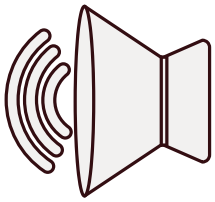
Summary and Practice Sheets

Grade 7

Waves



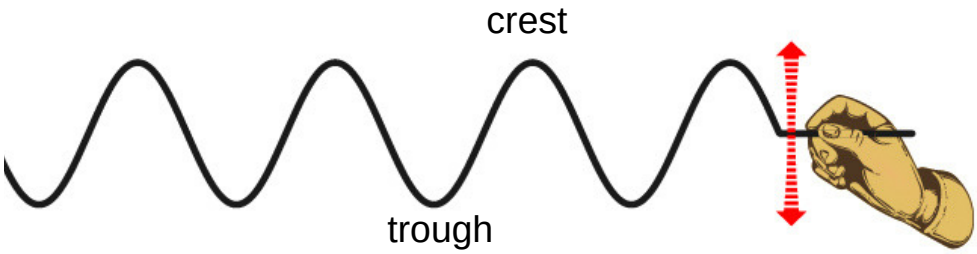
There are two main types of waves:

- mechanical waves - which require a medium to carry their energy
- electromagnetic waves - which can carry energy through matter or empty space

*All electromagnetic waves display transverse motion.
* Mechanical waves can be transverse, longitudinal or a combination.

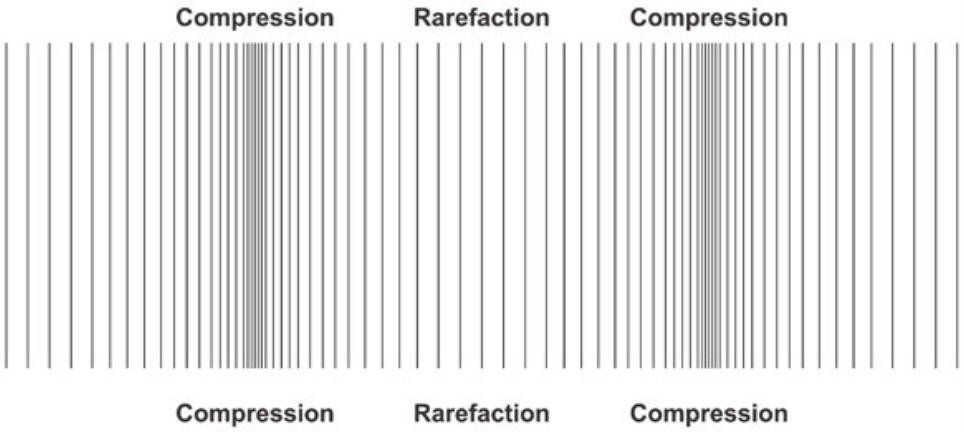
TRANSVERSE WAVES

- the particles of the medium move up and down, perpendicular to the direction the wave travels
- example: light waves



LONGITUDINAL WAVES

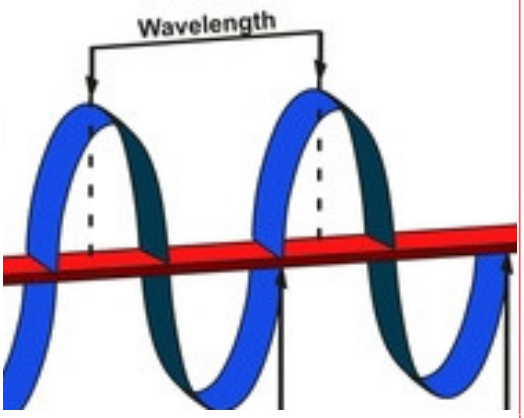
- the particles of the medium move back and forth, parallel to the direction the wave travels
- example: sound waves



WAVE PROPERTIES

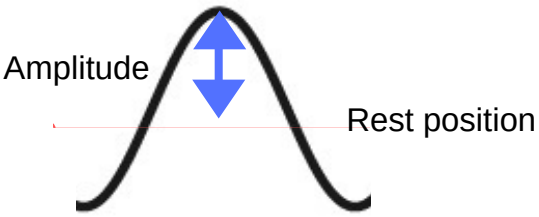
Wavelength:

the distance between the same points on different waves - e.g. crest to crest



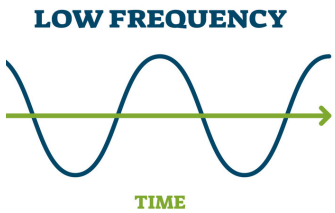
Amplitude:

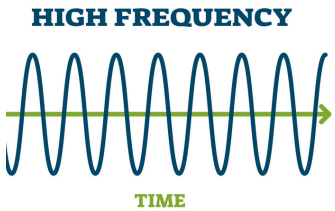
the height of a wave above or below the rest position; indicates the amount of energy carried by the wave



Frequency:

number of waves that pass a point in 1 second - measured in Hertz (HZ)





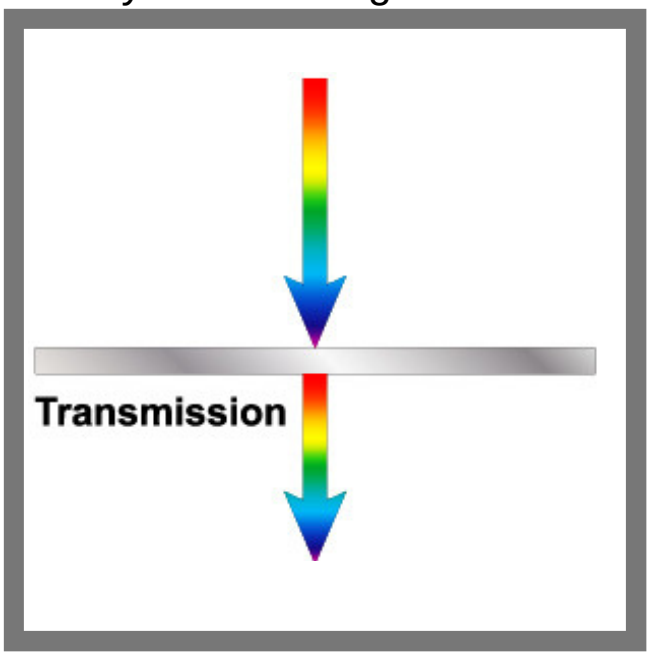
Wave Speed:

depends on the medium through which the wave travels

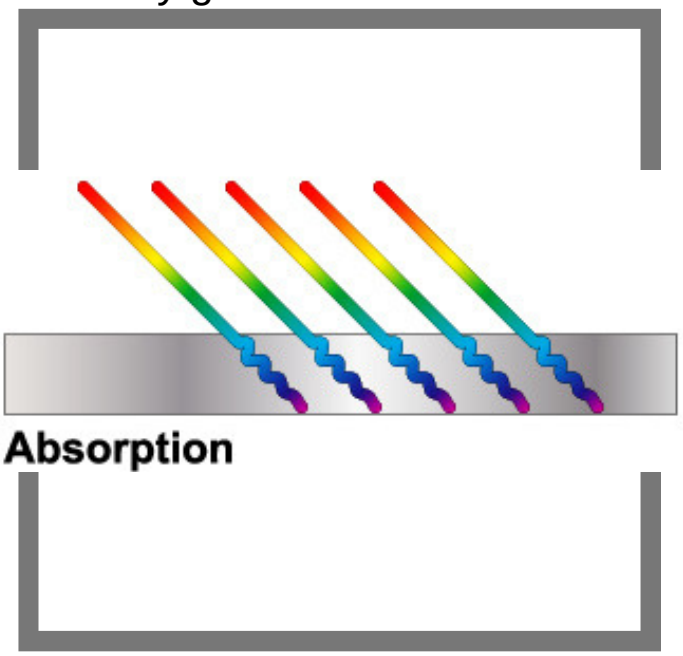
Electromagnetic waves in empty space have a speed of 300,000,000 m/s

How do waves interact with matter?

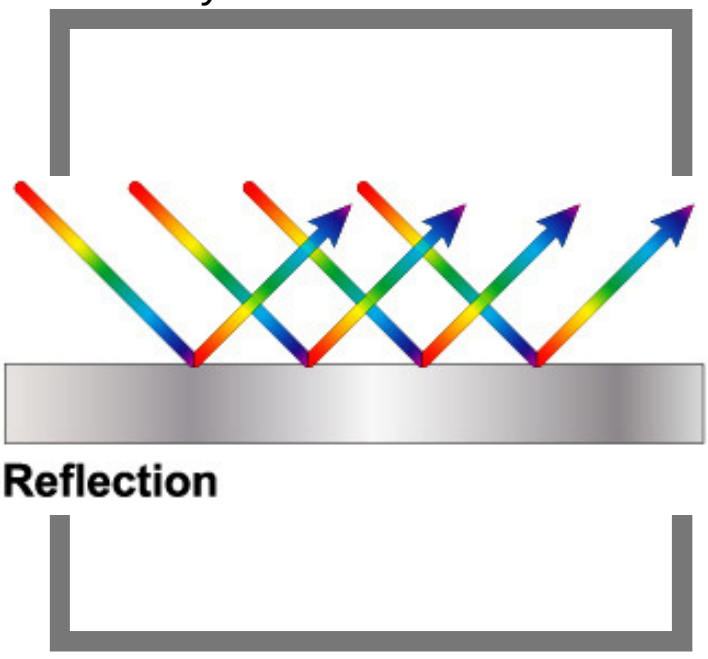
They move through matter



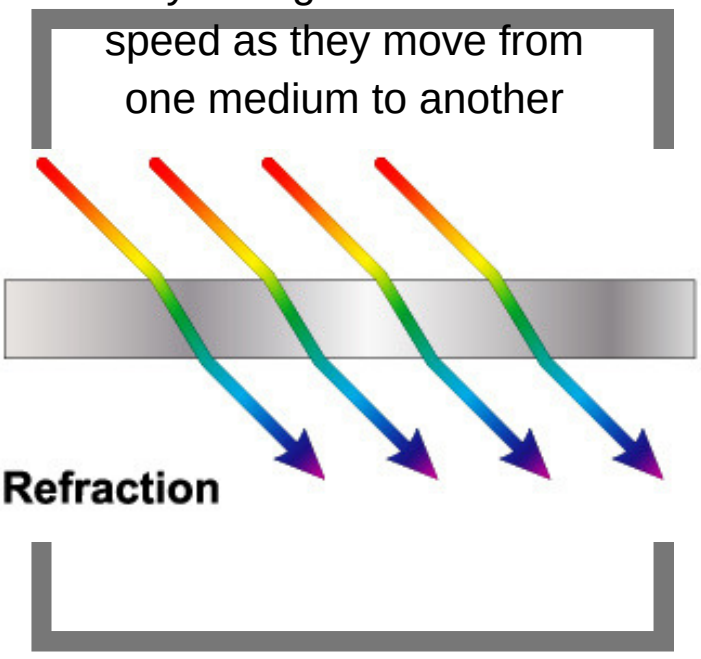
They get taken into matter



They bounce off of matter

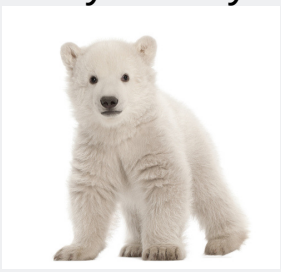


They change direction and speed as they move from one medium to another



Types of Animal Symmetry

Bilateral symmetry



an organism can be divided into 2 near equal halves

Radial symmetry

an organism can be divided into near equal parts from its center

Asymmetry

Animal Adaptations

structural

a feature of an organisms body that helps it survive
ex: a bird's beak

behavioral

things organisms do that help them survive
ex: bird migration

functional

body processes that help an organism survive
ex: respiration

Adaptations increase an organism's chance of surviving in its environment and reproducing

Animal Classifications

Animals are also grouped by the absence (invertebrates) or presence (vertebrates) of a backbone. Despite their differences vertebrates and invertebrates are both considered **chordates** because they have these four traits at some point in their lives: a notochord, a tail, a nerve cord, pharyngeal pouches

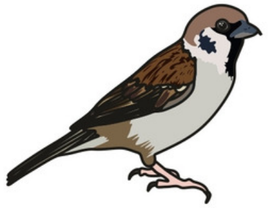
Vertebrates

animals with a backbone

Amphibian

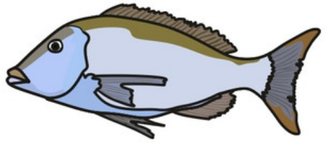
- have smooth moist skin (no scales)
- breathe with gills and lungs
- cold-blooded (**ectotherms**)
- spend part of their life in water and part on land
- most lay eggs in water

Bird



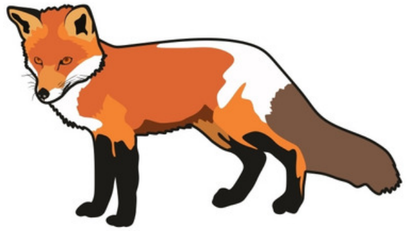
- have **feathers**, a beak and wings
- warm-blooded (**endotherms**)
- their offspring hatch from **amniotic** eggs

Fish



- have **gills to breathe,** scales and fins on their bodies
- cold-blooded (**ectotherms**)
- live in water

Mammal



- have hair of fur
- warm-blooded (**endotherms**)
- have **amniotic** eggs
- produce milk for their young
- there a 3 groups: monotremes, marsupials, and placental mammals

Reptile

- have scales and breathe with lungs
- cold-blooded (**ectotherms**)
- usually lay **amniotic** eggs on land

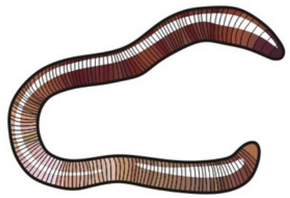
Animal Classifications

Invertebrates make up most (about 95%) of all known animal species.

Invertebrates

animals without a backbone

Worms



- are animals with flat, rounded or tube-shaped bodies and a head
- have **bilateral symmetry**
- usually have **hydrostatic** skeletons
- some worms live inside of other animals, others live in water or on land

Arthropods

- the largest animal phyla
- have **bilateral symmetry**
- usually have **exoskeletons**
- have 3 part bodies wiith: a head, a thorax and an abdomen
- most are insects and can fly
- insect arthropods go through **metamorphosis**

Cnidarians

- animals with special cells called **nematocysts** used to catch prey
- have **radial symmetry**
- have true tissues
- live in the water

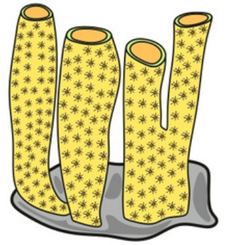
Echinoderms

- their bodies are covered with spikes or spines
- have a hard **endoskeleton**
- have tube feet
- live in salt water

Mollusks

- most have soft bodies with an external or internal shell
- have **bilateral symmetry**
- have a footlike muscle called a **mantle**

Sponges



- simple animals with few cells and no true tissues
- are asymmetrical
- take in food as water passes through their bodies
- live in water
- cannot move

Animal Behavior

Innate behaviors are those that are inherited. They are not learned.

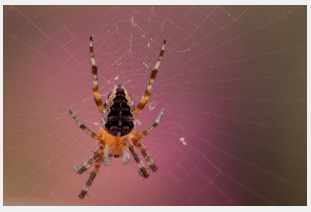
Innate Behaviors

Reflex

An action performed without thought as a response to stimulus.

Instinct

A pattern of innate behaviors that involve specific steps performed in order.



Migration

The instinctive seasonal movement of animals from one place to another.

Hibernation

Internal and external responses to periods of cold weather.

Animal Behavior

Learned behaviors are new behaviors developed through experience or practice.

Directions: Read about each learned behavior and provide an example.

Imprinting

The attachment an animal forms to another organism or place shortly after birth or hatching.

Example:

Trial and Error

The process of trying different methods before finding one that works.

Example:

Learned Behaviors

Conditioning

Behavior modification so that a response to one stimulus becomes associated with a different stimulus.

Example:

Cognitive Behavior

The process of thinking, reasoning, and solving problems.

Example:

Animal Communication Methods

Animals use communication for different purposes. They communicate to find mates, locate members of their groups, and to warn others.

Sound

Animals communicate using sounds like chirps, whistles, grunts, and clicks.

Light

Bioluminescence is the ability of certain organisms to give off light because of chemical reactions. Most of these organisms live in the ocean.

Chemicals

Pheromones are chemicals produced by one animal. They influence the behavior of another animal of the same species.

Body Language

Communication using the body to express different moods such as fear, anger, or happiness.

Animal Societies

Some animals live in highly structured societies. A society is a group of animals of the same species living and working together in an organized way.

Dominance

Members of a society with the highest social status are the dominant animal.

Submission

Members of a society with a lower social status compared to the dominant animal.

Societal Behaviors

Members of a society set up and defend areas, for feeding mating and raising their young.

Territorial Behavior

Members of a society have specific behaviors that help them attract a mate of the same species.

Courtship

Types of Development

After fertilization, a zygote begins to develop into an embryo. The embryo needs nourishment and protection. Different animals supply these needs in different ways.

External Development

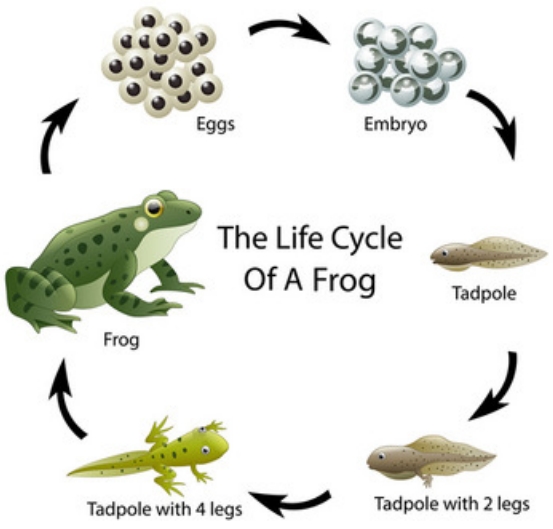
Embryos develop outside of the mother.

Internal Development

Embryos develop inside of the mother.

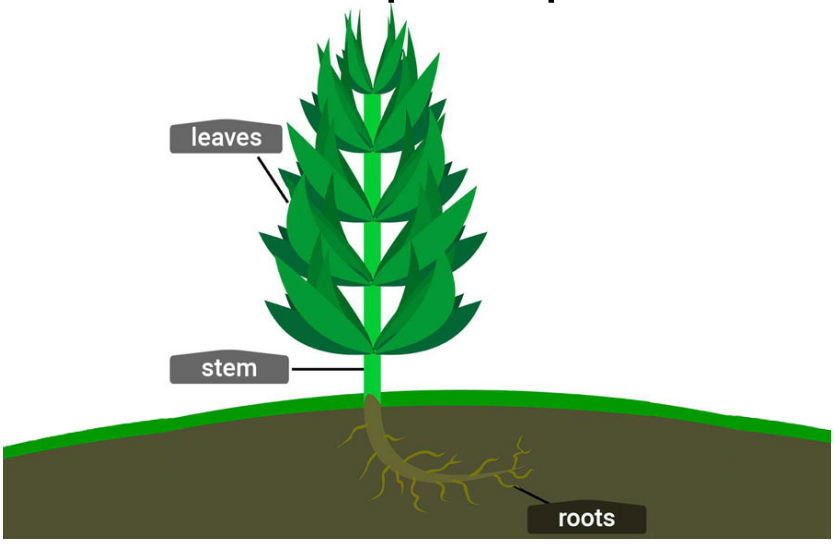
Metamorphosis

The form of the body changes as an animal grows from an egg to an adult.



Plant Structures and Function

Most plants have roots, stems, and leaves. These structures help the plants survive.



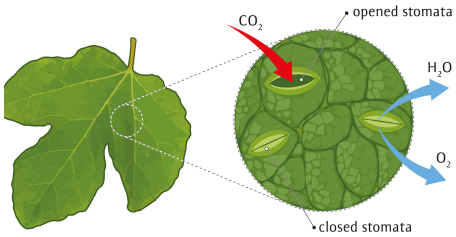
Roots

Taproots

Prop roots

Fibrous roots

Leaves



Stomata are small openings found on the leaves that allow gas exchange between plants and the atmosphere.

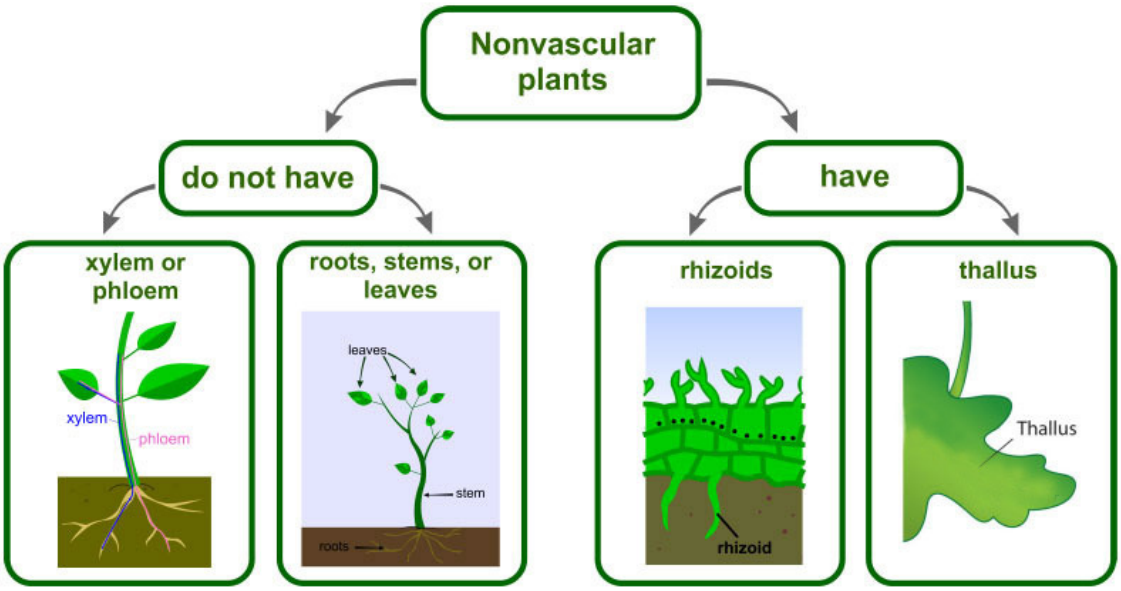
Stems

Herbaceous stem

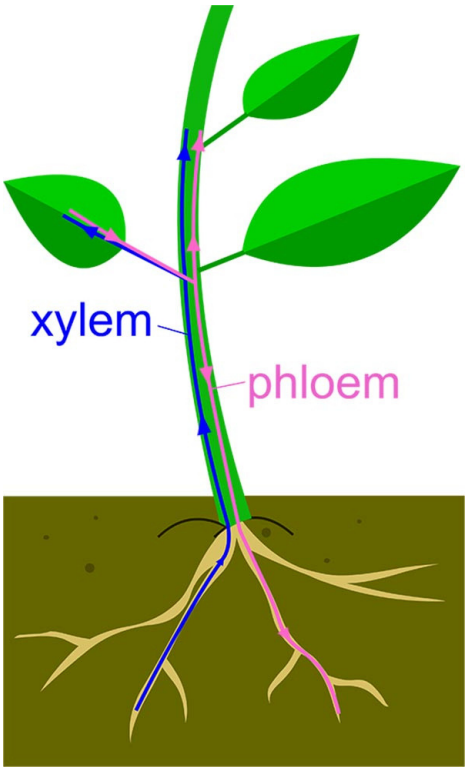
Woody Stem

Types of Plants

A nonvascular plant is a plant that does not have vascular tissue to transport water and nutrients. They do not have stems, roots, and leaves.

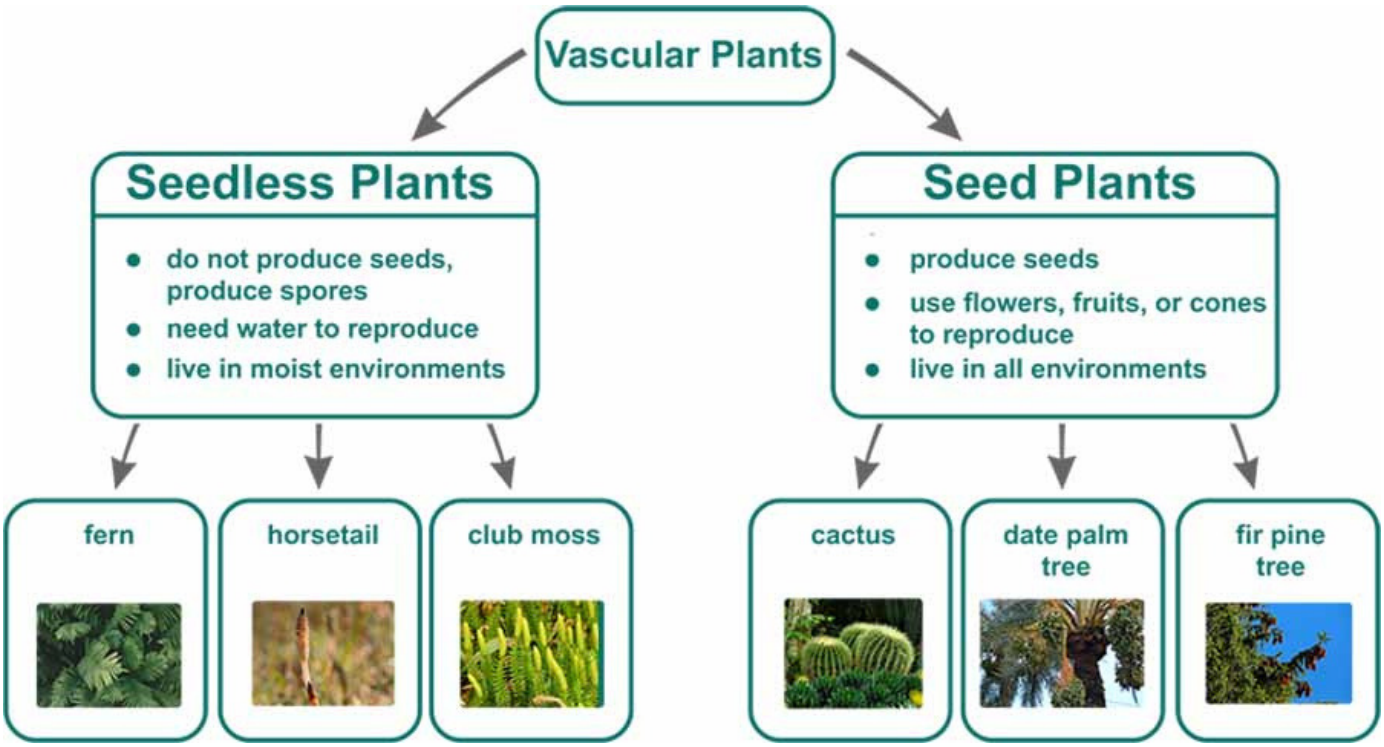


Vascular tissues found in vascular plants are tubes responsible for transporting substances throughout the plant. The two types of vascular tissues are called xylem and phloem. Xylem transports water. Phloem transports nutrients.



Vascular Plants

Vascular plants are divided into groups that produce seeds and those that do not.



THINK

What is the difference between a fern and a date palm tree?

Ferns do not produce fruit. This means they do not produce seeds.

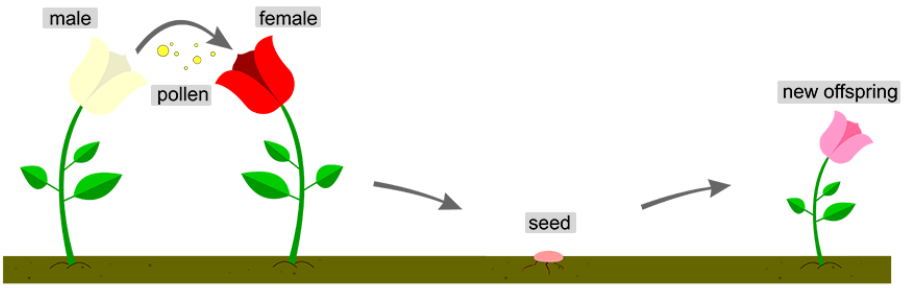
Palm trees produce fruit. This means that do produce seeds.

Plant Reproduction

All plants do not reproduce in the same way. Some plants reproduce by sexual reproduction and others by asexual reproduction.

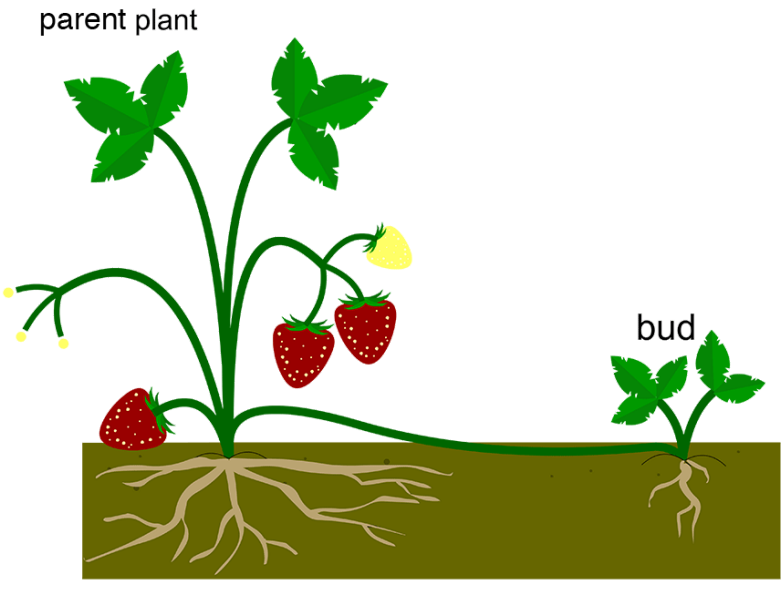
Sexual reproduction involves two parents contributing genetic material to produce unique offspring. This type of reproduction produces offspring with a different genetic makeup than the parent plant.

Sexual Reproduction



Asexual reproduction produces a new organism that is an exact copy of the parent. New plants can grow from a stem, a leaf, or another part of the parent plant.

Asexual Reproduction

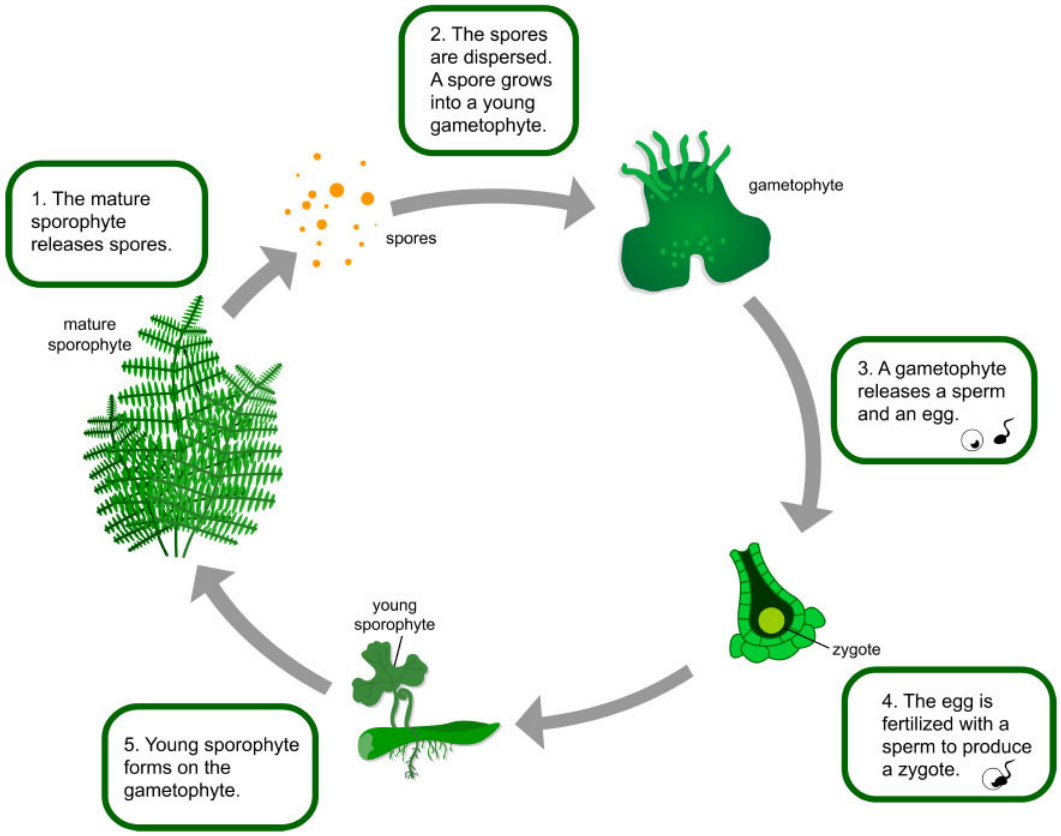


The bud is an exact copy of the parent plant.

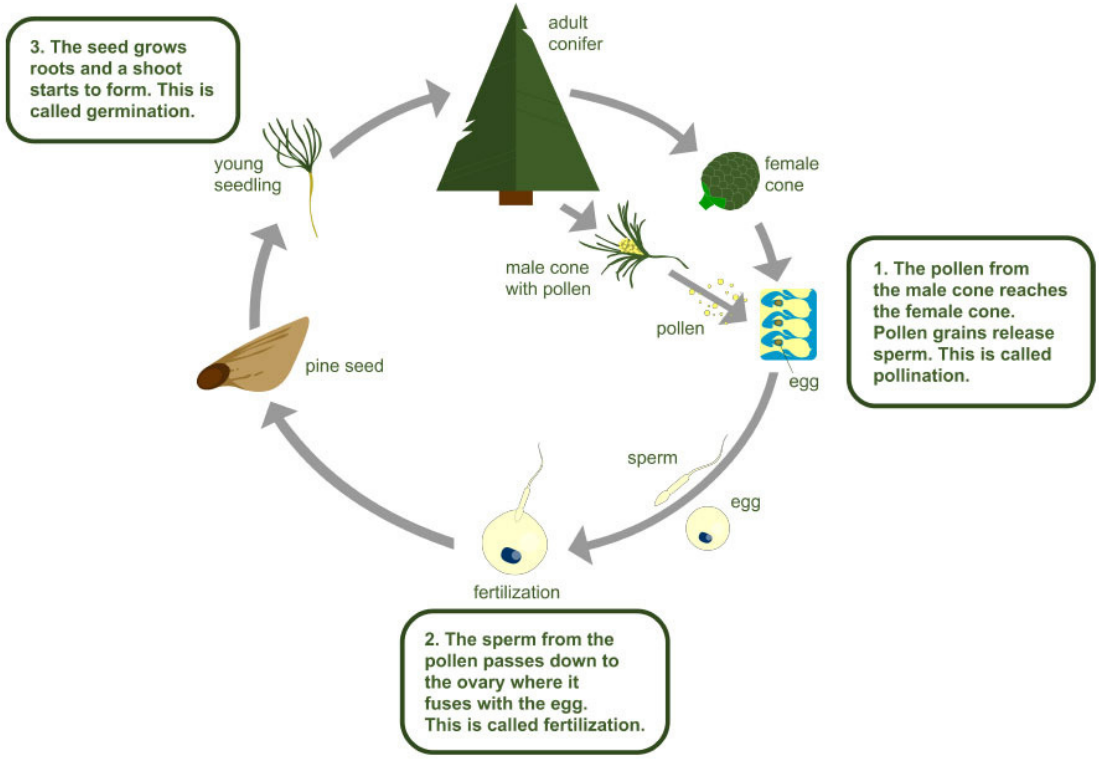
Plant Life Cycles

Some plants have seeds and flowers, and others do not. They each have a life cycle which allows them to reproduce over and over again.

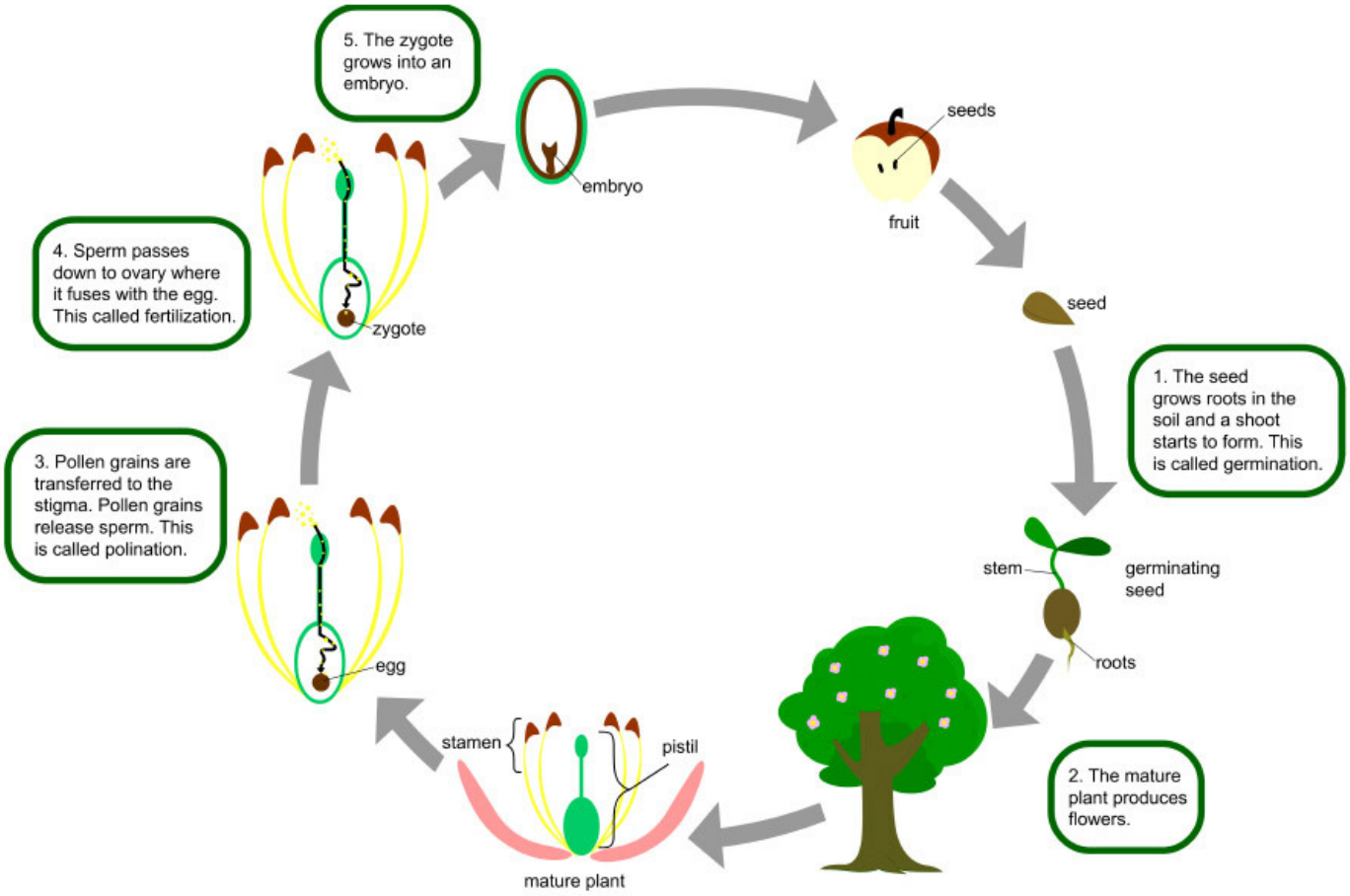
Life Cycle of Seedless Plants



Life Cycle of Gymnosperms



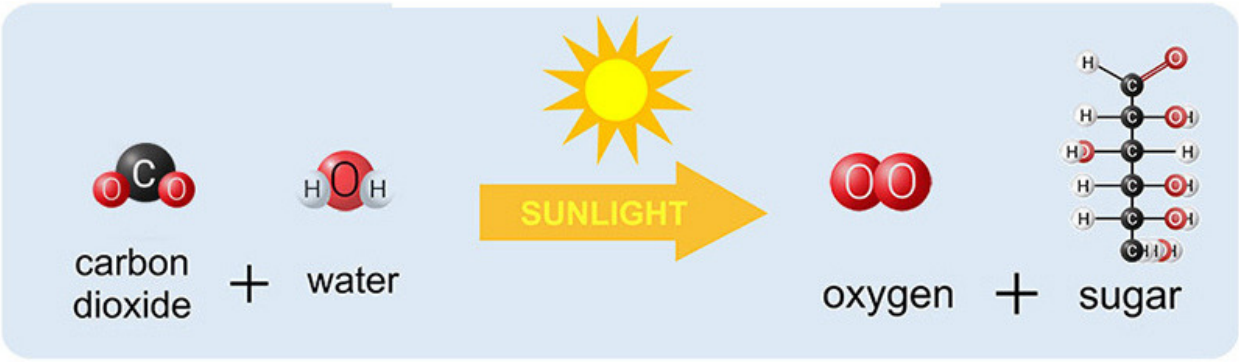
Life Cycle of Angiosperms



Plant Processes and Stimuli

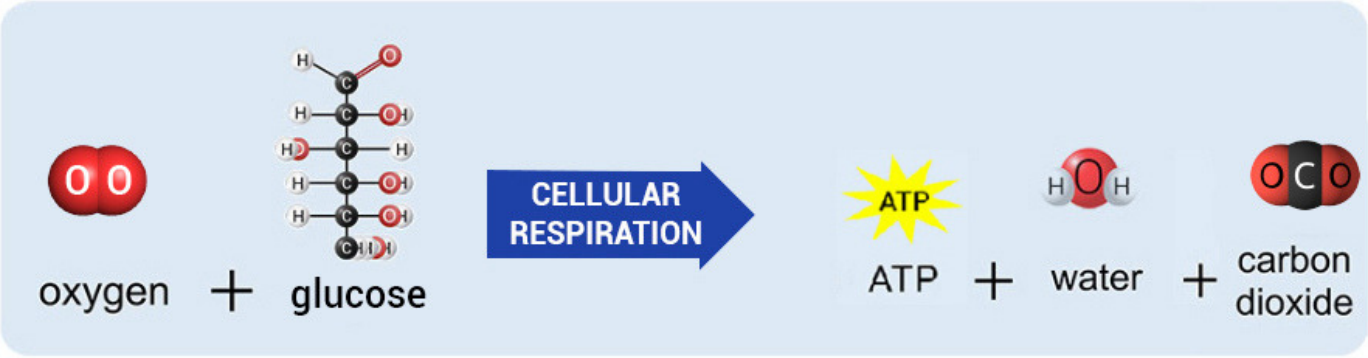
Photosynthesis is a series of chemical reactions in which plants use light energy from the sun to change carbon dioxide and water into the food energy molecule called glucose. This takes place in the chloroplasts.

Photosynthesis



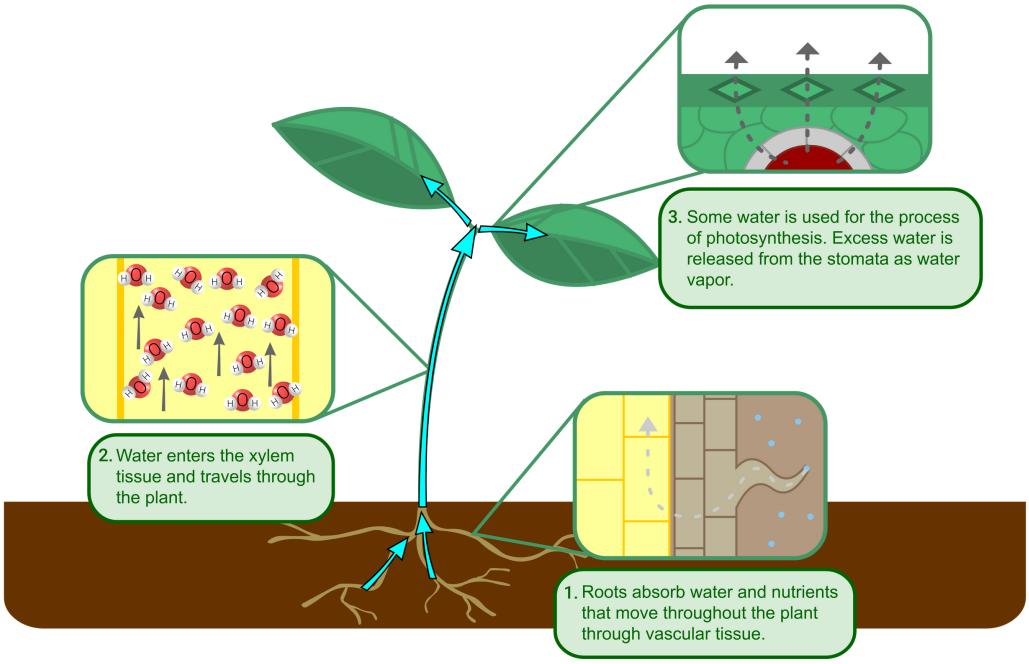
Cellular respiration is the process by which cells break down food molecules to release energy. The chemical reactions that take place during cellular respiration occur in two different parts of the cell: the cytoplasm and mitochondria.

Cellular Respiration

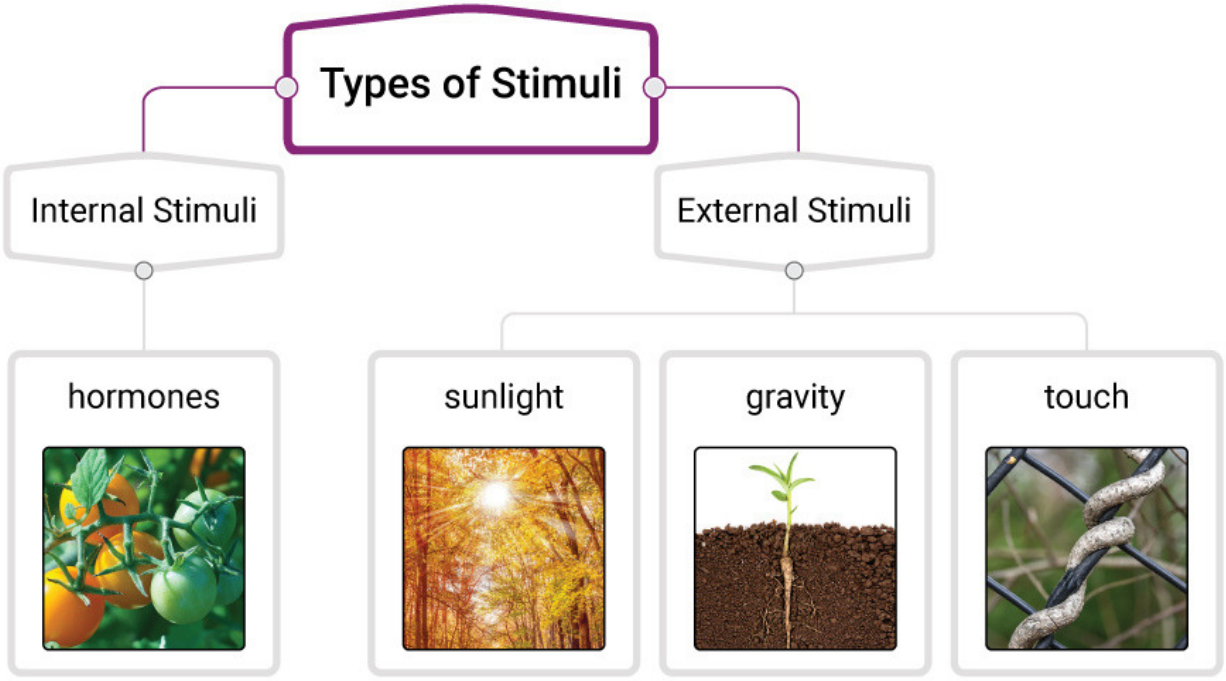


Plant Processes and Stimuli

Plants use a process called transpiration to move water taken in by roots from the soil to the rest of the plant. Transpiration is the evaporation of water that has moved from the soil, through the roots, and out of the leaves of plants.

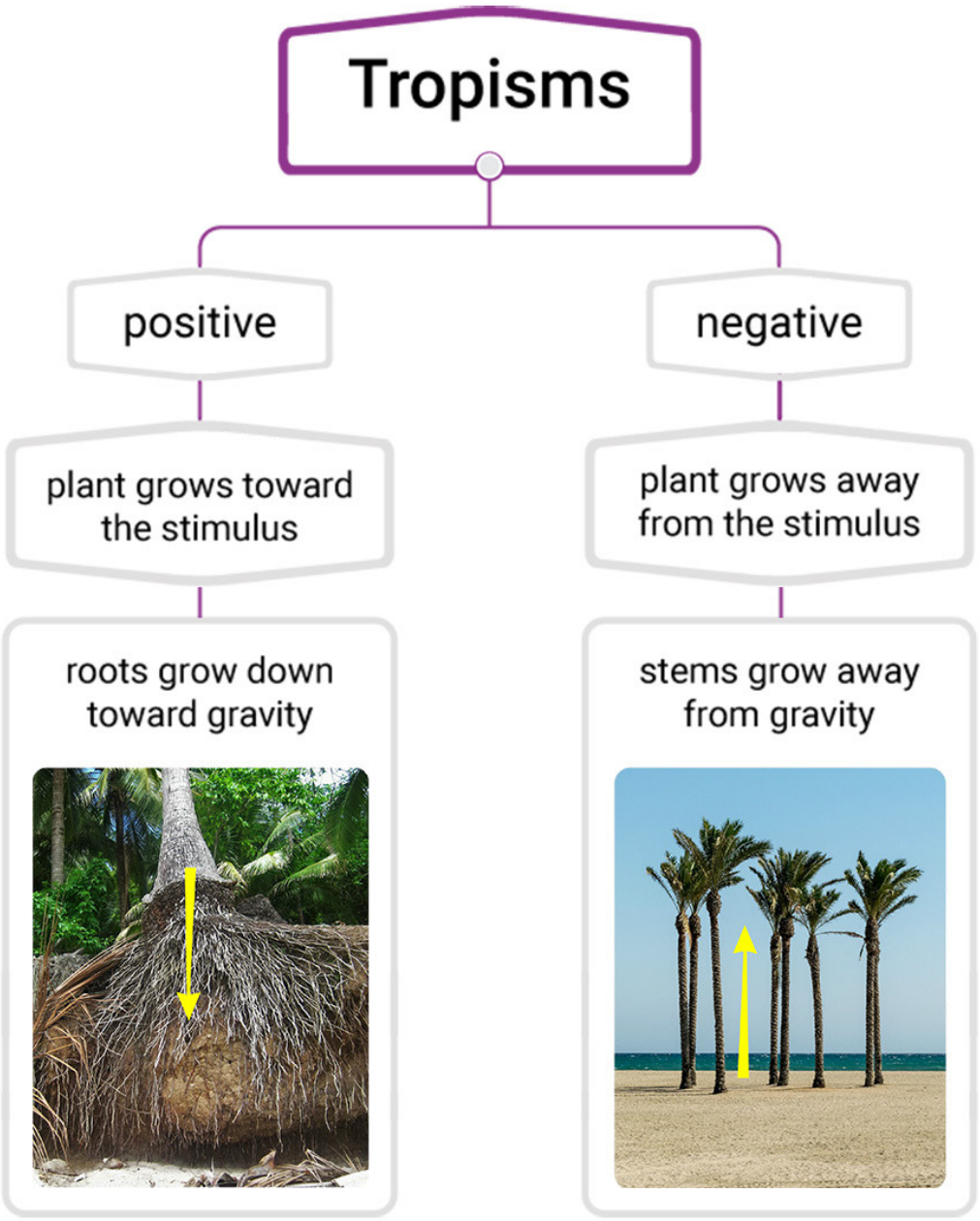


All organisms respond to changes that happen in their internal and external environment . This is known as responding to stimuli. .



Plant Processes and Stimuli

Plants respond to their environments. This is expressed in how they grow. Plant growth responses are known as tropisms.

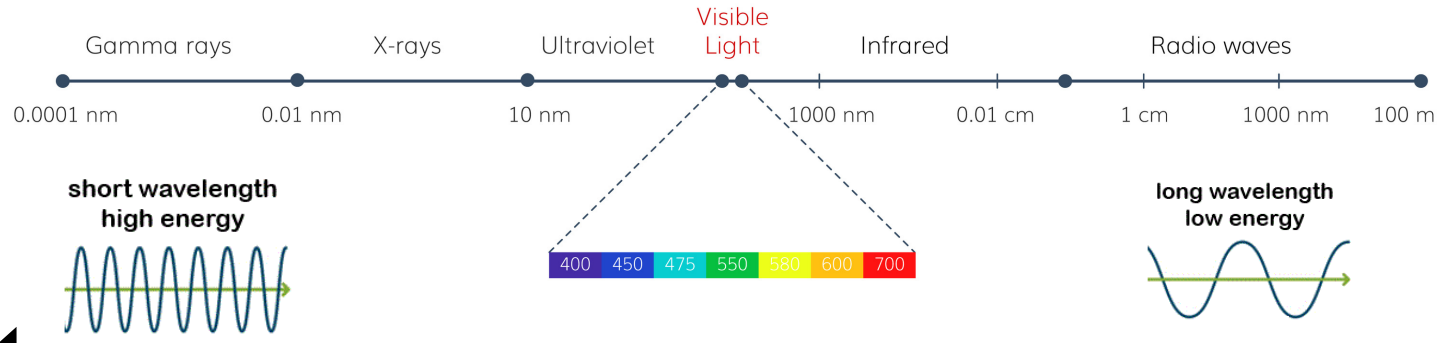


Phototropism, gravitropism and thigmotropism are growth responses, while photoperiodism is a flowering response.

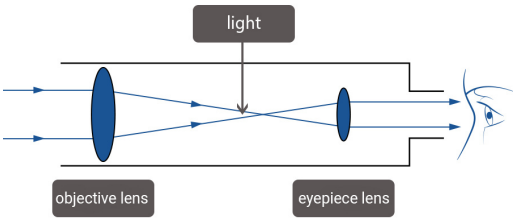
Observing the Universe

- Scientists study radiant energy from stars to learn more about the universe.
- Hot stars emit mostly short wavelengths with higher energy.
- Cool stars emit mostly long wavelengths with lower energy.

Electromagnetic spectrum



- Telescopes are tools which collect and magnify electromagnetic radiation from distant objects to produce images on Earth or in space.
- There are different types of telescopes based on the type of radiation they collect.



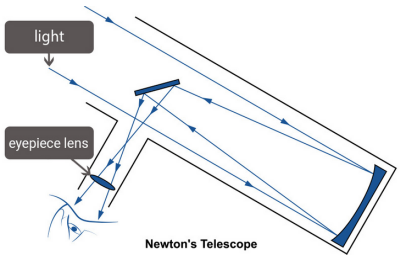
Refracting Telescope

- uses lenses

- collects visible light

Radio Telescope

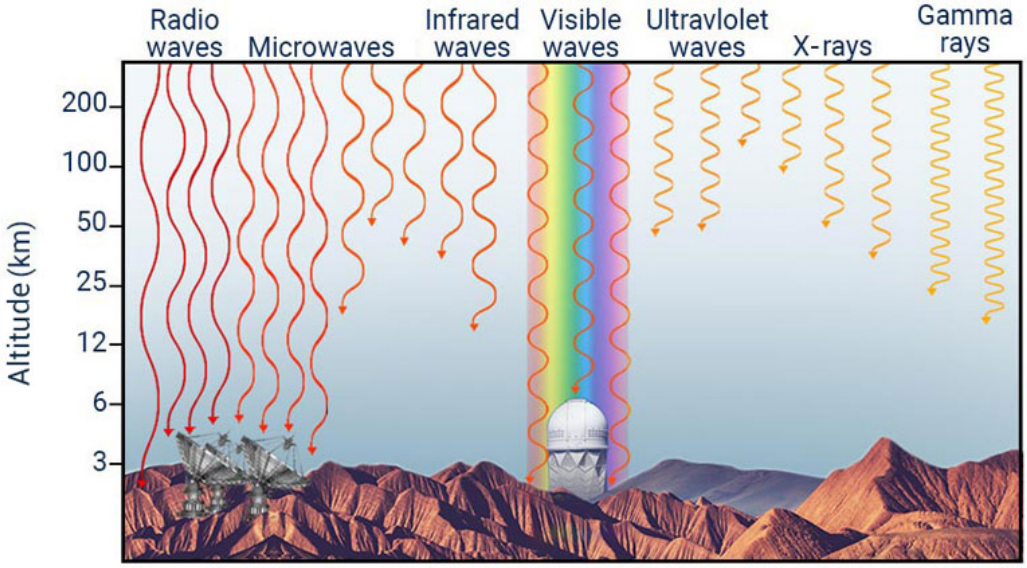
- collects radio waves & some microwaves



Reflecting Telescope

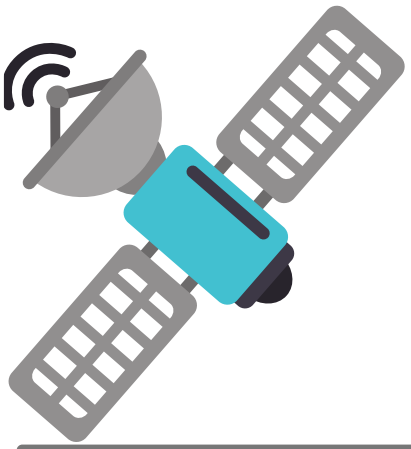
- uses mirrors

- collects visible light



SPACE TECHNOLOGY

strong, heat resistant materials needed to make missions to space possible lead to improvements in other areas.



Exploring the Universe

Past, present and future space missions involve special technology that allow spacecrafts and man to travel beyond Earth to explore the universe.

Rockets

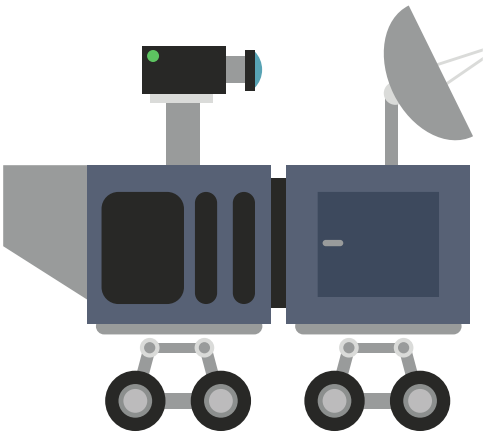
a vehicle that uses fuel exhaust to overcome gravity and propel itself into space

Artificial Satellites

man-made objects that orbit Earth or other bodies in space

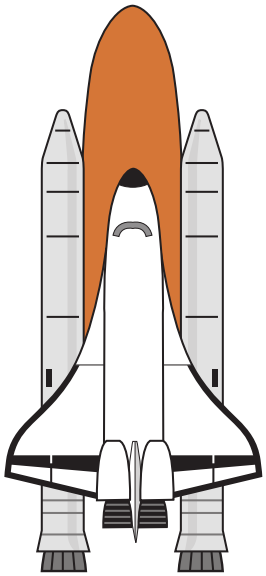
Space Probes

uncrewed spacecraft launched from Earth to explore space



Space Shuttles

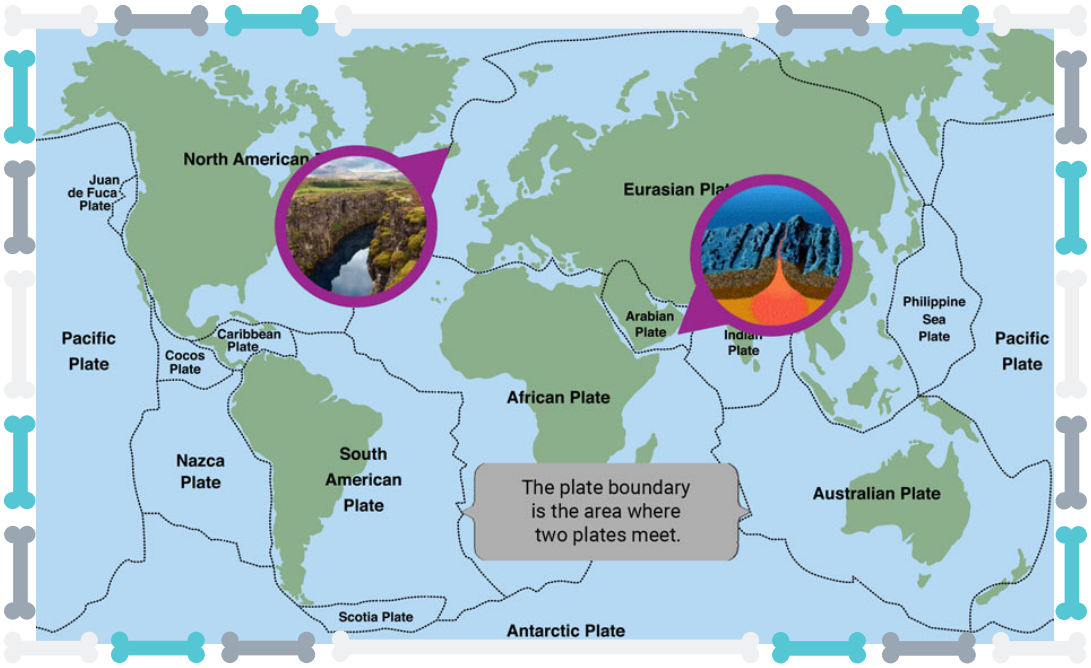
reusable spacecraft that transports people and materials to space



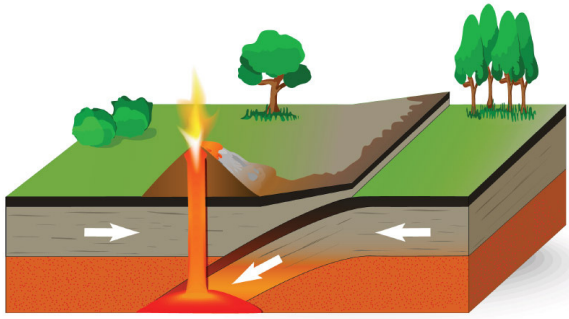
Safety, health and medical applications are a few examples:

Plate Tectonics

Plate tectonics is a theory that states that the Earth's crust is broken up into large solid plates that move slowly. These plates are known as tectonic plates.

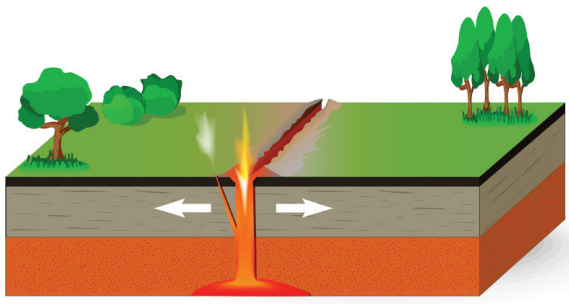


There are several types of boundaries.



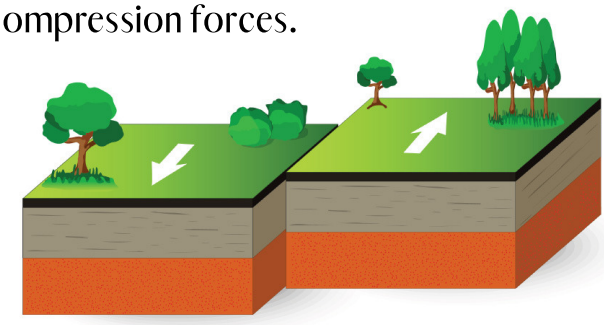
Convergent boundary

As convergent boundaries are pushed together, they cause compression forces.



Divergent boundary

As divergent boundaries are pulled apart, they cause tension forces.



Transform boundary

As transform boundaries slide past each other horizontally, they cause shear forces.

Earthquakes

An earthquake is the sudden shaking of the Earth's surface as a result of the movement of rocks along a fault in the crust.

Cause	Effect
forces build up pressure along faults →	movement of rocks occur along the fault
energy is released as rocks move →	the ground shakes causing an earthquake

The forces that act on tectonic plates must be large enough to make the crust move.

Effects of Earthquakes

mountain formation

tsunami

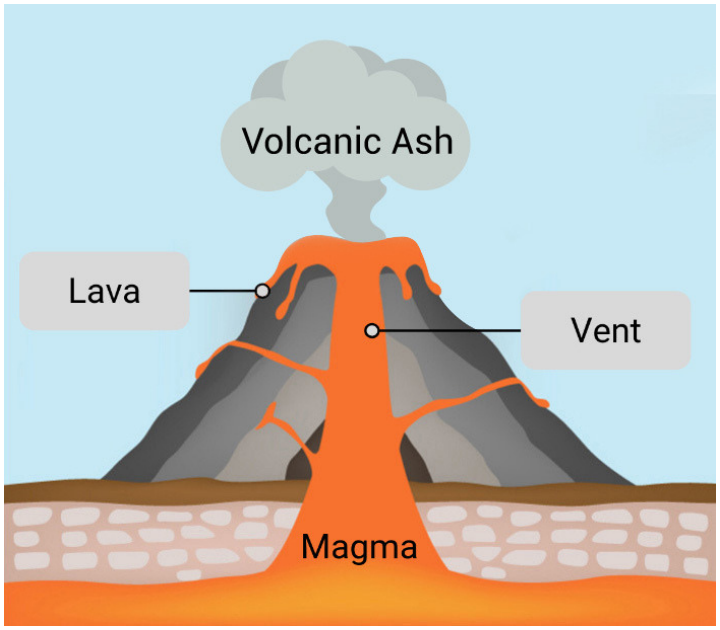
liquefaction

landslide

change Earth's surface

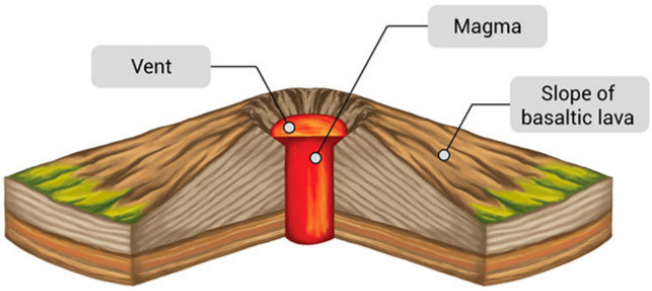
Volcanoes

A volcano is an opening in the Earth's crust that allows molten rock called magma and gases to come out to the surface.

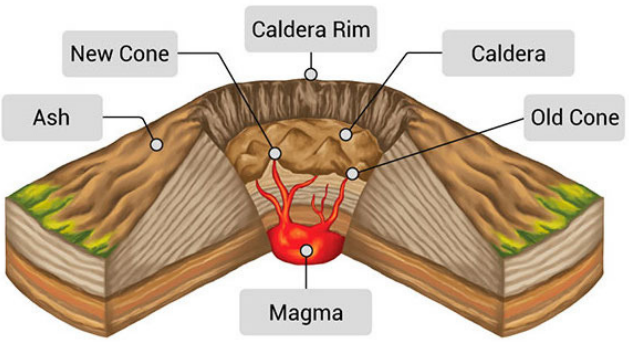


1. The magma collects in chambers under the surface.
2. As magma heats, it expands, and pressure forces it up through cracks in the Earth's crust called vents.
3. The magma reaches the surface causing volcanic eruptions.
4. The lava from the eruption cools to form new crust.
5. Volcanoes build themselves into a mountain with repeated eruptions.

Types of Volcanoes

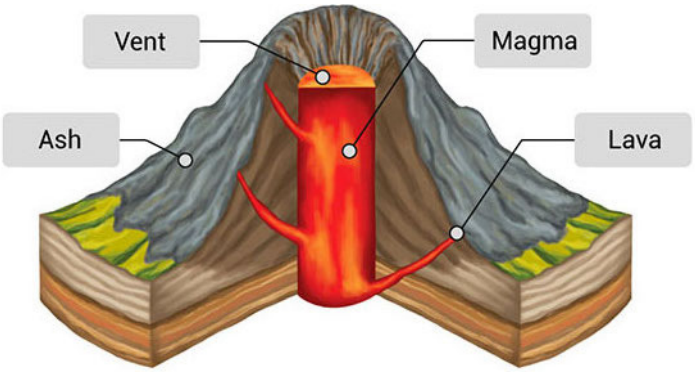


Shield Volcano



Caldera Volcano

As magma rises and builds up pressure, it can be released onto the surface of Earth in different ways. This leads to the formation of different types of volcanoes.



Composite Volcano

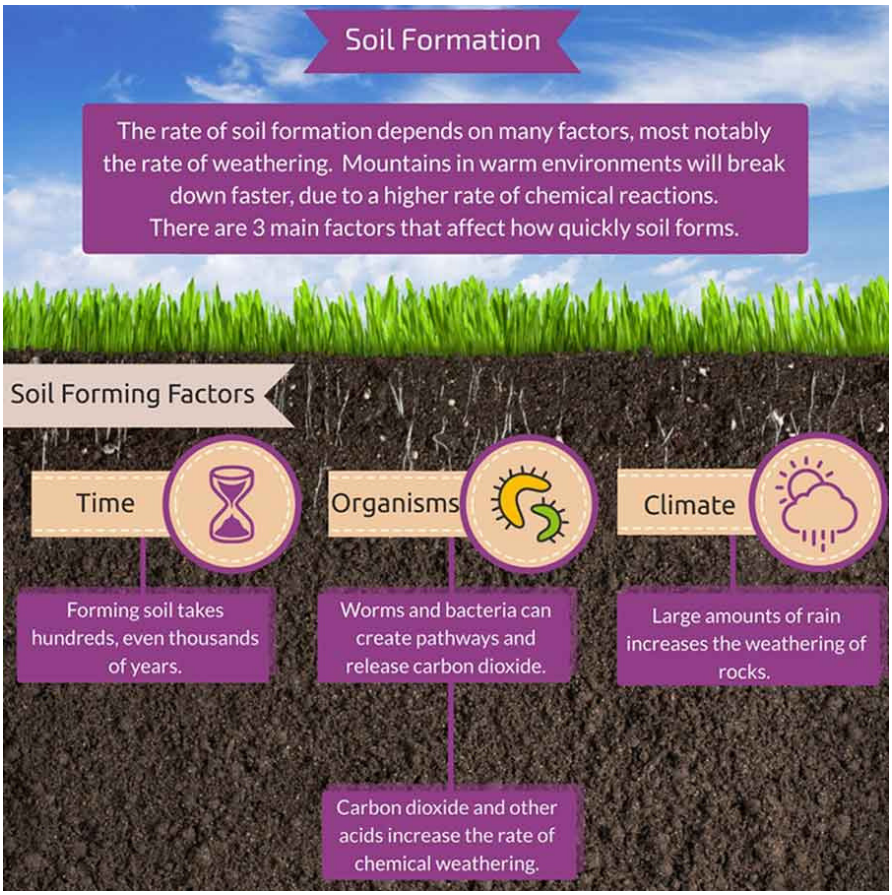
Changing Earth's Surface

The process which slowly breaks down our mountains and buildings is known as physical and chemical weathering.

Physical weathering is the process of breaking rock into small pieces without changing the composition of the rock.

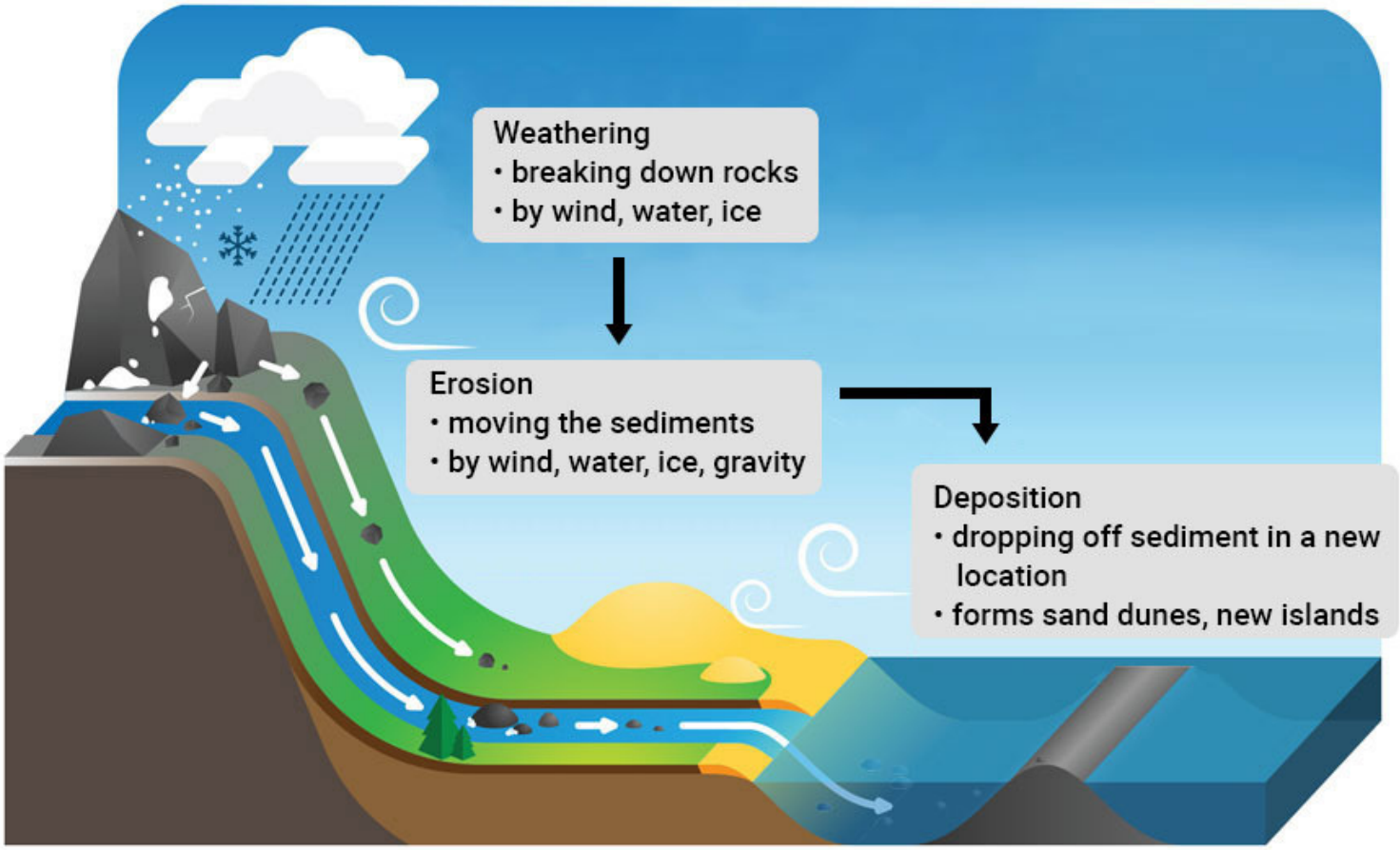
Chemical weathering is the process of chemically changing a rock's composition from exposure to gases and chemicals.

As rocks experience weathering, soil is formed on the surface of a rock.



Changing Earth's Surface

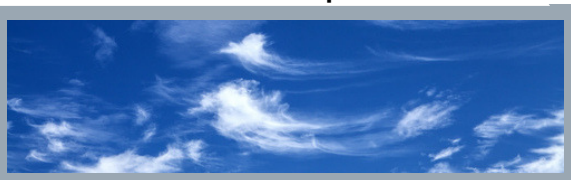
Weathering breaks down rocks into smaller particles, called sediment. The process of erosion moves this sediment by water, wind, or ice from one area to another.



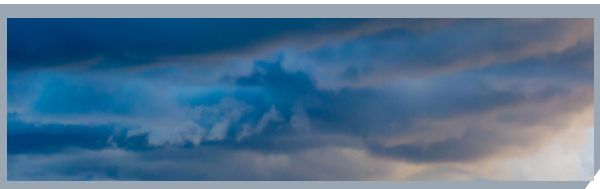
Water, wind, or ice are used for deposition. This is the process of depositing sediment and other eroded material in a new location.

EARTH'S ATMOSPHERE

Clouds are formed when water evaporates from Earth's surface, then cools and condenses in the atmosphere.

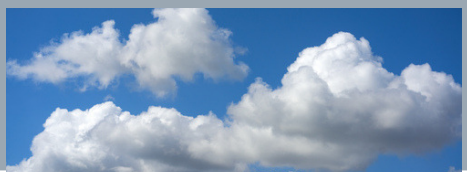


Cirrus clouds form high in the sky, are wispy and are made of ice

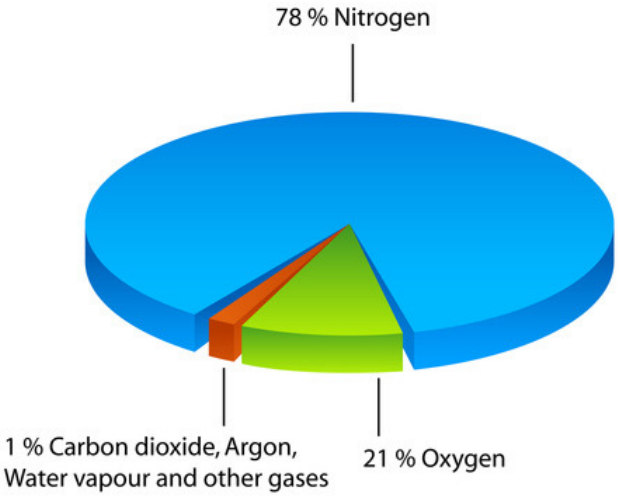


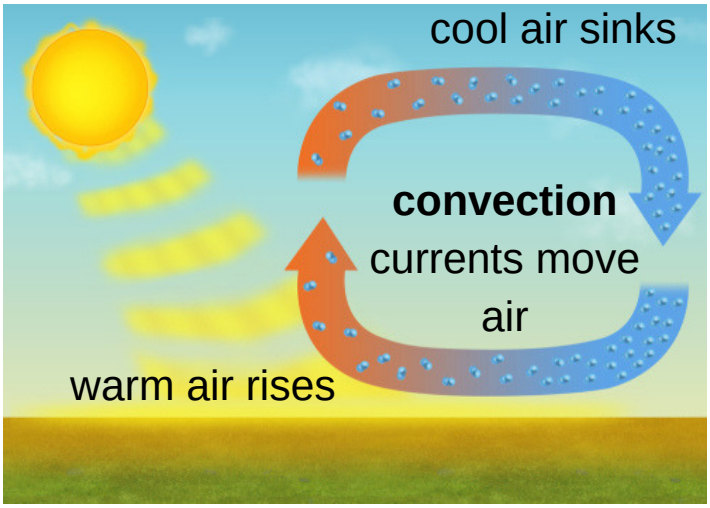
Stratus clouds form low in the sky and can bring rain

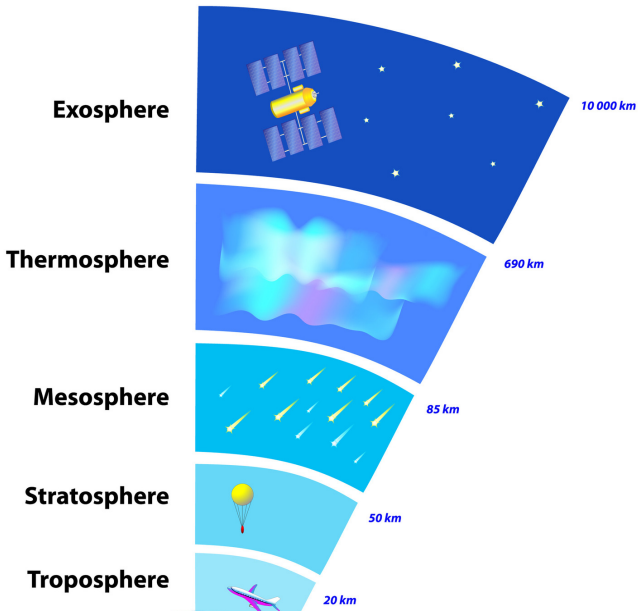
Cumulus clouds are fluffy with flat bottoms



Composition of Air







Layers of the Atmosphere

- The atmosphere is organized in layers.
- As altitude increases, air pressure within each layer decreases.
- Temperatures within each layer vary in alternating patterns.

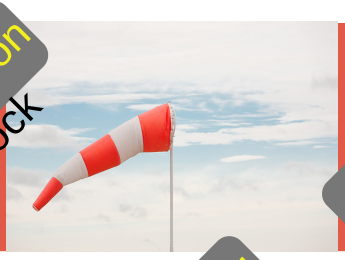
WEATHER

the conditions in the atmosphere
at specific place and time

How is weather described?

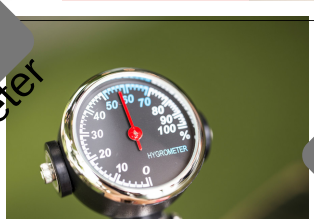
temperature — thermometer

wind direction — wind sock

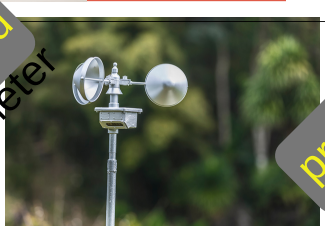


air pressure — barometer

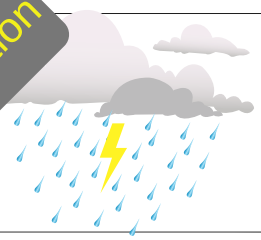
humidity — hygrometer



wind speed — anemometer

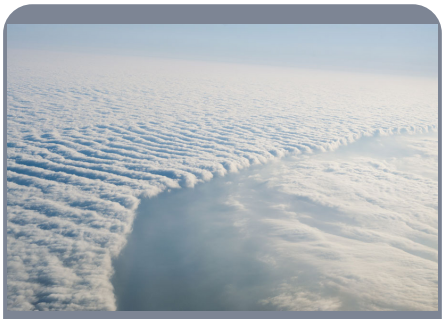


precipitation



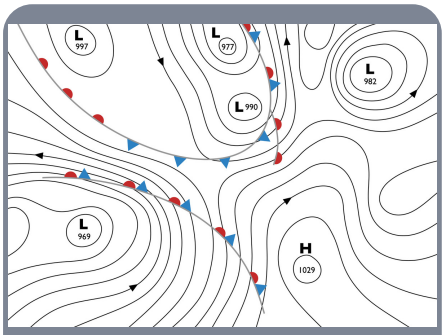
How does weather change?

Air Masses



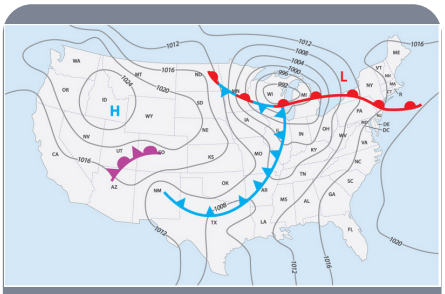
- large areas of air that have the same temperature, pressure, and humidity

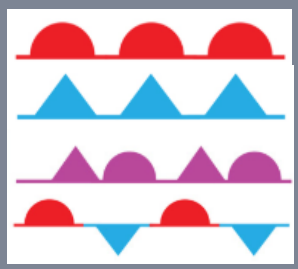
Pressure Systems



- a moving air mass with a particular pressure
- **high-pressure systems** form when cool air sinks --> bring clear skies
- **low-pressure systems** form when warm air rises --> bring storms

Fronts





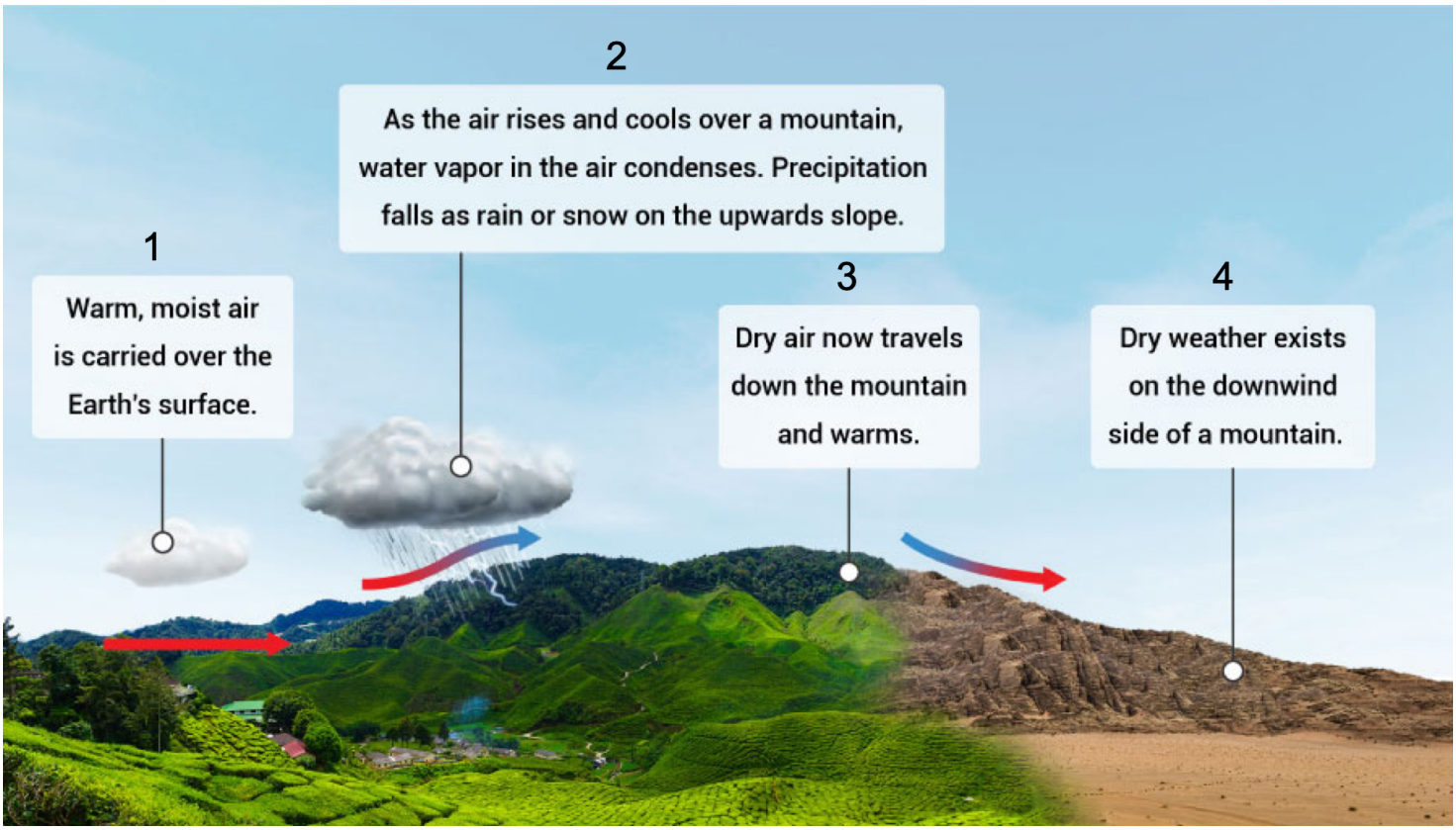
warm fronts
cold fronts
occluded fronts
stationary fronts

- boundaries where two air masses meet
- storms often occur at fronts

Earth's Climate

Weather describes the conditions of the atmosphere over short periods of time, while climate describes these conditions over longer time periods.

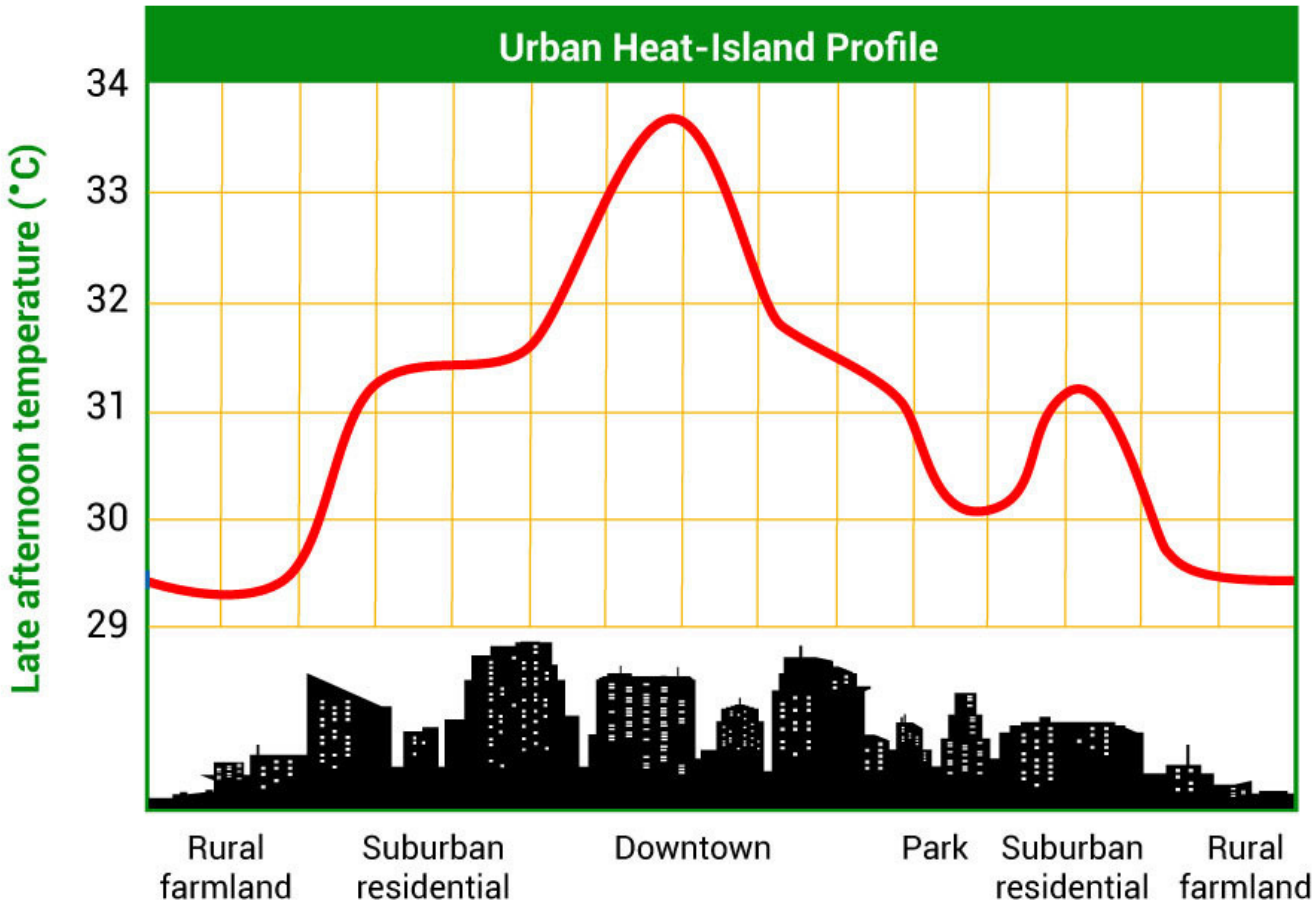
Water plays a key role in shaping the Earth, it is the main component of both weather and climate.



In addition to precipitation, the closeness of an area to large bodies of water, like oceans, also affects the climate of a location.

Earth's Climate

The geography of an area can directly affect the climate within a larger climate, this causes a microclimate.



A microclimate is a small area that has a different climate compared to its surrounding area

Part 1: Multiple Choice *Select the best choice to answer the question.*

1) Waves carry _____ through matter or empty space.
   a) particles
   b) energy
   c) water
   d) matter

2) In which type of wave do the particles of the medium move back and forth parallel to the direction the wave travels?
   a) mechanical wave
   b) longitudinal wave
   c) transverse wave
   d) electromagnetic wave

3) What is the distance between one point on a wave and the same point on the next wave referred to as?
   a) frequency
   b) wave speed
   c) amplitude
   d) wavelength

4) _____ is the height of a wave or its distance above or below the rest position.
   a) amplitude
   b) wavelength
   c) frequency
   d) wave speed

5) According to the law of reflection, which statement is true?
   a) the angle of incidence is greater than the angle of reflection
   b) the angle of incidence is equal to the angle of reflection
   c) the angle of incidence is less than the angle of reflection
   d) the angle of incidence can be greater than or less than the angle of reflection

6) Which type of wave interaction occurs when the energy of a wave does not move through, but is taken into matter and changed into thermal energy?
   a) transmission
   b) refraction
   c) absorption
   d) reflection

7) All electromagnetic waves are _____ waves.

a) longitudinal

b) transverse

c) mechanical

d) combination

Part 2: Fill-in-the-Blank *Complete each sentence by filling in the missing terms.*

Word Bank	absorbs	compression
empty space	larger	longitudinal
louder	mechanical	medium
rarefaction	reflects	refract
seven	smaller	speed
transverse		

8) Sound waves are _____ waves because they require a medium to carry their energy and are _____ waves because the medium they travel through moves parallel to the direction the wave travels.

9) There are _____ different types of electromagnetic waves, all of which can travel through matter or _____ and have _____ wave motion.

10) As a light wave moves at angle from one _____ to another it appears to bend or _____ due to a change in its _____.

11) In a sound wave, as the wave energy moves through a medium, the area in which the particles are squeezed closer together is called a _____, whereas the area in which the particles are spread out is called a _____.

12) A sound wave with a _____ amplitude carries more energy than a sound wave with a _____ amplitude which causes it have a _____ sound.

13) A glass window is _____ and can therefore _____ almost all of the light energy striking its surface.

14) An apple appears red because it _____ red light back to your eye and _____ all of the other colors of light.

Part 3: Short Answer Use your knowledge about waves to answer the questions.

15) Describe the difference in the pitch and wavelength of a sound wave that has a low frequency versus the pitch and wavelength of a sound wave that has a high frequency. Draw and label a diagram of each wave to support your explanation.

_____

_____

_____

_____

16) Compare the speed of sound waves to the speed of light waves. Describe how they each react when traveling through different types of matter.

17) Explain how the eye changes light waves to allow you to see images.

Part 1: Multiple Choice *Select the best choice to answer the question.*

1) Which characteristics are common to all animals?
   a) cell walls, ability to make their own food, multicellular
   b) collagen, muticellular, begin as a zygote, nerve cells
   c) multicellular, ability to make their own food, nerve cells
   d) photosynthesis, cell walls, chloroplasts

2) In which type of symmetry does the organism (such as a starfish) have a body plan that can be divided into two parts that are almost mirror images of each other anywhere from the center of its body ?
   a) bilateral symmetry
   b) transymmetry
   c) radial symmetry
   d) asymmetry

3) In taxonomy, which is the correct order for the classification of living things from the largest group to the smallest group?
   a) phylum, kingdom, domain, genus, species
   b) genus, phylum, domain, kingdom, species
   c) species, genus, phylum, kingdom, domain
   d) domain, kingdom, phylum, genus, species

4) What is an adaptation?
   a) a trait that helps an animal survive in its environment
   b) things animals must compete for in order to survive
   c) the way in which animals work together to keep their population alive
   d) a trait that decreases an animal's chance of survival

5) A bird's sharp claws used for hunting are an example of a _____.
   a) behavioral adaptation
   b) functional adaptation
   c) emotional adaptation
   d) structural adaptation

6) Which of the following are characteristics of invertebrates? (You may choose more than 1 answer.)
   a) they have a backbone
   b) they do not have a backbone
   c) most have hydroskeletons or exoskeletons
   d) they have endoskeletons

7) Which type of invertebrates are simple, asymmetrical and have no true tissues?
   a) arthropods
   b) cnidarians
   c) sponges
   d) roundworms

8) Which of the following are traits that all chordates have in common? (You may choose more than 1 answer.)
   a) a tail
   b) a backbone
   c) a notochord
   d) a nerve cord
   e) pharyngeal pouches
   f) an endoskeleton

9) Fish, amphibians, reptiles, birds and mammals are _____ because they have a backbone.
   a) invertebrates
   b) vertebrates
   c) chordates
   d) tunicates

Part 2: Fill-in-the-Blank: *Complete each sentence by filling in the missing terms.*

Word Bank	amphibian	asymmetry
bilateral	chordates	endotherms
exoskeleton	invertebrate	Mammals
structural	vertebrate	

10) Endoskeletons, exoskeletons, and hydrostatic skeletons are each examples of _____ adaptations.

11) Arthropods are a type of _____ that have a hard outer covering called an _____ and bodies with three parts.

12) A frog is an example of an _____. It is also considered a _____ because it has a backbone.

13) _____ are vertebrates that produce milk, have fur and are also _____ because they generate their body heat from the inside.

14) Vertebrate and invertebrate _____ both have these four traits at some point during their lifetime: a tail, a nerve cord, a notochord, and pharyngeal pouches.

15) Humans demonstrate _____ symmetry, while sponges demonstrate _____.

Part 1: Multiple Choice *Select the best choice to answer the question.*

1) Which characteristics are common to all animals?
   a) cell walls, ability to make their own food, multicellular
   b) collagen, muticellular, begin as a zygote, nerve cells
   c) multicellular, ability to make their own food, nerve cells
   d) photosynthesis, cell walls, chloroplasts

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   c) radial symmetry
   d) asymmetry

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   a) phylum, kingdom, domain, genus, species
   b) genus, phylum, domain, kingdom, species
   c) species, genus, phylum, kingdom, domain
   d) domain, kingdom, phylum, genus, species

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   a) a trait that helps an animal survive in its environment
   b) things animals must compete for in order to survive
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   d) a trait that decreases an animal's chance of survival

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   b) functional adaptation
   c) emotional adaptation
   d) structural adaptation

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   d) they have endoskeletons

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   b) cnidarians
   c) sponges
   d) roundworms

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   e) pharyngeal pouches
   f) an endoskeleton

9) Fish, amphibians, reptiles, birds and mammals are _____ because they have a backbone.
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   b) vertebrates
   c) chordates
   d) tunicates

Part 2: Fill-in-the-Blank: *Complete each sentence by filling in the missing terms.*

Word Bank	amphibian	asymmetry
bilateral	chordates	endotherms
exoskeleton	invertebrate	Mammals
structural	vertebrate	

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12) A frog is an example of an _____. It is also considered a _____ because it has a backbone.

13) _____ are vertebrates that produce milk, have fur and are also _____ because they generate their body heat from the inside.

14) Vertebrate and invertebrate _____ both have these four traits at some point during their lifetime: a tail, a nerve cord, a notochord, and pharyngeal pouches.

15) Humans demonstrate _____ symmetry, while sponges demonstrate _____.

Part 3: Short Answer *Use your knowledge about the characteristics of animals to answer the questions.*

16) Provide an example of a behavioral animal adaptation and explain how it helps the animal survive.

_____
_____
_____
_____

17) Compare ectotherms to endotherms. Name examples of each.

_____
_____
_____
_____

Chapter 8 – Animal Behavior and Reproduction

Answer the following questions.

Part A - Multiple Choice
Identify the choice that best completes the statement or answers the question.

1) _____ Which of the following choices is an example of learned behavior?
   a) instinct
   b) reflexes
   c) conditioning
   d) migration

2) _____ Which form of communication includes pheromones?
   a) light
   b) body language
   c) facial expressions
   d) chemicals

3) _____ Which of the following is the female reproductive organ?
   a) eggs
   b) sperm
   c) testes
   d) ovaries

4) _____ Animals communicate in a variety of ways including _____.
   a) migrating long distances
   b) living together in a society
   c) hibernating
   d) making chemicals

5) _____ When a baby kangaroo is born, it crawls into its mother's pouch for safety. What type of behavior is this?
   a) cognitive behavior
   b) innate behavior
   c) trial and error
   d) imprinting

6) _____ A wolf shows its teeth to a group of humans. Which type of behavior is displayed?
   a) courtship
   b) submission
   c) dominance
   d) aggression

7) _____ What is the length of time between fertilization and birth called?
   a) zygote
   b) metamorphosis
   c) external development
   d) gestation period

8) _____ Body language is an example of _____.
   a) society
   b) migration
   c) communication
   d) conditioning

9) _____ Which of the following is an example of external stimuli?
   a) stress
   b) communication
   c) trial and error
   d) instinct

10) _____ Which of the following is an example of learned behavior?
   a) imprinting
   b) instincts
   c) reflexes
   d) hibernation

Part B - Fill-in-the-Blank
Using the word bank, fill in the blank with the correct answer.

metamorphosis	*bioluminescence*	*zygote*

11) _____ is the ability for certain living things to give off light.

12) _____ is the process that transforms the body of an organism as it develops from an egg to an adult.

13) A _____ is the new cell formed when male reproductive cells fertilize an egg.

Part C - Short Answer
Answer each question using the space provided.

14) Explain the difference between submissive and dominant behavior in animals.

15) Explain the difference between internal and external development of a zygote of an animal. Provide examples of each type of development.

16) Describe how an animal's behavior can help it maintain homeostasis.

Chapter 9 – Introduction to Plants

Part A - Multiple Choice

Identify the choice that best completes the statement or answers the question.

1) _____ Which of the following best defines an angiosperm?
   a) plants that produce flowers and develop fruit
   b) plants that produce seeds and no fruit
   c) process that occurs when pollen grains join with female plant structure of the same species
   d) periods of no growth in plants

2) _____ Which of the following is an example of internal stimuli in plants?
   a) light
   b) touch
   c) hormones
   d) gravity

3) _____ What is it called when a plant grows toward a light source?
   a) transpiration
   b) thigmotropism
   c) gravitropism
   d) phototropism

4) _____ Which of the following terms describes a plant's response to the total hours of darkness in its environment?
   a) photoperiodism
   b) phototropism
   c) cellular respiration
   d) photosynthesis

5) _____ Substances that behave as chemical messengers within plants are called _____.
   a) stimuli
   b) plant hormones
   c) pollen
   d) rhizomes

6) _____ Which substance is broken down during cellular respiration to release energy?
   a) glucose
   b) water
   c) carbon dioxide
   d) nitrogen

7) _____ Which process produces carbon dioxide, water, and ATP?
   a) photosynthesis
   b) chlorophyll
   c) transpiration
   d) cellular respiration

8) _____ Which structure is a part of the sporophyte stage in the life cycle of a fern?
   a) spores
   b) mature fern plant
   c) male reproductive cells
   d) female reproductive cells

9) _____ Which of the following stages are a part of the life cycle of all plants?
   a) gametophyte and sporophyte stage
   b) pistil and stamen
   c) seed and gametophyte
   d) cone and seed

Part B - Fill-in-the-Blank
Using the word bank, fill in the blank with the correct answer.

rhizoids	*vascular plants*	*root*

10) _____ have vascular tissues that allow water and nutrients to be transported throughout a plant.

11) Plants are anchored to the soil and able to grow by their ____ systems.

12) Plant structures that anchor plants without transport tissues to a surface are called _____.

Part C - Short Answer
Answer each question using the space provided.

13) Explain how the life cycle of a fern is different from the life cycle of a conifer.

_____

_____

_____

14) Describe how roots and rhizoids are similar to one another.

15) How are gymnosperms different from angiosperms?

Part 1 Multiple Choice: *Choose the best choice(s) to answer the question.*

1) How does the radiant energy from stars travel through space?
   a) in the form of electromagnetic waves
   b) on rockets launched from space
   c) in the form of mechanical waves
   d) through optical space telescopes

2) What type of electromagnetic radiation do cooler stars mostly emit?
   a) gamma rays
   b) radio waves
   c) x-rays
   d) ultraviolet waves

3) What is the speed of light at which all electromagnetic waves travel?
   a) 3,000 km/s
   b) 3,000,000 km/s
   c) 300, 000 km/s
   d) 300 km/s

4) Which types of radiant energy can Earth-based telescopes detect? (You may choose more than 1 answer.)
   a) gamma rays
   b) radio waves
   c) x-rays
   d) ultraviolet waves
   e) microwaves
   f) visible light

5) What is the best location to place radio telescopes to collect radio waves from space?
   a) within cities
   b) on mountains
   c) near radio stations
   d) dry remote deserts

6) What are two reasons why space telescopes are better at collecting electromagnetic radiation and creating images than are Earth-based telescopes?
   a) they can collect all types of electromagnetic radiation
   b) they can only collect the types of radiation not absorbed by the atmosphere
   c) there is distortion and interference caused by the water vapor and gases in the atmosphere
   d) they are above Earth's atmosphere where the sky is darker and there is no weather

7) Which of the following are launched into space by rockets? (You may choose more than 1 answer.)
   a) moons
   b) artificial satellites
   c) people
   d) space probes

8) What is the difference between a space probe and a space shuttle?
   a) a space probe is an unmanned spacecraft not designed to return to Earth, while a space shuttle is a spacecraft used to transport people to and from space
   b) both space space probes and space shuttles transport people and materials to space
   c) a space shuttle is used to carry space probes into space and then the shuttle returns while leaving the probe to explore space
   d) a space probe is a type of space shuttle that transports supplies into space

Part 2: Fill-in-the-blank *Complete the sentences with the missing terms.*

Word Bank	Astrobiology	extraterrestrial life
International Space Station	liquid water	lunar
reflecting telescope	refracting telescope	Sun
Technology		

9) _____ developed for space, such as the materials used in spacesuits have been used for everyday applications such as sport clothing and firefighting gear.

10) Solar probes collect information about the _____, while _____ probes collect information about the moon to help scientists better understand their characteristics.

11) _____ is the study of life in the universe which includes the study of the possibility of life beyond Earth known as _____.

12) A _____ uses mirrors to focus light and produce images, while a _____ uses convex lenses to focus light and produce images.

13) Organic molecules, a source of energy and _____ are conditions needed in order for life to exist on Earth.

14) The _____ is a research laboratory orbiting Earth where astronauts work and live.

Part 3: Short Answer *Use your knowledge about space exploration to answer the questions.*

15) List the different types of electromagnetic waves in order from shortest wavelength to longest wavelength.

_____

_____

_____

_____

16) Describe some of the challenges of carrying out missions to the outer planets.

17) Explain how space exploration has benefited us in our everyday lives.

Chapter 11 – Earth's Changing Surface

Answer the following questions.

Part A - Multiple Choice
Identify the choice that best completes the statement or answers the question.

1) _____ Which of the following can be caused by an earthquake?
   a) tsunami
   b) hot spot
   c) weathering
   d) caldera

2) _____ Identify the squeezing force at convergent boundaries.
   a) tension
   b) shear
   c) compression
   d) subduction

3) _____ Glaciers deposit sediment and create _____.
   a) sand dunes.
   b) moraines.
   c) sedimentary basins.
   d) flood plains.

4) _____ When is volcanic ash produced?
   a) during lava flows
   b) during subduction
   c) during explosive eruptions
   d) at liquefactions

5) _____ When two plates collide, and one is denser than the other they form a subduction zone. What type of landform usually forms at this type of plate boundary?
   a) mountain
   b) earthquake
   c) volcano
   d) tsunami

6) _____ The surface along which the Earth's crust moves is called a _____.

a) fault
b) landslides
c) mudslides
d) hot spots

7) _____ Which of the following occurs because of the sudden movement of rocks along a crack in the Earth's crust?

a) earthquakes
b) lava flows
c) volcanic eruptions
d) convections

8) _____ When tectonic plates move towards each other, this is called a _____ boundary.

a) divergent
b) convergent
c) transform
d) subduction zone

Part B – Fill-in- the- Blank

Using the word bank, fill in the blank with the correct answer.

hot spots	*deposition*	*plate tectonics*	*physical weathering*

9) The theory of _____ states that Earth's surface is broken into plates that move with respect to each other.

10) Volcanoes can form along mid-ocean ridges, convergent boundaries and also above _____.

11) The process that breaks down rock but does not change its composition is called _____.

12) Sediment is removed by erosion. _____ lays down sediment in a new location.

Part C - Short Answer

Answer each question using the space provided.

13) Explain how earthquakes and volcanoes change Earth's surface.

_____
_____
_____
_____

14) What are the factors that affect the formation of soil?

15) Provide evidence that the continents have moved.

16) What is the difference between erosion and weathering?

Part 1: Multiple Choice *Select the best choice to answer the question.*

1) Identify the layers of the atmosphere in order from the Earth's surface.
   a) exosphere, mesosphere, thermosphere, troposphere, stratosphere
   b) mesosphere, troposphere, exosphere, stratosphere, thermosphere
   c) troposphere, stratosphere, mesosphere, thermosphere, exosphere
   d) stratosphere, thermosphere, troposphere, mesosphere, exosphere

2) Which gas is present in the Earth's atmosphere in the largest amounts?
   a) oxygen
   b) nitrogen
   c) carbon dioxide
   d) argon

3) What is the main difference between local winds and global winds?
   a) local winds blow over short distances, while global winds affect large areas around the Earth
   b) local winds only occur during specific times of the year, whereas global winds occur all year long
   c) global winds are caused by differences in air pressure, while local winds are not
   d) global winds move across the Earth due to convection currents, but local winds move because of global winds

4) Which process provides the water needed in the atmosphere for clouds to form?
   a) sublimation
   b) condensation
   c) precipitation
   d) evaporation

5) What are rain, sleet, snow and hail examples of?
   a) precipitation
   b) winds
   c) seasons
   d) weather

6) The place where two air masses meet is called a(n) _____.
   a) pressure system
   b) air mass boundary
   c) front
   d) stationary front

7) Which of the following are examples of measurements that are used to describe weather? (You may choose more than 1 answer.)
   a) temperature
   b) location
   c) wind speed
   d) time of year
   e) humidity

8) Which type of clouds do thunderstorms form from?
   a) cirrus
   b) cumulus
   c) cumulonimbus
   d) stratocirrus

9) Which of the following are associated with hurricanes?
   a) drought
   b) storm surges
   c) heavy snow
   d) heat exhaustion

Part 2: Fill-in-the-Blank *Complete each sentence by filling in the missing terms.*

Word Bank	anemometer	convection
Cumulus	decreases	higher pressure
high-pressure systems	increases	Lightning
lower pressure	low-pressure systems	Sun
tornadoes	wind sock	

10) As the altitude within Earth's atmosphere _____, air pressure _____.

11) _____ clouds look like puffy cotton balls in the sky.

12) Winds move from areas of _____ to areas of _____.

13) Energy from the _____ creates the uneven heating of Earth's surface which causes _____ currents to form in the atmosphere resulting in the movement of air.

14) A _____ is used to find wind direction and an _____ measures wind speed.

15) Clear skies are associated with _____, while _____ are associated with storms and precipitation.

16) _____ and thunder are common during thunderstorms. However, _____ can also form when warm air rises quickly and begins to rotate into a funnel cloud.

Part 3: Short Answer *Use your knowledge about weather and the atmosphere to answer the questions.*

17) Explain how winds are formed in the troposphere.

18) Compare the formation of a hurricane to the formation of a thunderstorm. How are they alike and different?

19) Describe the steps that lead to the formation of clouds.

Chapter 13 – Climate

Part A – Fill-in-the-Blank
Using the word bank, fill in the blank with the correct answer.

Deforestation	*monsoon*	*solstice*	*climate*

1) During a _____ the Earth's axis is either tilted towards or away from the sun.

2) The process of large scale cutting or burning of forests is called _____.

3) _____ is the long-term average weather conditions of a particular region.

4) A wind circulation pattern that changes direction with the seasons is called a _____.

Part B. Multiple Choice.
Identify the choice that best completes the statement or answers the question.

5) _____ Which of the following is a set of equations used to predict future climates?
a) global climate model
b) aerosols
c) microclimate
d) prevailing winds

6) _____ Which of the following helps keep temperatures on Earth warm enough for living things to survive?
a) oxygen
b) water vapor molecules
c) greenhouse gases
d) methane

7) _____ Identify the cause of seasonal changes on Earth.
a) Earth's ocean currents.
b) Earth's distance from the sun.
c) Earth's tilt on its axis.
d) Earth's prevailing winds.

8) _____ Which climate usually has warm summers, cold winters, and moderate precipitation?
a) tropical
b) dry
c) continental
d) polar

9) _____ What is the name of the periods that took place in between ice ages?

a) equinox
b) interglacial
c) El Niño
d) drought

10) _____ Which statement explains El Niño/Southern Oscillation?

a) Earth's axis tilts
b) The Pacific Ocean pressure pattern reverses.
c) The trade winds stop blowing.
d) A shift in the interglacial climate.

11) _____ What is it called when hot air masses remain in an area for weeks or months at a time, resulting in below-average precipitation?

a) monsoon
b) drought
c) global warming
d) El Niño

12) _____ The increase in the Earth's average temperature over the last 100 years is called _____.

a) greenhouse gases
b) deforestation
c) global warming
d) rain shadows

13) _____ What can humans do to reduce greenhouse gas emissions?

a) cut down forests
b) burn fossil fuels
c) drive hybrid vehicle
d) build houses on permafrost

Part C - Short Answer

Answer each question using the space provided.

14) Name three types of climate, and explain factors that affect the climate in a region.

_____

_____

_____

_____

_____

15) What is the difference between an equinox and a solstice?

16) Explain two ways that deforestation contributes to the greenhouse effect.