AP Biology – Fall 2019 Edward R. Murrow High School
Exam 3 Review Sheet Mr. Sprague

Format:

Section I 24 multiple choice questions
Section II 1 essay question and 2 short free response questions

Reading: Hillis chapters 4 and 5 (and all previous readings)

Concepts to Review:

- EVERYTHING FROM EXAMS 1 AND 2

- Cells
  - Be able to calculate the surface area and volume of a cell (see formula sheet).
  - Be able to explain the significance of surface area and volume for a cell.
  - Be able to explain the major differences between prokaryotic and eukaryotic cells.
  - Know all the structure and function of all cell organelles in chapter 4, and which organisms they are found in.
  - Be able to recognize diagrams of the cell organelles in chapter 4.
  - Be able to predict some possible functions of a cell based on which organelles are found in large or small numbers in that cell.

- Membranes and Cell Transport
  - Be able to describe the structure of the plasma membrane and explain the roles of *phospholipids*, *channel proteins*, *glycoproteins*, and *cholesterol*.
  - Be able to correctly use the terms *hypotonic*, *hypertonic*, *isotonic*, and *concentration gradient*.
  - Be able to compare the processes of *simple diffusion*, *facilitated diffusion*, and *active transport*.

- Intercellular Signal Transduction
  - Be able to describe the sequence of events involved in a signal transduction pathway.
  - Be able to explain the roles of *ligands*, *receptors*, *second messengers*, *kinases*, *phosphorylation*, and *transcription* (*gene expression*) in cell signaling.

- Labs
  - Understand the term *model*.
  - Be able to write a hypothesis and identify the *independent variable*, *dependent variable*, *control group*, *experimental group*, and *constants* (see Elements to Consider when Designing a Controlled Experiment handout).
  - Understand why large sample sizes, multiple trials, and statistical analyzes are used to verify results.
  - Be able to graph data appropriately and add 95% confidence intervals to a graph.
  - Be prepared to discuss the following labs: *Microscopy*, *Osmosis*, *Water Potential*, and *Plasmolysis*.
  - Understand the meaning of *water potential* and be able to calculate the water potential of a solution.

Overarching Questions to Consider:

Suggestion: Answer all of these questions in writing, then compare answers with a classmate. I promise that taking the time to do so will be well worth it and much more useful then memorizing facts and definitions.

1. How does DNA control cell activities and give you your unique characteristics?
2. Why is it better for a cell to have a higher surface-area-to-volume ratio?
3. How does the presence of membrane-bound organelles provide eukaryotes with an evolutionary advantage over prokaryotes?
4. How do mitochondria and chloroplasts show evidence of endosymbiosis?
5. How does the relative amount of various organelle types in a cell give us hints about the cell's function?
6. How do the size and polarity of molecules affect their ability to permeate the plasma membrane?

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7. Why do molecules naturally diffuse along a concentration gradient? Why does active transport require ATP?
8. Why does temperature affect the rate of diffusion?
9. What happens to a cell in a hypotonic solution? Why? What happens to a cell in a hypertonic solution? Why?
10. What does water potential represent? Why is the value negative?
11. How were we able to determine the sucrose concentration of the potato in lab? Why does this method work?
12. Why are second messengers necessary for the amplification of a signaling transduction pathway?
13. What does it mean when we say a cell signaling pathway results in a gene being "expressed"?

Practice Exam Questions:

Visit the course website and click on the "Multiple Choice Practice" link. Complete all practice questions for the relevant chapters and check your work against the answer key. Note: these items are password protected.

Practice multiple choice and partial versions of free response questions are also available through the College Board by logging into AP Central with the class code.

Essay Question Sneak Peak:

Read each question carefully and completely. Answers must be written out in paragraph form. Outlines, bulleted lists, or diagrams alone are not acceptable.

1. Several zucchini squashes were peeled and each cut into six identical cubes. After being weighed, each cube was soaked in a different sucrose solution for 24 hours in an open container at a constant temperature of 21°C. The cubes were then removed from the sucrose solutions, carefully blotted on paper towels, and weighed again. The mean percent change in mass (due to a net gain or loss of water) and 2 standard errors of the mean ($2SE_{\bar{X}}$) are shown in Table 1.

TABLE 1. PERCENT CHANGE IN MASS OF ZUCCHINI CUBES IN DIFFERENT SUCROSE SOLUTIONS

Molarity of Sucrose Solution (M)	Mean Percent Change in Mass (%)	$2SE_{\bar{X}}$
0.0	10	1.0
0.2	5	1.2
0.4	–2	1.2
0.6	–8	1.1
0.8	–13	1.2
1.0	–16	1.0

Parts (a), (b), (c), and (d) are not shown.