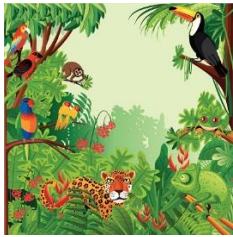


Ecology

Match the following biome terms with the correct definition.

- | | |
|--|---|
| <u> C </u> 1. Tropical Rainforest | a. Largest aquatic biome. |
| <u> H </u> 2. Tropical Savanna | b. Very little rainfall, hot during day, cold at night. |
| <u> E </u> 3. Temperate Deciduous Forest | c. Very high rainfall year round and very hot. |
| <u> G </u> 4. Taiga | d. Very little rainfall, very cold year round, frozen ground. |
| <u> D </u> 5. Tundra | e. Characterized by broadleaf trees that lose leaves in the fall. |
| <u> B </u> 6. Desert | f. Aquatic biome characterized by a mix of salt and fresh water. |
| <u> A </u> 7. Ocean | g. Characterized by needle-leaf, evergreen trees, cold temps. |
| <u> F </u> 8. Estuary | h. Characterized by grasses, zebra, giraffe, lion. |

9. Label the following biomes according to the pictures shown.



 TROPICAL RAINFOREST



 DESERT



 TAIGA



 DECIDUOUS FOREST

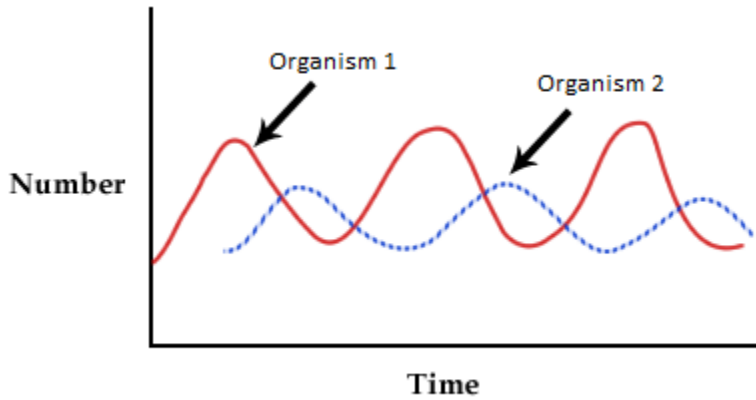
10. Match the following terms regarding relationships between organisms.

- | | |
|------------------------------|--|
| <u> C </u> 1. Mutualism | a. General term for relationship between two organisms. |
| <u> D </u> 2. Commensalism | b. One organism is benefitted, one organism is harmed. |
| <u> B </u> 3. Parasitism | c. Both organisms help, or benefit, each other. |
| <u> A </u> 4. Symbiosis | d. One organism is benefitted, one organism is unaffected. |
| <u> F </u> 5. Predator | e. Organism that is hunted and eaten. |
| <u> E </u> 6. Prey | f. Organism that is doing the hunting. |

11. Identify each of the following symbiotic relationships as mutualism (M), commensalism (C) or parasitism (P).

- Remoras attach themselves to a shark's body. They then travel with the shark and feed on the leftover food scraps from the shark's meals. They do not harm the shark. C
- Oxpeckers feed on ticks found on rhinos. M
- Silverfish live and hunt with army ants. They share the prey. M
- A flea feeds on a mouse's blood to the mouse's detriment. P
- Yucca flowers are pollinated by yucca moths. The moths lay their eggs in the flowers where the larvae hatch and eat some of the developing seeds. Both species benefit. M

12. What type of graph is show below? **PREDATOR -PREY**



13. Which organism is the predator? The prey?

PREDATOR – 2 PREY - 1

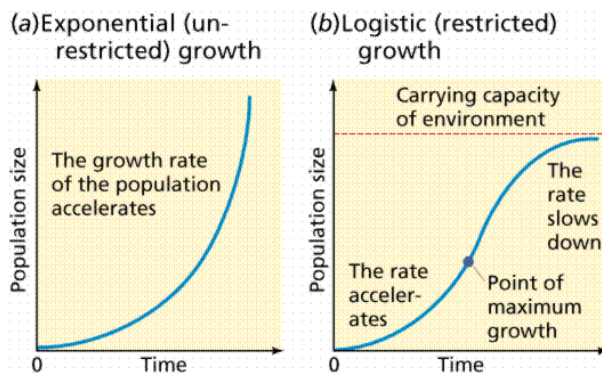
14. When Organism 2 begins to decrease, what happens to Organism 1?

ORGANISM NUMBER 1 INCREASES

15. For each of the scenarios below, tell whether the population will increase or decrease.

- a. An increase in immigration and an increase in the birth rate. **__ INCREASE __**
- b. An increase in the death rate and a decrease in immigration. **__ DECREASE __**
- c. A decrease in the birth rate and an increase in emigration. **__ DECREASE __**
- d. An increase in the death rate and a decrease in the birth rate. **__ DECREASE __**

16. Draw each of the population growth curves below. Label them. Label the carrying capacity. Indicate which ones have limiting factors.



17. Limiting factors that limit a population because of its size are called **__ DENSITY DEPENDENT __** factors.

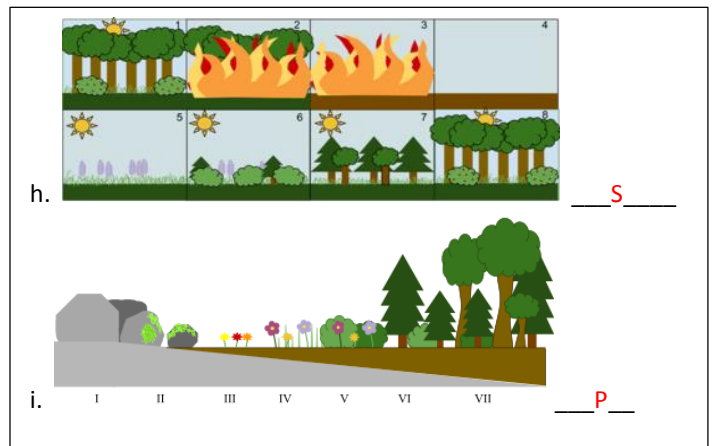
18. Limiting factors that limit a population regardless of its size are called **__ DENSITY INDEPENDENT __** factors.

19. For each of the scenarios below, mark (DD) for density dependent limiting factors and (DI) for density independent limiting factors.

- a. Competition **__ DD __**
- b. Severe weather changes **__ DI __**
- c. Disease **__ DD __**
- d. Seasonal changes **__ DI __**
- e. Parasitism **__ DD __**
- f. Predators **__ DD __**
- g. Flood **__ DI __**
- h. Natural Disaster **__ DI __**
- i. Fire **__ DI __**
- j. Overcrowding **__ DD __**

20. For each of the statements below, write (P) for primary succession or (S) for secondary succession or (B) for both.

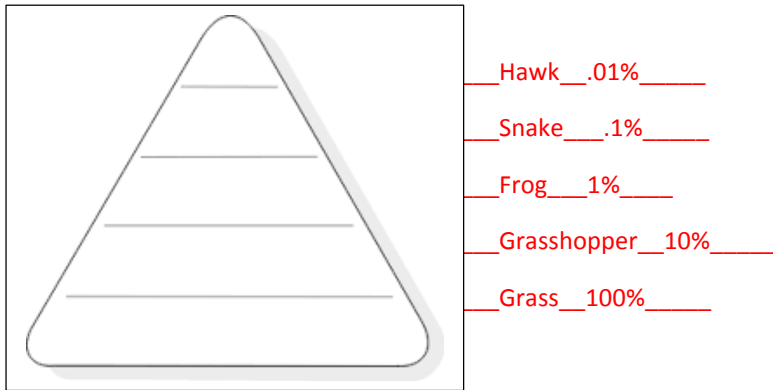
- a. Begins with bare rock **__ P __**
- b. Begins with soil **__ S __**
- c. Pioneer species are lichen **__ P __**
- d. Pioneer species are grasses/weeds **__ S __**
- e. Begins after a volcanic eruption **__ P __**
- f. Begins after a clear-cutting, fire, flood **__ S __**
- g. Results in a climax community **__ BOTH __**



21. In the space below, create a food chain using the following organisms: grasshopper, grass, hawk, frog, snake. Label each of the following terms in your food chain: producer, herbivore, carnivore, 1st level consumer, 2nd level consumer, 3rd level consumer, 4th level consumer

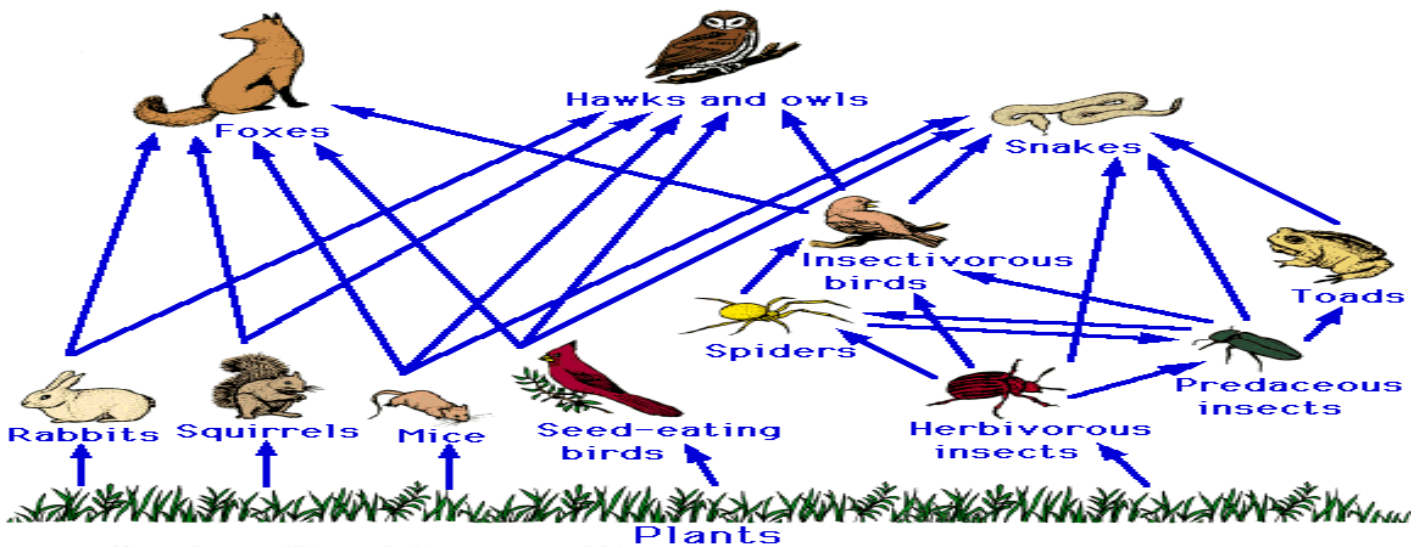
GRASS → GRASSHOPPER → FROG → SNAKE → HAWK
 Producer Primary Con. Secondary Tertiary Quaternary
 Herbivore Carnivore Carnivore Carnivore

22. Use the food chain you created above and fill in the pyramid below. If the producer level has 100% of the energy from the sun, write in the amount of energy that is passed up to all of the other trophic levels on the lines next to the pyramid.



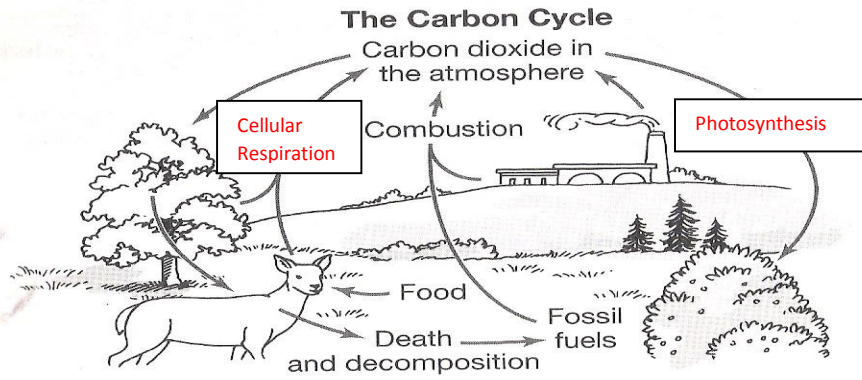
- a. Color the level with the most biomass green. Bottom should be green (grass)
- b. Color the level with least amount of energy red. Top should be red (Hawk)

23. Use the food web below to answer the following questions.



- a. Which organisms are on the first trophic level? **Plants**
- b. Which organisms are considered first order consumers? **Rabbits, Squirrels, Mice, Seed-eating birds, Herbivorous Insects**
- c. First order consumers are found on which trophic level? **Trophic Level #2**
- d. The foxes, hawks and owls and snakes are considered what type of consumers? **Carnivores**
- e. Are there any omnivores in this food web? **No**
- f. Herbivores are which level consumers? **Primary Consumers**
- g. Write one food chain from this food web. **Plants → Squirrels → Fox**

24. Fill in the blanks in the carbon cycle picture below.

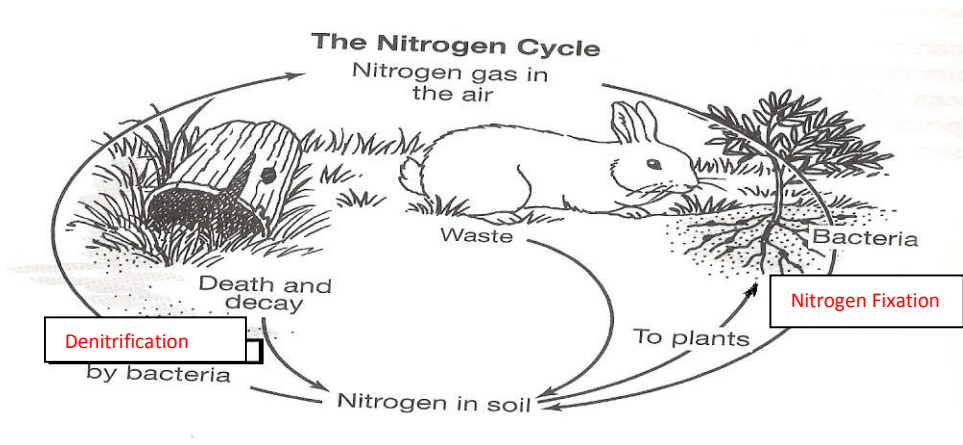


25. Which process removes carbon from the atmosphere? **Photosynthesis**

26. Which processes put carbon back into the atmosphere?

Cellular Respiration, Combustion (burning of wood and fossil fuels), Decomposition

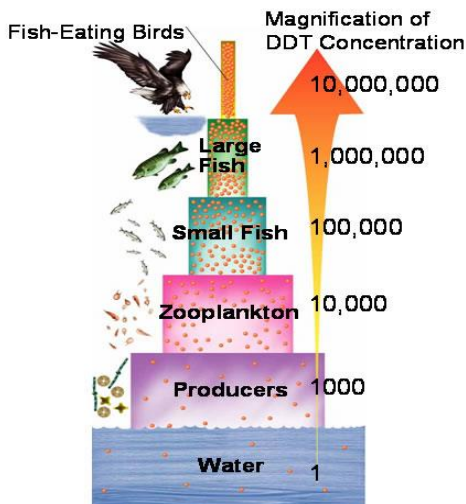
27. Fill in the blanks in the nitrogen cycle picture below.



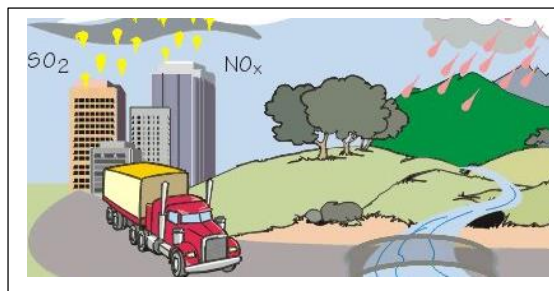
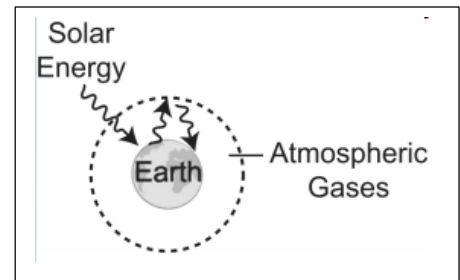
28. What is the only nutrient that does not cycle through the atmosphere? **Phosphorus**

29. What human impacts are shown in the pictures below?

Biomagnification



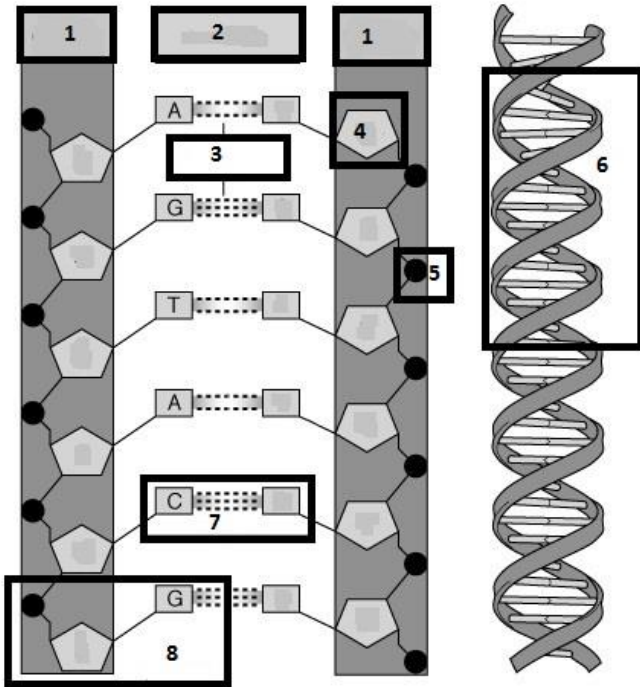
Global Warming (Top)



Acid Rain (Bottom)

RNA, Replication, Transcription and Translation

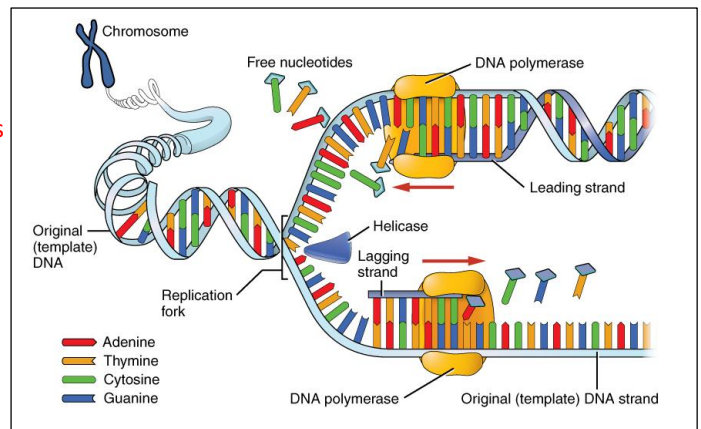
1. The monomer unit for DNA is nucleotide. The nucleotide is composed of what 3 parts? **Nitrogen base, Sugar, Phosphate group**
2. Where is DNA found in the cell? **Nucleus**
3. What is the function of DNA? **Store Genetic Information**
4. How are genes related to DNA? **DNA codes for your genes**
5. Label the parts of the DNA molecule below.



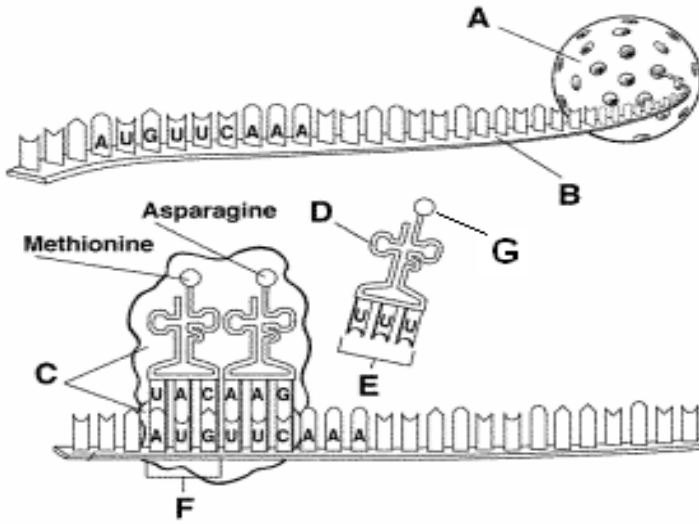
1. **DNA Strand Backbone**
 2. **DNA Rungs**
 3. **Weak Hydrogen Bonds**
 4. **Deoxyribose Sugar**
 5. **Phosphage Group**
 6. **Double Helix**
 7. **Complementary Nitrogen Bases**
 8. **Nucleotide**
- * What shape is the double helix? **Twisted**
- ** Which two scientists are credited with discovering the structure of DNA? **Watson & Crick**

6. What phase of the cell cycle is DNA replicated? **S phase**
7. In what part of the cell does DNA replication take place? **nucleus**
8. Which two enzymes are involved in DNA replication?
Helicase and DNA polymerase
9. What process is shown in the diagram to the right? **Replication**
10. Which DNA bases pair together? **A-T and C-G**
11. Using the bases on the DNA strand below, fill in the complimentary bases underneath.

A	T	G	C	C	A	A	T	T	G	T	G	G
T	A	C	G	G	T	T	A	C	A	C	C	C



12. Using the diagram below, answer the following questions.



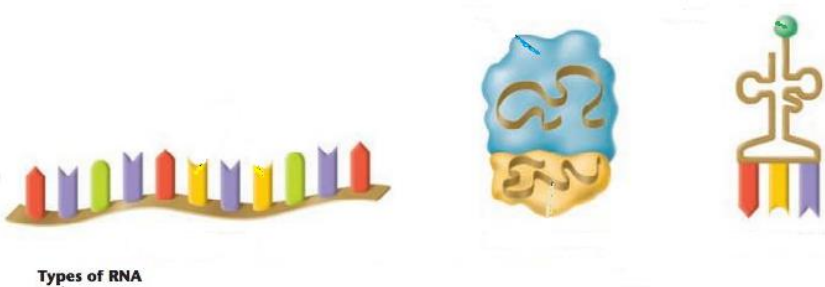
- a. Label the following parts to the diagram.
- A. Nucleus
 - B. mRNA
 - C. Ribosome
 - D. tRNA
 - E. Anticodon
 - F. Codon
 - G. Amino Acid

- b. What process is occurring in the top diagram? **Transcription**
- c. What process is occurring in the bottom diagram? **Translation**
- d. The end result of this process is to make what? **Protein (Polypeptide Chain)**

14. Using the chart below, fill in the differences between DNA and RNA.

	DNA	RNA
Number of Strands	2	1
Nitrogen Bases	A,T,C,G	A,U,C,G
Sugar Present in nucleotide	Deoxyribose	Ribose

15. Using the diagram below, label the three types of RNA and tell the function of each.



mRNA – Contains codons, Transfers message from DNA to the ribosome

rRNA – Makes up the ribosome

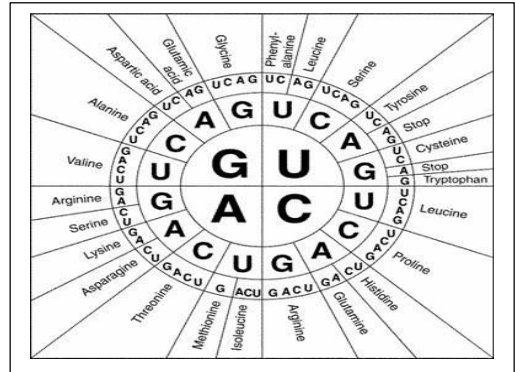
tRNA – Contains an anticodon, transfers the correct amino acid to the ribosome to make the polypeptide chain

16. For the following piece of DNA below, first transcribe it into mRNA, then translate it into a protein. Use the codon chart.

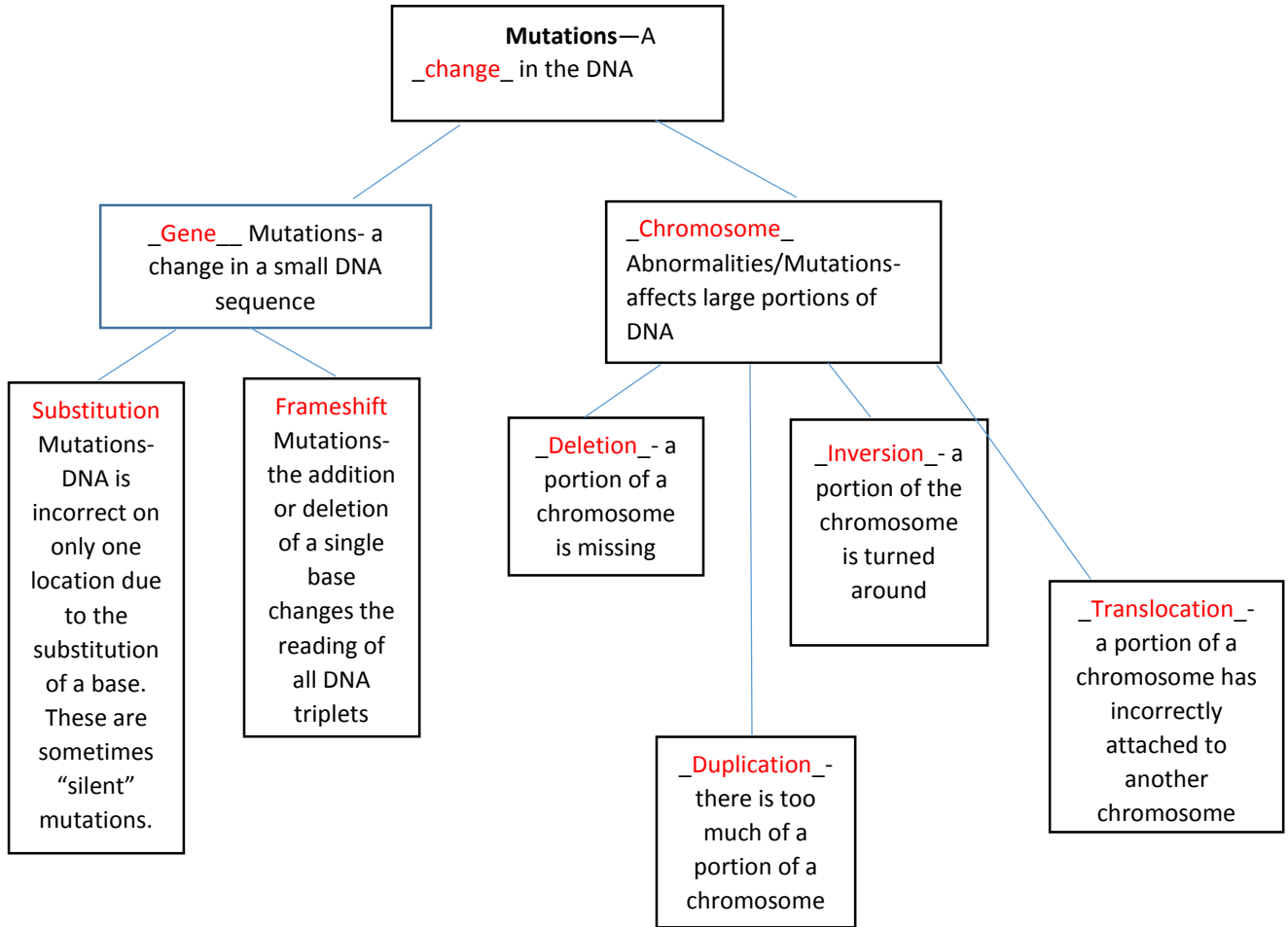
DNA segment: CGA TTA CGG CTT AAG

mRNA segment: GCU AAU GCC GAA UUC

Polypeptide chain: Ala-Asp-Ala-Glu-Phe



17. Fill out the following concept map on mutations.



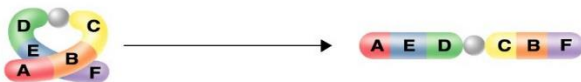
18. What types of chromosome mutations are shown below?



Deletion



Duplication



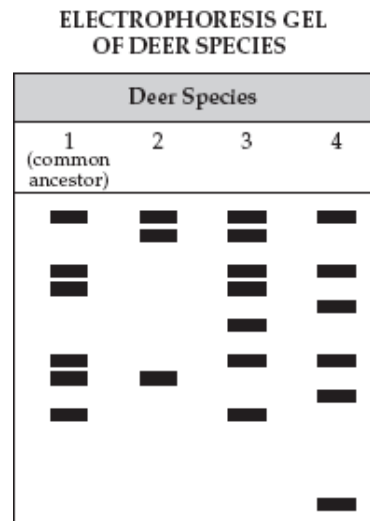
Inversion



Translocation

19. Read the following gel electrophoresis and identify the deer species that is most closely related to the ancestor.

Species 3 is the most closely related to the common ancestor.



Genetics

Match the following genetics vocabulary terms.

- | | |
|--------------------------------------|--|
| <u> C </u> 1. Gene | a. Organisms that have two identical alleles for a certain trait; ex: BB or bb |
| <u> H </u> 2. Allele | b. When two different plants reproduce with each other; pollen of one plant goes into another |
| <u> J </u> 3. Dominant | c. Segments of DNA that determine traits |
| <u> I </u> 4. Recessive | d. A tall pea plant (TT) crosses with a short pea plant (tt) and produces Tt offspring |
| <u> E </u> 5. Gregor Mendel | e. Father of Genetics and experimented on pea plants to determine laws of genetics |
| <u> A </u> 6. Homozygous | f. When the pollen of one plant goes into its own pistil to reproduce; offspring are identical |
| <u> M </u> 7. Heterozygous | g. The first generation to be produced from two parents |
| <u> B </u> 8. Cross-Pollinate | h. Alternate form of a gene; single letter represents this; ex: B for brown |
| <u> F </u> 9. Self-Pollinate | i. A trait that is masked or hidden by a dominant trait |
| <u> K </u> 10. True Breeding | j. A trait that overpowers another trait |
| <u> M </u> 11. Hybrid | k. Organisms that self-pollinate and make offspring identical to themselves |
| <u> L </u> 12. Parental Generation | l. The two parent organisms that are initially crossed to produce offspring |
| <u> G </u> 13. F1 Generation | m. Organisms that have two different alleles for a certain trait; ex: Bb |
| <u> O </u> 14. Genotype | n. The physical description of a trait; ex: blue flowers, tall, short, colorblind |
| <u> N </u> 15. Phenotype | o. The two letter combination that represents a trait; ex: BB or Bb or bb |

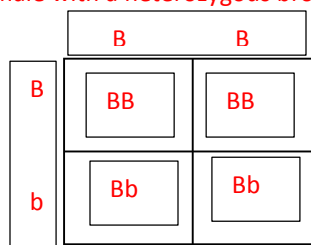
16. Complete Dominance- One Trait is completely dominant over a recessive trait. Ex: Eye color

Brown is dominant to blue eyes. Cross a homozygous brown male with a heterozygous brown female. Use the letter B.

Provide the phenotypic and genotypic ratio:

Phenotypic Ratio: 4 Brown eyes: 0 blue eyes

Genotypic Ratio: 2 BB: 2 Bb: 0 bb



17. Incomplete Dominance – there is no dominant trait. Therefore a **blended**_ phenotype is produced.

Red Flowers (RR) crossed with White Flowers (rr) = (Rr) Pink Flowers

Cross a Red and Pink Flower.

Provide the phenotypic and genotypic ratio:

Phenotypic Ratio: **2 red: 2 pink: 0 white**

Genotypic Ratio: **2 RR: 2 Rr: 0 rr**

	R	R
R	RR	RR
r	Rr	Rr

18. Codominant - **both**_ dominant traits expressed.

Black horse (BB) crossed with a White horse (WW) = (BW) Blue Roan Horse (hair coat has an equal number of black and an equal number of white hairs – NO Gray hairs!!!!)

Cross a Blue Roan Horse with a White Horse

Provide the phenotypic and genotypic ratio:

Phenotypic Ratio: **0 Black: 2 Roan: 2 White**

Genotypic Ratio: **0 BB: 2 BW: 2 WW**

	B	W
W	BW	WW
W	BW	WW

19. Multiple Alleles- 2 or more dominant traits that are codominant with each other and are both dominant over a recessive trait as well. Ex: ABO Blood Types

Blood types **A**_ and **B**_ are co-dominant over type O blood.

Cross a Heterozygous A with a Type O

What is the only genotype that will give you type O blood?

Provide the phenotypic and genotypic ratio:

Phenotypic Ratio: **50% Type A; 50% Type O**

Genotypic Ratio: **50% I^Ai; 50% ii**

	I ^A	i
i	I ^A i	ii
i	I ^A i	ii

Give the genotype of the Universal Donor of Blood: **Type O**_

Give the genotype of the Universal Recipient of Blood: **Type AB**_

20. Sex-Linked Crosses: always found on the **X**_ chromosome (generally a recessive trait)

Male = **XY**_ Female = **XX**_ Colorblindness is a recessive sex-linked trait, it is carried on the **X**_ chromosome.

A colorblind man marries a normal woman who is a carrier of the colorblind trait.

Will they have children that are colorblind? **Yes**

Can the Father give the colorblind gene to his daughter? **yes** To his son? **no**_

	X ^c	Y
X ^C	X ^C X ^c	X ^C Y
X ^c	X ^c X ^c	X ^c Y

21. The male sex chromosomes are XY and determine the sex of the child.

22. The female sex chromosomes are XX.

23. Match Mendel's three laws with the correct definition.

B 1. Law of Dominance

a. Genes separate during gamete formation

A 2. Law of Segregation

b. Some alleles are dominant and some are recessive

C 3. Law of Independent Assortment

c. Genes separate during gamete formation WITHOUT influencing each other's inheritance

Characteristics of Life

Name the 8 characteristics of that all living things share.

1. **COMPOSED OF CELLS**

5. **RESPOND TO STIMULI IN THEIR ENVIRONMENT**

2. **HAS A GENETIC CODE (DNA) AND MACROMOLECULES**

6. **ABLE TO MAINTAIN HOMEOSTASIS**

3. **OBTAINS MATERIALS AND USE ENERGY**

7. **ABLE TO GROW AND DEVELOP**

4. **CHANGE OVER TIME AS A POPULATION**

8. **ABLE TO REPRODUCE (EITHER SEXUALLY OR ASEXUALLY)**

Cells

1. The basic unit of structure and function in an organism is the **cell**.

2. List the three components of the Cell Theory.

a. **ALL ORGANISMS ARE COMPOSED OF CELLS.**

b. **THE CELL IS THE BASIC UNIT OF STRUCTURE AND FUNCTION IN AN ORGANISM.**

c. **ALL CELLS COME FROM PRE-EXISTING CELLS.**

3. The cell theory was developed through the work of what three scientists? **Schleiden, Schwann and Virchow (Hooke named cells)**

4. Give the functions of the following cell structures.

a. Cell Wall- **found only in plant cells; provides support and protection to plant cell**

b. Cell Membrane-**found in all cells; also called phospholipid bilayer; selectively permeable to what gets into and out of cell**

c. Cytoplasm- **gel-like material that holds all organelles in place**

d. Chromatin (DNA)- **disorganized form of DNA found in the nucleus when cell is not dividing**

e. Chloroplast- **contains chlorophyll; found only in plant cells; site of photosynthesis**

f. Vacuole- **found in eukaryotic cells; much larger in plant cells; storage of food, water**

g. Golgi Bodies- **packages materials, especially proteins, and readies them for shipment into the cell in a vesicle**

h. Mitochondria- **found in eukaryotic cells; site of cellular respiration, where glucose is broken into ATP for the cell**

i. Endoplasmic Reticulum- **transportation system within the cell for materials**

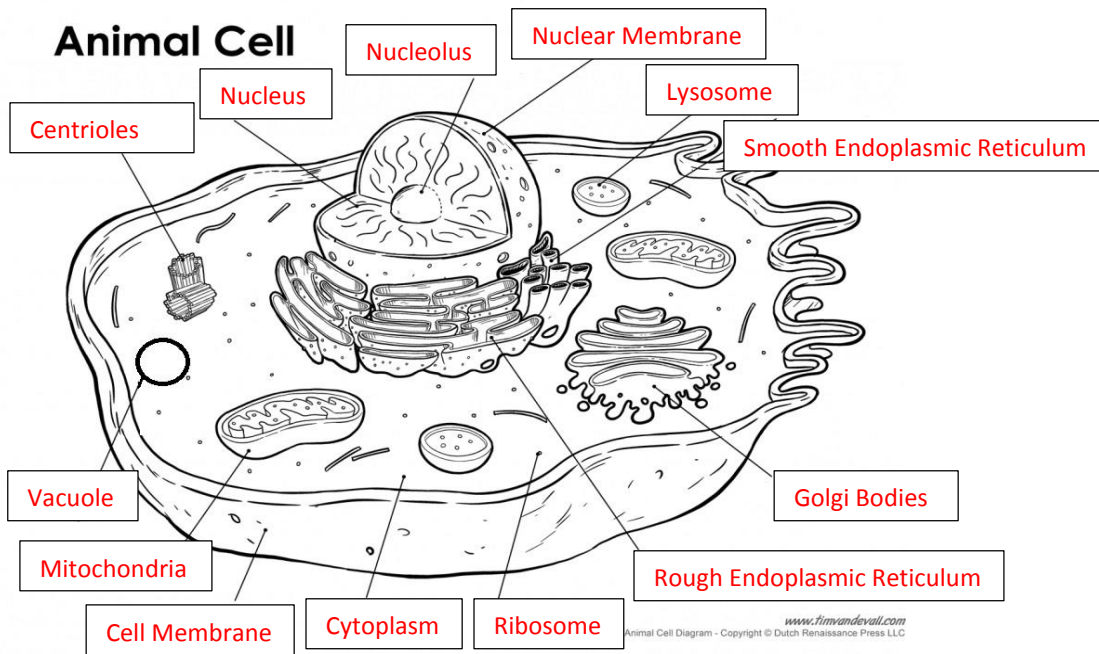
j. Nucleus- **controls all cell activities and contains DNA**

k. Nucleolus- **found inside the nucleus; produces ribosomes**

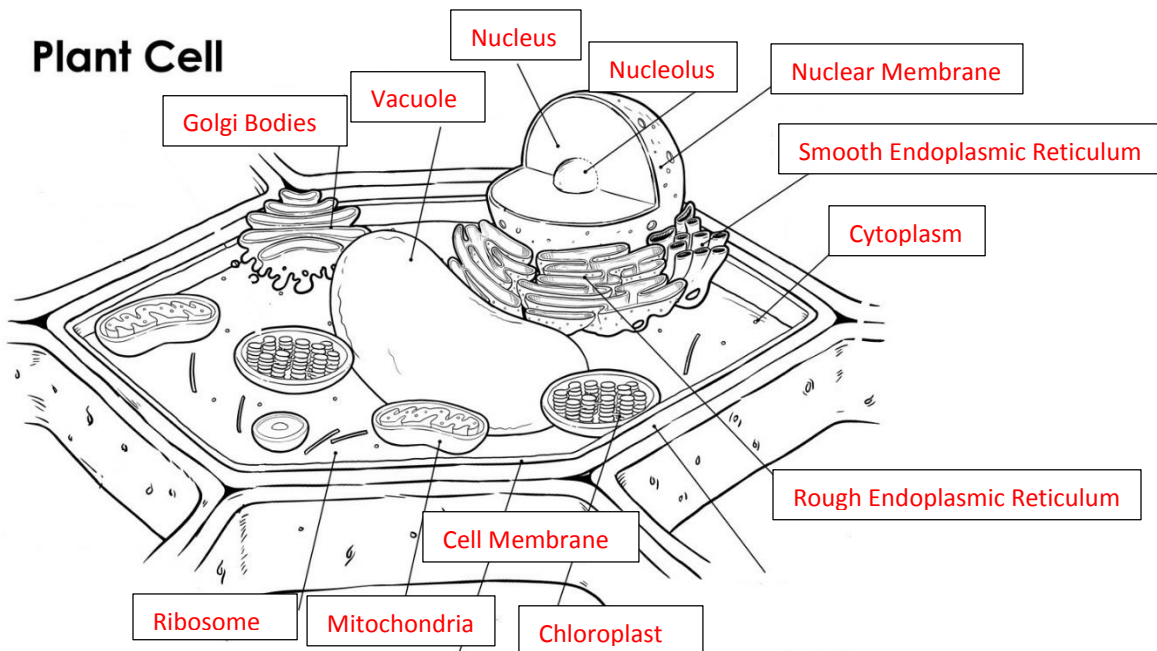
l. Ribosomes- **can be free in the cytoplasm or attached to rough ER; site of protein synthesis**

- m. Centrioles- found only in animal cells; plays a role in cell division
- n. Lysosomes- contain digestive enzymes for breaking down wastes and old cell parts
- o. Cilia- many hair-like (eyelash) structures that surround the cell and aid in movement
- p. Flagella- one or more long, whip-like tails found on a cell to also aid in movement

5. Label the following typical animal cell below.



6. Label the following typical plant cell below.



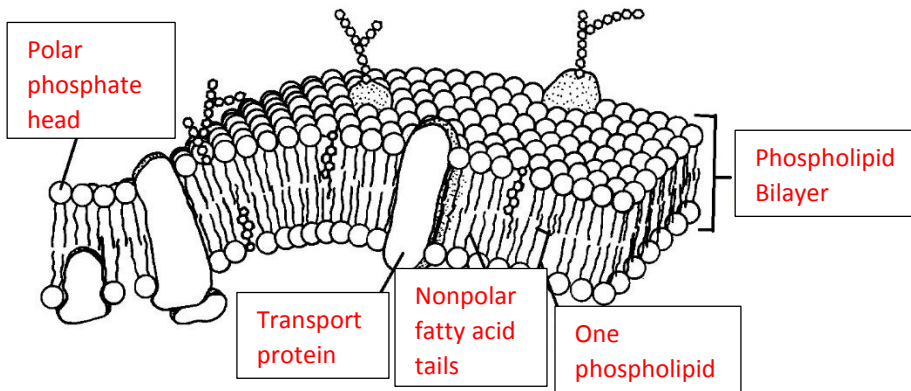
7. What are BOTH of the differences between the two categories of cells below?

- a. Prokaryotic cells- **no true, membrane-bound nucleus and no membrane bound organelles**
- b. Eukaryotic cells- **does have a true, membrane-bound nucleus and does have membrane-bound organelles**

8. Put the following levels of organization in order starting with cells and ending with biosphere: organs, tissues, ecosystem, biosphere, cells, organ systems, population, biome, community, organism.

cells-->tissues-->organs-->organ systems-->organism-->population-->community-->ecosystem-->biome-->biosphere

9. Label the diagram below of the cell membrane using the following terms: transport/carrier proteins, polar phosphate head, nonpolar fatty acid tails, one phospholipid, phospholipid bilayer.

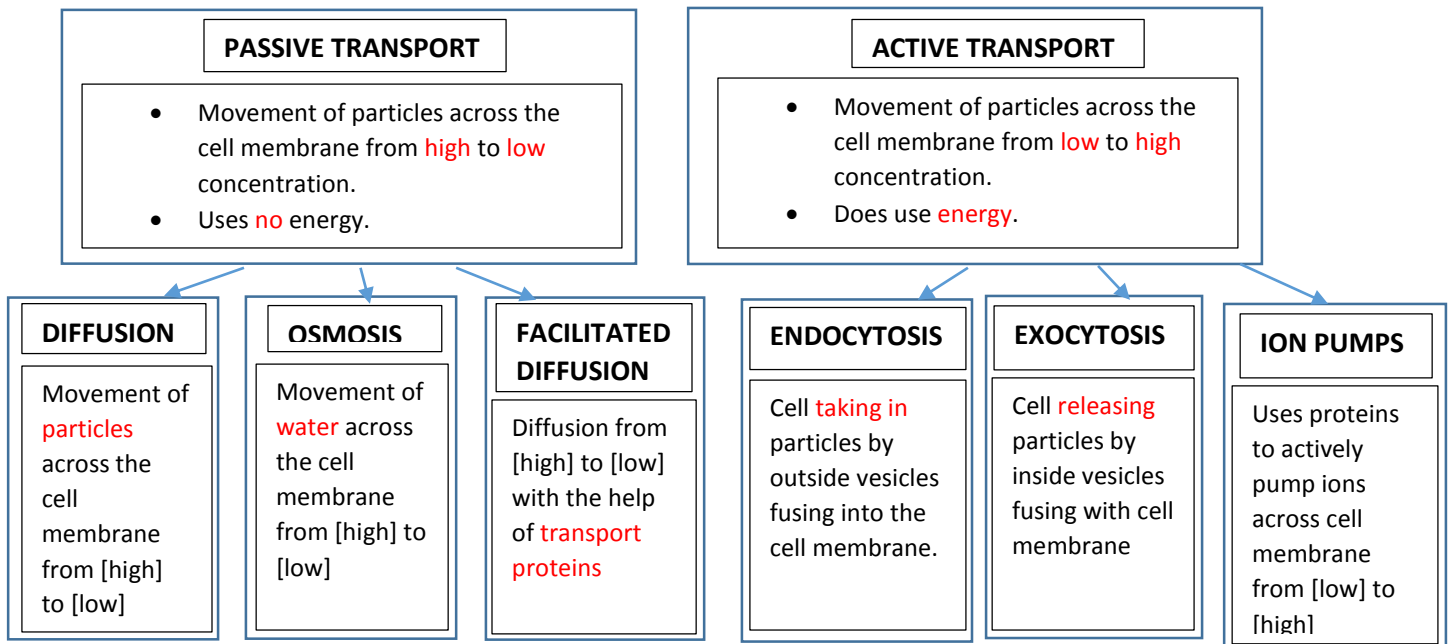


10. Circle the correct description of the cell membrane.

- a. The cell membrane is **fluid** / ~~immoveable~~.
- b. The cell membrane **is** / ~~is not~~ selectively permeable.
- c. The cell membrane is composed of **phospholipids, proteins, and cholesterol**.

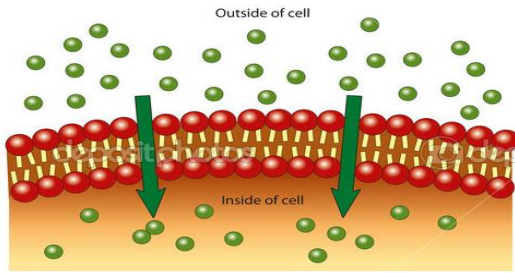
Cell Transport

Fill in the concept map below on the different types of cell transport.



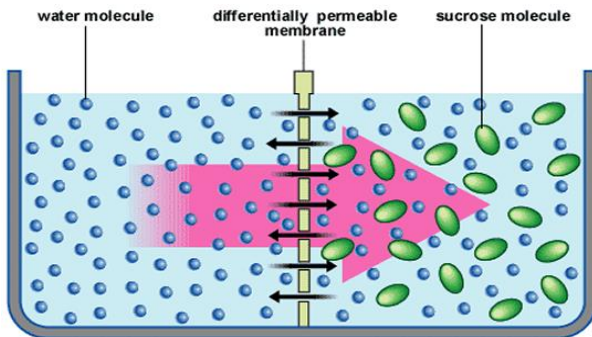
For each of the diagrams below, answer the questions to the right.

1.



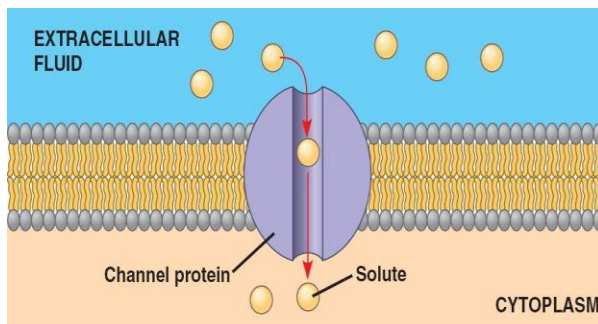
- Are these molecules passing from **high to low** concentration or from low to high concentration?
- Are the molecules moving **with** the concentration gradient or against it?
- Is this active or **passive** transport?
- Is anything assisting the molecules through the cell membrane? **no**
- Is this osmosis, **diffusion** or facilitated diffusion?

2.



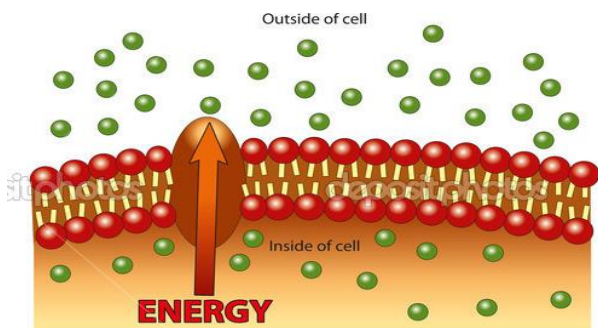
- Are these molecules passing from **high to low** concentration or from low to high concentration?
- Are these molecules moving **with** the concentration gradient or against it?
- Is this active or **passive** transport?
- What molecule is passing through the membrane? **water**
- Is this **osmosis**, diffusion or facilitated diffusion?

3.



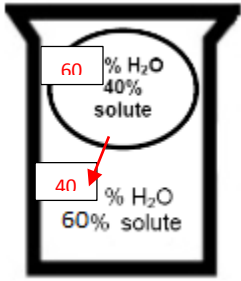
- Are these molecules passing from **high to low** concentration or from low to high concentration?
- Are these molecules moving **with** the concentration gradient or against it?
- Is this active or **passive** transport?
- What is assisting the molecules through the cell membrane?
Transport protein
- Is this osmosis, diffusion or **facilitated diffusion**?

4.



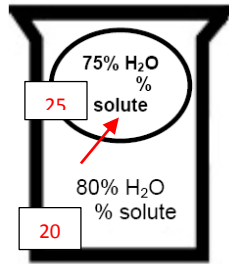
- Are these molecules passing from high to low concentration or from **low to high** concentration?
- Are these molecules moving with the concentration gradient or **against** it?
- What is causing the molecules to pass through the membrane? **energy**
- Is this **active** or passive transport?

5. Label the types of solutions below as hypertonic, hypotonic or isotonic. Draw arrows to show the direction of water flow. Tell whether the cell will swell, shrink or stay the same size.



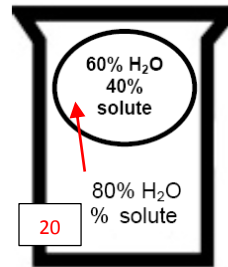
_____ hypertonic _____

_____ shrink _____



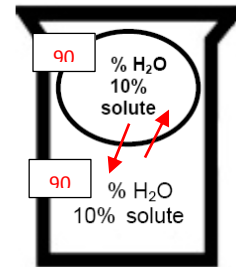
_____ hypotonic _____

_____ swell _____



_____ hypotonic _____

_____ swell _____



_____ isotonic _____

_____ stays same _____

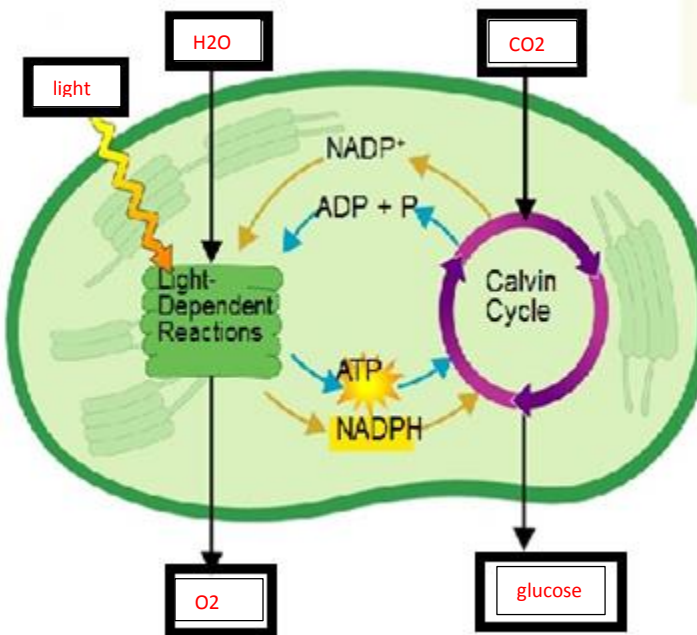
6. If a salt water plant cell containing 40% salt and 60% water is placed in a beaker of freshwater (100% pure water), what will happen to the size of the plant cell? swell What type of solution is the plant cell placed in? hypotonic

Photosynthesis

1. Write the equation for photosynthesis below and label the reactants and the products.



2. Fill in the boxes of the chloroplast below for the stages of photosynthesis and answer the questions.



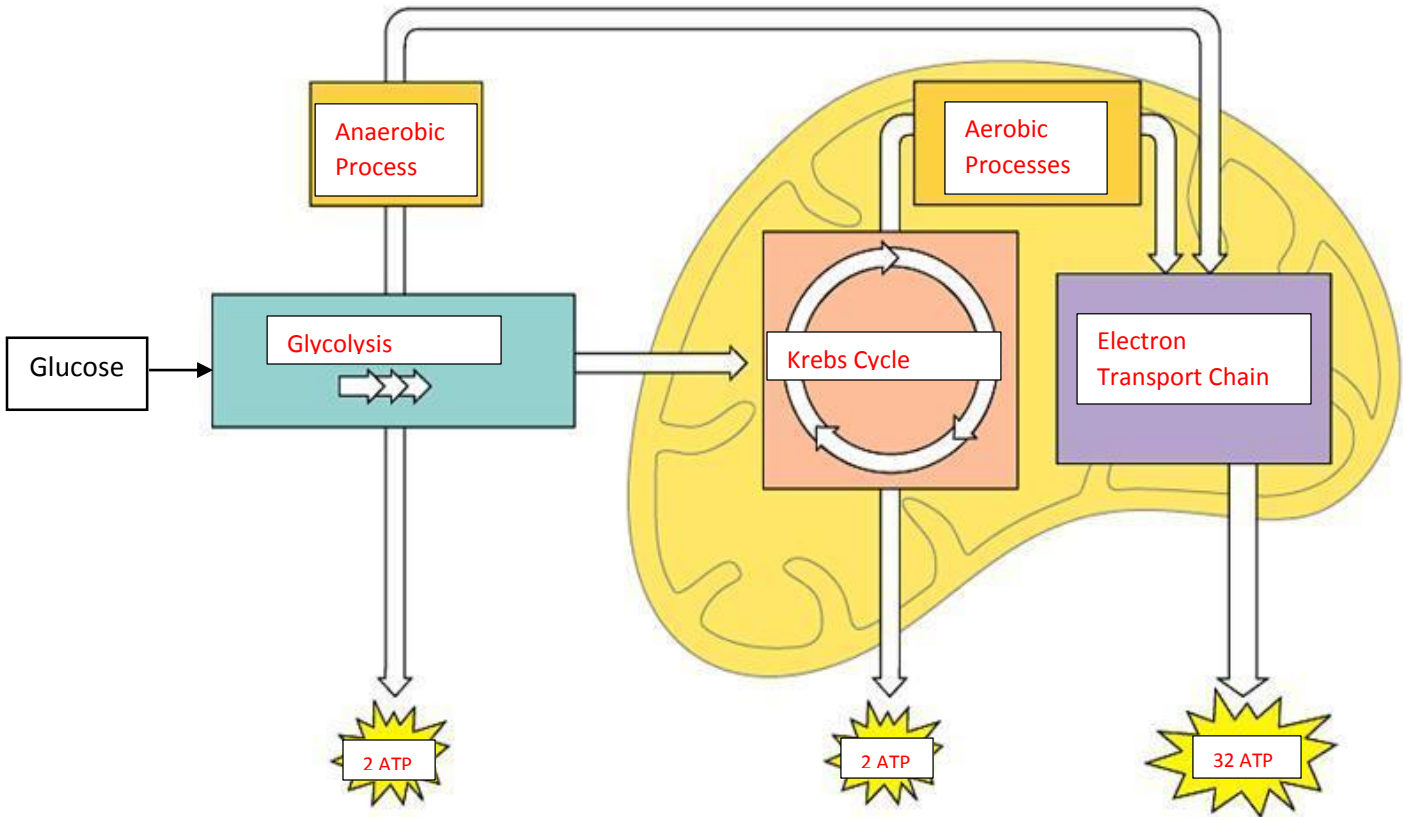
- List all the reactants of photosynthesis.
Carbon dioxide, water, and sunlight
- List all of the products of photosynthesis.
Oxygen and glucose
- What are the two stages of photosynthesis?
Light Dependent Reactions and Calvin Cycle
- In what organelle is photosynthesis occurring?
chloroplast
- In what part of this organelle does the Light Dependent Reactions occur? **thylakoids**
- In what part of this organelle does the Light Independent Reactions occur? **stroma**
- What are all of the needed reactants for just the Light Dependent Reactions?
Light, water, NADP+ and ADP + P
- What are all of the products of just the Light Dependent Reactions?
Oxygen, ATP and NADPH
- What are all of the needed reactants of just the Light Independent Reactions?
Carbon dioxide, ATP and NADPH
- What are all of the products of just the Light Independent Reactions? **Glucose**

Cellular Respiration

1. Write the equation for cellular respiration below and label the reactants and products.



2. Fill in all the boxes and stars for the mitochondria below and answer the questions about cellular respiration.

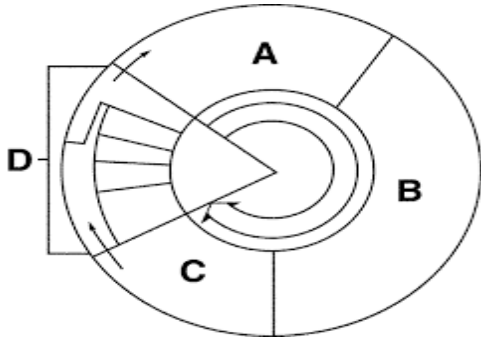


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- List all the reactants of cellular respiration. **Glucose and oxygen**
- List all of the products of cellular respiration. **Carbon dioxide, water, and ATP**
- In what organelle does cellular respiration occur? **Mitochondria**
- What is the end goal of cellular respiration? **To make energy from food**
- What are the three stages of cellular respiration? **Glycolysis, Krebs Cycle, Electron Transport Chain**
- Which stage of cellular respiration produces the most ATP? **Electron Transport Chain**
- Which stages are aerobic? **Krebs Cycle and Electron Transport Chain**
- Which stage is anaerobic? **Glycolysis**
- Anaerobic respiration is also called **_fermentation_**.
- The two types of fermentation are **_alcoholic_** fermentation and **_lactic acid_** fermentation.
- If an organism can only do glycolysis or fermentation, then how many ATP are produced from each glucose molecule? **2**
- Which type of respiration, aerobic or anaerobic, INITIALLY produces ATP quicker? **Anaerobic (glycolysis)**
- Which type of respiration, aerobic or anaerobic, EVENTUALLY produces more ATP overall? **Aerobic**
- What happens to the ATP molecule once it leaves the mitochondria to give free energy to the cell? **A third phosphate group breaks off and releases free energy**

Cell Cycle and Cell Division

1. Label the parts of the cell cycle below and tell what is happening in each phase.



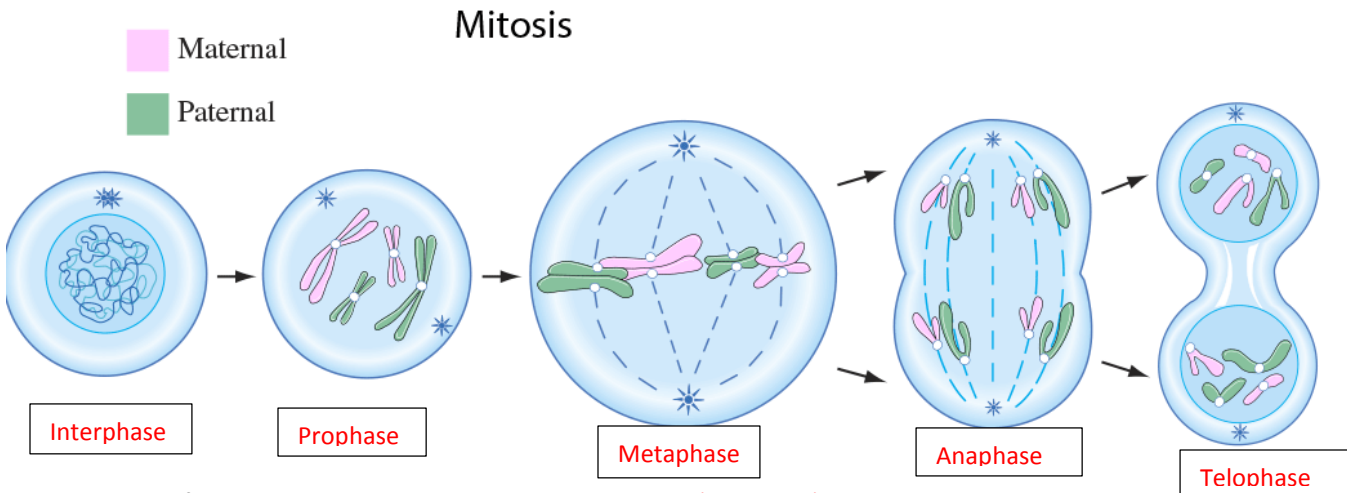
- A. G1=cell growth
- B. S = DNA replication
- C. G2 = preparing for cell division

A, B, and C together make up Interphase.

The longest phase of the cell cycle is Interphase.

- D. Mitosis
- Cytokinesis

2. Label the phases of mitosis below.



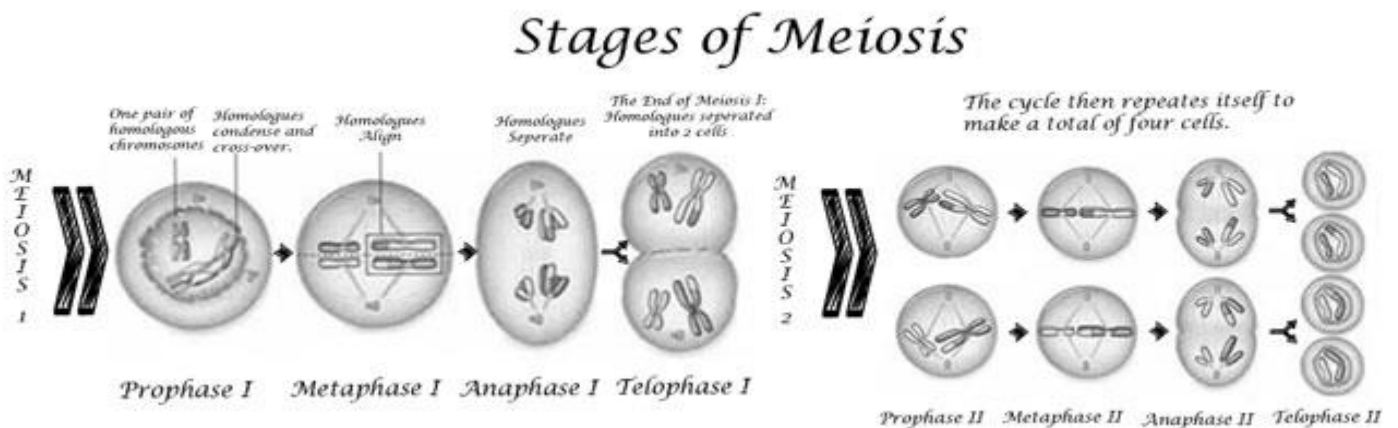
3. What types of cells in an organism do mitosis? **Somatic cells (body cells)**

4. Why do these cells do mitosis? **Growth and repair of body cells**

5. If an organism has 16 chromosomes in its body cells, how many chromosomes will be in the daughter cells? **16**

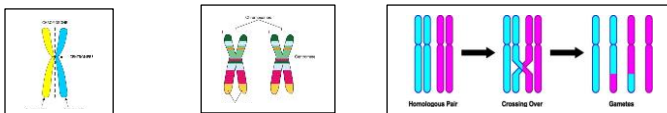
6. How does the number of daughter cells compare in mitosis and meiosis? **Mitosis produces 2 and Meiosis produces 4 cells**

7. Use the diagram below to answer the questions.



8. What process occurs in prophase I that allows for genetic variation? **Crossing over**

9. Draw the following in the space below: one chromosome, two homologous chromosomes, and two homologous chromosomes crossing over.



10. For each of the terms or phrases below, mark it as applying to asexual reproduction (A) or sexual reproduction (S).

- | | |
|--|---|
| <u> A </u> a. Budding | <u> S </u> g. Conjugation |
| <u> S </u> b. Produces genetically different cells | <u> A </u> h. Binary Fission |
| <u> A </u> c. Fragmentation | <u> A </u> i. Mitosis |
| <u> A </u> d. Produces genetically identical cells | <u> S </u> j. Producing Haploid Gametes |
| <u> S </u> e. Meiosis | <u> A </u> k. Producing Diploid Cells |
| <u> A </u> f. Regeneration | <u> S </u> l. Crossing-Over |

Evolution

Match the following terms with the correct definition.

- | | |
|--------------------------------------|---|
| <u> E </u> 1. Natural Selection | a. Any inherited characteristic that increases an organism's chance of survival |
| <u> A </u> 2. Adaptation | b. Structures that are no longer used by organisms and are usually reduced in size |
| <u> C </u> 3. Divergent Evolution | c. Two organisms from a common ancestor become more and more dissimilar |
| <u> H </u> 4. Convergent Evolution | d. An organism's ability to survive and reproduce |
| <u> F </u> 5. Coevolution | e. Individuals best suited to the environment are the ones that survive and reproduce |
| <u> B </u> 6. Vestigial Organ | f. Two species in close interaction change over time in response to each other |
| <u> G </u> 7. Variation | g. Differences among individuals of a species |
| <u> D </u> 8. Fitness | h. Two unrelated organisms develop similar structures and appearances |

9. Read the scenario below and write how the tenets of natural selection apply to the deer mouse.

Deer Mouse- found in sandy soils in Nebraska. Deer mice are widespread across North America, but they usually have dark coat, so that they can blend into dark soils and stay hidden from owls. However, the soil turned into a more sandy environment. Over a period of many years the deer mice with dark coats became obvious to predators and were eaten. The lighter coated mice blended in with their environment and now most mice have lighter coats.

- a. Variation in the Gene Pool Deer mice have light coats and dark coats
- b. Organisms over-reproduce Deer mice produce a lot of offspring
- c. Struggle for Existence Deer mice have to compete to survive from predators like the owl
- d. Survival of the Fittest Deer mice with dark coats were more prevalent in dark soil and deer mice with light coats were more prevalent in sandy soil

10. Classify the following adaptations as structural, physiological or behavioral.

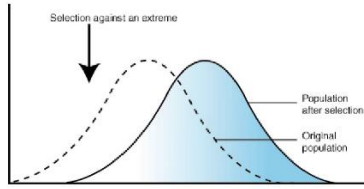
- a) The sticky tongue of a frog Structural
- b) Saliva that digests carbohydrates Physiological
- c) The woodpecker using a cactus spine to remove insects from a tree Behavioral

11. Classify the following types of reproductive isolation as geographical, behavioral or temporal.

- a) The northern spotted owl and the western spotted owl are two closely related species that both live along the western coast of the United States. The two are prevented from reproducing from one another, however, due to the barrier of mountain ranges. Geographical
- b) Closely related American toads and Fowler's toads do not interbreed, despite living in the same area, because American toads mate in early summer and Fowler's toads mate in late summer. Temporal
- c) It is difficult to distinguish between the eastern meadowlark bird and the western meadowlark based on their appearance. However, each has a distinct mating call that each type of species will only recognize. Behavioral

12. Identify the following scenarios as directional selection, disruptive selection, or stabilizing selection.

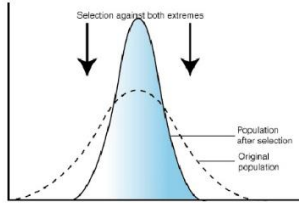
- One extreme trait is favoured



a)

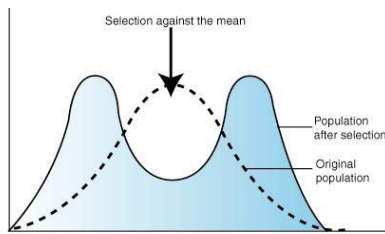
Directional

- Most Common
- Average survives



b)

Stabilizing



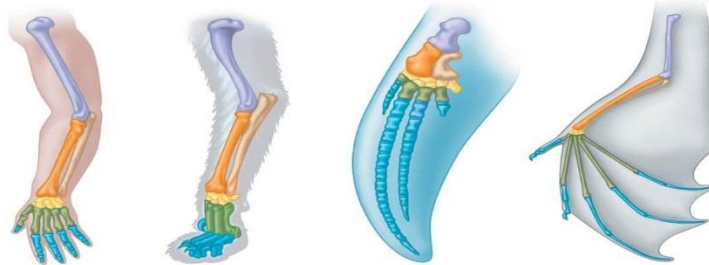
c)

Disruptive

- d) Within a certain species of butterfly, there are the following variations in the gene pool: light colored, medium colored, and dark colored. The spruce forest the butterflies live in contain light and dark trees. The light and dark butterflies are able to survive because they blend in with the light and dark butterflies survive because they blend in with the dark trees when hiding from predators, but the medium colored butterflies are dying out because they cannot hide from predators- they are too dark to hide on the light colored trees and too light to hide on the dark colored trees. Disruptive

13. Use the pictures below to answer the questions.

a. Picture of Homologous Structures:



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i. Homologous Structures

Structure:

Function:

Common Ancestor:

Associated with Which Type of Evolution:

Circle which one applies

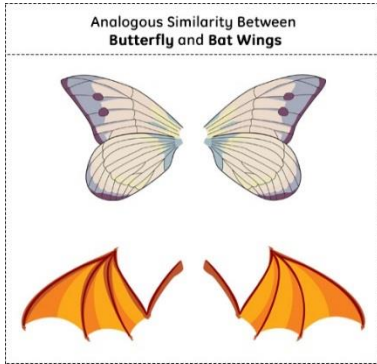
Same or Different

Same or Different

Yes or No

Convergent or Divergent

b. Picture of Analogous Structures:



ii. Analogous Structures

Structure:

Function:

Common Ancestor:

Associated with Which Type of Evolution: **Convergent** or Divergent

Circle which one applies

Same or **Different**

Same or Different

Yes or **No**

14. Classify the following scenarios as divergent evolution, convergent evolution or coevolution.

a. On the Galapagos Islands, Darwin studied the beaks of finches found on each island. Although fossil evidence suggests there was a single ancestral species of finch, the modern-day finches consist of a wide variety of species, each with a distinct beak shape adapted for the food present on each island **Divergent evolution**

b. Dolphins, whales, and sharks all have similar body shapes and characteristics, adapted for life in an aquatic environment. However, dolphins and whales are mammals, and sharks are fish. **Convergent evolution**

c. Monarch butterflies have a mimic. There is another species of butterfly that looks very similar to the Monarch, but does not belong to the same species. The bold colors of the Monarch are an adaptation to avoid predators. Although the other butterfly did not always (in history) look like the Monarch, it was an adaptation to have warning coloration similar to that of the Monarch. Natural selection caused the mimic species to shift its characteristics to become more similar to the Monarch. **Coevolution**

Classification

1. The Father of Modern Taxonomy is **Carolus Linnaeus**.

2. The modern taxonomic system, which involves giving every organism 2 names, is called **binomial nomenclature**.

3. The first part of the scientific name of an organism is the **genus**.

4. The second part of the scientific name of an organism is the **species**.

5. Which scientific name is written correctly? Circle the correct answer.

Felis domesticus

Felis Domesticus

felis Domesticus

Felis domesticus

6. Using the chart below, which two organisms are most closely related? Which organism is least closely related to the other three?

Modern Day Levels of Classification

	Man	Box Elder Tree	Bobcat	Canadian Lynx
Kingdom	Animalia	Plantae	Animalia	Animalia
Phylum	Chordata	Anthophyta	Chordata	Chordata
Class	Mammalian	Dicotyledonae	Mammalia	Mammalia
Order	Primates	Sapindales	Carnivora	Carnivora
Family	Hominidae	Aceraceae	Felidae	Felidae
Genus	Homo	Acer	Lynx	Lynx
Species	sapiens	nugundo	rufus	canadensis

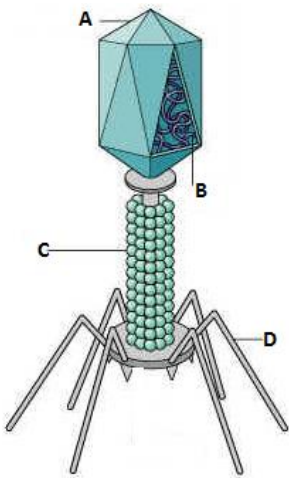
Two organisms most closely related are the bobcat and Canadian lynx

The organism least closely related to the other three is the Box Elder Tree

7. Fill out the chart below to compare the different kingdoms of living things.

KINGDOM	PROKARYOTE OR EUKARYOTE?	CELL WALL? SUBSTANCE?	UNICELLULAR OR MULTICELLULAR?	AUTOTROPH OR HETEROTROPH?
ARCHAEBACTERIA	Prokaryote	Yes; without peptidoglycan	Unicellular	Can be both
EUBACTERIA	Prokaryote	Yes; with peptidoglycan	Unicellular	Can be both
PROTISTA	Eukaryote	Some yes (algae); cellulose	Mostly unicellular; algae multicellular	Can be both
FUNGI	Eukaryote	Yes; chitin	Mostly multicellular	Heterotrophic Decomposer
PLANTAE	Eukaryote	Yes; cellulose	Multicellular	Autotroph
ANIMALIA	Eukaryote	No	Multicellular	Heterotroph

8. What is pictured below? Is it considered a living thing? Why or Why not? Label its parts.



A virus is pictured.

It is not a living thing because it has no characteristics of living things except reproduction, and it can't even do that without a host cell.

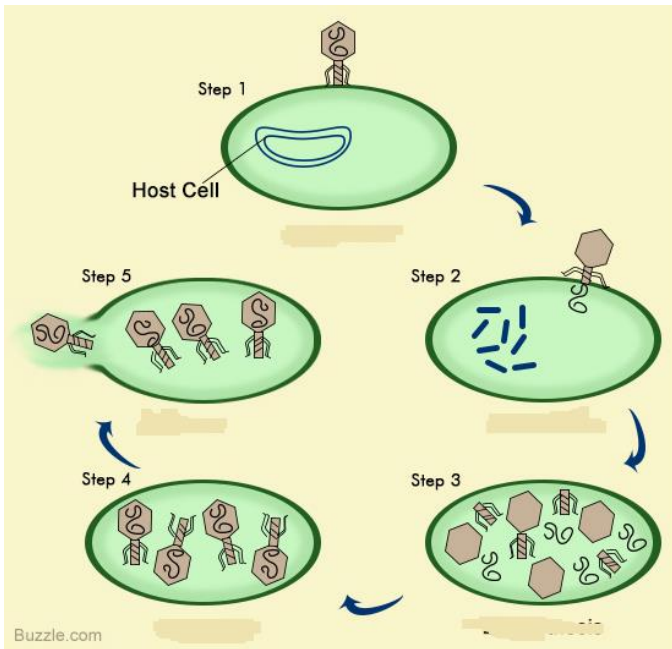
A = Capsid

B = Nucleic Acid (either DNA or RNA but not both)

C = Sheath

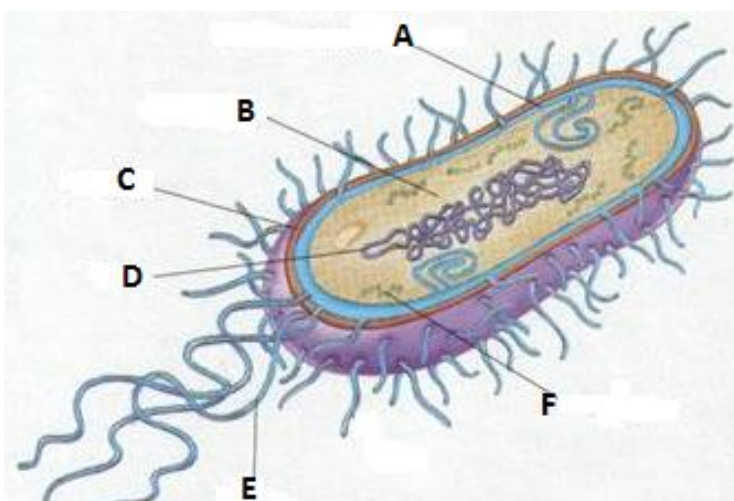
D = Tail Fibers

9. The following is the viral lytic cycle. Describe each of the phases in the space below.



- Step 1. Attachment- the virus attaches to the host cell
- Step 2. Injection- the virus injects its nucleic acid into the host cell.
- Step 3. Replication- the virus makes copies of all of its parts
- Step 4. Assembly- the virus puts all of its parts together into many viruses
- Step 5. Lysis- the host cell bursts and dies, spreading many viruses to the surrounding cells

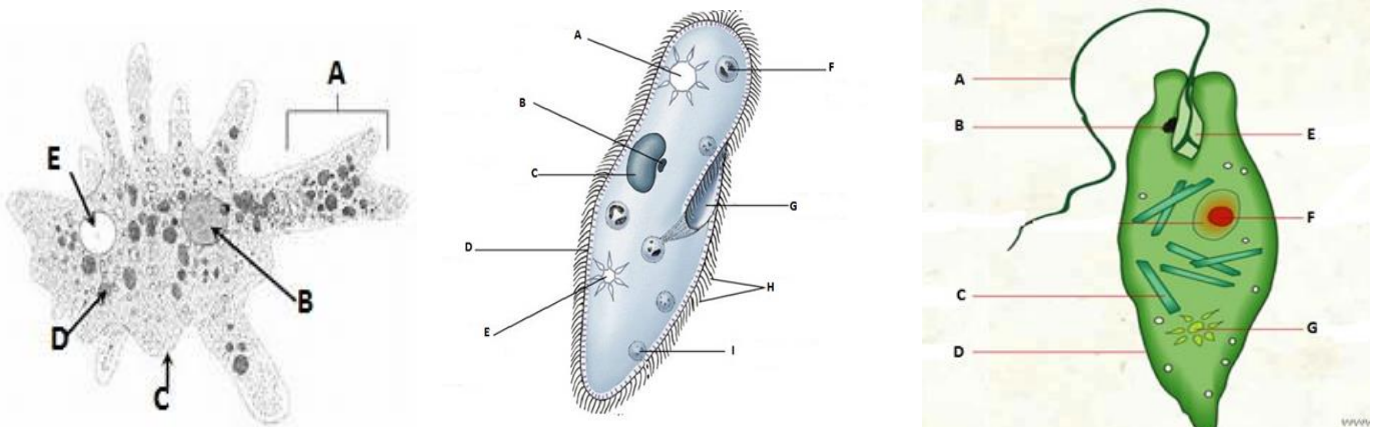
10. What type of organism is pictured below? Is it a prokaryote or eukaryote? How do you know? Label its parts.



- The organism below is a bacteria.
- Bacteria are prokaryotes with no membrane-bound nucleus and no membrane-bound organelles.
- A = Cell membrane
- B = cytoplasm
- C = Cell Wall
- D = DNA/ Bacteria chromosome
- E = Flagella
- F = Ribosomes

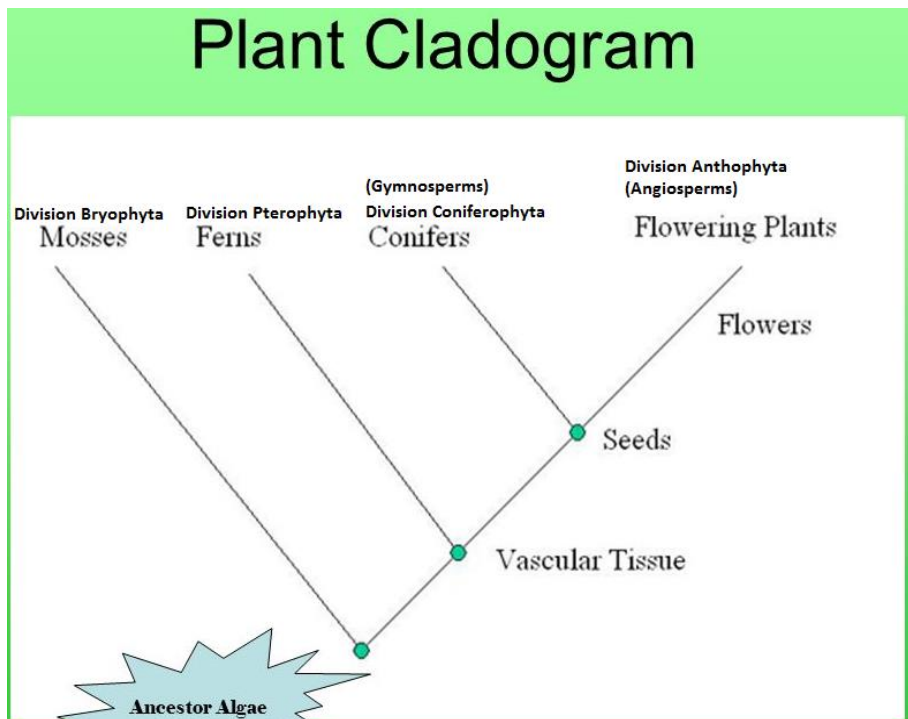
The organisms below are protists. Protists are the only unicellular eukaryotes. Their cells have a nucleus.

11. What types of organisms are pictured below? Are they prokaryotes or eukaryotes? How do you know?



12. Which kingdom is composed of decomposers that reproduce mainly by spores? Kingdom Fungi

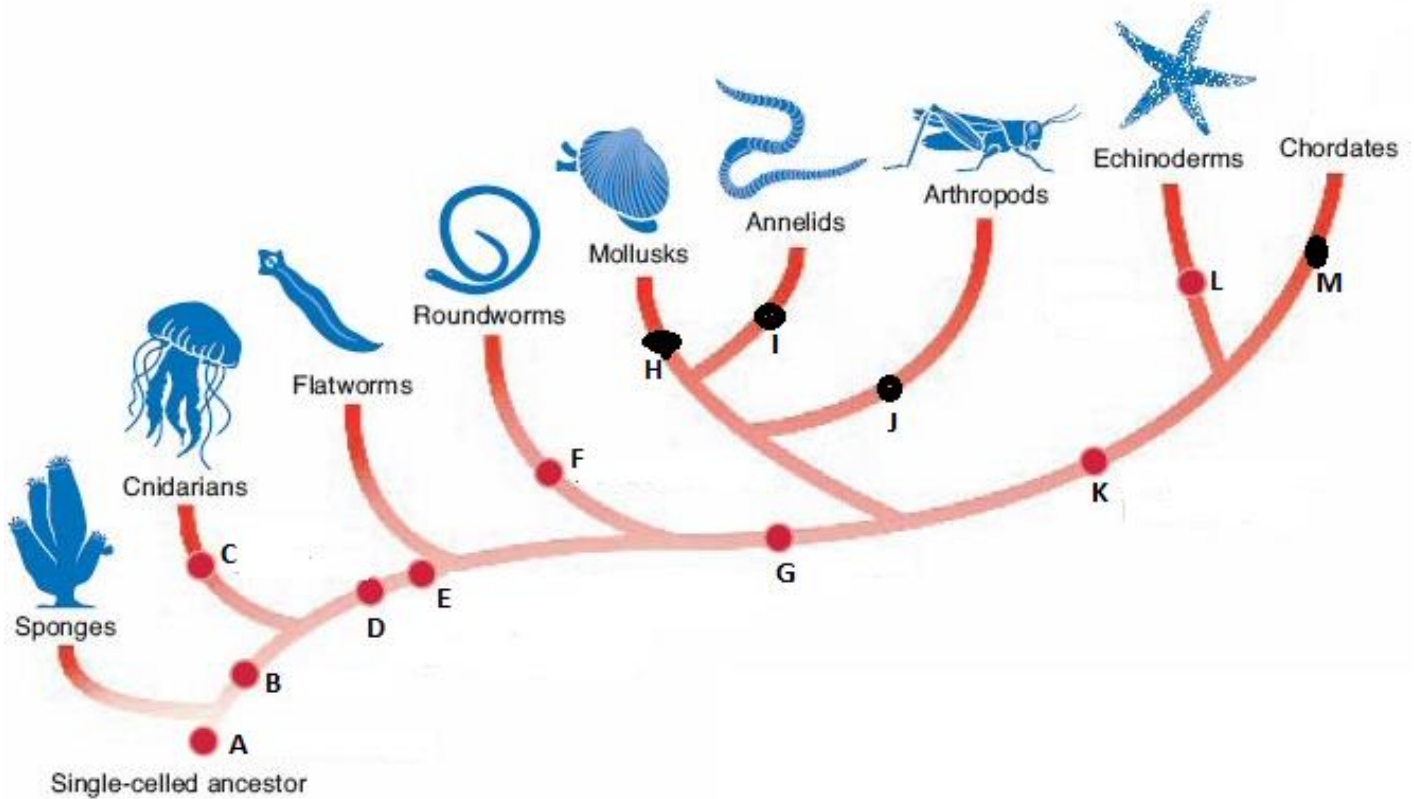
13. Using the plant cladogram below, answer the following questions.



- a. The ancestor of land plants is algae according to the above cladogram.
- b. Which division is non-vascular (no xylem or phloem)? Division Bryophyta (Mosses)
- c. If a plant is non-vascular, what does that mean for the plant? It must live low to the ground to absorb water
- d. Which divisions contain vascular tissue? Divisions Pterophyta (ferns), Coniferophyta (gymnosperms), Anthophyta (angiosperms)
- e. What is the advantage of having vascular tissue? The plant can grow taller.
- f. Which divisions have seeds? Division Coniferophyta and Division Anthophyta
- g. What is the advantage of having seeds? The plant can grow away from water.
- h. Which division is known as gymnosperms and produce seeds in cones? Gymnosperms
- i. Which division is known as angiosperms and produce seeds in fruits? Anthophyta

14. Read the following descriptions and write which letter matches it on the Invertebrate Phyla cladogram below.

- a. **H** characterized by muscular foot
- b. **B** motility
- c. **G** coelom
- d. **E** worms with flat body plan
- e. **J** jointed appendages and segmented body
- f. **C** radial symmetry with one body opening, tentacles with stinging cells
- g. **K** deuterostome
- h. **D** bilateral symmetry, two body openings
- i. **I** worms with segmented body plan
- j. **L** radial symmetry with two body openings
- k. **A** multicellular, sessile, filter feeding
- l. **M** dorsal nerve cord, notochord, pharyngeal gill slits
- m. **F** worms with round body plan



15. Read the following descriptions and write which letter matches with them on the Phylum Chordata cladogram below.

- a. H hair, mammary glands, endothermic, four-chambered heart
- b. G feathers, hollow bones, endothermic, four-chambered heart
- c. A dorsal nerve cord, notochord, pharyngeal gill slits
- d. D bony endoskeleton, ectothermic, two-chambered heart
- e. F scaly skin, amniotic egg, ectothermic, three chambered heart
- f. B vertebral column, no jaws, ectothermic, two chambered heart
- g. E smooth skin, four limbs, lungs, ectothermic, three chambered heart
- h. C cartilage endoskeleton, jaws, ectothermic, two chambered heart

