**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_**

**Biology SOL Review**



**I. Scientific Investigation:**

1. Place the following steps of the Scientific Method in chronological order:

\_\_\_\_\_\_\_Communicate your results

\_\_\_\_\_\_\_Construct a hypothesis

\_\_\_\_\_\_\_Analyze data and draw conclusions

\_\_\_\_\_\_\_Ask a question

\_\_\_\_\_\_\_Do background research

\_\_\_\_\_\_\_Test the hypothesis (Experimentation)

**Vocabulary: Encyclopedias, state/local agencies, scientific journals**

2. Research can be conducted using many different sources for current findings.

a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the best place to locate *current* findings on the newest technologies

b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are a good place to find information on extinct species or historical theories

c.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can help research the effects of pesticides on the squirrel population

**Vocabulary:** **Hypothesis, Variables, Independent Variable, Observations, Control, Constant, Dependent Variable, Inference**

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- act of gathering information about a system or environment using one or more of the five senses.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a conclusion based on prior knowledge or information.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- “educated guess” or predicted solution to a problem
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- factors that change and can be measured in the experiment.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the variable that you change on purpose.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- The variable that changes as a result of changing the I.V.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- A standard against which experimental results can be measured.
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- Things that are kept the same in the experiment.

**Vocabulary: Constants , Variables ,Qualitative data , Quantitative data , Control , Experiment, Dependent Variable, Independent variable, Hypothesis**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the type of data gathered using the 5 senses.

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the type of data gathered using actual measured numbers.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is an educated guess/prediction; usually in “IF...THEN” form.

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- are the factors that are measured in an experiment.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the variable that you purposely change...variable “I” change.

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the variable that changes as a result of changing the IV.

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the standard against which the experimental results are compared.

8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the thing(s) that are purposely kept the same in the experiment.

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a structured way to test a hypothesis.

**Label the parts of the microscope below and identify the functions of specific parts.**

**Vocabulary: objective lens, ocular lens, diaphragm, fine focus, course focus, stage, barrel, base, stage, clips, lamp, arm, revolving nosepiece**



**II. Characteristics of Living Things**

***A. List the 7 Characteristics of Life***

**Vocabulary: cells, metabolism, homeostasis, reproduce, heredity, evolution, interdependence**

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**- smallest unit of all life

2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**- get and use energy in order to carry out life functions 3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**- organisms rely on each other to survive

4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**- either asexually or sexually

5. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-** maintain a constant internal environment, ex. body temperature

6. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-** pass on traits to offspring

7. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-** populations of organisms change over time

***B. Biological terms in order from smallest to largest***

**Vocabulary: ecosystem, population, organ system, cell, organism, organ, community, species, biosphere, tissue**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the smallest unit of life

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of cells that carry out a similar function

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of tissues that carry out a specialized function in the body

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of organs that work together to perform body functions

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a single living thing

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of organisms of the same species that live in the same area and can interbreed

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of organisms that look similar and can produce fertile offspring

8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a group of different species that live in the same habitat and interact with one another

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a community of organisms and their non-living environment

10**.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: all of the world and it's atmosphere that support life

**III. Life at the Molecular Level**

***A. Inorganic Compounds****~ (Typically* ***DO NOT*** *contain the element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)*

**1. Water**

**Vocabulary: hydrogen bonding, floats, acids, temperature, capillary action, water, polar, 7, 4, 14, 0, adhesion, cohesion, solvent, bases, high heat of vaporization, homeostasis, surface tension**

**a**. Water molecules have a slightly negative charge at one end and a slightly positive charge at the

other end. This means that the molecule is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**b**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the attraction between the positive end of one water molecule and the negative end of another water molecule.

**c**. Many of the 5 unique properties of water are caused by **hydrogen bonding**

~ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the movement of water up thin plant tubes, caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_which means that water molecules ‘stick’ to other things.

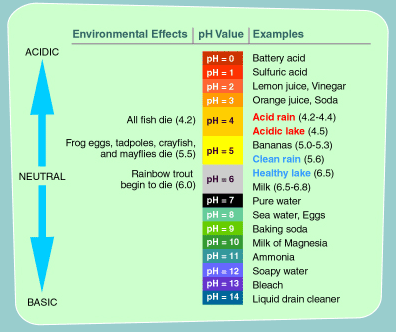
~ The property that helps bugs stand on water is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_caused by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

~ Water expands when it freezes which makes ice (**\*\***).

~ Water has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so it takes a lot of energy to change from a liquid to a gas. This helps organisms maintain the amount of water they have in their bodies.

~ Water resists temperature change so organisms maintain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and keep a constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**d**. Because water is a polar molecule, it is called the universal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because it can dissolve many substances.



**e**. Cells are 95% \_\_\_\_\_\_\_\_\_\_\_\_\_\_, therefore 95% of your entire body is made of water.

~~**The pH scale** is from 0-14.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have a range 0-6.

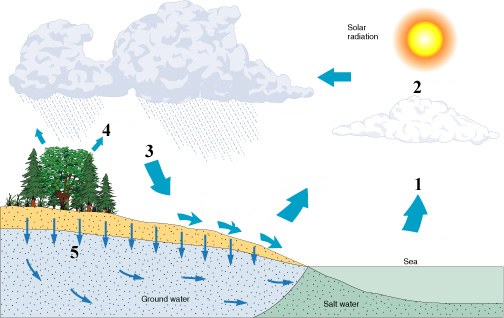
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have a range 8-14.

Neutral solutions have a pH of \_\_\_\_\_\_.

**2. The Water Cycle**

**Vocabulary: condensation, transpiration, precipitation, capillary action, evaporation, run-off, ground water**

1. Water falls to the ground in the form of\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . (# \_\_\_\_\_\_\_\_\_)



**6**

**b**. Water percolates through the soil to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (# \_\_\_\_\_\_\_)

**c**. Water that doesn’t go into the ground is

called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (# \_\_\_\_\_\_)

**d**. Water is taken into plants through the

roots by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**e**.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process of releasing water vapor into the atmosphere from plant leaves. (# \_\_\_\_\_\_)

**f**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ puts water from oceans & lakes into the atmosphere. (# \_\_\_\_\_\_\_\_\_\_)

**g**. Water in the atmosphere forms droplets in clouds by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (# \_\_\_\_\_\_\_\_\_)

**3. The Carbon Dioxide/Oxygen Cycle**

**Vocabulary: heterotrophs, CO2, water, O2, glucose, chloroplasts, mitochondria, photosynthesis,**

**chemical, respiration, autotrophs, solar**

**a**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_use organelles called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in their leaves to collect \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.

**b**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_occurs so plants can make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to use for energy.

**c**. Photosynthesis converts \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_energy into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_energy.

**d**. Photosynthesis uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_energy to form . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_& \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



**e**. Animals that can’t make their own food are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**f**. Animals use organelles called . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to perform a process called \_\_\_\_\_\_\_\_\_\_\_\_which breaks down food molecules to produce ATP for energy.’

**g**. Respiration uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to produce\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**h**. The gas made by respiration is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; the gas taken in by photosynthesis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

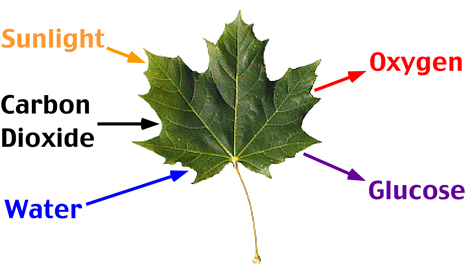
**i**. the gas taken in by respiration is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;the gas produced by photosynthesis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**j.** The letter \_\_\_\_\_\_ represents the rabbit dying and replacing nutrients in the soil.

**k.** The letter \_\_\_\_\_\_ represents carbon dioxide being taken in to perform photosynthesis.

**l.** The letters \_\_\_\_\_\_ and \_\_\_\_\_\_ show CO2 being released into the atmosphere by respiration.

**m.** The letters \_\_\_\_\_\_ and \_\_\_\_\_\_ show carbon compounds being ingested for metabolic purposes.



>Write the chemical equation for **photosynthesis**:

>Write the chemical equation for **respiration:**

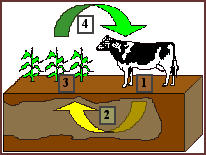
**4. The Nitrogen Cycle**

**Vocabulary: decompose, heterotrophic, autotrophs, producers, consume**

**a**. Nitrogen is absorbed from the soil by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (plants) to build compounds

**b**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plants to build their own compounds.

**c**. When organisms die, the bodies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and nitrogen goes back to the soil.



**d**. Nitrogen-fixing bacteria use the nitrogen compounds for themselves and to make the nitrogen available for other\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and organisms to use.

**e.** The number \_\_\_\_\_\_\_\_represents organic wastes from plants and animals adding nitrogen to the soil.

**f.** The number \_\_\_\_\_\_\_\_ depicts plants using nitrogen in the soil to grow, develop, and reproduce.

**g.** The number \_\_\_\_\_\_\_\_ shows that plants are eaten by animals (including people) to gain nitrogen.

**h.** The number \_\_\_\_\_\_\_\_ is where bacteria in the soil convert nitrogen in to forms that plants can use.

***B. Organic Compounds or Macromolecules****:*  there are \_\_\_\_\_\_\_\_\_ macromolecules.

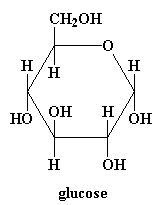
**All** organic molecules contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Carbohydrates**

**Vocabulary: starch, cellulose, monosaccharides, dehydration synthesis, built, glucose, broken down, disaccharide, hydrolysis, polysaccharide, lactose**

**a**. Carbohydrates are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to store energy in plants and are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be used as cellular energy to accomplish the characteristics of life.

**b**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are monomers of carbohydrates. An example of simple sugar is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



**c**. Two simple sugars make a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: examples are sucrose and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**d**. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a carbohydrate made of many sugars.

**e**. A polysaccharide found in plant cell walls is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**f**. A polysaccharide used to store energy in plants is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**g**. Sugars are put together using a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Lipids**

**Vocabulary: fatty acids, fat, cuticle, oil, phospholipids bi-layer, store, plants, glycerol, wax**

**a**. Lipids are macromolecules that are insoluble in water, including \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**b**. A monomer of a lipid is made of three \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**c**. Lipids are used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy in animals.

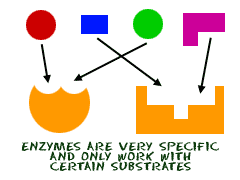
**d**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have a waxy coating on their leaves called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which keeps from losing too much moisture or from becoming water logged.

**e**. Cell membranes are made of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

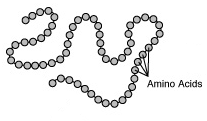
1. **Proteins**

**Vocabulary: amino acids, peptide, dipeptide, polypeptide, enzymes, speed up, active site**

**a**. Proteins are made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ joined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds.



**b**. Two amino acids joined is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_.



**c**. Three or more amino acids joined is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**d**. Enzymes bind to the substrate at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**e**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are a special group of proteins that catalyze or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions.

1. **Nucleic Acids**

**Vocabulary: adenine, cytosine, guanine, thymine, uracil, replication, sugar, ribose, DNA, RNA, Watson & Crick, nucleotides, double helix, genetic engineering, insulin, deoxyribose, phosphate, base**

**a**. The two types of nucleic acids are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**b**. The monomer of a nucleic acid is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is made of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



**c**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is common to **all** living things and it stores genetic information.

**d**. In DNA, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**e**. The shape of a DNA molecule is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, discovered by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**f**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a process that makes an exact copy of DNA.

**g**. The sugar in DNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but the sugar in RNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**h**. In DNA adenine bonds with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but in RNA it bonds with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**i**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is single stranded, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is double stranded.

**j**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is copied by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which becomes the pattern for making proteins.

**k**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process of inserting foreign DNA into host DNA to make recombinant DNA to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, interferon, and human growth hormone.

**IV. Life at the Cellular Level**

***A. The Parts of the Cell Theory***

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***B. Development of the Cell Theory***

**Vocabulary: Schwann, Leeuwenhoek, Pasteur, Redi, spontaneous generation, Virchow, Schleiden, Hooke**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- observed cells in pond water through his own invention. He made the 1st microscope!

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- observed cork and named cells

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- studied plant cells

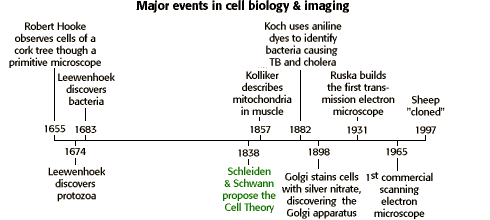
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- studied animal cells

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the idea that living things come from nonliving matter

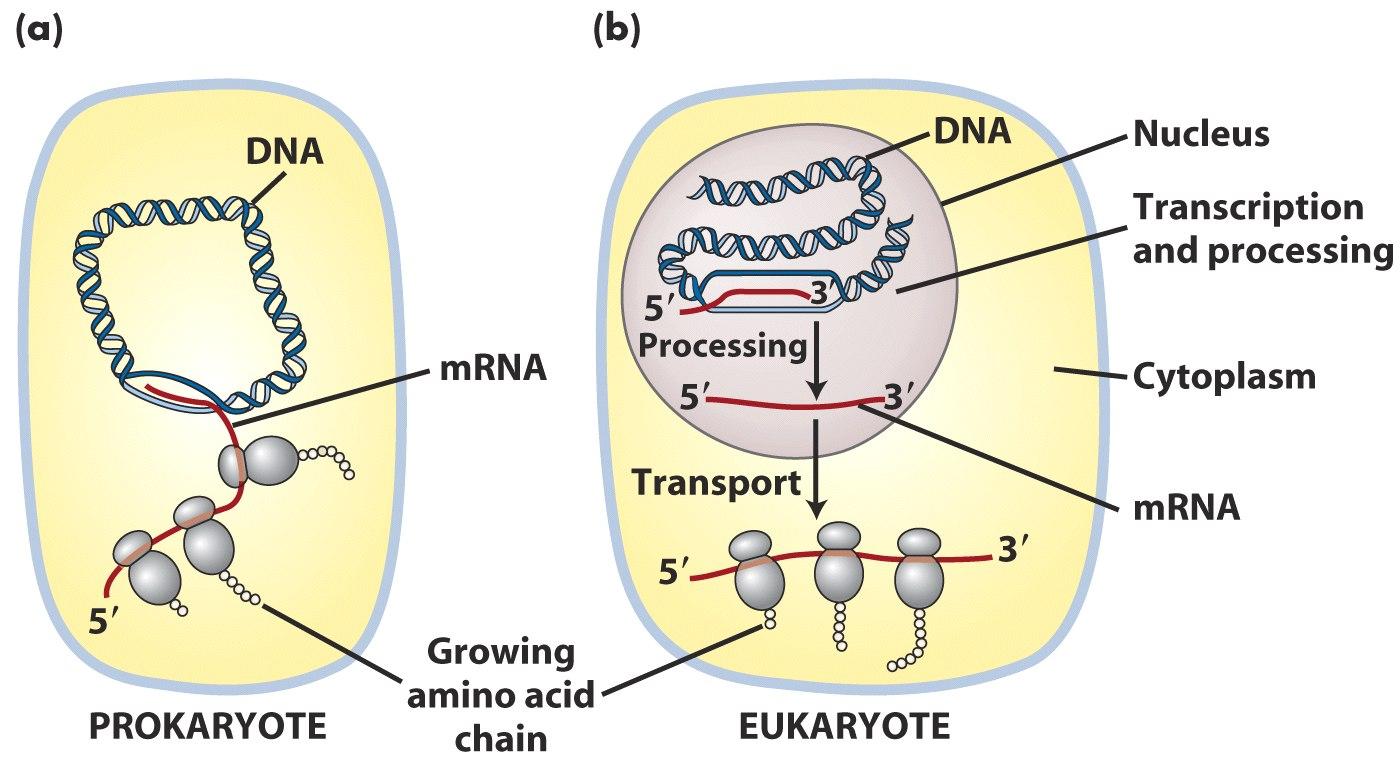
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- meat/maggot experiment to disprove spontaneous generation

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - meat broth experiment to disprove spontaneous generation

8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- proposed/concluded that all cells come from preexisting cells



***C. Types of Cells***



**Vocabulary: prokaryotes, eukaryotes, both**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- have a nucleus

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- have organelles

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- go through mitosis

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- go through binary fission

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- have ribosomes to synthesize proteins

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_only include organisms from the kingdoms Archaebacteria and Eubacteria.

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- do not have organized structures within the cell, except ribosomes

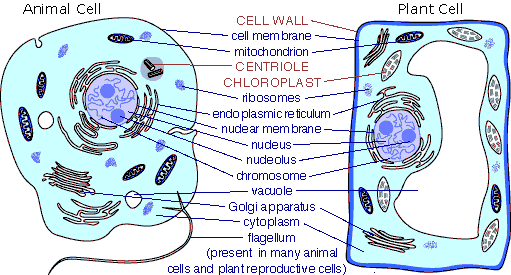
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_include organisms in the kingdoms Protista, Fungi, Plant, and Animal

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_have DNA, (HINT: ALL kingdoms of organisms have this in common)

***D. Differences between plant and animal cells*** (complete the table)

|  |  |  |
| --- | --- | --- |
| DIFFERENCES | Plants | Animals |
| 1. shape ( b/c of cell wall) |  |  |
| 2. **different** organelles present |  |  |
| 3. nucleus location (b/c of vacuole) |  |  |

***E. Cellular Organelles***



1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- command center of the cell; DNA in the form of chromosomes is here

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- small organelle in the nucleus that makes ribosomes.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - small spheres made of rRNA in the nucleus, cytoplasm, and on the ER

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the site of protein synthesis in prokaryotes and eukaryotes

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - transport system of the cell

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- collects, packages, and distributes proteins

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- contains digestive enzymes to break down old cell parts

8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- storage tank of the cell

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- organelle that conducts ‘respiration’ for the cell

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the powerhouse of the cell

11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- organelle that conducts ‘photosynthesis’ for plant cells

12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- assists in cell division in animal cells only

13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the medium in which organelles float inside a cell

14. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- made of cellulose (plants) or chitin (fungi); outer boundary of some cells

15. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - the outer layer or boundary of an animal cell

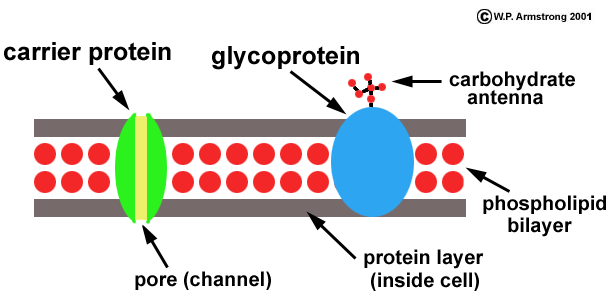
16. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - would be quite numerous in a heart muscle cell because it is very active

17. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - would be numerous in a cell that produces large quantities of **melanin**

***F. The Fluid Mosaic Model and Movement through the Cell Membrane***

**Vocabulary: diffusion, proteins, cell membrane, active transport, endocytosis, exocytosis, phospholipids**

**energy, low, high, carbohydrates, water, facilitated diffusion, pinocytosis, osmosis, phagocytosis**



1. The cell membrane is composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The Fluid Mosaic Model describes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or passive transport, doesn’t require \_\_\_\_\_\_\_\_\_\_\_.

4. Passive transport, or diffusion, moves molecules move from areas of \_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_ concentration.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - diffusion using carrier proteins to help molecules across the membrane.

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a type of diffusion involving ONLY the movement of water molecules.

7. Look at the picture below. Because large molecules are too big to diffuse through the membrane, water molecules have to move to equalize the pressure. This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. The movement that requires energy moves molecules from \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ concentrations.

9. Membrane folding is a type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that requires \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. Membrane folding that involves taking in solid particles is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. Membrane folding that engulfs small amount of liquids is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. Membrane folding that removes particles from the cell is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

13. Our **cells** are made of 95% \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, therefore 95% of your **body** is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

14. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are too large to diffuse through the membrane and are transported by carrier \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**V. Cell Division**

***A. Mitosis***

**Vocabulary: nucleus, replicated, interphase, prophase, metaphase, anaphase, telophase, cytokinesis,**

**centromere, sister chromatid, chromatin, centrioles, spindle fibers, plate, furrow**

1. A chromosome is made of two identical parts called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The parts of a chromosome are held together by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. Only animal cells have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to help with chromosome movement.

4. During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sister chromatids are separated at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and are pulled to opposite ends of the cell.

5. DNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so each cell will have the same information.

6. Chromosomes line up along the equator of the cell in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. Loose or uncoiled chromosomes are actually DNA in the form of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spindle fibers shorten which pulls chromosomes to the poles.

9. After the nucleus divides, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or division of the cytoplasm, occurs.

10. In plant cells only, a cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. In animal cells only, a cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are attached to chromosomes at the centromere

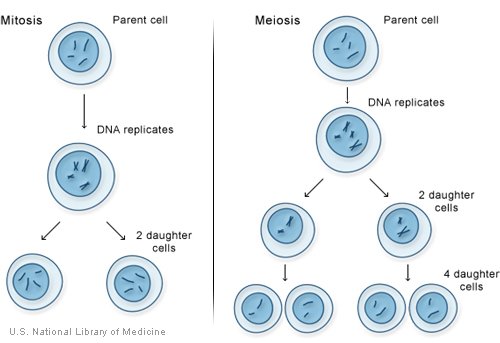
13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- chromatin condenses and becomes visible chromosomes

14. The picture to the right is an onion cell going through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

15. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- nuclear membrane begins to disappear

16. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- two daughter cells are formed

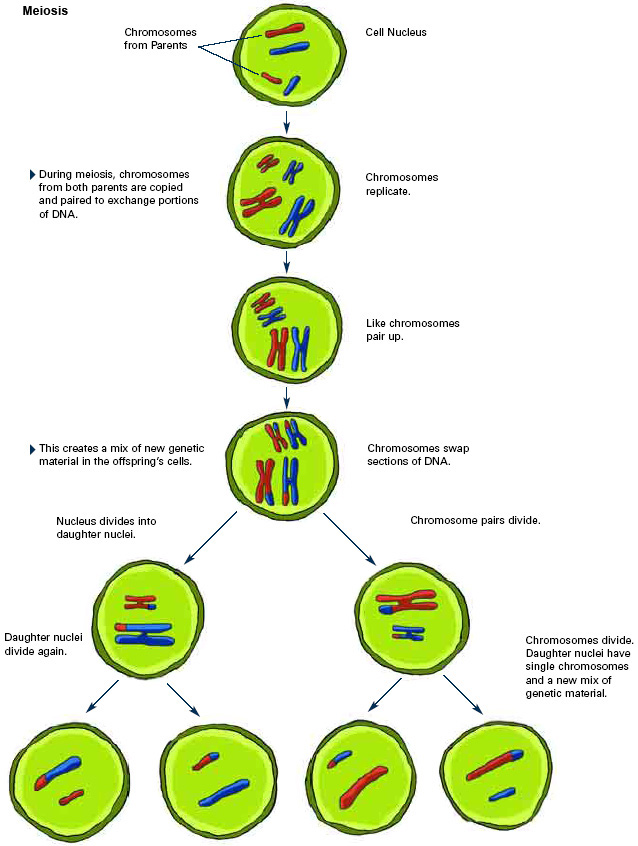
17. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- nuclear membrane begins to form around each set of chromosomes



***B. Meiosis.***

***Vocabulary:* gametes, 1, the same, 46, 23, eggs, sperm, homologous, diploid, half, 2, haploid, prophase**

1. Meiosis is a type of cell division that makes sex cells or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



2. The two types of sex cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. Mitosis consists of \_\_\_\_\_\_\_\_\_\_\_\_\_ division(s), while meiosis consists of \_\_\_\_\_\_\_\_\_\_ division(s).

4. Mitosis makes cells with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of chromosomes as the parent cell, but meiosis produces cells with \_\_\_\_\_\_\_\_\_\_ the number of chromosomes as the parent cell.

5. A human’s body cells have \_\_\_\_\_\_\_\_\_ chromosomes; sex cells or gametes have \_\_\_\_\_\_\_\_\_\_\_\_.

6. For every chromosome your mother gave you, there is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chromosome from your

father with information regarding the same trait(s).

7. When a cell has a full complement of homologs from each parent, the cell is said to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Sex cells have only ONE set of chromosomes, they are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. (**\*\***) chromosomes exchange information during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which adds to diversity.

***C. Other types of division and Asexual Reproduction in Organisms***

**Vocabulary: binary fission, budding, mitosis, sporulation, vegetative propagation, regeneration**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - repairing severed appendage (starfish or lizard tail)

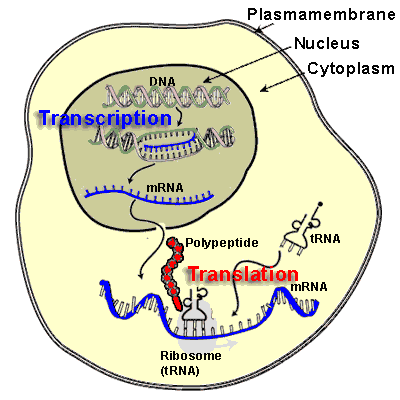
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- growing new roots for a plant from plant clippings

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- new mold growing where spores have fallen, also occurs in ferns

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- only occurs in prokaryotes

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- occurs in yeast and hydra when a tiny bud sprouts from a parent

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- occurs in single celled eukaryotes like paramecium, splitting the nucleus



***D. Making a Protein***

**Vocabulary: translation, diffusion, transcription, proteins, mRNA, amino acid(s), DNA, grow, peptide, tRNA,**

**codon, nitrogenous bases, cytoplasm, ribosome, nucleus, anticodons**

1. After a new cell is formed it must get bigger or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The three things that effect a cells’ size are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and S.A. to volume ratio.

3. Cells get bigger by making organic compounds like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_>

4. The process of protein synthesis is comprised of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the genetic code is copied from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. Because DNA can’t leave the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the message is carried out to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. Once the message from DNA is copied, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ leaves the nucleus and travels to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. A sequence of 3 bases on DNA or mRNA is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but 3 bases on a tRNA molecule are called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. Codons match with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transfers the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to a ribosome.

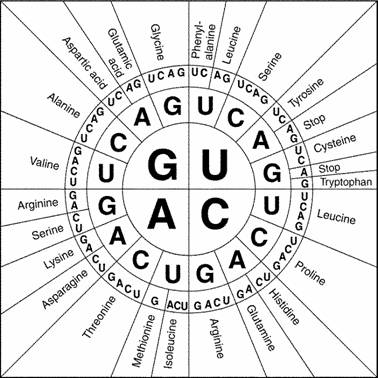
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are linked by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. Another name for protein synthesis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. The sequence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carries the genetic code.

***E. Transcription and Translation:***

*Use the codon chart below to transcribe and translate the following DNA sequence.*



DNA STRAND - TACGGCCATTTCGATTTGAGCATC

1. mRNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. amino acids: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. This protein is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ amino acids. (give the number of amino acids)

***F. DNA Technology***

**Vocabulary: DNA sequence, genes, profiling, identical, fraternal, collaborative, same**

1. DNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is used to identity crime suspects (such as murder and rape).

2. Using electrophoresis, scientists can determine an individual’s DNA fingerprint.

No 2 people have the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ profile, except for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ twins.

3. Human Genome Project was a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ effort because 13 countries worked on it.

4. The objective of the Human Genome Project was to understand the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Scientists wanted to determine the sequence of bases to find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

responsible for diseases.

6. Look at the electrophoresis sample below. Who is the father of the child? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

dad 1

mom

baby



dad 2

**VI. Genetics**



***A. Genetics Basics***

**Vocabulary: phenotype, gene, heredity, genetics, genome, recessive, dominant, Gregor Mendel, trait,**

**genotype, alleles, homozygous, heterozygous**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- two **different** alleles, a hybrid (Tt)

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the passing of characteristics from parent to offspring

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the **type** of **genes** or alleles present in an organism’s genome

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- form of gene that always shows even in the presence of recessive allele.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- all of the genes in an organism

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- are different forms of the same gene (ex: tall vs. short)

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- two alleles of the **same** form that make up a genotype, pure breed (TT or tt)

8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the Father of Modern Genetics

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- form of a gene **only** expressed in a homozygous state

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is an inherited characteristic

11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is an organism’s **physical** appearance

12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the study of heredity

13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a segment of DNA located on a chromosome

***B. Mendelian Genetics***



**Vocabulary: monohybrid, dihybrid, independent assortment, genotypic, phenotypic, segregation, Punnett square, P, F1, F2, incomplete dominance, codominance, sex-linked traits**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- table used to diagram the probability of getting certain genotypes

2. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cross constitutes a study of only **one** trait

3. A\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cross constitutes a study of **two** traits at a time

4. The first generation of a cross is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or parental generation

5. The offspring of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ generation is the F1 generation

6. The offspring of the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ generation is the F2 generation

7. The Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ states that each gene is inherited separately from others

if they are on different chromosomes

8. The Law of\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ states the 2 alleles for each trait separate as gametes form

9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is blending of traits; red flowers + white flowers = pink

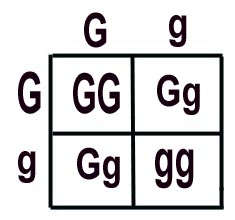
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- both alleles are expressed equally, as in blood typing (A+B = AB)

11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- controlled by genes on sex chromosomes; colorblindness, hemophilia

12. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cross of 2 heterozygotes produces offspring with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio of 9:3:3:1.

13. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cross of 2 heterozygotes produces offspring with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio of

3:1, but a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio of 1:2:1.



***C. Mutations****~ there are 2 major types ‘****gene’*** *and ‘****chromosomal’***

**1. Gene Mutations**

**Vocabulary: gene, point, frame shift, mutagens, UV light, chemicals**

**a**. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation is a change in one or more nucleotide bases of DNA.

**b**. Mutations are caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**c**. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation is when 1 nucleotide base in DNA is changed.

**d**. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation occurs if 1 or more nucleotides in DNA are added or deleted; this causes the codon sequence to be shifted.

**~ if the original DNA is ATAACGCCTATT...**

~ then the number of codons is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

~ then the mRNA sequence would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**~ if the original DNA were replicated and the ‘G’ was deleted...**

~ then the DNA sequence would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

~ then the number of codons would be\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

~ then the mRNA sequence would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**~ if the original DNA is replicated and ‘C’ was added to the beginning...**

~ then the DNA sequence would be\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

~ then the number of codons would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

~ then the mRNA sequence would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Chromosomal Mutations**

**Vocabulary : duplication, inversion, translocation, nondisjunction, polyploidy, haploid, triploid, diploid, chromosomal**

**a**. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation occurs if there is a change in the number or structure of a single chromosome or whole sets of chromosomes

**b**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - occurs when chromosomes don’t separate during meiosis

**c**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - chromosome pieces are moved onto another chromosome

**d**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a segment of chromosome is inserted in reverse order

**e**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a segment of a chromosome is repeated

**f**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - whole extra sets of chromosomes in the same cell

**g**. In plants and animals, sex cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which means that they have half the number of chromosomes that a body cell has

**h**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a cell with 2 sets of chromosomes (1 from mother; 1 from father)

**i**. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a cell with 3 sets of chromosomes

***D. Genetic Disorders***

**Vocabulary: 21st, 23rd, karyotype, trisomy, chromosomal, monosomy, nondisjunction**

1. Only a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ detects a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation caused by nondisjunction

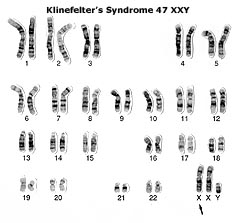
2. Down Syndrome is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chromosome pair; caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs when there is an extra copy of a chromosome in a diploid cell.

4. Klinefelter Syndrome is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pair; caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Disorder**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Disorder**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gender \_\_\_\_\_\_\_\_\_\_\_\_ Gender**\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**VII. Taxonomy-**the naming and organization of organisms developed by **Carolus Linneaus,** based on structural similarities

***A. Classification****:* Complete the table by arranging the terms largest (1) to smallest (7)

**Vocabulary: Genus, Kingdom, Species, Phylum, Class, Family, Order**

THEN develop a pneumonic device to remember the order (**example**: King Paul Cried Out For Good Soup).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Classification Level |  | Your Catch Phrase |
| 1 |  | 1 |  |
| 2 |  | 2 |  |
| 3 |  | 3 |  |
| 4 |  | 4 |  |
| 5 |  | 5 |  |
| 6 |  | 6 |  |
| 7 |  | 7 |  |

***B. Naming Organisms***

***Vocabulary:* genus, Linneaus, species, different, the same, binomial nomenclature, kingdom**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or ‘2 name naming’ was developed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. An organism’s scientific name is made of its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ then its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. If 2 organisms are in the same genus, they must be in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ family

4. *Clostridium tetani* and *Clostridium botulinum* are two types of bacteria from the Monera

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They are in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species, but they are in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genus

5. The **Class** of Mammals includes organisms such as rabbits and elephants which are in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Phylum** but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Species**

1. Only organisms that interbreed and produce fertile offspring are in the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***C. Kingdoms***

**Vocabulary: eukaryote, binary fission, unicellular, both, jellyfish, multicellular, algae, autotroph, heterotroph, wall, prokaryote, dogwood, jellyfish, plantae, fungi, bacteria, mold, mildew, sporulation, sexual, mitosis, paramecium, amoeba, membrane, fern, sponge, moss**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Kingdom | Cell  Type | Cell Outer Boundary | Number of Cells | Type of Reproduction | Energy Getting | 2  examples |
| **Monera** | **prokaryote** |  |  |  |  |  |
| **Protista** |  |  | **both, usually unicellular** |  | **both** |  |
| **Fungi** |  | **wall made of chitin** |  |  |  |  |
| **Plantae** |  | **wall made of cellulose** |  |  | **autotroph** |  |
| **Animalia** |  |  |  | **sexual** |  |  |

***D. Kingdom Specimens***

***Vocabulary:* monera, protista, fungi, plant, animal, chitin, cellulose, cell walls, nucleus, arthropods**

1. The first and least complex kingdom which includes thousands of types of bacteria is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. The next kingdom to evolve was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which consists of only single celled organisms.

3. Fleas are multicellular, heterotrophs with segmented legs, thus they are in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kingdom.

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are heterotrophic organisms that get nutrients from dead or decaying organisms.

5. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kingdom includes multicellular organisms that make their own food

6. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kingdom includes unicellular organisms that don’t have nuclei.

7. Most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are unicellular, except for plant-like varieties like sea weed.

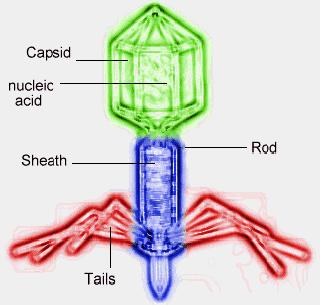
8. Fungi are different than plants because fungi have cell walls made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. Insects in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kingdom are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because their legs are segmented.

10. The highest level of organization for Porifera (a sponge) is tissue. It’s in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kingdom.

***E. Viruses, agents of disease***

**Vocabulary: virus, host, capsid, antibodies, DNA, against, lysogenic, cell, living, nonliving**



1. Viruses are considered \_\_\_\_\_\_\_\_\_\_\_\_\_\_ because they can not perform the characteristics of life without a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Viruses are made of 2 organic compounds, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cycle is a process by which a virus infects a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which eventually bursts, releasing newly assembled viruses.

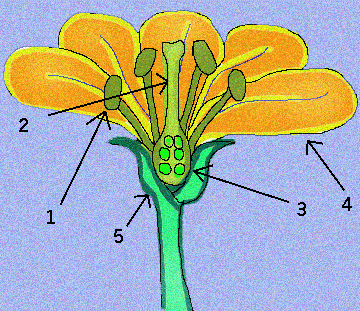
4. A virus infects a cell by injecting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into a cell.

5. The cold and the flu are caused by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. Antibiotics are typically used to fight bacterial infections. “Antibiotic”means \_\_\_\_\_\_\_\_\_\_ life. Because viruses are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, antibiotics don’t work against viruses.

1. Vaccines are used to help organisms make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to build immunity. Vaccines are made from destroyed or weakened forms of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***F. Sexual Reproduction in Plants***



**Vocabulary: sperm, meiosis, plants, mitosis, eggs, wind, insects, birds,**

**ovary, running water, pollination,sporulation, sexual, asexual, stamen**

1. ONLY the most complex kingdoms, like animals and \_\_\_\_\_\_\_\_\_\_\_\_ use \_\_\_\_\_\_\_\_\_\_\_\_\_ reproduction. It requires 2 gametes called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is located inside a pollen grain which fertilizes an egg.

3. Pollen is located on the tip of the \_\_\_\_\_\_\_\_\_\_\_\_\_ (give **# \_\_\_\_\_**), which is the male part of a flower.

4. Ovules are the same things as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Ferns and mosses use \_\_\_\_\_\_\_\_\_\_\_ to reproduce and sometimes need \_\_\_\_\_\_\_\_\_ to carry spores.

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_occurs when pollen from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is deposited on the pistil, which can happen by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. The female part of a flower that contains ovules or\_\_\_\_\_\_\_\_\_\_\_ is called the \_\_\_\_\_\_\_\_\_ (**# \_\_\_\_**)

8. The body cells of a plant are made by \_\_\_\_\_\_\_\_\_\_\_\_\_, but sex cells are made by \_\_\_\_\_\_\_\_\_\_\_\_.

**VIII. Evolution-** the **theory** that there is a gradual change in characteristics over time.

***A. Early Theorists***

**1. Lamarck**

**Vocabulary: Inheritance of Acquired Traits, Law of Use and Disuse**

a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - if you don’t use it, you lose it

b. Lamarck believed that giraffe’s long necks were a result of being stretched because they were trying to reach tall trees, and the ones who didn’t stretch died out

c. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - was his belief that if a characteristic occurs and is beneficial to an organism’s survival, then it will be passed on; ex. if a toe gets cut off and it’s helpful, then that trait gets passed on to offspring.

d. **NO fossil evidence** to support this theory so it was ***thrown out***

**2. Charles** **Darwin**

**Vocabulary: The Origin of Species, finches, Galapagos Islands, Natural Selection, Survival of the Fittest**

a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - only the

organisms that are best suited to their



environments will survive

b. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ were a

cluster of islands that had different

food sources. Because of this, the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ had different beaks to help eat the food.

c. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was his book that compiled his evidence for evolution

***B. Types and Rates of Evolution***

**Vocabulary: gradualism, convergent, divergent, punctuated equilibrium**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - related organisms become more distant (finches with different beaks)

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - distantly related organisms develop similar characteristics

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - organisms evolve as a result of small adaptive changes over time

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - long periods of no change followed by short periods of rapid change.

***C. Evidence of Common Ancestry***

**Vocabulary: appendix, younger, older, homologous structures, fish, vestigial organs, common ancestors, phalanges, rabbits, DNA sequence, humerus, gorillas, embryology**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a bat’s wing, whale’s flipper, and human arm have the same number,

type, and arrangement of bones; also found in fossil records.

2. The bone of the upper arm is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



3. Human fingers and the bones in the tip of a bat’s wing are both called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. The presence of the same number & type of bones in the wing of a bat and the arm and hand of a human suggests that a bat and a human must share \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **-** similar amino acid sequences in proteins of horses and humans provides evidence of similar origin, this is the most **specific** way to compare organisms.

6. The fact that the DNA of humans and that of monkey species are 99% similar suggests that they

probably share \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. The most specific way to provide evidence of common ancestry is by using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ embryos of different organisms (chicken, human, rabbit) look similar at certain early stages, which means the same genes are being expressed at those times.

9. According to the diagram below, the embryological development of the stages in the middle boxes box suggest that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are more closely related because they look alike.

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - is a structure that has no apparent use; the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in humans may be a remnant of a digestive organ still found in other organisms.

11. According to relative dating of fossils: the deeper under ground the fossil is, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it is.

12. If 4 types of fern fossils were found in the northeast United States, which of the following could be inferred?

**A**. turtles were there **B**. it was covered by an ocean **C**. it was once warmer

**IX. Ecology** - the study of organisms and their interactions with the environment

***A. Biomes and Ecosystems***

**Vocabulary: ecological succession, climax community, primary succession**

1. Small shrubs and annual plants are those associated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This is represented in the pictures to the right by letter \_\_\_\_\_\_\_\_\_\_\_\_\_.



2. Fires that destroy climax communities can occur naturally in forests if, for instance, lightning strikes trees or dry foliage. This helps ecosystems by allowing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to start over. This is represented by letter \_\_\_\_\_\_.

3. Imagine a forest fire wiped out a full grown forest. Place the letters (W-Z) from the diagram to the right in order from primary succession to climax community. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Hardwood trees and large plants are associated with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This would be letter \_\_\_\_\_\_\_\_\_\_\_.

5. Ecological succession starts with primary succession and is stable as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**1**

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**Terrestrial and Aquatic Biomes**

**Vocabulary: desert, rain forest, deciduous, coniferous, tundra, ocean, grassland, freshwater**

6. Biomes are typically named for the type of vegetation, so biomes that primarily have varieties of

grasses are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ biomes, but pine trees are usually in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ biome.

7. Two of the coldest biomes are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and taiga. Which # above is this type of biome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. A biome that has a thick canopy of trees and plants is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This is # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from above.

9. In the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the amount of precipitation exceeds the amount of evaporation.

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ biomes are **aquatic** and include lakes and rivers. Organisms in these biomes are sensitive to even the smallest environmental changes. Which # above is this type of biome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forests have cone baring trees. Which # above is this type of biome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has varying salinity and temperature zones. This **aquatic** biome is # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

13. Lions can easily stalk their prey in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ biomes because the vegetation is the same color as their fur, which serves as camouflage. This biome is pictured in # \_\_\_\_\_\_\_\_\_\_\_

14. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ biomes have sparse vegetation. The few plants that can survive here have shallow root systems that collect rain water as soon as it falls. Which # above is this type of biome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. \_\_\_\_\_\_\_\_\_\_\_\_ trees have thin needle-like leaves instead of broad leaves with a lot of surface area.

16. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ trees have broad leaves that **change color** and **fall off** in the fall.

17. In **VA**, most of the trees lose their leaves in the fall. The biome is a temperate \_\_\_\_\_\_\_\_\_\_\_ forest.

***B. Energy Transfer***

**Vocabulary: consumer, autotrophic, biotic, abiotic, increase, decrease, species, carnivore, omnivore, herbivore, scavengers, decomposers, producer, population, heterotrophic, community, energy, ecosystem, biosphere**

1. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an organism at the beginning of a food chain; produce their own food

2. Organisms, like plants, that can make their own food are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. Organisms that feed off of other organisms are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an organism that eats producers or other organisms for energy.

5. A nonliving part of the environment is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factor.

6. A living part of the environment is a (n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factor.

7. A consumer that eats only producers is called a (n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. A consumer that eats both plants and animals is called a (n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a group of organisms that can interbreed and produce fertile offspring.

10. Many populations of different organisms living together is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. A species that lives together and interbreeds is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. The community of organisms in an area including abiotic factors is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. The Earth represents a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is transferred through an ecosystem by eating or consuming food.

15. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eat things that are already dead (ex. vulture)

16. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ break down decaying organisms and nutrients are put back into the soil by bacteria and fungi like mushrooms)

17. [A hunter <---- a fox <---- a rabbit <---- grass or plants] In food webs or food chains, the arrow

ALWAYS points to the direction that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ flows.

18. [A hunter <---- a fox <---- a rabbit <---- grass] In this food chain, the rabbit is a

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the fox is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the grass is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. [A hunter <---- a fox <---- a rabbit <---- grass] In this example, the rabbit and fox could not

interbreed because they are not in the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

20. [A hunter <---- a fox <---- a rabbit <---- grass] In this example, if the rabbit population increased,

then the fox population would probably \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***C. Relationships***

**Vocabulary: commensalism, mutualism, parasitism, symbiosis, water, predation, sunlight, extinction, limiting factors, competition for food, pollution, disease, climate**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - one organism is harmed while the other benefits

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - both organisms benefit.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- flea and a cat.

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ buffalo and an insect eating bird

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms living together

6 When one organism benefits and the other is harmed the relationship is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_..

7. Anemones release poisonous chemicals from their tentacles that paralyze prey. Clown fish are not

affected by the poison & find protection from predators by living near anemones. This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because the fish don’t harm or benefit the anemone.

8. Lichen is a type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which a type of algae and fungus live together. This type of relationship is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. Things that limit the size of populations are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. On the rain forest floor, a limiting factor for plants would be availability of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. In the desert, a limiting factor for both plants and animals would be availability of \_\_\_\_\_\_\_\_\_\_\_\_\_.

12. Hunting is encouraged for deer populations because they live in such close proximity to each other

that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a limiting factor.

13. Only 3,000 manatee *Trichechus manatus* are left, and most of them are in the ocean around Florida.

Because there is little genetic diversity, a disease that reduces fertility might cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_.