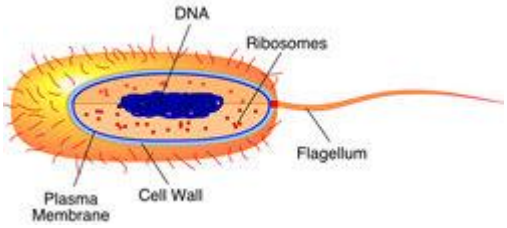
BIOLOGY END OF COURSE TEST STUDY GUIDE

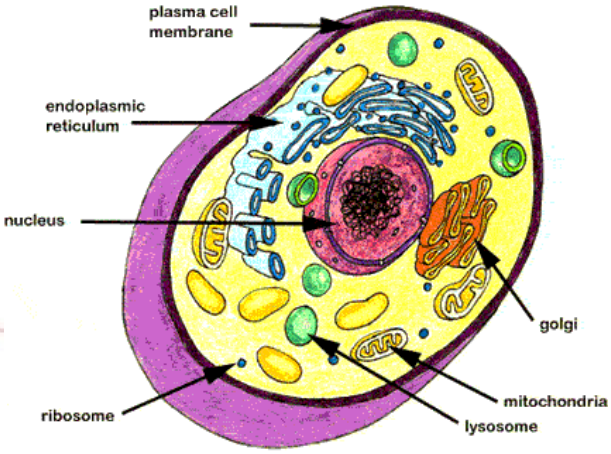
Content Doma in 1: Cells

1. The _cell_____ is the basic unit of structure and function in all living organisms.

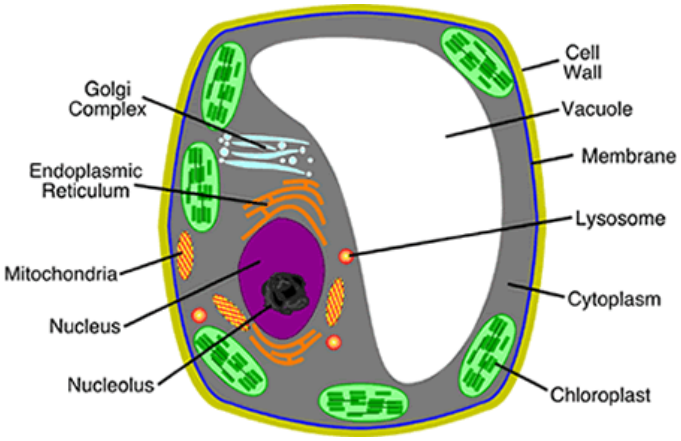
2. There are 2 main categories of cells: Prokaryotic and Eukaryotic.



Prokaryotic cell



Eukaryotic cell- animal cell



Eukaryotic cell- Plant cell

- If a cell has a nucleus and membrane bound organelles, it is said to be ___**eukayotic**_____.
- If a cell does not have a nucleus or organelles, it is said to be ___**prokaryotic**_____.

3. There are only 2 kingdoms whose members contain prokaryotic cells. They are __**Eubacteria**_____ and ___**Archaebacteria**_____.

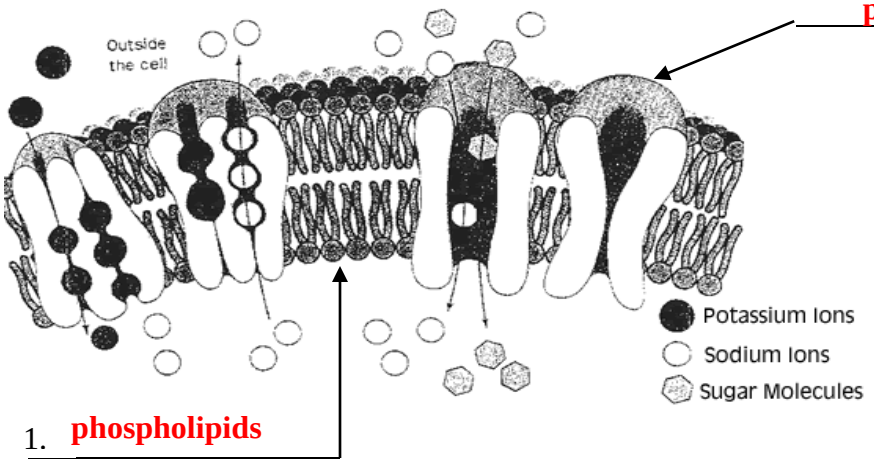
4. Organisms with prokaryotic cells are all __**single (unicellular)** ____ celled organisms where as eukaryotes can be either __**single**_____ celled or ___**multi**__ celled organisms.

5. Which of the following are characteristics of living things? (Circle correct characteristics)

Reproduction *Gas exchange* *growth*
Take in energy *assimilation of materials* *respond to stimuli*
Definite shape *movement*

6. The __**plasma or cell membrane**___ is the outer boundary of the cell and it controls what enters and leaves the cell.

7. Label the following structures in the membrane below:



8. The parts inside of a cell which perform a specific function for the cell are known as _**organelle**_____.

9. Fill out the table below on the Cell Parts.

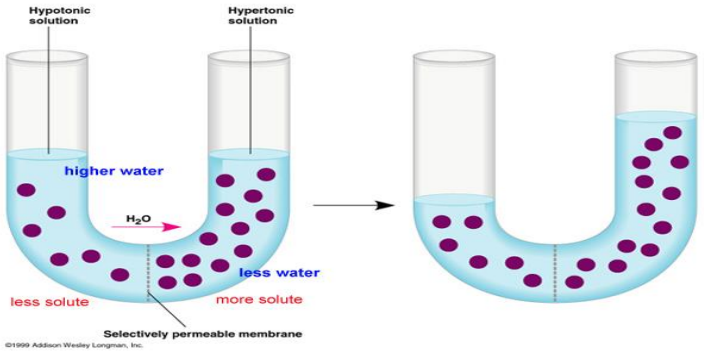
Cell Part	Function
Mitochondria	Energy center or "powerhouse" of the cell. Turns food into useable energy (ATP). This is the site for Cellular Respiration.
Ribosome	Make protein
Golgi body (apparatus)	Processes, packages and secretes proteins (cell's post office)
Lysosome	Contains digestive enzymes, breaks things down
Endoplasmic reticulum	Transport, "intracellular highway"
Vacuole	Stores water or other substances (Plants- 1 large one Animals-several small ones.
chloroplast	Uses sunlight to create food, site of photosynthesis (only

	found in plant cells)
Cell wall	Provides additional support (plant, fungi, and bacteria cells)
Cytoplasm	Jelly-like fluid interior of the cell
Nucleus	the "control center" of the cell, contains the cell's DNA (chromosomes)

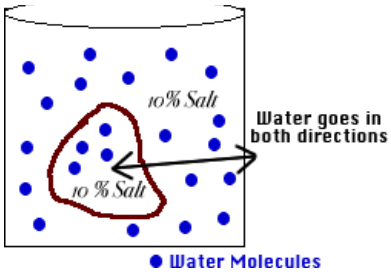
10. Living things maintain a balance between materials entering and exiting the cell. Their ability to maintain this balance is called __**homeostasis**_____. (You can also apply this term to the whole organisms when discussing maintenance of body temperature, hormone levels, sweating vs. shivering, etc…).

11. The movement of substances across the cell membrane from an area of high concentration to an area of low concentration is known as __**diffusion**_____.

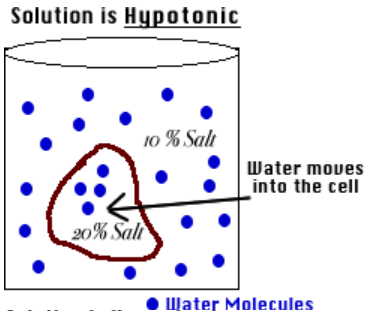
12. The diagram below is illustrating the process of ___**osmosis**_____.



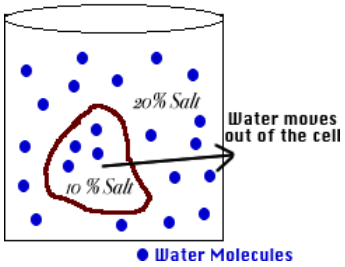
13. The following diagrams represent different solutions that can affect the rate of osmosis. Label the diagrams as being either hypotonic, hypertonic , or isotonic.



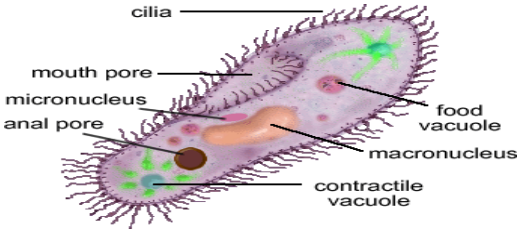
This solution would be _____isotonic_____.



This solution would be **hypotonic**.



This solution would be **hypertonic**.



14. The contractile vacuole inside of some protists like the paramecium above maintains osmotic balance by pumping out excess _____**water**_____.

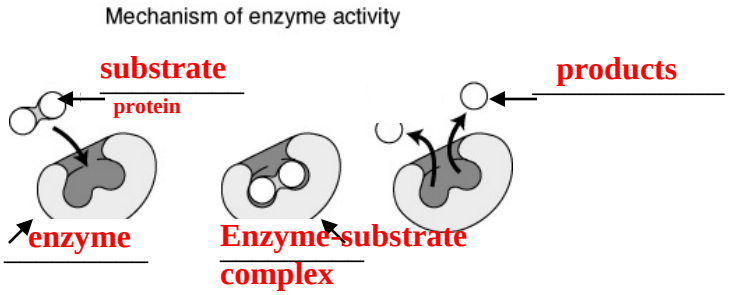
15. _**Active Transport**_____ is the type of transport which requires energy.

16. Bulk transport into the cell is known as __**endocytosis**_____, and bulk transport out of the cell is known as _____**exocytosis**_____.

17. _**Enzymes**_____ are special proteins that speed up the rate of chemical reactions.

18. The __**substrate**_____ is the substance an enzyme acts upon.

19. Label the diagram below with the following terms: Enzyme/substrate complex, substrate, enzyme, products.



20. If you see a word that ends in –ase, it is probably an __**enzyme**_____, and if a word ends in –ose it is a __**sugar/carbohydrate**_____.

21. The area in which a substrate molecule fits into an enzyme is known as the _**active site**_____.

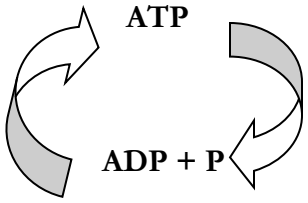
22. Fill in the table on the 4 major biomolecules

Biomolecule	Monomer	Function
1. Carbohydrate	**Monosaccharide**	**energy**
2. **Lipid**	Glycerol and fatty acids	**storage**
3. **P rotein**	**Amino Acid**	Some are important structural components of living things- some serve as enzymes .
4. Nucleic acids	**Nucleotide**	**Genetic information**

Content Domain 2: Organisms

23. ATP-*Adenosine Triphosphate* is a special molecule that stores and releases the energy in its bonds when the cell needs it. Below is a diagram showing the ATP-ADP cycle. On the lines beside the diagram write either **energy released for chemical reactions** or **energy supplied through cellular respiration.**

energy supplied through cellular respiration



energy released for chemical reactions

24. The process in which plants utilize sunlight energy into chemical energy in the form of glucose is called ____**photosynthesis**_____.

25. The process above takes place in the ___**chloroplasts**_____ of the plant cell.

26. Fill in the summary reaction for photosynthesis below with the correct reactants and products. Use the following terms: water, carbon dioxide, glucose, oxygen, CO_2, H_2O, $C_6H_{12}O_6$, O_2 (Place symbols on the top lines and words on the bottom.)

sunlight

_____ **CO_2**____ + ____ **H_2O** _⟹ _ **$C_6H_{12}O_6$** _ + _____ **O_2**_____

carbon dioxide _ ___ **water** ___ __ **glucose** _ ____ **oxygen**___

27. The process by which organisms break down glucose in order to release the energy in it is known as ____**cellular respiration**_____.

28. This process takes place in the __**mitochondria**_____ of the cell.

29. Fill in the summary reaction for cellular respiration below with the correct reactants and products. Use the following terms: water, carbon dioxide, glucose, oxygen, CO_2, H_2O, $C_6H_{12}O_6$, O_2 (Place symbols on the top lines and words on the bottom.)

__ **$C_6H_{12}O_6$**____ + _**O_2**___ ⟹ ___ **CO_2**_____ + _____ **H_2O** __

_ **glucose**___ ___ **oxygen** _ _ **carbon dioxide** ___ ____ **water** ___

30.__**Taxonomy**_____ is the branch of biology which deals with the grouping and naming of organisms.

31. Carolus Linneaus developed the two word system to name organisms known as __**binomial nomenclature**_____.
32. The first word of a scientific name is the ___**genus**_____ name and the second word is the ___**species**_____ name.

33. There are _____**7**_____ taxa (classification categories) in Linneaus' system. List them in order from smallest to largest.

1. species
2.genus
3.family
4.order
5.class
6. phylum
7.Kingdom

34. In the modern day classification system there are ___**6**_____ kingdoms and ___**3**_____ domains.

35. Correctly identify the kingdoms given the descriptions in the table below. Provide an example organism in each kingdom.

Kingdom	Description	Example Organism
Fungi	Consumers that stay put. They have eukaryotic cells. They may be unicellular or multicellular. They decompose dead organisms and waste from the environment.	What is the only single celled organism in this group? **yeast**
Plantae	Multicellular eukaryotes that photosynthesize. Have cellulose cell walls.	**Oak, grass**
Archaebacteria	Mainly found in extreme environments. Some of these prokaryotic cells like extremely hot temperatures and areas of high salt content.	**Halobacteria**
Animalia	Multicellular consumers. They do not contain cell walls. Most have the ability to move.	**Horse, kangaroo**
Protista	Most diverse kingdom of organisms. They may be unicellular or multicellular. They live in moist environments. Some are plant-like, some animal-like, some fungus-like.	**Paramecium. Amoeba**
Eubacteria	This group of prokaryotes can be both beneficial and harmful. Some cause diseases while others are used in the food	**E.Coli**

	industry and are decomposers.	

36. Match the animal phylum characteristics with the correct phylum name:

__**E**__Contain no specialized tissue. Have many pores.
__**F**_ Bodies with radial symmetry. Stinging cells
__**A**__ Flat worms. Only one body opening for digestive tract
__**C**__ Round worms. First group with 2 body openings
__**G**__ Segmented worms. First group with complete Digestive system.
__**I**__ snails, squid, clams, oysters, slugs. Soft-body
__**D**__ Jointed appendages and exoskeletons.
__**H**__ spiny skin
__**C**__ notochord, gill slits, tail

A. Platyhelminthes
B. Chordata
C. Nematoda
D. Arthropoda
E. Porifera
F. Cnidaria
G. Annelida
H. Echinodermata
I. Mollusca

37. In the table below, write in the correct Vertebrate class.

Class	Description
Amphibia	Must return to water to reproduce. Obtain oxygen with gills when young and with lungs and through skin as an adult.
Aves	Have hollow bones and feathers.
Agnatha	Are jawless fish with skeletons made of cartilage.
Chondrichthyes	Have skeletons of cartilage. Sharks, skates and rays are examples.
Reptilia	The first group to produce an amniotic egg. Have tough scaly skin.
Mammalia	Feed their young milk. Have hair as a body covering
Osteichthyes	Bony fish.

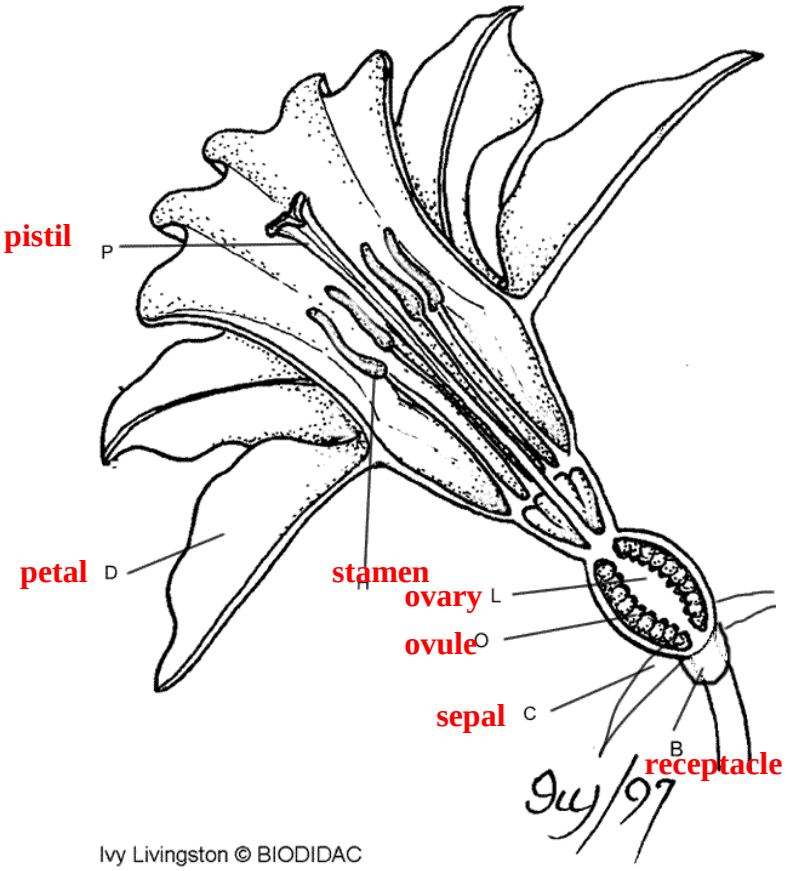
38. Organism that can maintain a constant body temperature regardless of external temperature are known as ____**endothermic**_____. Also known as warm-blooded.

39. Organisms whose body temperature is similar to the temperature of the environment are known as ___**ectothermic**_____. Also known as cold-blooded.
40.___**Non-vascular**_____ plants have no vascular tissue, no roots, stems, or leaves. Ex. Mosses, hornworts, and liverworts.

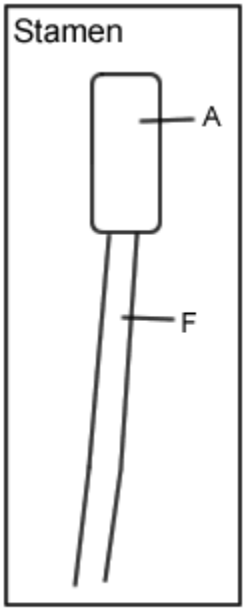
41. ____**Vascular**_____ plants have vascular tissue to transport food and water. Ex. Ferns, grass, trees, bushes, etc….

42. The type of vascular tissue that conducts water from the roots to the leaves is known as _____**xylem**_____.
43. The type of vascular tissue that conducts sugar from the leaves to the roots is known as_____**phloem**_____.

44. Label the flower below using the following terms: Petal, Pistil, stamen, ovary, ovule, sepal



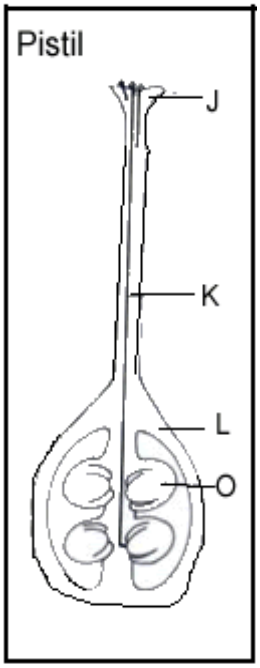
45. Label the 3 parts of the pistil, and the 2 parts of the stamen in the drawings below.



anther

petal

filament



stigma

style

ovary

ovule

46. The __**cuticle**_____ is a waxy substance that reduces water loss in plants.

47. __**Stomata**_____ are openings in the epidermis of a leaf that allows for gas exchange and transpiration.

Content Domain III: Genetics.

48. Chromosomes are made up of the organic molecules called ___**nucleic**_____acids.

49. There are 2 kinds of nucleic acids __**DNA**_____ and ___**RNA**_____.

50. How do these 2 kinds differ?

1.**DNA double strand, RNA single strand**
2.**DNA bases include A-T and G-C, RNA is A-U and G-C**
3. **DNA found in the nucleus only, RNA moves from nucleus to cytoplasm**

4. **RNA has sugar ribose, DNA has sugar deoxyribose**

51. List the four kinds of nitrogenous bases found in the DNA molecule showing which bonds to which. **Adenine to Thymine and Cytosine to Guanine**

52. List the four kinds of nitrogenous bases found in the RNA molecule showing which bonds to which. **Adenine to uracil and cytosine to guanine**

53. Name the 3 kinds of RNA ___**mRNA**_____, ___**tRNA**_____, and _____**rRNA**_____. Know the function of each.
mRNA- carries message from nucleus to cytoplasm, tRNA- carries over appropriate Amino acids to assemble the protein, rRNA- part of ribosome that is responsible for site of protein synthesis, where mRNa is read and tRNA brings the amino acids

54. The DNA molecule has the shape of a _____**Double helix**_____
55. The RNA molecule is ___**single**_____ stranded.

56. The process by which DNA makes a copy of itself is known as ___**replication**_____ and it takes place during _____**interphase**_____ of the cell cycle.
57. Where does the above process take place in the cell?___**nucleus**_____

58. The process of protein synthesis occurs in 2 stages. ___**Transcription**_____ is the first stage and must take place in the nucleus. _____**translation**_____ is the second stage and occurs on ribosomes in the cytoplasm.

59. If the sequence of codons on an mRNA are **ACGAACCUUAGG**, what would the ones on the DNA have been?_____ **TGCTTGGAATCC**_____

60. What does a codon on the RNA molecule code for?__**One amino acid** _____

61.Humans have ___**46**_____ chromosomes in every body cell. This is known as the __**diploid**_____ number and is abbreviated by **2N**.

62. Humans have ___**23**_____ chromosomes in their sex cells. This is known as the ___**haploid**_____ number and is abbreviated by **N**.

63. Cells divide by the process of ___**mitosis**_____ for growth and repair.

64. List the 4 phases of the above cell division in order.
1._**Prophase**_____ 2. ___**Metaphase**_____ 3. __**Anaphase**_____
4.___**Telophase**_____

65.During which phase do the chromosomes line up in the middle?_____ **Metaphase** ____

66. During which phase do replicated chromosomes separate from each other?**Anaphase** _

67. The division of the cytoplasm of the cell is known as cytokinesis. How does this differ between plant and animal cells? **Animal cells- pinch in, Plant cells form cell plate**
68. Another name for sex cells is __**gamete**_____.

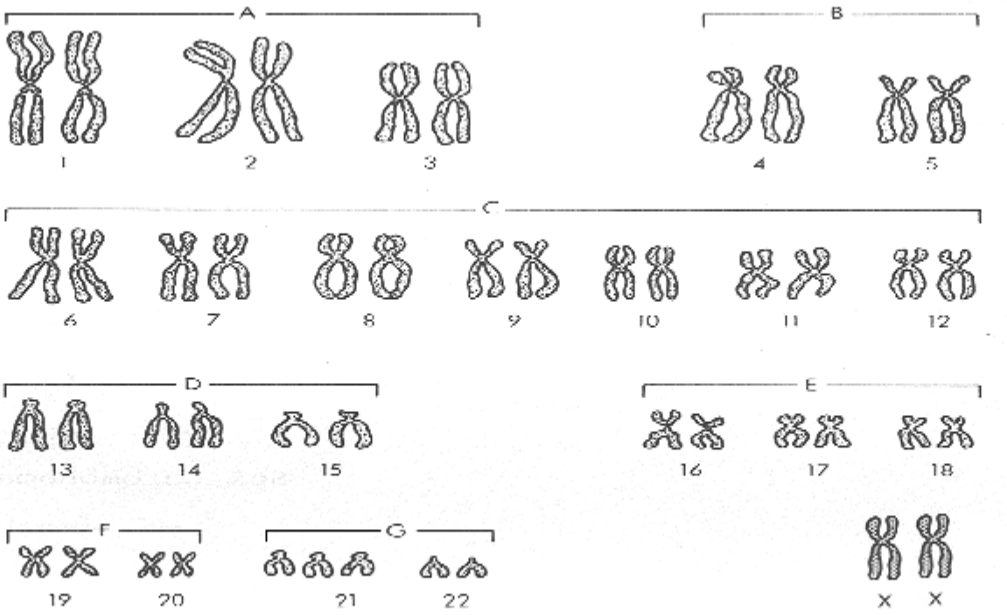
69. Meiosis is different from mitosis in that in meiosis _____**4**_____daughter cells are formed instead of _____**2**_____ as in mitosis. Also in meiosis the chromosome number is __**halved**_____ from diploid to haploid. What is the diploid number for humans?____**23**_____

70. The male gamete is the __**sperm**__ and the female gamete is the ___**egg or ovum**____.

71. Chromosomes come in pairs known as __**homologues**_____.

72. During meiosis, when these pairs don't separate properly, genetic disorders can occur. This failure to separate is known as ____**non-disjunction**_____.

73. The karyotype below illustrates what would happen if this mutation occurred. What type of disorder would this individual have? What is the sex of the individual?



Down Syndrome

Down Syndrome- female

74. What occurs to the homologous pairs in prophase 1 of meiosis that gives us genetic variation?___**sister chromatids separate**____

75. The study of inheritance is known as __**Genetics**_____.

76. An Austrian monk named_____**Gregor Mendel**_____ is known as the father of genetics.

77. He explained the principles of dominance, independent assortment and segregation. Name the plant he used to make crosses to discover these principles.___**Pea**_____
78. The __**Punnett**_____ square is used to determine the outcome of a genetic cross.

79. Cross a homozygous tall plant with a short plant. Tall is dominant. What would the genotype of the tall plant be _**TT, Tt** _? What would the genotype of the short plant be___**tt**___?

Tt	**Tt**
Tt	**Tt**

What would be the phenotype of all the offspring?

80. If you cross a red flower and a white flower all the offspring are pink. This is an example of __**incomplete dominance**___.

81. Blood type is an example of codominance. _ **A**__ and ____**B**____ are both dominant and _____**O**_____ is recessive.

Content Domain IV: Ecology

82. **Choose a word from the list below to complete the following paragraph.**
Ecology, habitat, niche, biome, limiting factors, predator, prey, decomposers, photosynthesis, symbiosis, parasitism, mutualism, commensalism, succession, primary succession, secondary succession, pioneer, ecosystem, food chain, food pyramid, carrying capacity, food web, abiotic, biotic, heterotrophs, autotrophs, carnivore, herbivore, biomass, 10%, 90%, climax community

---

_**Ecology**_____ is the branch of biology that studies the interaction of living organisms in their environments. The living things are called ___**biotic**_____ factors and the non-living factors such as wind, air, water, soil, etc. are the __**abiotic**_____ factors. Where an organism lives such as an owl in a tree is its __**habitat**_____ and the job the organism has in the environment is its ___**niche**_____. An owl's niche would be that of a __**predator**_____. The mouse an owl eats would be a ___**prey**_____. This relationship plus what the mouse eats could be shown in a __**food**_____ _____**chain**_____. If several food chains intertwine showing many feeding relationships and energy flow you would have a ____**food**_____ ____**web**_____. If the flow of energy is shown in a food or energy pyramid, which kinds of organisms normally form the base of the pyramid?__**producers**_____(producers or consumers). How much energy is available for the next level?_____**10%**_____. The total amount of living matter produced in an environment is called its____**biomass**_____. All of the biotic and abiotic factors interacting in an area form a(n) ____**ecosystem**_____. An area

characterized by a dominant climate and plant/animal life is known as a ___**biome**_____. Plants are the only organisms that can convert sunlight into chemical energy in the form of carbohydrates. Plants are the __**autotrophs**_____ or _____**producers**_____ and the animals and fungi are the _____**heterotrophs**_____ or _____**consumers**_____.The process by which plants trap the energy from sunlight to make glucose or other sugars is known as___**photosynthesis**_____. Organisms that break down dead organic matter and return nutrients to the soil are called ___**decomposers**_____. Sometimes two organisms live together in a relationship known as __**symbosis**_____. If both organisms benefit from the relationship such as in lichens, the relationship is called ___**mutualism**_____, but if one organism is harmed due to the relationship it is called ___**parasitism**___. All organisms require things in order to live. When these things are not available, they cannot reproduce or stay alive. These factors are called the ___**limiting**_____factors. They could include space, food, nutrients, water, etc. When an area has reached the maximum capacity of individuals, it is said to be at __**carrying capacity**_____. The gradual change of an ecosystem or environment to a different kind of environment is known as ___**succession**_____. When it occurs after a fire, hurricane, or other natural disaster it is known as __**secondary**_____, but when it occurs where there has never been any life before it is called _**primary**_____. The first plants, such as lichens, mosses, and ferns to live on bare rock or ground are called ___**pioneer**_____plants. The stable community containing mostly hardwood trees would be known as _**climax community**_____.

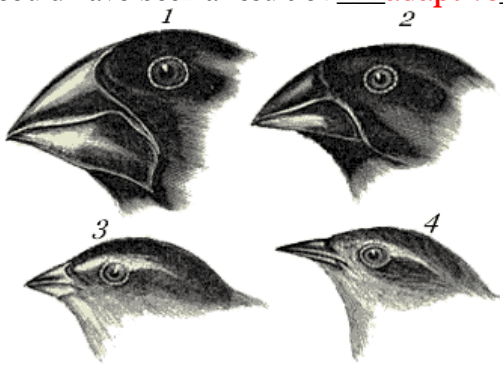
Content Domain V: Evolution

83. ___**Darwin**_____ was an English naturalist who traveled to the _____**Galapagos**_____ islands making careful notes and descriptions of the organisms there such as tortoises and finches?

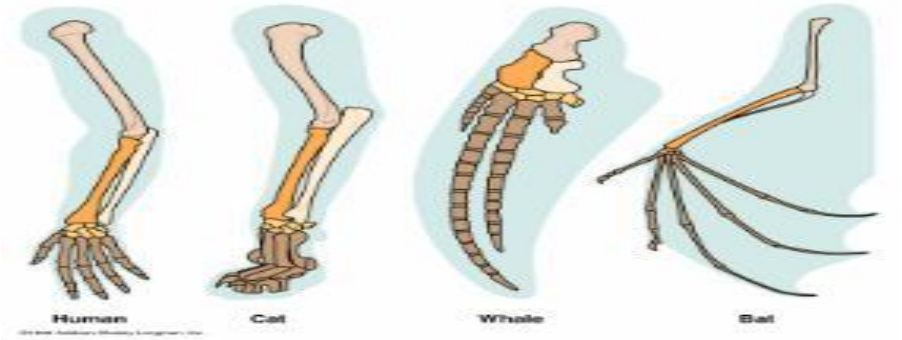
84. His theory of _**natural selection**_____ stated that organism who were well suited to the environment would survive and pass on their traits to their offspring.

85. Favorable variations within a species that allow them to be well suited to the environment are known as _**adaptation**_____.

86. The finches below show similar birds with variations in beaks and eating habits. This could have been a result of ___**adaptive**_____ radiation.



87. The diagram below shows anatomical evidence for evolution. These structures are known as __**homologous**____structures.

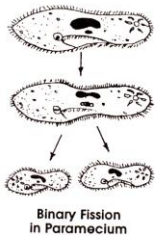


88. _**Convergent**_____ evolution occurs when two unrelated species have similar form.

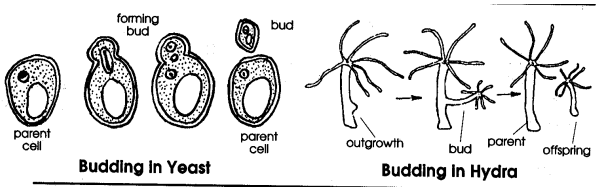
89. Would breeding race horses be an example of artificial or natural selection?____**artificial**_____

90. _**Fossils**_____ or the traces of organisms that once lived are also evidence for evolution.

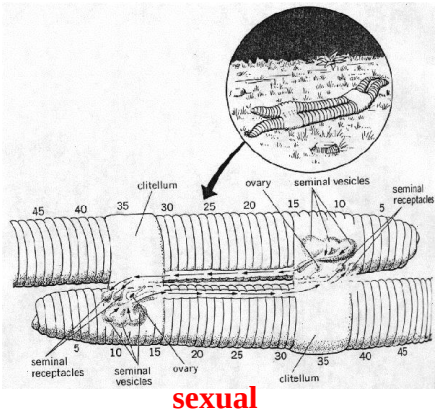
100. Label the following diagrams as either Sexual or Asexual Reproduction



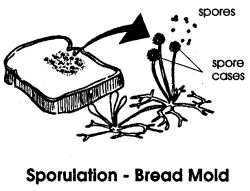
asexual



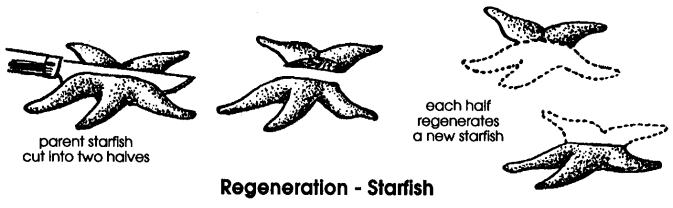
asexual



sexual



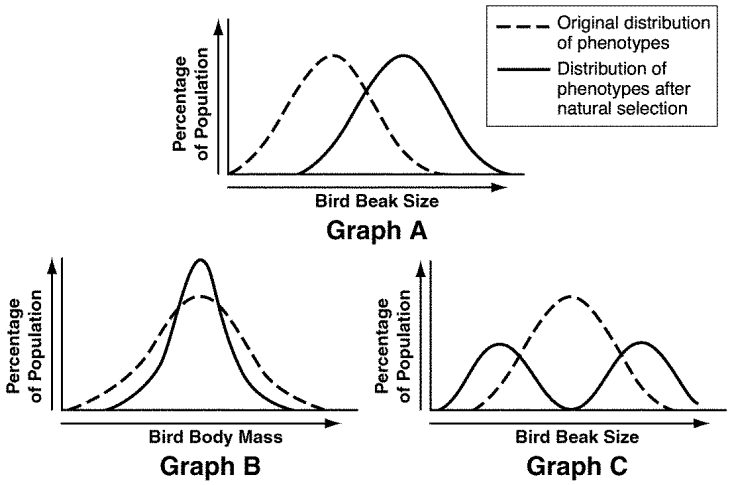
asexual



asexual

Sexual or asexual

101. Label the following types of selection as disruptive, directional, or stabilizing.



Graph A ____**directional**_____
Graph B ____**stabilizing**_____
Graph C ____**disruptive**_____

102. __**speciation**_____ is the formation of a new species. It can occur very slowly over a long period of time called _____**gradualism**_____ or several species can form quickly called _____**punctuated**____ ___**equilibrium**_____.

103. How well an organism is suited to its environment and can reproduce offspring is known as _____**fitness**_____. If environmental conditions change and an organism no longer has adaptations suited to the environment __**extinction**_____ may occur.

104. The total of all the alleles present in a population is its _**gene**_____ ___**pool**_____.

105. ___**Lamarck**_____ said organisms **acquired traits** based on the use or disuse of a body part.

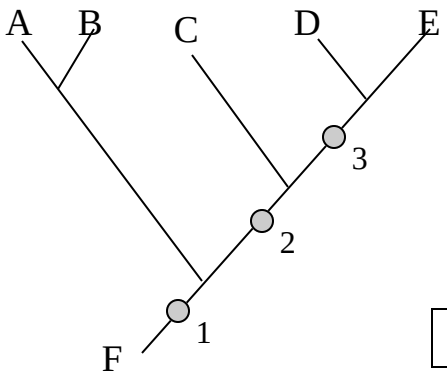
106. The age of fossils can be determined in two ways. __**Relative**_____ ___**dating**_____ shows if a fossil is older or younger than other fossils based on their depth in rock bed. ___**Radioisotope**_____ ___**dating**_____ uses the half life of elements such as carbon to determine the fossil's age.

107. In order for speciation to occur ____**reproductive**_____ __**isolation**_____ must occur. One form is when a physical boundary like a river or canyon separates a population called _____**geographic**_____ _____**isolation**_____.

108. Evidence that supports the theory of evolution includes:

a. _____**anatomy**_____- the study of physical body parts (Homologous, analogous, vestigial organs)
b. ____**embryology**_____- the study of developing embryos
c. __**biochemistry**_____- the study of proteins and DNA
d. __**genetics**_____- the study of how traits are passed to offspring
e. __**direct**_____-observing changes in organisms with short life spans like bacteria
f. ____**fossil**_____-observing evidence of ancestors found in rock

109.



cladogram

a. The diagram represents a ____**phylogenetic**_____ tree.
b. The ancestor of all the other organisms is letter __**F**_____.
c. The two closest related organisms are:
    a. C and F
    b. C and D
    c. D and E
    d. E and F

d. The numbers on the diagram represents ____**derived**_____ traits.
e. How many traits separate:
    a. A from F _____**1**_____
    b. E from F _____**3**_____
    c. C from F _____**2**_____
    d. A from B_____**0**_____
    e. C from D _____**1**_____

110. a. Explain how a cactus is adapted to live in the desert.

_____

_____

b. Explain how a polar bear is adapted to live in the tundra.

_____

_____