Objective 1 – Nature of Science

LABORATORY SAFETY RULES AND EQUIPMENT

1. Read, understand, and follow all safety instructions.
2. Check with a teacher for special directions before beginning.
3. Follow directions and only use the equipment as instructed.
4. Locate and use all required safety equipment, including:

Safety Goggles: protect eyes from splashing or hot liquids
Safety Apron: protect clothes from splashing or hot liquids
Mitts: protect skin from hot surfaces and equipment

5. Pour acid into water, not water into acid.
6. Keep the correct spatula and/or stopper with its container.
7. Report all accidents, spills, and broken glass to the teacher.
8. Avoid eating or drinking anything in the laboratory.
9. Keep water away from electrical equipment.
10. Keep hair and clothing away from fire.
11. Clean up your area, tools, and hands when done.

SCIENTIFIC PROCESS

1. Begin with a problem or **question**.
2. Learn and **collect information** about your question.
3. Make a **hypothesis:** an educated guess about what might happen; must be able to be tested; not just an opinion.
4. Design and conduct an **experiment** to test your hypothesis.

Variable: thing that can be changed in an experiment; be sure to change only the variable you are testing
Control Group: used to compare experiment's results to; the "normal" conditions

Hypothesis: The more fertilizer a plant is given, the taller the plant will grow.
Not a Hypothesis: Roses are prettier than tulips.
Variable: The amount of fertilizer the plants get.
Control Group: Plants that did not get fertilizer.

5. Collect, organize, and think about your **observations**; can use your senses (like sight or smell) or tools (like a ruler or thermometer).
6. Use or make **models** (simple representations used to help you understand data or ideas better; they are not perfect).
7. Make a **conclusion:** Do results support your hypothesis?

LABORATORY EQUIPMENT

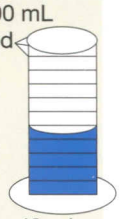
Equipment	Description
Binoculars	make distant objects look larger and closer
Collection Net	catches specimens (samples)
Compass	tells directions (north, south, east, west)
Dissecting Tool	helps to cut, observe, and examine specimens
Hand Lens	makes small objects look bigger
Hot Plate	heats chemicals in the laboratory
Microscope	makes very small objects look much bigger
Petri Dish	allows someone to make observations or grow bacteria (often a shallow, clear dish)
Stopwatch	measures time precisely
Telescope	helps person see objects in the sky
Test Tube	holds chemicals (glass tube with closed end)
Water Test Kit	analyzes water properties

Measurement	Basic Metric Unit	Tools
Volume	liter (L)	graduated cylinder
Length	meter (m)	ruler or meter stick
Force	Newtons (N)	spring scale
Temperature	Celsius (°C)	thermometer
Mass	gram (g)	double pan balance triple beam balance

MEASUREMENT

Beaker: container with liquid level marks; provides less precise volume measurement than the graduated cylinder
Graduated Cylinder: tube with level marks; observe liquid volume from bottom of the **meniscus** (curved surface)
Water Displacement Method: to find the volume of an irregular shape, submerge the object in a graduated cylinder containing liquid

In this 100 mL graduated cylinder, each mark is 10 mL. The volume of liquid = 43 mL



the object's volume = final volume - initial volume
Metric System: based on factors of 10; often used for measurements; need more of "small" unit to equal "large" unit

kilo	hecto	deka	base	deci	centi	milli
1,000	100	10	1	0.1	0.01	0.001

Large Unit ← → Small Unit

Examples: 1 kiloliter = 1,000 liters
60 milligrams = 6 centigrams

ORGANIZING AND EVALUATING INFORMATION

Average: add the values and divide by the number of items
Hypothesis: educated guess about what may happen; support hypothesis with repeated experiments/large sample size
Inference: reasonable statement based on observations/clues

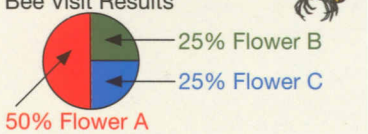
Example: You observe that the distance between an animal's footprints increased. You infer that the animal began running.

Prediction: a guess about what will happen next based on observations and your own experiences
Theory: explanation based on many observations and data
Independent Variable: variable that is changed during the experiment; shown on x-axis (horizontal axis)
Dependent Variable: variable that responds to the independent variable; its value is measured and depends on the independent variable's value; shown on y-axis (vertical axis)
Table: uses columns and rows to organize information
Circle Graph: uses a circle to show parts of a whole

Example: Table

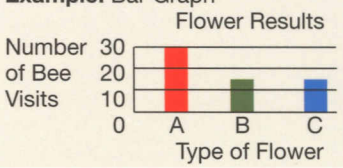
Flower	Number of Bee Visits
Flower A	30
Flower B	15
Flower C	15

Example: Circle Graph
Bee Visit Results

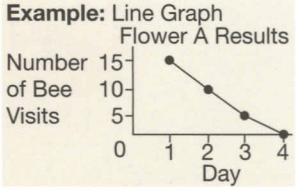


Bar Graph: shows data in different categories using bars
Line Graph: plots and connects data points on a graph; shows a trend (often over time)

Example: Bar Graph



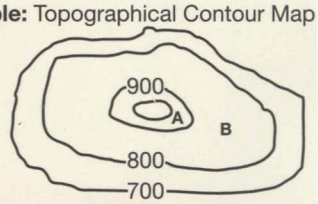
Example: Line Graph



Questions: 1) In the line graph above, what is the independent variable? 2) What is the dependent variable? 3) Do the bee visits increase, decrease, or remain constant over time?
Answers: 1) day 2) number of bee visits 3) decrease

Contour Map: lines connect points of equal elevation (height above sea level); the closer the lines are spaced, the steeper (greater) the change in elevation

Example: Topographical Contour Map



Which point is steeper, A or B? **A**

Objective 2 – Living Systems and the Environment

ORGANISMS AND THEIR NEEDS

Organism: a living thing (plant or animal)
Needs: organism's requirements to survive (like food, water, living space); organisms depend on other organisms and their habitat to meet their needs (birds use twigs to build nests)
Competition: a struggle for a limited amount of resources; an organism must have a way to get what it needs (food, water, oxygen) or it will die (plants in a jungle compete for sunlight)
Ecosystem: the mix of all living (biotic) and nonliving (abiotic) things and conditions in an area (like temperature, animals, etc.)
Environment: surrounding conditions; different environments support different types of organisms
Species: organisms with similar characteristics, live in same area, and breed with each other (Monarch butterfly) to produce fertile offspring; may naturally live (native) or not naturally live (invasive) in ecosystem
Population: organisms that are of same species, live in same area, and breed with each other (Monarch butterflies in a certain forest)
Community: all the populations that live and interact in an area (all the animals and plants that live in a certain forest)
Habitat: area an organism lives in and gets what it needs (lake)
Niche: the role a species has in an ecosystem (squirrels consume acorns from trees)
Ecological Succession: gradual replacement of plants and animals over time due to environmental changes (new species of trees replace the old trees that burned down in a forest fire)

TRAITS AND BEHAVIORS

Traits: an organism's characteristics (eye color, height)
Inherited Trait: characteristic passed from parent to offspring through genes
Adaptation: trait that helps an organism live and meet its needs better; organisms may use colors, smells, or poisons to blend into their habitat or protect themselves

Example: The bad scent of a skunk's spray helps to keep predators away from it.

Natural Selection: process by which organisms with certain favorable traits survive and reproduce more successfully than others
Evolution: changing of a species' traits over many years
Behavior: the way an organism does something or acts
Inherited Behavior: behavior an organism is born with; not learned **Example:** breathing
Learned Behavior: behavior an organism is not born with; must be learned **Example:** reading

ROLES OF ORGANISMS

Type of Animal	Source of Food	Example
Herbivore	plants	cow
Carnivore	animals (meat)	wolf
Omnivore	plants and animals	bear

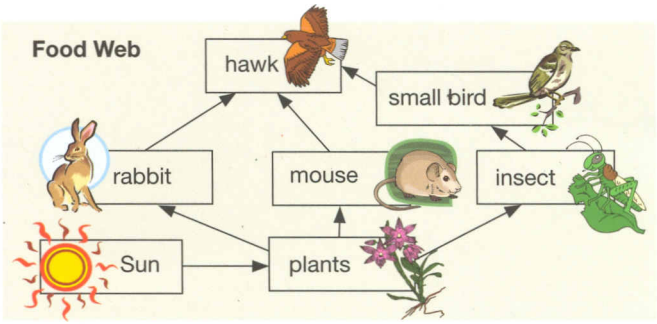
Term	Role	Example
Predator	hunts/eats other organisms	lion
Prey	hunted as food	rabbit
Scavenger	gets food from dead animals	vulture
Producer	makes own food	plants
Consumer	gets food from other organisms	animals
Decomposer	gets food from dead organisms or the waste of organisms	fungi

Symbiosis: close association between two (or more) organisms; may be beneficial, harmful, or neutral (no effect)

Relationship	Organism #1 Effect	Organism #2 Effect
Parasitism	good (+)	bad (-)
Mutualism	good (+)	good (+)
Commensalism	good (+)	no effect

FOOD CHAINS

Food Chain: describes how energy is passed from one organism to another; energy originates from the Sun and is passed to producers and then to consumers; energy moves in the direction of the arrow from one organism to the other
Food Web: picture that shows the many food chains in an ecosystem; arrows show the direction energy moves (a hawk gets energy by eating a rabbit, mouse, or small bird)



SURVIVAL OF POPULATIONS

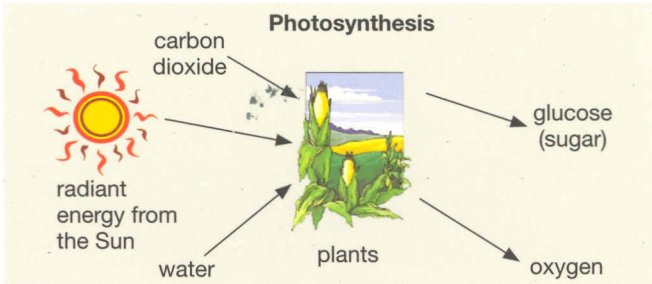
Extinct: if a species cannot get what it needs, it will die out (T. rex dinosaur)
Endangered: if a species cannot get what it needs, the number will get smaller and over time may become extinct
Impacts on Organism Populations: effects on populations caused by the amount of food, water, disease, predators, etc.
Human Impact: humans can change an ecosystem in bad ways (like through air/water pollution) or in good ways (like conservation); impacts can be short or long term
Environmental Changes: changes in the environment can affect the survival of an organism or species

Example: If a river dries up, the fish will die and the food supply for bears will decrease. The bear population will decline unless the bears find a different food source.

Limiting Factors: factors that control a population's size
Examples: food, water, living space, shelter
Carrying Capacity: maximum population that can live in an area over a long period of time (controlled by limiting factors)

PHOTOSYNTHESIS

During photosynthesis, plants transform the Sun's energy (light) into chemical energy in the form of glucose. Animals eat plants (or other animals that have eaten plants) and use the glucose.
Carbon Dioxide-Oxygen Cycle: during photosynthesis plants produce the oxygen that animals need; during respiration animals produce the carbon dioxide that plants need

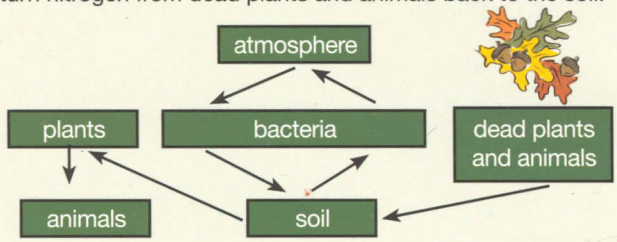


$6H_2O + 6CO_2 \xrightarrow{\text{light energy}} C_6H_{12}O_6 + 6O_2$
water + carbon dioxide produces glucose + oxygen

Objective 2 – Living Systems and the Environment, cont.

NITROGEN CYCLE

Nitrogen is needed by living things. Bacteria change the nitrogen in the air into a form that plants can get and use from the soil. Animals get nitrogen by eating plants. Decomposers return nitrogen from dead plants and animals back to the soil.



CELLS

Cell: smallest unit of living things
- all organisms are made of one or more cells
- cells have functions (jobs) that help keep the organism alive
- cells contain smaller structures that each have a function (cell walls and chloroplasts are structures unique to plant cells)

Nucleus: the "brain" of the cell; controls the cell's activities and contains chromosomes made of DNA

Structure and Function: the structure (overall makeup of an organism or a part of it) can help with its function (job)

Example: cell membranes are made of layers of fat and protein with small pores (structure) which allow the membranes to control what enters and leaves the cells (function)

Diffusion: movement of molecules from area of higher concentration (amount) to lower concentration

Osmosis: movement of water from areas of higher concentration to lower concentration until cell equilibrium (stability) is reached; the cell membrane (outer layer) controls the flow of molecules in and out of the cell

Turgor Pressure: pressure inside a plant cell caused by the osmotic flow of water into the cell; allows plants to remain upright; without turgor pressure the leaves would sag or wilt

ORGANIZATION

Living things build and organize themselves from small and simple (atom) to complex systems (communities).

Examples: a group of cells that do certain functions make up a tissue; a group of tissues working together make up an organ

Levels of Organization

Term	Example
atom	oxygen
molecule	water
cell	red blood cell
tissue	muscle tissue
organ	heart
organ system	circulatory
organism	person
population	people in a certain city
community	all populations in a city

System and Parts: properties of a system can be different from those of its parts; systems depend on interaction of parts

Interaction among Systems: often many systems must interact to perform a function (like in the human body)

Example: A person can exercise only because several organs and organ systems interact. A person (using his/her brain) decides to exercise. The nervous system sends a signal to the muscles to begin moving. The circulatory system begins pumping blood faster to provide more oxygen to the body.

HOMEOSTASIS AND FEEDBACK MECHANISMS

Homeostasis: ability of an organism or its systems to maintain internal equilibrium (stability or balance) using chemical reactions and physical processes (feedback mechanisms)

Feedback	Response to Stimulus	Example
Negative	decreases effect	a body that is too hot, will try to cool itself down
Positive	increases effect	presence of stomach acid increases its production

Example: Homeostasis - Body Temperature Control

Body Temperature	Feedback Mechanism
Too hot	sweat, blood vessels dilate (get bigger) to allow heat out
Too cold	shiver, blood vessels constrict (get smaller) to keep heat in

Body Systems Work Together to Control Temperature

brain detects body temperature is too low

↓

nervous system sends signals

↙ ↘

dermal (skin) blood vessels constrict

muscles contract (shiver)

GENETICS

Heredity: the passing of traits from one generation to the next

Gene: piece of DNA that represents the basic unit of heredity

DNA: contains genetic information that controls a cell's activities; found in the nucleus of organism's cells; can be inherited only through sperm and egg cells

Chromosome: structure found in cell's nucleus; contains DNA

Allele: form of a gene that controls a characteristic

Trait: organism's characteristics (eye color, height)

Selective Breeding: purposely selecting organisms to mate in order to produce offspring with certain characteristics

Dominant Trait: trait that appears when at least one dominant allele is inherited; represent allele with capital letter **Example:** R

Recessive Trait: trait that appears when two recessive alleles are inherited; represent allele with lowercase letter **Example:** r

Genotype: inherited combination of alleles; represented by two letters **Examples:** RR, Rr, or rr

Phenotype: organism's appearance based on its genotype **Example:** red petals on a flower

Example: Genotype and Phenotype

Let R represent the dominant allele of red petals

and let r represent the recessive allele of white petals

Genotype	Phenotype	Reasoning
RR	red petals	two dominant alleles
Rr	red petals	one dominant allele
rr	white petals	two recessive alleles

Punnett Square: diagram that helps to predict the possible genotypes and phenotypes of offspring

Example: Punnett Square

B is dominant allele (brown hair)

b is recessive allele (blonde hair)

Father, Bb

Mother, Bb

	B	b
B	BB	Bb
b	Bb	bb

Possible Combinations

Genotype	Phenotype
BB ($\frac{1}{4}$)	brown
Bb ($\frac{2}{4}$)	brown
bb ($\frac{1}{4}$)	blonde

There is a $\frac{3}{4}$ (or 75%) chance the offspring will have brown hair, and 25% chance it will have blonde.

Objective 3 – Structures and Properties of Matter

PROPERTIES

Matter: anything that has mass and takes up space; makes up all things (living and nonliving) in the world; classified by properties, or characteristics, including:

Property	Description
State	form of matter (solid, liquid, or gas)
Mass	amount of matter in an object (grams)
Weight	amount of gravity on object (Newtons)
Volume	amount of space object takes up (liters)
Density	mass divided by volume (grams/liter)
Magnetism	ability to be attracted, or pulled, to magnets
Conduction	ability to carry heat, electricity, and sound (opposite is called insulation)

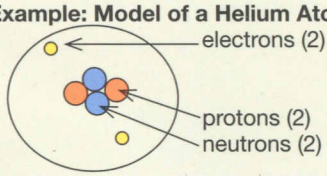
Term	Changes in State	Water
Boiling Point	from liquid to gas	100 °C
Freezing Point	from liquid to solid	0 °C

ATOMS

Atoms are the very small substances (building blocks) of all matter. The nucleus is the central part of the atom and contains most of its mass. An atom has three main parts.

Atom Part	Location	Charge
Proton	in nucleus	positive (+)
Neutron	in nucleus	neutral (no charge)
Electron	outside nucleus	negative (-)

Example: Model of a Helium Atom



STATES OF MATTER

State	Atom Movement	Energy	Shape
solid	small distances	low	fixed
liquid	larger distances	medium	container's shape
gas	great distances	high	fills space

When matter absorbs energy, its atoms move faster and they spread apart from each other. Atoms are packed closest together in solids and farthest apart in gases.

CLASSIFICATION OF MATTER

Element: substance made of only one kind of atom

Examples: carbon, helium, iron, potassium, calcium

Molecule: substances made of more than one atom

Examples: methane (CH_4) is made of 1 carbon and 4 hydrogen atoms; ozone (O_3) is made of 3 oxygen atoms

Compound: substance made of two or more elements

Example: salt (NaCl) is made of sodium and chlorine

Mixture: two or more substances blended together; because they do not make a new substance, they keep their own physical properties; can be separated

Examples: salt and pepper mixture, salad

Solution: mixtures that are blended so well that their properties are the same throughout; one substance dissolves into the other

Examples: salt dissolved in water; chocolate syrup dissolved in milk

PERIODIC TABLE

Chemical Symbol: element's abbreviation; first letter is capitalized and second letter (if has one) is lowercase

Examples: N for nitrogen, O for oxygen, Au for gold

Chemical Formula: substance's abbreviation
Subscript: number at the lower right of element's symbol (shows number of atoms); if no subscript, there is 1 atom

Example: H_2O has 2 hydrogen atoms and 1 oxygen atom

Periodic Table: chart of elements, arranged in rows in increasing atomic number (the number of protons in the element); elements in the same column (group) are similar

Periodic Table

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt									

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Example: Helium's Data from Periodic Table

2 ← atomic number (number of protons)
He ← symbol
4.0026 ← atomic mass (protons + neutrons)
Helium ← name

METALS, NONMETALS, AND METALLOIDS

Element Type	Location on Periodic Table
Metal	left side
Nonmetal	right side
Metalloid	along the zigzag line (stair step)

Metals: shiny, can be bent or pulled, good conductors of heat/electricity; many are solids at room temperature
Nonmetals: dull, brittle, poor conductors of heat/electricity; many are gases at room temperature
Metalloids: conducts electricity under some conditions

CHEMICAL REACTIONS AND PHYSICAL CHANGES

Law of Conservation of Mass: mass is not created or destroyed in an ordinary chemical reaction
total mass of reactants = total mass of products
Physical Change: change in size, shape, or state; still same substance (steam and ice are both water)
Chemical Reaction: process in which one or more substances change to produce a new substance
Chemical Equation: gives the number and kind of substances involved in a reaction; reactants are the starting materials and products are the final materials

Example: reactant + reactant yields product
$2Na + Cl_2 \longrightarrow 2NaCl$

Exothermic Reaction: gives off (produces) energy

Example: $2Na + Cl_2 \longrightarrow 2NaCl + energy$

Endothermic Reaction: takes in (absorbs) energy

Example: $N_2 + O_2 + energy \longrightarrow 2NO$

Specific Heat: the amount of energy needed to change the temperature of 1 gram of a substance by 1 °C

Example: Water's specific heat is about five times greater than land's specific heat. Large bodies of water, like oceans, store large amounts of heat from the Sun. Since water heats and cools more slowly than landmasses, temperature differences can cause thermal wind systems (cool air replaces warmer air).

Sea Breeze: daytime wind from ocean to land
Land Breeze: nighttime wind from land to ocean

Objective 4 – Motion, Forces, and Energy

ENERGY

Energy: ability to move or change matter (do work)
Potential Energy: energy of position (stored energy)

Example: a rock resting on a mountain has more potential energy than a rock resting on a small hill

Kinetic Energy: energy of motion

Example: a rock rolling down a hill

Energy Form	Description
Chemical	stores energy in molecules/bonds
Mechanical	moves objects
Electrical	moves electrons through circuit wires
Sound	vibrates; makes a sound in an ear
Light	travels as a wave
Thermal	produces heat; due to motion of atoms
Solar	provides most of the Earth's energy; generated by the Sun

ENERGY TRANSFORMATIONS

Energy can be transformed (changed) from one form to another. People transform energy to meet their needs.

Examples:

- Chemical energy from gasoline is converted to mechanical energy when you drive a car.
- Electrical energy is converted to light energy when you turn on a lamp.
- Mechanical energy from wind is converted to electrical energy in windmills.
- Chemical energy from batteries is converted to sound energy when you turn on a radio.

FORCE

Force: a push or pull; force is needed to start or stop the motion of an object; depends on the mass of an object

Force = mass x acceleration

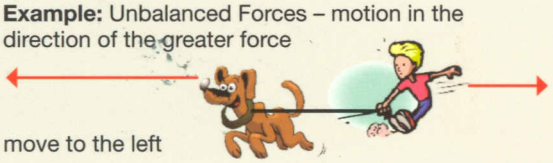
Example: By contracting, the heart generates a force to accelerate a mass of blood through the body's circulatory system.

Balanced Forces: opposing forces are equal in size; does not change the speed or direction of an object

Example: Balanced Forces – no motion

Unbalanced Forces: opposing forces are not equal in size; can change the speed and/or direction of an object

Example: Unbalanced Forces – motion in the direction of the greater force



move to the left

Resistance Force: force, like friction, opposing motion
Gravity: a force that pulls objects in the universe toward one another; gravity varies by location; the Earth's gravity is greater than the moon's gravity so a person weighs more on the Earth than on the moon (but mass is the same)
Weight: measures the force of gravity on an object; the acceleration due to gravity is 9.8 m/s^2

Weight = mass x gravity

MOTION

Motion: change in position over certain amount of time
Speed: rate at which object moves

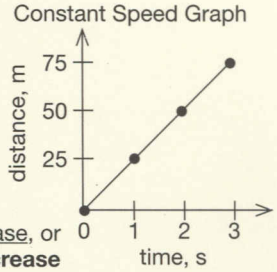
Speed = distance ÷ time

Velocity: describes speed in a given direction
Acceleration: rate at which velocity changes

Example: Speed

distance, m	time, s	speed, m/s
0	0	0
25	1	25
50	2	25
75	3	25

Constant Speed Graph



Does distance increase, decrease, or remain constant over time? **increase**

WORK AND SIMPLE MACHINES

Work: force acting through a distance

Work = Force x distance

Machine: tool that makes work easier by changing the size or direction of the force put into it (input force)

Simple Machine	Description
Inclined Plane	slanted surface
Wedge	inclined plane that moves (like a seedling root tip pushing into the soil)
Screw	inclined plane wrapped around a bar
Lever	rigid bar that moves about a fixed point, called the fulcrum
Pulley	rope, chain, or belt wrapped around a grooved wheel
Wheel and Axle	two circular objects of different sizes; the force applied to the wheel is transferred to the axle

Simple Machine Examples


Inclined Plane (ladder)


Wedge (chisel)


Screw (screw)


Lever (hammer)


Pulley (well)


Wheel and Axle (wagon)

WAVES

Wave: disturbance that transmits energy
Medium: substance (like solid, liquid, or gas) through which a wave travels
Mechanical Waves: waves that require a medium

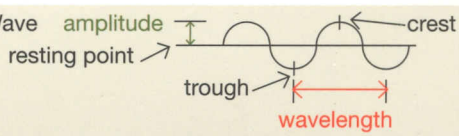
Examples: ocean waves through water, sound waves through air, seismic waves through the ground

Electromagnetic Waves: waves that do not require a medium; can travel through a vacuum (empty space)

Examples: visible light, radio waves, and X-rays can travel through a vacuum or through a medium

Amplitude: maximum distance from resting point
Wavelength: distance between two adjacent crests (peaks) or troughs (valleys)
Frequency: number of wavelengths in given time period

Example: Wave



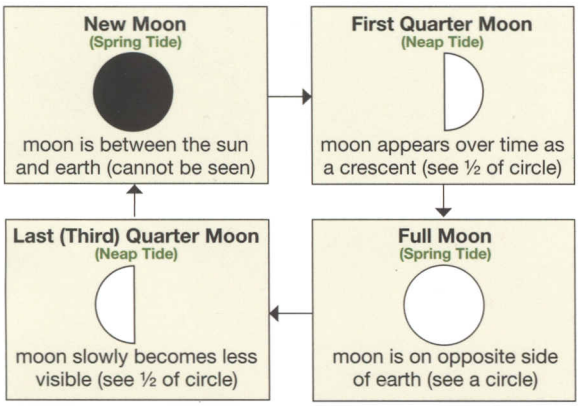
Objective 5 – Earth and Space Systems

THE UNIVERSE

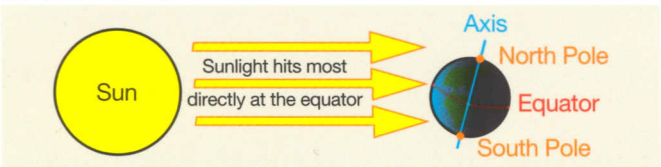
Universe: space and the matter and energy it contains
Galaxy: system (large group) of stars in space
Star: huge, hot body made of different gases; radiates energy; a star's temperature is related to the color of light (spectra) the star gives off (based on its elements); a star's brightness depends on its temperature, size, and distance from Earth
Nebula: large clouds of gas and dust; may glow by themselves, absorb starlight, or reflect starlight
Comet: small object made of ice with some gas, dust, and rock; a "tail" can appear as the comet revolves around the Sun and is heated
Planets: nearly round objects that revolve around a star; in our solar system the planets that revolve around our Sun are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
Sun: star that is the center of our solar system; provides most of Earth's energy
Moon: object that revolves around a planet; natural satellite

Eclipse	Description
Lunar	moon moves into Earth's shadow
Solar	moon's shadow crosses Earth

Tides: the daily movement (rise and fall) of the Earth's ocean surfaces; caused by the moon's pull of gravity on the Earth
Spring Tide: largest difference between low and high tide
Neap Tide: smallest difference between low and high tide
Phases: four stages that the moon goes through when it revolves around the Earth each month



Earth: our planet; revolves around Sun in elliptical (oval) shape
Seasons: natural divisions of the year caused by the tilt of the Earth's axis, combined with its revolution around the Sun
Length of Daylight: depends on latitude (distance north or south of equator) and season (more daylight during Summer)
Equinox: the two times per year when the Sun is directly over equator; length of day and night are same; in northern hemisphere occurs in March (vernal) and September (autumnal)
Solstice: the two times per year when the Sun is farthest from equator; in northern hemisphere summer solstice (in June) is longest day of year and winter solstice (December) is shortest



Cycle	Time
Earth revolves around Sun	one year (365¼ days)
Moon revolves around Earth	one month (29½ days)
Earth rotates on its axis	one day (24 hours)

COMPOST

Biomass: total of all materials that come from living organisms
Composting: breaking down (decaying) of dead organisms by decomposers (like bacteria) to produce carbon dioxide, water, minerals, organic compounds, and heat

EARTH CHANGES AND RESOURCES

Changes: different events cause the Earth's surface and animal populations to change over time; can be caused by catastrophic natural events (earthquake, volcano) or by humans (pollution, unregulated hunting, species introduction)

Term	Description
Erosion	moving rocks or soil from one place to another due to water, wind, or gravity
Weathering	breaking down of materials like rocks into smaller pieces (soil, sand, dirt)
Deposition	dropping eroded rock and soil to new location

Natural Resource: a substance that helps support life on Earth

Resource Type	Typical Time to Replace	Examples
Renewable	within a person's lifetime	trees, oxygen
Nonrenewable	millions of years	oil, gas, coal
Inexhaustible	not used up	sun, wind, tides

Fossil Fuels: energy sources (coal, oil, and gas) that were made over many years from the remains of living things

Human Impact	Examples
Negative	air, water, and soil pollution, deforestation
Positive	conservation, habitat preservation, recycling

GEOLOGY

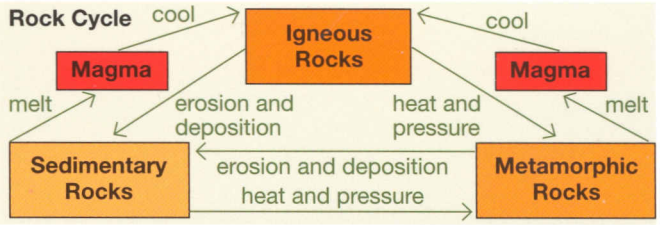
Plate Tectonics: theory that the lithosphere (Earth's outermost layer) is divided into plates that slowly but constantly move

Boundary	Plate Movement	Possible Result
Convergent	collide → ←	mountain,volcano
Divergent	move away ← →	rift valleys, earthquakes
Transform	slide past ⇐⇒	fault lines

Continental Drift: theory that continents move away from each other; continents may have once been connected
Land Subsidence: sinking of areas of the Earth's crust; caused by underground voids or compaction

Rock Type	Formation Process
Igneous	hot magma cools and hardens
Sedimentary	rock pieces deposited and compacted together
Metamorphic	existing rock changed by heat and pressure

Lava: term for magma after a volcanic eruption



WATER

Watershed: land area which drains surface water into a body of water (like a stream)
Surface Water: water on earth's surface (lake, stream, ocean)
Ground Water: water located beneath land surface and trapped in porous rocks/soil; provides water to plants, wells, aquifers (underground reservoirs), etc.
Precipitation: water that falls to Earth (rain, snow, sleet, hail)
Transpiration: water vapor released into atmosphere by plants
Water Cycle: constant movement of water between the Earth's surface and air (goes back and forth between liquid and vapor)