Rain	33 Degrees F (1 Degrees C) or Above	Liquid
Snow	32 Degrees F (0 Degrees C) or Below	Solid
Sleet	32 Degrees F (0 Degrees C) or Below	Solid - Liquid Mix Forms when rain travels through a freezing layer of air as it travels to the surface of earth.
Hail	On the surface of earth: Any temperature - often warm In the atmosphere: 32 Degrees F (0 Degrees C) or Below	Solid Forms during a Storm - Strong upward winds whip rain up to the cold upper atmosphere where it can freeze resulting in the solid ice precipitation known as hail.

Clouds

Clouds form when water vapor cools down and changes state from a gas to a liquid. This state change is known as condensation. At first, the tiny droplets that form are not big enough or heavy enough to fall back to earth as precipitation so these water droplets are the clouds we see from the surface of earth..

Draw and Label Cirrus, Cumulus, Stratus and Cumulonimbus Clouds in the space below.

Type of Cloud	Graphic	Description	Weather it Brings
Cirrus		High clouds that are made of ice	Fair Weather
Cumulus		Fluffy, white cotton ball clouds	Signal Fair Weather
Cumulonimbus		Dark, puffy, and tall storm clouds that are dark grey	Stormy Weather: thunder, lightning, precipitation (can produce rain, snow, sleet, or hail)
Stratus		Clouds that can cover (blanket) the whole sky. These are also fog clouds.	Can produce light rain or snow.

Climate

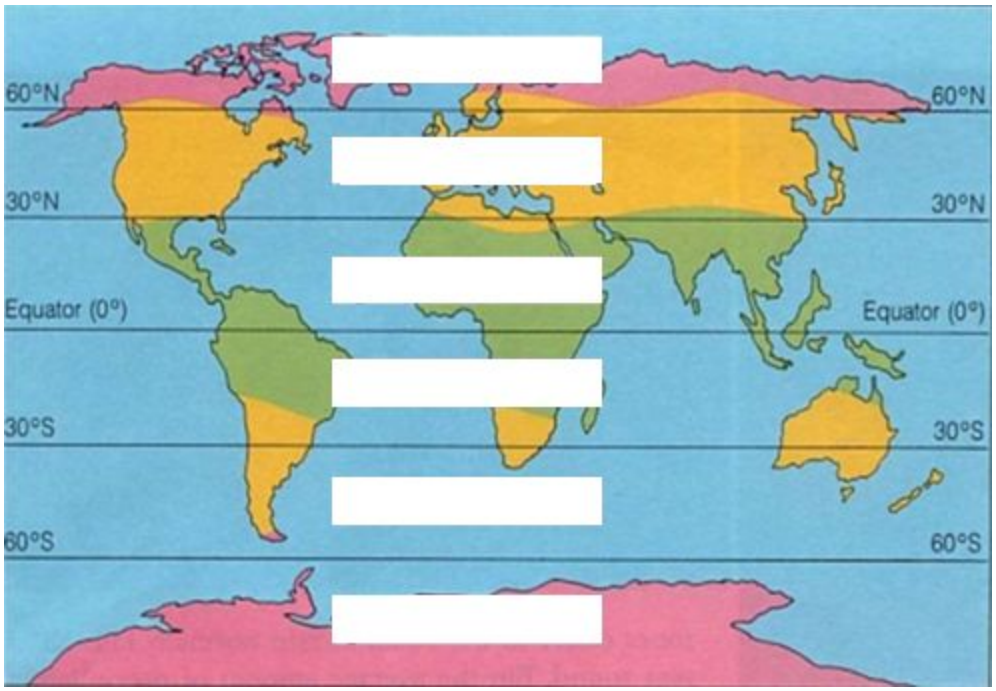
Climate is the average weather in an area over a long period of time (more than 30 years). It includes things like: weather conditions, weather extremes, droughts and rainy periods. The climate of an area impacts what plants will grow in the area and what animals can live there.

Factors that Affect Climate

1. Latitude- Climate Zones

- Latitude is the distance North or South of the Equator.
- Generally it is hotter closest to the equator and coolest near the poles (farthest away from the equator).
- The three climate zones are: polar, tropical and temperate zones

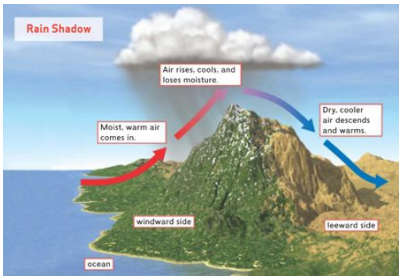
Label the Climate Zones on the diagram in the space below.



Climate Zone	Location	Characteristics
Polar Zone	Between 66.5 Degrees Latitude and 90 Degrees Latitude (the top and bottom of the globe)	These zones do not get direct sunlight at any time during the year causing temperatures in these areas to be cold all year long. Lots of snow and ice.
Temperate Zone	Between the Polar and Tropical Zones in both hemispheres	The amount of direct sunlight changes throughout the year because of the tilt of the earth on its axis and its revolution around the sun. Places in the temperate zone have hot summers and cold winters. (Winter, Spring, Summer, Fall the Temperate Zone has them all)
Tropical Zone	Located between the equator and 23.5 Degrees Latitude (the middle of the globe)	These zones get direct sunlight all year long causing the temperatures in these areas to be warm all year long. Area receives the most rainfall.

2. Elevation

· Elevation is the height of an area above sea level. The elevation affects the climate of an area because as the elevation increases, temperatures and air pressure decrease.
· The top of a mountain is generally colder in temperature than the bottom of the mountain.
· Higher elevations have lower air pressure because there is less air above them pushing down.
· Mountains can also affect the amount of precipitation received by both of its sides. One side of a tall mountain can receive a lot of precipitation while the other nearly none. This is called a rain shadow desert. It is when a mountain is so high that the water vapor in the air condenses before it reaches the top of the mountain giving one side a lot of rain and leaving only dry air on the other side.



3. Proximity to Large Bodies of Water

The temperature of water changes much more slowly than land. Because of this, areas near large bodies of water do not change temperature as much as areas away from large bodies of water. This makes climates in shore areas more moderate (stable) than areas away from water. Areas away from water generally have greater differences in temperature from summer to winter and also in the daily high and low temperatures.

Environments

Environment	Climate
Desert	· Very little rainfall · Hot in the daytime and cold at night · Low humidity
Swamp (Wetland)	· Year round heat and humidity; wet all the time · Often located in tropical areas
Tundra	· Coldest and driest of all areas · Long winters and short summers · Stays cold all year
Temperate Grassland -Savanna	· Low to moderate rainfall · Warm temperature (high in wet season; low in dry season)
Temperate Grassland -Prairie	· Average rainfall between 10 to 35 inches · Hot summers and cold winters
Tropical Rainforest	· Warm all year · Very high humidity · Very high amounts of rainfall each year

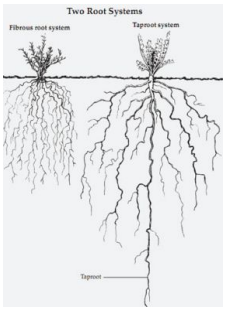
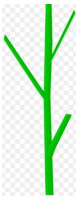
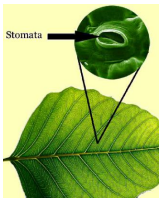
Big Ideas 14 Study Guide: Organization and Development of Living Things

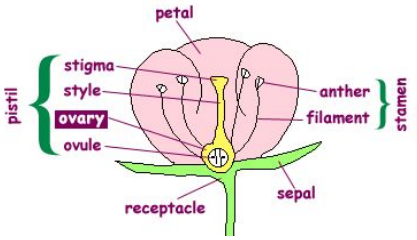
Human Body Parts and Functions - Use the cards from classroom matching activity to practice.

Organ	Function
Bladder	Stores urine until the body is ready to release it
Brain	The control center of the body
Ear	Senses sound waves
Eye	Senses and reacts to light and allows for vision
Heart	Pumps blood throughout the body
Kidneys	Helps balance the salts and acids in the body by filtering blood
Liver	Cleans the blood coming from the digestive system and makes bile
Lungs	Take in oxygen and expel carbon dioxide
Muscles	Produce movement by connecting your bones together.
Ovaries	Female reproductive organ that produces the egg
Pancreas	Helps with digestion by secreting enzymes to process sugars
Skeleton	Protects organs, provides support for the body and forms blood cells
Skin	Keeps germs and foreign objects from entering the human body and helps keep your body cool when you sweat
Small intestine	Digests and absorbs nutrients from food
Stomach	Breaks food down as part of the digestive process
Testes	Male reproductive organ

Here is a link to an online interactive to practice identifying the organs and learning where they are in the human body. http://www.softschools.com/science/human_body/diagram/

Plant Parts and Functions

Part	Function	Picture
Roots	• Absorb water and nutrients from the soil • Anchor (hold) the plant in place • Store sugars and carbohydrates made by the leaves (roots do not make food)	
Stem	• Transports water and nutrients throughout the plant • Supports the plant parts.	
Leaves	• Make food for the plant using photosynthesis • Gases are exchanged through openings on the leaves - carbon dioxide is taken in and oxygen is released.	
Flower	• Helps the plant reproduce by attracting pollinators and making seeds.	
Seed	• The seed is the fertilized part of the flowering plant. When it germinates, it can produce a new plant.	
Fruit	• The sweet and fleshy product of a tree or other plant that contains seed and can be eaten as food. • Protects the seed and aids in seed dispersal.	
Spore	• A seed like structure that produces a new plant (e.g., ferns or mosses).	

Flower Parts	• The flower is the reproductive structure of a plant. • Tested parts are: stamen, pistil, ovary, petal, sperm, and egg	
Stamen	• The male reproductive structure of a flowering plant. • There is a fine dust like powder called pollen on the stamen that contains the male reproductive cells of plants that reproduce by seed.	See image above - contains filament and anther. The pollen (sperm or male reproductive cells) are held on the anther.
Pistil	• The female reproductive structure of a flowering plant.	See image above - contains stigma, style, ovary, and ovule.
Ovary	• The female reproductive organ that produces and contains egg cells.	See image above
Petal	• Modified leaves that surround the reproductive parts of flowers. • They are often brightly colored or unusually shaped to attract pollinators.	See image above
Sperm	• The male reproductive cell (pollen)	See image above- The pollen (sperm or male reproductive cells) are held on the anther.
Egg	• The female reproductive cell (ovule)	See image above

Below is a link to an online interactive to practice identifying the parts of a flower and learning where they are on the plant. https://extension.illinois.edu/gpe/case4/c4m1ec.html

How Plants Respond to Environmental Factors

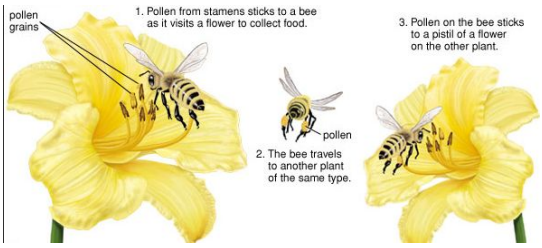
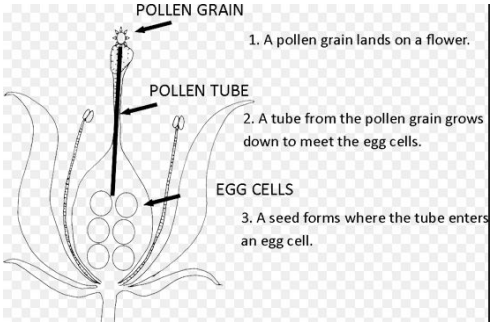
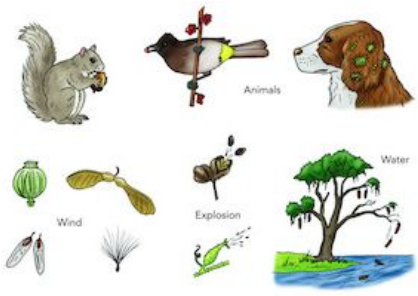
Factor	How Plants Respond
Heat	Most plants have an ideal temperature in which they will germinate (start to grow)
Light	Stems and leaves grow toward light since leaves use sunlight to make food.
Gravity	Roots grow downward into the soil in response to the pull of gravity.

Classifying Plants

Flowering Plants	Non-Flowering Plants
If it has a seed, fruit, food, or flower then it is a flowering plant. Examples: Carrots, Oak tree, Rose,Orange tree	If it reproduces by spore, or has cones then it is a nonflowering plant. Examples: ferns and mosses (spore) Pines and firs (cones)

Reproduce by Seed	Reproduce by Spore
Flowering plants, Conifers (Pines and Firs)	Ferns and Mosses

Plant Reproduction

Pollination		To transfer the pollen from the male reproductive structure (stamen) to the female reproductive structure (pistil) to fertilize flowering plants.
Fertilization (Seed Production)		The process by which the female reproductive cell (egg) is united with the male reproductive cell (sperm contained in pollen).
Seed Dispersal		The process of moving the seed to a new location so that it has room to grow. Animals, wind, and water aid in seed dispersal.
Germination (Sprouting)		The process by which plants begin to grow from a seed or a spore.

Seedling		A young plant that is not yet producing flowers.
Adult Flowering Plant		A fully grown plant that has flowers so it is able to reproduce.

Pollination and Fertilization Video http://studyjams.scholastic.com/studyjams/jams/science/plants/flowers.htm

Classifying Animals

Class of Animal	Characteristics	Examples
Mammals	• Vertebrates with hair or fur • Most give live birth (platypus and echidna lay eggs) • Feed their babies milk from their mother • Breathe using lungs • Warm-blooded	Whale, dolphin, bat, rhinoceros,rat, human,squirrel,
Birds	• Vertebrates with feathers and wings • Lay eggs • Breathe using lungs • Warm-blooded	Penguin, pelican,vulture, peacock
Reptiles	• Vertebrates that breathe using lungs • Have dry skin with scales • Usually lay eggs on land • Cold-blooded	Alligator, snake, turtle,
Amphibians	• Vertebrates with smooth, moist skin • Lay eggs in water • Breathe through gills when young and then lungs as adults • Cold-blooded	Salamander, frog, toad
Fish	• Vertebrates with scales and fins • Most lay eggs • Breathe using gills • Cold-blooded	Stingray, goldfish, shark, eel
Arthropods	• Invertebrates with segmented bodies • Exoskeletons • Jointed legs	Spider, Butterfly, Cockroach

Animals can also be classified into two classes depending on if they have a backbone. Vertebrates are animals that have a backbone. Mammals, birds, reptiles, amphibians, and fish are all vertebrates.

Invertebrates are animals that do not have a backbone. Arthropods are invertebrates.In place of a backbone, they have exoskeletons.

Below is a link to an interactive to practice the characteristics of the vertebrates - mammals, birds, reptiles, amphibians, and fish.
http://www.sheppardsoftware.com/content/animals/kidscorner/games/animalclassgame.htm

Big Idea 17 Study Guide: Interdependence

Adaptations are characteristics of an organism that increase its chances of survival in an environment. An organism is a living thing. Plants and animals are organisms. Some adaptations that help plants and animals survive include life cycle variations, animal behaviors, and physical (structural) characteristics.

Life Cycle adaptations are differences in the way that animals or plants reproduce that help them survive in an environment.

Life Cycle Variation	**How it Helps the Organism Survive**
Female Loggerhead Sea Turtles lay more than 100 eggs	This ensures that more of the turtles will live to be adults
A butterfly goes through complete metamorphosis which includes the egg, larva, pupa, and adult stages.	Butterflies eat leaves during the larva stage of development and nectar during adulthood so less of each type of food is needed in order for butterflies to survive.
Plants have brightly colored petals to attract pollinators	Pollination is an essential part of the flowering plant life cycle enabling the plant to reproduce

Behavioral Adaptations are things that animals do that help them survive. Some behaviors are learned while others are hereditary instincts that the animal is born knowing how to do.

Behavioral Adaptation	**How it Helps the Organism Survive**
Birds move south, migrate, for the winter	Keeps the bird from freezing and allows the bird to find food during seasonal temperature changes
Opossums play dead	Keeps predators from eating the opossum
Prairie dogs call out in alarm when a predator is threatening	Protects the prairie dog from predators

Behavioral adaptations can be categorized as **inherited behaviors** or **learned behaviors**.

Inherited Behaviors (Instincts)	**Learned Behaviors**
Spiders spin webs without being taught.	Bear cub watches mother to learn how to catch salmon when it jumps out of the river
Baby turtles know how to walk to the ocean after they hatch without being taught.	Chimpanzees poke a stick into a termite mound to capture termites for food.
Babies cry when they need something without being taught.	Tiger cubs play and learn important moves that will help them become capture prey

Structural Adaptations are physical structures that a plant or animal has that helps it survive.

Structural Adaptation	**How it Helps the Organism Survive**
Tigers have sharp claws and teeth	Allows the tiger to capture and eat its prey
Whales have thick layers of blubber	Allow them to stay warm
Some plants have large leaves	Allow them to collect sunlight in areas with little light

Many plants and animals respond to changing seasons in order to survive. Below are some animal behaviors and plant responses that happen because of the changing seasons.

Seasonal Response	**How it helps the Organism Survive**
A bear hibernates	During hibernation, the bear sleeps and its heart rate and breathing slow down requiring less energy during the cold winter when food is less plentiful
Many plants become dormant	Many plants go into an inactive state during winter when temperatures drop below what plants need to survive. Leaves fall off of deciduous trees when it gets cold and there is less sunlight.
Birds migrate	Helps the bird survive cold winters and find food in a warmer place

Florida plants and animals may have shorter or less pronounced seasonal adaptations than plants and animals living in areas north of Florida since Florida winters are not as cold as these areas.

Environments

Plants and animals, including humans, impact the environment. When the environment changes, the characteristics of the different plants and animals in the environment determine if the plant or animal is able to survive and reproduce in the changed environment or if the animal has to move to a new location in order to survive. If a plant or animal is unable to survive in the new environment and unable to move to a new location, the plant or animal will not survive. Some ways that humans have negatively affected the environment include deforestation (removing forests to use the land in other ways) and pollution. Both of these disrupt the ecosystems and habitats in which they occur. Invasive species, species of plants or animals that are not native to an area, also impact environments. An example of an invasive species here in Florida, are the Burmese Pythons who are threatening the Everglades. These Pythons have no natural predators and are eating animals causing a disruption in the food chain.

Food Chains

Plants and animals in an ecosystem are dependent on each other for survival.
The energy source that drives the food chain is the sun. The sun's energy is passed along the food chain as producers make their own food through photosynthesis and consumers (predators) eat producers and other consumers (prey) to obtain this energy. Producers (plants) are the only ones that can make their own food using the sun's energy. All of the others (consumers) must eat plants and other animals that have eaten plants to get that energy.

Herbivore	An animal that obtains nutrients from eating plants
Omnivore	An animal that obtains nutrients from eating both plants and animals
Carnivore	An animal that obtains nutrients from eating other animals
Producer	A producer is a plant. They are able to produce their own food using energy from the sun in a process called photosynthesis.
Consumer	A consumer is an animal that eats plants or other animals in order to get the energy they need to live.

Big Idea 16 Study Guide: Heredity and Reproduction

Life Cycles

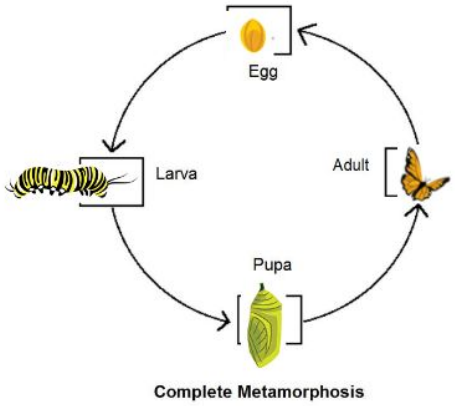
Complete Metamorphosis - Consists of 4 stages of development -

Egg - the first stage in the life cycle of many organisms.

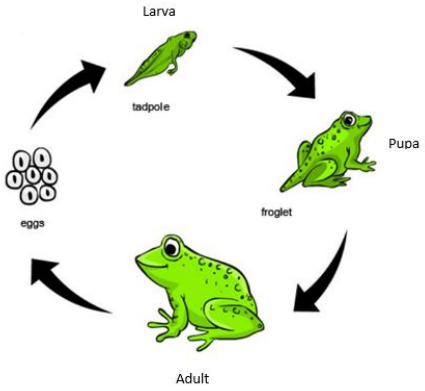
Larva - the small, worm-like stage in the life cycle of some insects.

Pupa - stage in the life cycle of some insects when the insect changes from a larva into an adult.

Adult - stage of an animal or plant life cycle when the organism is fully grown and able to reproduce.



Complete Metamorphosis

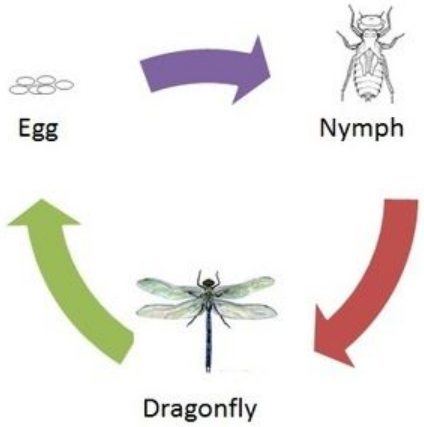


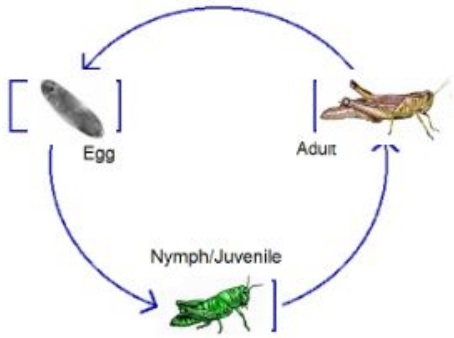
Incomplete Metamorphosis - Consists of 3 stages of development -

Egg - the first stage in the life cycle of many organisms.

Nymph (Juvenile) - a stage in the life cycle of some insects in which the insect looks like a smaller version of an adult. As the insect grows, it sheds its exoskeleton and grows a larger one.

Adult - stage of an animal or plant life cycle when the organism is full grown and able to reproduce.





Incomplete Metamorphosis

Life Cycle of a Flowering Plant:

Pollination - a pollinator (animal, wind, water) moves pollen from the stamen (male) of one flower to the pistil (female) of another flower.

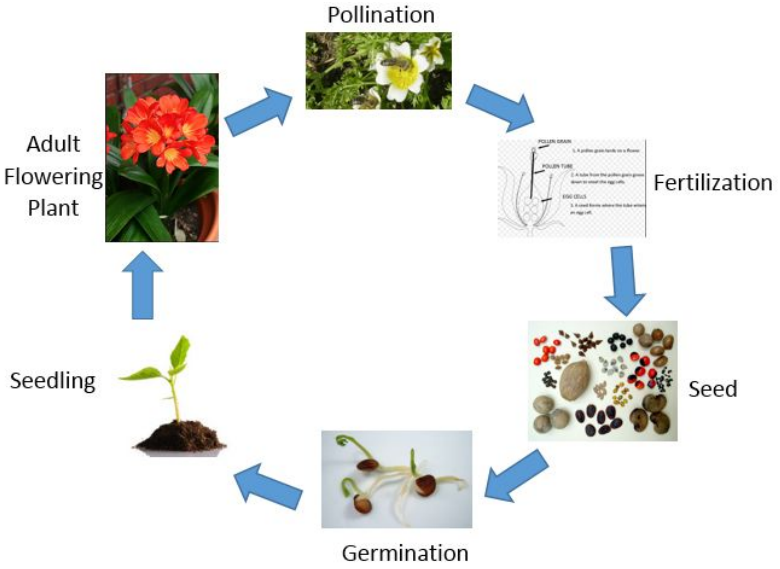
Fertilization - the male pollen travels down the pistil and joins with the egg in the ovary forming a seed.

Seed - the product of fertilization of a flowering plant. A seed contains an embryo and is able to germinate to produce a new plant in the right conditions.

Germination - when a seed begins to grow or sprout.

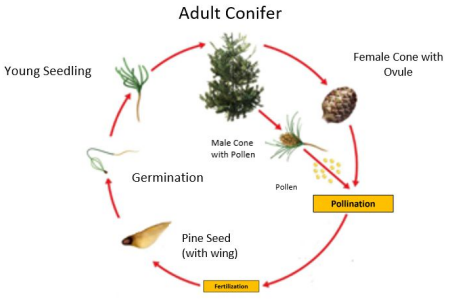
Seedling - a young plant. Due to its lack of flowers, it is unable to reproduce.

Adult Flowering Plant - a full grown plant with flowers capable of producing new seeds.



Life Cycle of a Non-Flowering Plant that Reproduces by Seed:

A Pine Tree, an example of a conifer, is a Non-Flowering Plant that Reproduces by Seed. The conifer life cycle is similar to that of flowering plants but conifers have male and female pine cones instead of flowers.



Life Cycle of Non-Flowering Plants that Reproduces by Spore:

Ferns and Mosses are Non-Flowering Plants that Reproduce by Spore-

Spore - A seed like structure that produces a new plant.

Life Cycle of Many Animals:

Egg or Embryo - describes a developing animal BEFORE it is born or hatched.

Infant - a very young animal that needs a lot of care from an adult.

Adolescent - describes the developing animal when it is changing into an adult (another word for teenager).

Adult - describes a full grown animal capable of reproduction.