

SEMESTER 1 REVIEW

Answer the following review questions neatly on separate paper. Be as complete as possible. Put part of the question in the answer, so you can use your answers as a study guide. DO NOT WAIT UNTIL THE LAST MINUTE TO START ON THIS!! This will take you a significant amount of time to complete, but it will help you to focus on material for the final. Pull out packet pages, old quizzes, laboratory write-ups, and other materials to help you complete this and study!

I. Unit 1: INTRO SCIENTIFIC METHOD and BASIC BIOCHEMISTRY (chapters 1 & 2)

1. Describe the parts of the Scientific Method?
2. Define: experimental variable, controlled variable, control group, experimental groups.
3. List the 4 major biological compounds, their major functions, and 3 examples of each.
4. Explain hydrolysis & dehydration synthesis?
5. Explain how enzymes work. Use the following words: substrate, product, reactants, enzyme, active site.
6. What factors affect enzyme action? How does each affect enzyme action?
7. When is it most appropriate to use a line graph? When is it most appropriate to use a bar graph?
8. A scientist studied the effects of various water pH levels on the heart-rate (heartbeats per minute) of a small crustacean called a *Daphnia*. He did this by putting *Daphnia* in solutions varying in pH solutions and counted the number of times their hearts beat in one minute.
 - a. What would be the independent variable?
 - b. What would be the dependent variable.
 - c. Sketch a set up of the graph that could be made from his data. Be sure to title your graph.
 - d. Would it be a line graph or a bar graph?

II. CELLS and ENERGY (chapters 3, 4, 5)

1. Sketch an animal cell and a plant cell. Label the following organelles and describe their functions: nucleus, nucleolus, cell membrane, cell wall, chloroplast, mitochondria, endoplasmic reticulum, golgi body, lysosome, cytoplasm, ribosome
2. Name several differences between plant and animal cells? Name several similarities?
3. Explain diffusion, osmosis, active transport, and passive transport?
4. Use sketches to explain what happens to a cell when it is in a hypotonic solution, a hypertonic solution, and an isotonic solution. Be sure to illustrate the concentrations of salt and water in each cell and environment for each solution.
5. What are field of view and total magnification? How are they related?
6. Review the parts of a microscope and their functions.

7. Write the general equation of photosynthesis.
8. What is the purpose of photosynthesis
9. What effect do increases in temperature, CO₂ or light have on the rate of photosynthesis?
10. Write out the equation for cellular respiration.
11. What is the purpose of cellular respiration?
12. Where do respiration and photosynthesis occur in a cell?
13. Why is ATP so important to living things?

III. Unit 3: EVOLUTION/CLASSIFICATION (chapters 12, 13, 14, 15, and text p. 332)

1. Explain the parts of Darwin's theory of natural selection?
2. Explain Lamarck's theory of evolution.
3. Explain inheritance of acquired traits?
4. What is spontaneous generation?
5. Define: Heterotroph Hypothesis, Autotroph Hypothesis, Biogenesis, Abiogenesis.
6. What is Binomial Nomenclature? Who created the modern system for classification?
7. List the taxonomic categories in order. Which organisms are most closely related?
8. List the characteristics of each the 5 kingdoms and give an example of an organism in each kingdom.
9. What determines whether 2 organisms are members of the same species?
10. Explain how the law of superposition is used to determine the relative age of fossils.
11. What is Pangaea? How does Pangaea relate to the theory of continental drift and plate tectonics?
12. How are fossils used by scientists to support the theory of natural selection?

IV. Unit 4: GENETICS I -DNA, RNA, AND PROTEIN SYNTHESIS (chapters 9 & 10 & p. 127)

1. Who are Watson and Crick? What did they do for the field of biology?
2. Draw a diagram of a DNA molecule containing 4 base pairs. Label the following: deoxyribose, phosphate, adenine, guanine, cytosine, thymine, nucleotide, hydrogen bond.
3. What is a nucleotide?
4. What is DNA replication? What enzymes are involved in this process?
5. What happens during transcription? Explain the process.
6. What occurs during translation? Explain the process.
7. How many bases are needed to code for 1 amino acid? What is this called on mRNA?
9. What are 3 differences between RNA and DNA?
10. Transcribe this DNA to mRNA, then to tRNA, then determine it's amino acid sequence:
T A C G C T A C C A T C A G T

V. MITOSIS/MEIOSIS AND PATTERNS OF INHERITANCE (chapters 6, 7, & 8)

1. What types of cells are diploid? What types of cells are haploid ?
2. Answer the following questions and assume you are using a human cell with 46 chromosomes:
 - a. What is the diploid number?
 - b. What is the haploid number?
 - c. If this cell went through mitosis, how many chromosomes would the daughter cells have?
 - d. If a cell went through meiosis how many chromosomes would the daughter cells have?
1. What is genetics?
2. Who was Gregor Mendel? What did he do?
3. Define Parental Cross, F₁, and F₂.
4. Concept generalization: dominant, recessive, homozygous, heterozygous, genotype, phenotype, allele, test cross, genotypic ratio and phenotypic ratio.
5. List and explain Mendel's three laws.
6. Solve this monohybrid cross problem. Show genotypes and phenotypes:
Rr x Rr R = red, r = blue
7. Solve this **incomplete dominance** problem. Show genotypes and phenotypes. The heterozygote is pink.
RWx WW R = red, W= white

8. Solve these **multiple allele** problems . Show genotypes and phenotypes.
 - b. Could a man with A blood and a woman with B blood have a child with O blood? Use a Punnett square to show results.
9. Flower color is **incompletely dominant** in four-o'clocks. How could offspring that are only pink be obtained?
10. What is the difference between autosomes and sex chromosomes?
11. What determines the sex of a human?
12. Solve this **sex-linked** problem: A color-blind man marries a woman whose father was color blind. What are the possible phenotypes for their offspring?
13. What is a karyotype? How is it used by biologists?
14. Draw a pedigree (family chart) for the following family: A straight thumb is recessive to a curved (hitchhiker's) thumb. Bob and Linda are a married couple. Bob has a hitchhiker's thumb like his father, but his mother did not. Linda has a straight thumb as do both of her parents. Bob and Linda have three children: A boy with hitchhiker's thumb, a boy with a straight thumb, and a girl with a straight thumb.