8th grade Science STAAR Review

Objective 4: Organisms & Environment

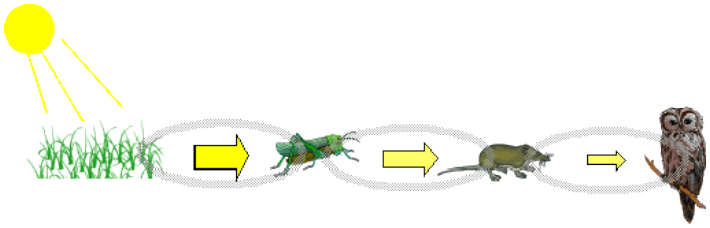
8.11 A describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems

ECOSYSTEM - an **ecosystem** includes the **biotic** (living) and **abiotic** (non - living) parts of the environment.

Food Chain

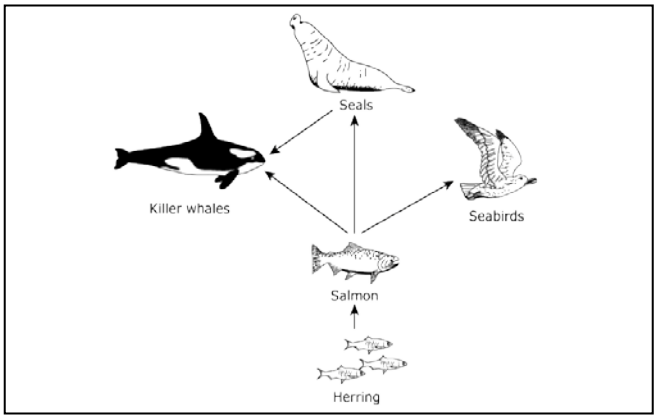
The path of food energy from the sun to the producer then transferred to a series of consumers

Arrows show the flow of **energy**.



Note: The sun provides energy to plants to produce food in the process called **Photosynthesis.**

Food Web - A model that shows all the possible feeding relationships between organisms living in an ecosystem.



Energy flows through various food chains as animals eat plants and predators consume prey, creating a food web. The energy that flows though food chains and food webs comes from the Sun.

Trophic levels of organisms in a food web range from primary producers (autotrophs), and different levels of heterotrophs, including primary consumers (herbivores), secondary consumers (carnivores that eat herbivores), and tertiatry consumers (carnivores that eat carnivores).

AQUATIC ECOSYTEMS

Aquatic ecosystems include freshwater and marine biomes and constitute the largest part of the biosphere. In marine ecosystems, phytoplankton are autotrophic producers and are consumed by zooplankton and small invertebrates, which are consumed secondarily by fish and larger marine life.

Question: What is the main difference between freshwater and marine ecosystems?

_____

_____

Question:
Give an example of a predator/prey in this ecosystem.

_____

_____

TERRESTRIAL ECOSYSTEMS

A **terrestrial ecosystem** is an ecosystem that is found on land.

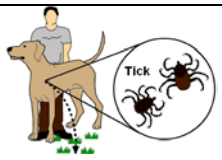
In terrestrial ecosystems, the primary producers are plants, which are consumed by insects, arthropods, and grazing animals. Secondary consumers include spiders, frogs, and carnivorous animals.

Question:
Give an example of a predator/prey in this ecosystem.

_____

_____

Symbiosis

Parasitism is an interaction between two organisms, in one organism benefits (the parasite) and the other organism is harmed (host).	
Mutualism is an interaction between two organisms, in which there is benefit to both.	
Commensalism is an interaction between two organisms, in which one benefits and the other is not affected.	

Words you need to know:

A **producer** is an organism that is able to produce its own food, usually by using energy from sunlight to make sugars (**photosynthesis**).	 Ex: plants
A **consumer** is an organism that eats other organisms for energy.	 Ex: herbivores, carnivores, omnivores, and scavengers
A **decomposer** is an organism that gets energy by breaking down the remains of dead organisms or organic wastes and consuming or absorbing nutrients (recycle nurients) .	  Ex: fungi and bacteria

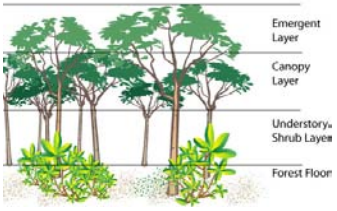
A **herbivore** is an organism that consumes only plants	 Ex: Giraffe, rabbits, cows
A **carnivore** is an organism that consumes other animals	 Ex: hawks, tigers
An **omnivore** is an organism that consumes both plants and animals	 Ex. Humans, bears
A **parasite** is an organism that survives on a host organism and causes harm to the host.	 Ex. Insects that eat tomatoes
A **host** is an organism that is used by another for nutrients, shelter, or transport; it is harmed by the relationship	 Ex. Humans are host for mosquitoes
A **prey** is an organism that is hunted by other organisms for food	 Prey
A **predator** is an organism that hunts for its food	 Predator

8.11 B investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition

Biotic & Abiotic

Term	Definition	Examples
Biotic factors	are the living parts of an ecosystem	Animals (ex. Horses, dogs) Plants (ex. Trees, grass) Fungi (ex. mushroom) Microorganism (ex. bacteria)
Abiotic Factors	are the non living parts of an ecosystem	Sunlight Air Temperature Water Soil Wind Clouds

Competition for Biotic & Abiotic

Biotic Competition	Abiotic Competition
	
Competing for food	Competing for sunlight

Resources for an organism's habitat, including space, food, shelter, and water, may be limited or depleted by competition. Two species cannot operate in the same niche in the same environment.

DEFINITIONS you must know.

A **population** is a group of living organisms of the <u>same kind</u> living in the <u>same place.</u>	Ex. Group of polar bears 
A **niche** is an organism's "job" or role in an ecosystem.	 Examples: A ladybug eating aphids
A **community is** ALL <u>species</u> or <u>populations</u> living in the same area.	
Competition occurs when more than one individual, or populations in an ecosystem relies upon the same limited resources. Two types of competition: a. **Intraspecies competition**: occurs when members of the same species compete for same resources in an ecosystem b. **Interspecies competition**: occurs when individuals of two separate species share a limiting resource in same area.	Examples of **limited resource**s: food, water, territory  
Invasive species vs. native species 	An **"invasive species"** is defined as a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

8.11 C explore how short-and long-term environmental changes affect organisms and traits in subsequent populations

Short-Term and Long-Term Environmental Change Effects

Adaptations are traits that make an animal suited to its environment.

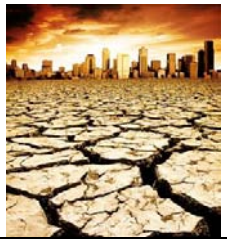
Two Types:
Structural Adaptations are inherited physical features of and organism. (Ex. White fur on a polar bear)

Behavioral Adaptations are things organisms do to survive. (Ex. Migration & hibernation)

Biodiversity-The number of different species of plants and animals in an area

Short Term and Long Term Environmental Changes

Short-Term	Long-Term
- Drought - Smog - Flooding - Volcanic Eruption - Blizzard - Pollution	- Ice Age - Deforestation - Urbanization - Global Warming - Extinction of Species - Radioactive Waste/Pollution

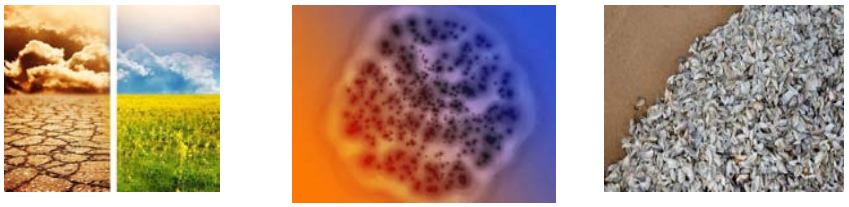


Changes in environmental conditions can affect the survival of individual organisms and entire species.

Long-term environmental changes, like climate change, can permanently alter an ecosystem, but over time the change may cause some genetic variations to become more favorable or less favorable in the new environment. If adaptations to the new environment are not present or do not develop, populations can become **extinct**.

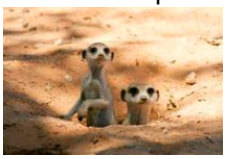
	Short-term environmental changes, like "floods, don't give populations time to adapt to change and force them to move or become **extinct**. **Human activity** affects natural systems through agriculture, resource consumption, and pollution from waste disposal and energy production. 
8.11 D recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems	**Dependence on Ocean Systems** **Humans depend on the ocean for:** Weather, Food, Transportation and Recreation **Humans modify by:**

Overfishing	personal sport, commercial harvesting 
Artificial Reefs	man made underwater structure to promote marine life such as a sunken ship 
Run Off	chemicals and trash flow to the ocean from rivers and streams 

	Human activity such as runoff pollution can originate from small or large sources on land and water, including motorized vehicles, oil spills, agricultural chemicals, and recreation. Runoff pollution negatively affects beaches and ocean habitats. Overharvesting food from the ocean creates an imbalance in existing ocean food webs. **(What does overharvesting mean and how would this cause an imbalance?)** **Other examples** of the **effects of human activity on oceans** include climate change, spread of disease, and introduction of exotic species. Climate Change Disease Exotic species/Invasive 
7.10 B describe how biodiversity contributes to the sustainability of an ecosystem	**BIODIVERSITY** The number of different species of plants and animals in an area Biodiversity, or biological diversity, is the variety of life and the intricate interactions that support and link organisms together in a geographical region. Biodiversity includes a variety of <u>genes, species, and ecosystems</u>. The **higher** the biodiversity of an ecosystem, the **better** that ecosystem can withstand environmental stress. Hence, if biodiversity is lost, that ecosystem has less ability to withstand the same environmental stress.
7.10 C observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds	**Ecological Succession** The gradual replacement of one plant community by another through natural processes over time **Primary –** Begins in a place without soil (Side of a Volcano) Starts with ***<u>Pioneer Spices</u>*** (like Lichen that doesn't need soil). They die /decompose and leave behind organic matter on bare rock to make soil. Then simple plants, grass, shrubs, trees grow and die to provides home to insects, birds and small mammals. **Secondary** - Begins in a place that already has soil and was once the home of living organisms. Example….. After forest fires.

Following a major disturbance, such as natural disaster, a progression of re-building occurs. Weeds, small insects, and other pioneers will move into the disturbed area first. This literally lays the foundation for other species to move into the area, and the progress continues. This is referred to as ecological succession.

Vocabulary you need to know:

Habitat	A place where an organism naturally lives and grows 
Microhabitat	A very small specialized habitat, such as the space under a rock  …small pond or in a schoolyard tree.
Succession (Ecological Succession)	Transition of species present in a community in an area virtually barren of life, or after a disturbance 

QUESTION:

A very hot wildfire burns up an acre of prairie. Organisms above and below ground get wiped out, and even the abundance of soil nutrients suffers. What will happen first in the area's recovery?

A. Organisms will return to the soil
B. Weeds will return.
C. Humans will plant saplings
D. Rain will bring nutrients

7.11 A examine organisms or their structures such as insects or leaves and use dichotomous keys for identification

Dichotomous Key

Dichotomous Key - a tool that allows the user to determine the identity of items by their characteristics, such as insects, leaves, trees, mammals, reptiles and others.

Follow the clues in a **dichotomous key** to identify the organism!

Based on the observation data and key below, what is the correct identification for the three arachnids?

Arachnid Observations			
#	Body	Tail	Legs
1	Segmented	Present with no stinger	Shorter than body
2	Not segmented	Not Present	Longer than body
3	Segmented	Present with stinger	Shorter than body

1. a) Abdomen segmented.....go to 2
   b) Abdomen not segmented ....go to 4
2. a) Abdomen with tail.....go to 3
   b) Abdomen without tail.....go to 5
3. a) Tail with stinger.....Scorpion
   b) Tail without stinger..... Whipscorpion
4. a) Legs longer than body.....Daddy long legs
   b) Legs not longer than body…Wind scorpion
5. a) Covered with spines .....Mite
   b) Few spines.....Tick

Arachnid #1's identity:_____

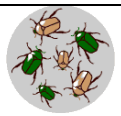
Arachnid #2's identity:_____

Arachnid #3's identity:_____

7.11 C identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (Geospiza fortis) or domestic animals

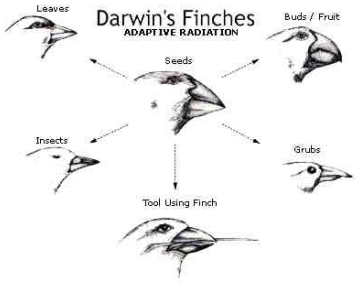
Changes in Genetic Traits - Natural Selection

Natural Selection - the basic concept by Charles Darwin is that environmental conditions (or "nature") determine (or "select") how well certain traits of organisms can survive and be passed on; organisms missing these traits might die before reproducing. As long as environmental conditions remain the same, the traits that help them survive will become more common within the population.

Natural Selection	
There is a *variation in traits*. For example, some beetles are green and some are brown.	
There is a *degree of difference* in reproduction. Since the environment can't support unlimited population growth, not all individuals get to reproduce to their full potential. In this example, green beetles tend to get eaten by birds and survive to reproduce less often than brown beetles do.	
There is *heredity*. The surviving brown beetles have brown baby beetles because this trait has a genetic basis. End result: brown colored beetle have more offspring, becomes more common in the population.	

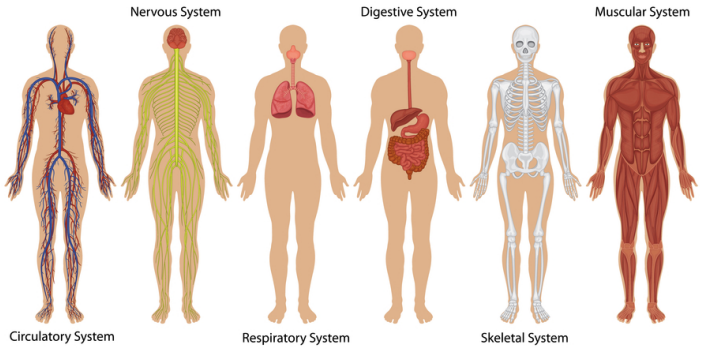
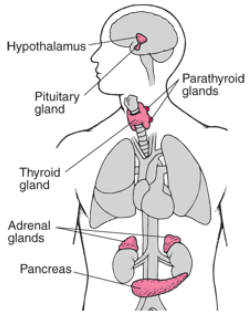
Darwin's finches are an excellent example of the way in which species' gene pools have adapted in order for long term survival through their offspring.

The Darwin's Finches diagram shows the way the finch has adapted their becks to take advantage of feeding on different foods in different ecological niche.



Selective Breeding

Selective Breeding - is the process of breeding plants and animals for particular genetic traits. Such as the various breeds of dogs.

	Adaptation — A process by which a population becomes better suited to its habitat; a genetic variation that provides an advantage to survive and reproduce, generally spreads through the population 
	Bird Adaptation Bird feet have adapted through natural selection.  
7.12 B identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems	**Human Body Systems** Human Body Systems 
	Endocrine System **<u>Function:</u>** • Regulates body by secreting hormones into the bloodstream, such as insulin • Helps body maintain **homeostasis** • Also controls growth, reproduction and metabolism **Includes:** Glands and hormones 

Circulatory System

Function:

Transport blood throughout the body via the **heart**, **veins** (blood flows to the heart) and **arteries** (blood flows away from the heart).

Includes:

- Heart
- Arteries
- Veins
- Blood

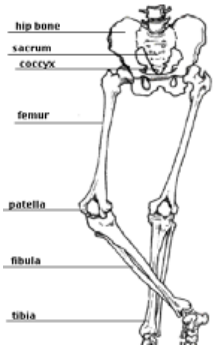
Respiratory System

Function:

Supplies blood with oxygen in the lungs and removes carbon dioxide.

Includes:

Airways, such as the trachea, as well as lungs, and alveoli



Skeletal System

Function:

Support the body
Protects internal organs
Makes red blood cells

Includes:

Bones and joints

Muscular System

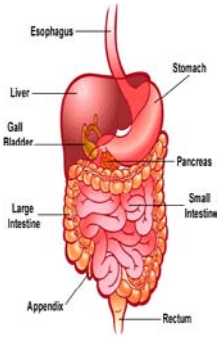
Function:

- Provides movement to the body
- Contract (become shorter)
- Relax (become longer)
- Provides strength, balance, and warmth

Includes:

Muscles, ligaments and tendons

There are three types of muscles: skeletal, smooth, and cardiac



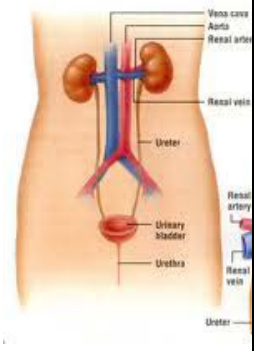
Digestive System

Function:

- Breaks down food
- Absorbs nutrients

Includes:

Mouth, esophagus, stomach, small and large intestines, and anus



Excretory system

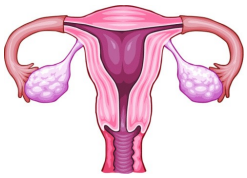
Function:

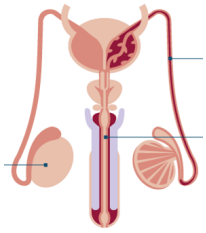
- Filters the blood (**kidney**)
- Removes waste in the form of fluids (urine).

Includes:

Kidneys and bladder

Reproductive System

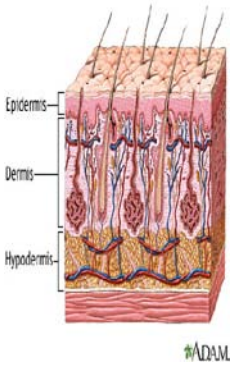




Function:

- Male-to produce and deliver sperm
- Female-to produce ova and prepares the female's body to nourish a developing embryo

Integumentary System

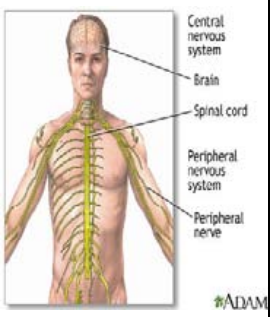


Function:

- Helps regulates temperature
- Protects the body from the outside world

Includes:
Skin, hair, nails and sweat glands.

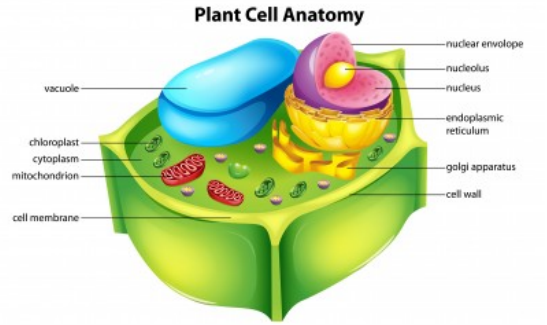
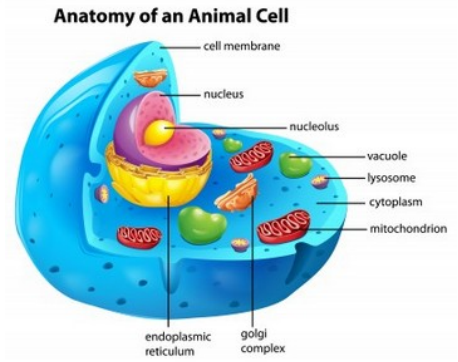
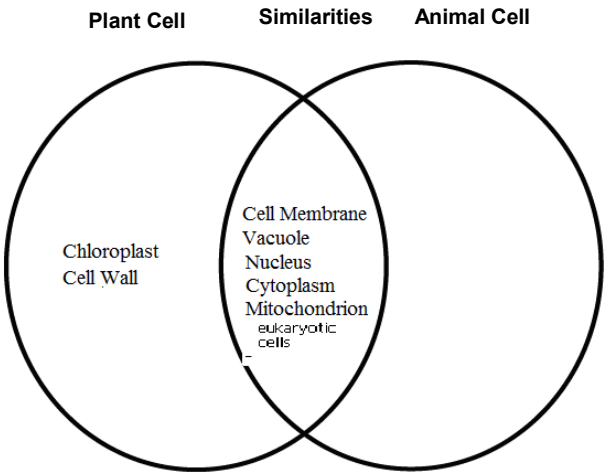
Nervous System



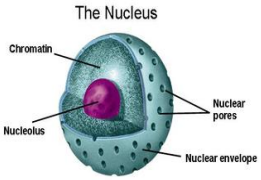
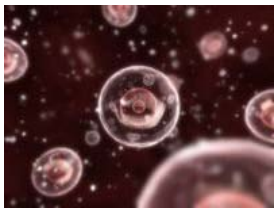
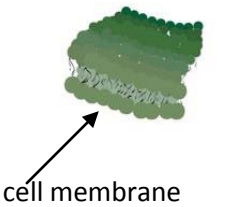
Function:

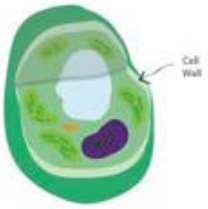
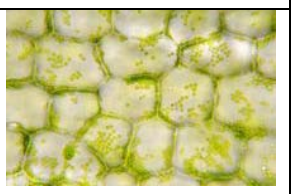
- Network that relays messages back and forth from the brain to different parts of the body
- Functions as the control center, coordinating all actions and reactions

Includes:
Brain, spinal cord, and nerves

7.12 D differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole	**Differentiate: Structure and Function Plant & Animal Cells** **Plant Cell**  **Animal Cell**  Plant Cells have a chloroplast and a cell wall. Animal cells do not. 

STRUCTURE & FUNCTION of Plant and Animal Cell Organelles

Organelles	**Function**	In plant, animal, or both?
Nucleus	Controls the cell & contains genetic material	In both 
Cytoplasm	The jellylike material that makes up much of a cell inside the cell membrane, and, in eukaryotic cells, surrounds the nucleus. Supports and protects organelles	In both 
Mitochondrion	Provides **energy** for the cell	In both 
Vacuole	Stores water and food/waste	In both 
Cell Membrane	Controls movement of materials in & out of cell and a barrier between cell and its environment	In both 

Cell Wall	Supports and protects the cell	 Only in PLANT cells!
Chloroplast	The green organelle in plant cells that converts light energy into chemical energy. Uses energy from the sun to make food (photosynthesis)	 Only in PLANT cells!

7.12 F recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life

Cell Theory - The **most basic unit** of living system and **all living things** are made up of **cells**

Cells are the structural and functional units common to all living organisms.

A cell is the **smallest unit of life** that is classified as a **living** thing. Some organisms are **unicellular,** meaning they consist of only a single cell. Most bacteria are unicellular.

Other organisms, including humans, are **multicellular**, consisting of many cells. For example, humans have about 100 trillion cells.

All cells need genetic and environmental information in order to function. The cell theory states that new cells come from old survive.

Cells use a series of chemical reactions to break down nutrients in food to create energy and produce waste through a process called metabolism.

Cells use energy from food to carry on life.

Cellular respiration (heterotrophs)	The process of using oxygen to break down nutrients to release energy for the cell 
Photosynthesis (autotrophs)	Process by which plant cells make food using water, carbon dioxide, and light from the Sun

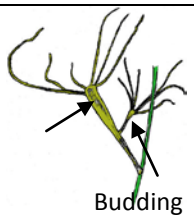
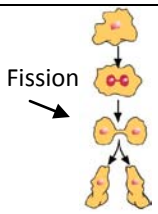
To carry out their day to day functions, cells require **energy**. The ultimate **source of this energy** is the sun.

Some organisms can **trap energy directly** from the sun, storing it away to used for energy. These organisms are called **autotrophs**. Autotrophs can make their own food. This process is called **photosynthesis.**
Organisms which are **not capable** of photosynthesis are called **heterotrophs**, and must get their energy through their diet instead.
Cellular respiration is the process of breaking down carbohydrates, fats and proteins (obtain from diet) to release energy that can be delivered to each cell for use.

To convert the energy stored into a form that is usable, both autotrophs and heterotrophs must take large molecules and break them down into smaller, easier to use molecules.

7.14 B compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction

Asexual & Sexual Examples Uniform or Diverse offspring?

Asexual Reproduction • Only 1 parent • Offspring **exactly like** parent genetically (**uniform**)	 Budding	 Fission uniform
Sexual Reproduction • Requires 2 parents • Offspring is **different** from each parent (**diverse**)	 diverse	

In **asexual reproduction** of **prokaryotic cells**, DNA is replicated from the parent resulting in **uniform offspring**. These cells divide by **binary fission**. Organisms composed of **eukaryotic cells** can also reproduce asexually by forming **spores, by budding, or by vegetative propagation**.

In **sexual reproduction** of **eukaryotic organisms**, DNA is combined and unique combination of **dominant and recessive traits** from two parents create **diverse offspring**.

7.14 C recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus

Genetic Material

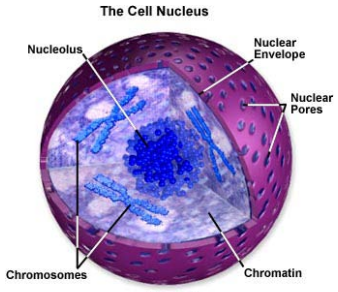
Gene - a unit of instructions for traits, found in the DNA of an organism.

Genes play an important role in determining physical traits (how we look).

DNA is located in chromosomes in the nucleus
Humans have 23 pairs of chromosomes

Traits - characteristics that distinguish an organism.

Inherited Traits - traits that are inherited in the genes and passed down from parent to offspring (generation to generation)

Type of Inherited Trait		Genes are located in the Chromosomes in the Nucleus
		 Figure 1
Attached Ear Lobe	Hanging Ear Lobe	

Genetic information is inherited from both parents in sexual reproduction. Inherited traits include expressed external characteristics such as eye color and hair color and internal characteristics such as blood type. Inherited traits are not affected by the organism's surroundings.

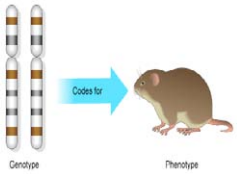
VOCABULARY YOU NEED TO KNOW :

Heredity:
Process of characteristics transmitted from parent to offspring.

Genes:
The basic physical and functional unit of heredity made up of DNA.

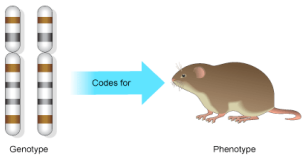
Genotype:
A genetic makeup of an organism

Example: Bb (brown hair dominant)



Phenotype:
The physical appearance of an organism

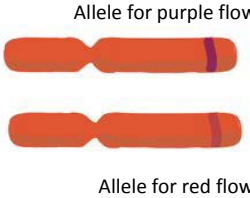
Example: long body, brown hair, etc.



Trait:
A characteristic of an organism controlled by genetics.

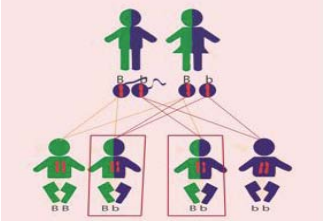
Example: color

Alleles:
Variations of a gene relating to the same trait.



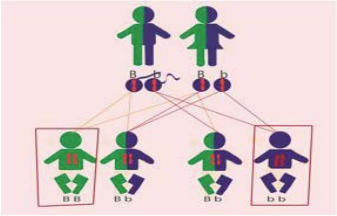
Heterozygous:
Having two different alleles for a trait.

Example: Bb in picture to your right.



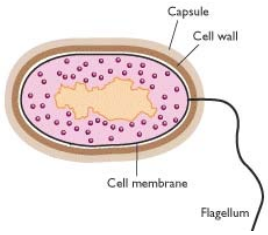
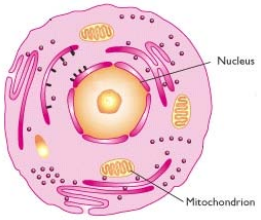
Homozygous:
Having two of the same alleles for a trait.

Example: BB or bb in picture to your right.



6.12 D identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms

Characteristics of Organisms

Prokaryotic	Eukaryotic
Does not have an organized nucleus. Their DNA is floating around the cell.	Has a nucleus.
	

Autotrophic	Heterotrophic
Organisms that make their own organic food	Organisms that consume food that is already present in the environment
	

Three domains are used to classify or group organisms.

DOMAIN	Description	Examples
Archae	Primitive unicellular prokaryotes; some autotrophs and some heterotrophs; some live in harsh conditions	Halophilic archae live in very salty water
Bacteria	Unicellular prokaryotes; most are heterotrophs; “typical” bacteria	Staphylococcus bacteria*, E. coli*
Eukarya	Unicellular and multicellular eukaryotes	Fish, tree, algae

The eukarya domain can be divided into four distinct **kingdoms.**

KINGDOM	Description	Examples
Protist	Typically unicellular eukaryotes; some autotrophs and some heterotrophs	Amoeba, algae, euglena
Fungi	Typically multicellular eukaryotes; heterotrophs; many are decomposer	Mushroom, mold, yeast, *Penicillium*
Plant	Multicellular eukaryotes; autotrophs	Tree, grass, corn
Animal	Multicellular eukaryotes; heterotrophs	Snail, dog, human

QUESTIONS:

1. Of the characteristic comparisons in the list below, which is the best choice for classifying an organism into a taxonomic Kingdom?
   A. Fur vs. no fur
   B. Legs vs. no legs
   C. Multicellular vs. unicellular
   D. Brown-colored vs. green-colored

2. Organisms classified in the Animal Kingdom most commonly reproduce
   A. sexually
   B. asexually
   C. by vegetative propagation
   D. none of the above

3. This fungus is an example of an organism that -

   A. makes its own food using photosynthesis
   B. consumes other organisms for food
   C. can either make its own food or consume other organisms
   D. does not need food