

Name:

Hour:

Cumulative Final Exam Review Guide

Unit One: Nature of Science

1. On a separate sheet of paper write definitions for the following terms
 - a. Biology
 - b. Control Group
 - c. Hypothesis
 - d. Independent Variable
 - e. Dependent Variable
 - f. Constants
2. How do you write a proper hypothesis? Provide an example.
3. List the six steps of the scientific method in order
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
4. Read and analyze the following experiment

Dr. Bunsen Honeydew and his assistant Beaker have been working on a cure for Fozzie's bad jokes. After trying to teach Fozzie new jokes, they gave up and decided they had to approach the problem from a different point of view, that of the audience. They have created a formula that looks like water, tastes like water, and is odorless like water. Before Fozzie's show, Bunsen and Beaker split the audience in half. The left side of the audience (group A) was given a bottle of water and asked to drink it all before the show started. The right side of the audience (group B) was given a bottle of the formula and was also asked to drink it all before the show started. After the first few jokes, Fozzie was hit by seven tomatoes, heckled by Waldorf and Statler (as usual) and booed; all by the left side of the audience (group A). The right side of the audience (group B) didn't notice the booing or tomatoes because they were too busy laughing at Fozzie's jokes.

Identify the following:

Control Group:

Experimental Group:

Independent Variable:

Dependent Variable:

Constants:

Unit Two: Biochemistry

1. On a separate sheet of paper, write definitions for the following terms
 - a. Organic Compound
 - b. Photosynthesis
 - c. Cellular Respiration
 - d. Aerobic Respiration
 - e. Anaerobic Respiration/fermentation
 - f. Macromolecule
 - g. Monomer

2. Identify the four types of organic compounds and answer the questions about each.

a. _____

- i. What are the monomers?
- ii. What is the polymer?
- iii. What are the elements that make up this molecule?
- iv. What are they used for?
- v. Provide at least one example

b. _____

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- ii. What is the polymer?
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c. _____

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d. _____

i. What are the monomers?

ii. What is the polymer?

iii. What are the elements that make up this molecule?

iv. What are they used for?

v. Provide at least one example

3. Why is water so important to living things? Provide and explain 7 reasons.

a.

b.

c.

d.

e.

f.

g.

4. Why is ATP so important to cells?

5. What is the difference between aerobic respiration and anaerobic respiration/fermentation? Which makes more molecules of ATP?

6. Write out the equation for photosynthesis

a. What are the reactants?

b. What are the products?

c. What else must be present for photosynthesis to occur?

7. Write out the equation for cellular respiration

a. What are the reactants?

b. What are the products?

c. What else must be present for cellular respiration to occur?

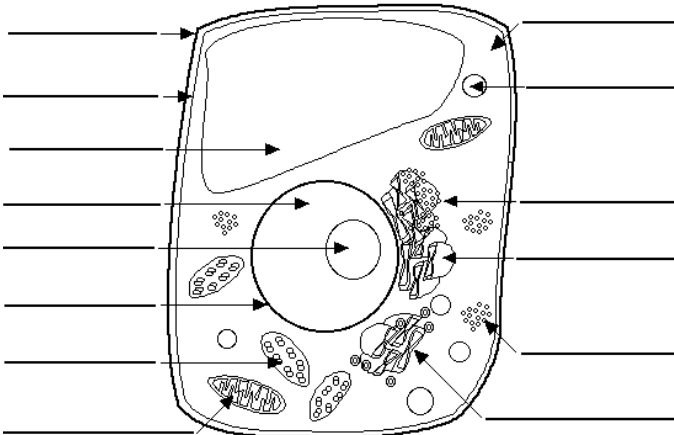
Unit Three: Cells

- On a separate sheet of paper, write definitions for the following terms
 - Diffusion
 - Passive Transport
 - Hypertonic
 - Hypotonic
 - Osmosis
 - Active Transport
 - Isotonic
 - Cells
- Explain the function of the organelles listed and then identify the organelles listed on the diagrams on the following page.

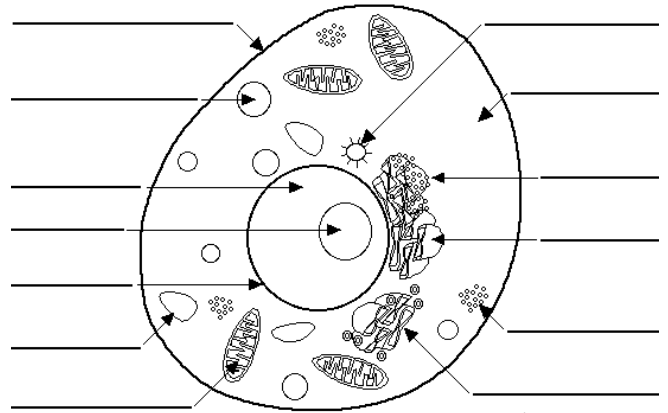
Organelle	Function
Mitochondria	
Nucleus	
Cytoplasm	
Nuclear Envelope	
Cell Membrane	
Golgi Apparatus	
Smooth ER	
Rough ER	
Ribosomes	
Vesicles	
Central Vacuole	
Cell Wall	
Chloroplast	

3. Label the following diagrams

Cross-Section of a Plant Cell



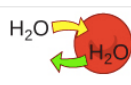


Cross-Section of an Animal Cell



4. Of the two diagrams, which is an animal cell and which is a plant cell? How do you know?

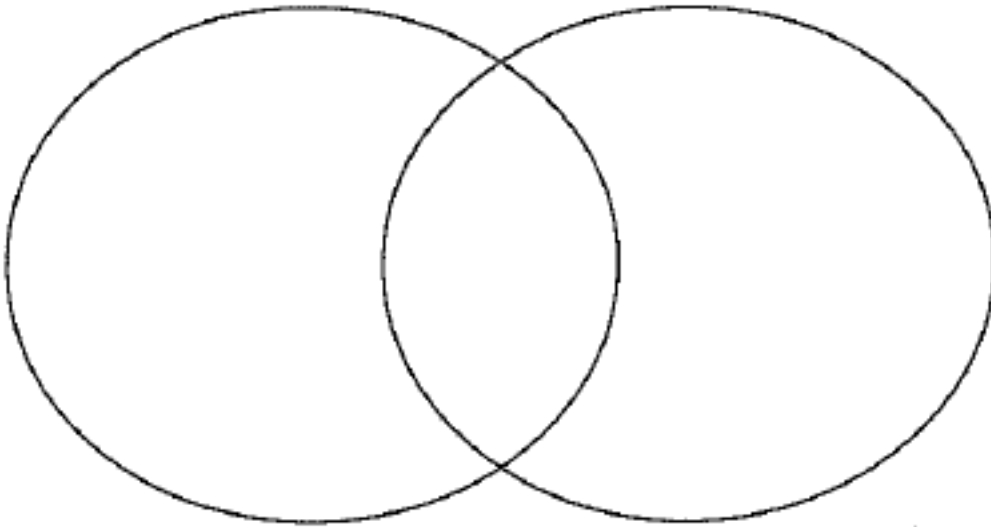
5. The following table gives you information relating to different types of solutions: hypertonic, isotonic, and hypotonic. Fill in the missing information to identify the solution and what happens to cells in each solution.

If the fluid outside the cell has...	The outside fluid is... (hypertonic, isotonic, hypotonic)	Water diffuses... 	Effect on cell (shrivels, stays the same, bursts)
Lower free water molecule concentration than salt		Out of the cell.	
High free water molecule concentration than salt		Into the cell 	
Same free water molecule concentration as salt		Into and out of the cell at equal rates 	

6. Identify the descriptions below as either an example of diffusion (d) or osmosis (o)

- _____ Two drops of blue food coloring and two drops of yellow food coloring are added to a glass of water, later all of the water is green.
- _____ The iodine and starch lab that we did in class.
- _____ A lump of sugar is added to a beaker of water, eventually the sugar is completely dissolved in the water.
- _____ In an isotonic solution, water molecules move into and out of the cells at the same rate.
- _____ I spray perfume in the front right corner of the room and it can eventually be smelled in the back left corner of the room.

7. Compare and contrast passive and active transport. Be sure to give examples of each.



8. Bacteria come in three basic shapes. Give the common and scientific name of each.

- a.
- b.
- c.

Unit Four: Cell Division

1. On a separate sheet of paper, write definitions for the following terms

- | | |
|---------------|--------------------------|
| a. Chromosome | h. Cancer |
| b. Diploid | i. Crossing-Over |
| c. Haploid | j. Autosome |
| d. Trisomy | k. Homologous Chromosome |
| e. Karyotype | l. Sex-Chromosome |
| f. Mitosis | m. Chromatid |
| g. Meiosis | n. Centromere |

2. All of the DNA in a cell is much larger than the cell itself. How does the DNA become more compact to fit inside the nucleus?

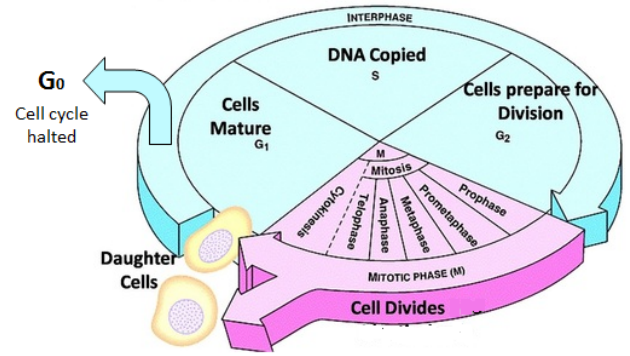
3. What combination of sex chromosomes produce males and females in humans?

4. If a sperm cell contains 10 chromosomes, how many chromosomes will be in the organism's body cells?

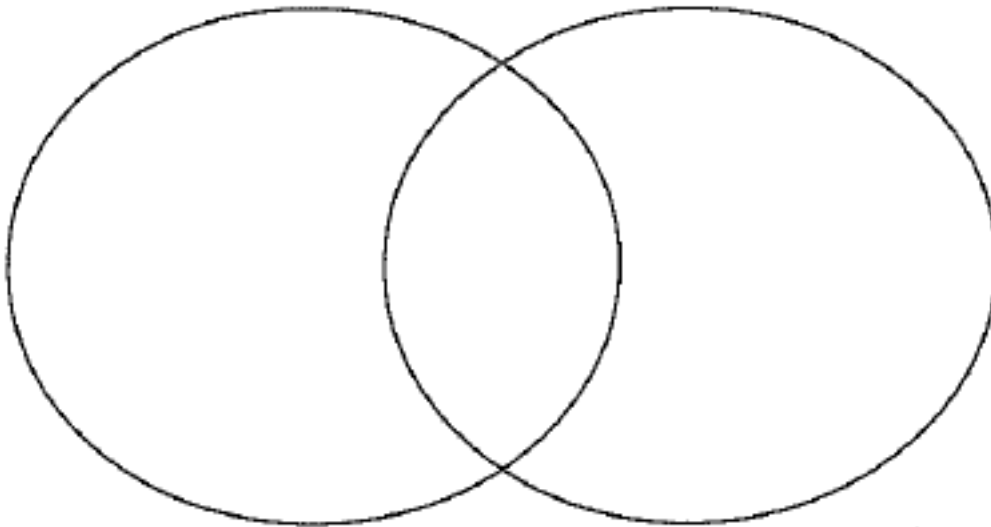
5. List three characteristics of cancer cells?

- a.
- b.
- c.

6. Use the diagram to answer the following questions
- What does the diagram represent?
 - What happens in the G₁, S, and G₂ stage?
 - What phase do cells spend the most time in?
 - What phase do cells spend the least time in?
 - Mitosis is also known as the division of what?
 - Which two phases make up cell division?

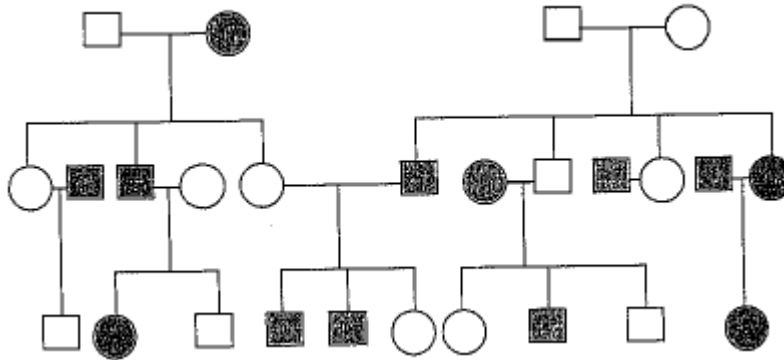


7. Compare and contrast mitosis and meiosis. Be specific.



Unit Five: Genetics

- On a separate sheet of paper, write the definitions for the following terms.
 - Allele
 - Homozygous
 - Heterozygous
 - Genotype
 - Phenotype
 - Complete Dominance
 - Incomplete Dominance
 - Co-Dominance
 - Genetics
 - Heredity
 - Recessive
 - Mutation
 - Autosomal
 - Sex-linked
- Identify the pedigree as autosomal or sex-linked and dominant or recessive. Then give the most probable genotype of each individual.



- Who is known as the “father” of genetics? What did he study? Why did he study this?
- Who is more commonly affected by sex-linked traits and why are they more commonly affected?
- Perform the following crosses using Punnett squares and give the requested ratio. G is dominant for green skin; g is recessive for blue skin. B is dominant for brown eyes; b is recessive for blue eyes.

a. $Gg \times Gg$ (Genotypic Ratio)

b. $Bb \times Bb$ (Phenotypic Ratio)

c. $GgBb \times GgBb$ (Genotypic and Phenotypic Ratio)

Unit Six: DNA

1. On a separate sheet of paper, write definitions for the following terms
 - a. DNA Replication
 - b. Nucleotide
 - c. Nucleic Acid
 - d. Mutation
 - e. RNA Transcription
 - f. Amino Acid Translation
 - g. Codon
 - h. Anticodon
 - i. DNA Fingerprint
2. Describe the structure of DNA. Include all of the various parts that make up DNA.
3. Explain how a DNA fingerprint can be used to solve crimes.
4. Compare and contrast DNA and RNA. Which one is the blueprint of life?
5. What are the base pairing rules for...?
 - a. DNA?
 - b. RNA?
6. Answer the following questions based on the DNA sequence: **TACGCCTTG**
 - a. What will the complimentary DNA strand look like?
 - b. Transcribe the DNA into a strand of mRNA
 - c. Translate the mRNA into a protein chain (you need your codon chart for this)
7. Describe the process of protein synthesis in detail.
8. There are three main types of mutations. List and briefly describe them.
 - a.
 - b.
 - c.
9. Does every mutation cause damage to an organism? Explain your answer.

Unit Seven: Evolution

1. On a separate sheet of paper, write definitions for the following terms

<ol style="list-style-type: none"> a. Evolution b. Natural Selection c. Adaptation d. Fossil e. Homologous Structure 	<ol style="list-style-type: none"> f. Vestigial Structure g. Analogous Structure h. Species i. Competition
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2. Where did Darwin do most of his research?

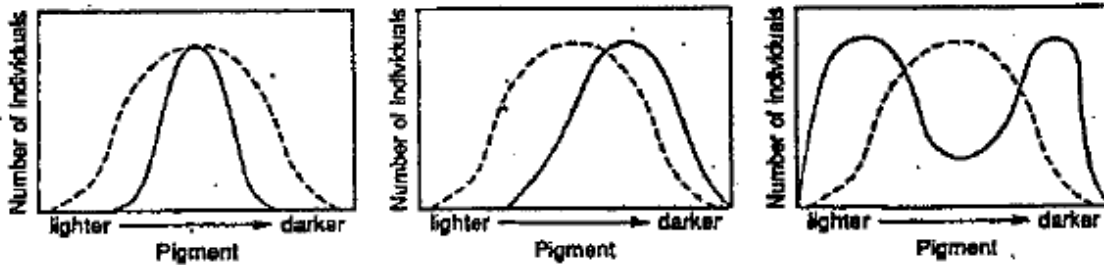
3. Explain natural selection.

4. List and describe some variables that cause evolution.

5. If a population is not evolving, this means that the population is in what?

6. Of the items listed below, circle any that could contribute to natural selection.
 - a. Phenotypic Variation
 - b. Genetic Variation
 - c. Renewable Water Supply
 - d. Environmental Change
 - e. Limited Living Space
 - f. Climate Change
 - g. Unlimited Resources
 - h. Mutation
 - i. Food Source

7. There are three types of natural selection that can occur. Identify each of the graphs below as either Stabilizing Selection, Disruptive Selection, or Directional Selection. Be sure to provide an explanation of each type of natural selection.



Type of Selection			
Description of Selection			

8. List and explain the 4 requirements for natural selection

a.

b.

c.

d.

9. List and explain the six pieces of extra evidence for evolution

a.

b.

c.

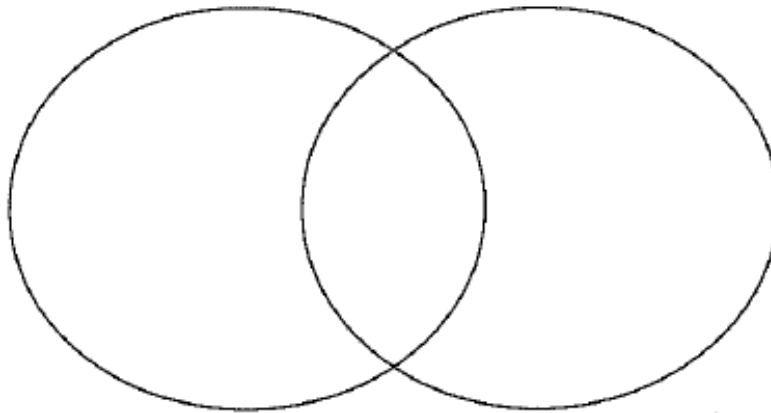
d.

e.

f.

10. Explain speciation as it relates to Darwin's finches. What key adaptations in the finches is affected by the type of food available?

11. Compare and contrast homologous structures and analogous structures. Give an example of each.



12. Name two vestigial structures in humans

a.

b.

Unit Eight: Populations & Ecology

1. On a separate sheet of paper, write definitions for the following terms
 - a. Producer
 - b. Primary Consumer
 - c. Secondary Consumer
 - d. Tertiary Consumer
 - e. Habitat
 - f. Carrying capacity
 - g. Ecology
 - h. Ecosystem
 - i. Biotic Factors
 - j. Biodiversity
 - k. Population
 - l. Biome
 - m. Abiotic Factors
 - n. Community
 - o. Secondary Succession
 - p. Primary Succession

2. There are five types of symbiotic relationships. Name, define, and provide an example of each below.

a.

b.

c.

d.

e.

3. Draw a food web in the space below based on the following food chains:

- a. Plants → Mouse → Hawk
- b. Plants → Rabbits → Wolf
- c. Plants → Rabbits → Snake → Hawk
- d. Plants → Mouse → Snake
- e. Plants → Deer → Wolf
- f. Plants → Hawk → Wolf

4. Provide examples from the food web above for each of the following

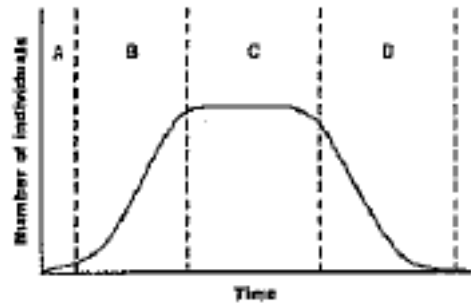
- | | | | |
|-------------|---------------------|-----------------------|----------------------|
| a. Producer | b. Primary Consumer | c. Secondary Consumer | d. Tertiary Consumer |
|-------------|---------------------|-----------------------|----------------------|

5. Most ecosystems only contain four trophic levels. Based on your food web from #2, explain which trophic level(s) the wolf feeds at and why.

6. Explain how much energy moves up through the trophic levels and why there is not a 4th level consumer.
7. Explain how primary succession differs from secondary succession. How are they similar? Why is succession important?

8. Use the graph to answer the questions
 - a. Which section shows an increase in birth rate?
 - b. Which section show an increase in death rate
 - c. Why does the graph level off in second C?

Population Growth Over Time



9. What factors cause population growth to increase?
10. What factors cause population growth to decrease?
11. Explain the following cycles (you may sketch a diagram if that's easier)
 - a. Water Cycle
 - b. Carbon Cycle
 - c. Nitrogen Cycle