**Chapters 7, 8, 9 practice**

1. (2 points) In the chemical equation 6H2O + 6CO2 → C6H12O6 (glucose) + 6O2

The *reactant/product* is water and carbon dioxide and the *reactant/product* is glucose and oxygen.

1. (12 points) State the three parts of cell theory:
   1. \_\_\_All living things are made of cells\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_The cell is the smallest unit of structure and function\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_Cells come from other cells through cell division\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. (6 points) What are the differences between a prokaryote and a eukaryote (hint: more than one!)? Is a *micrococcus* bacterium a prokaryote or a eukaryote?

Eukaryotes have a nucleus with DNA inside and membrane bound organelles. Bacteria have neither so they are prokaryotes.

1. (6 points) What do hypertonic, hypotonic, and isotonic mean?

Hypertonic: above strength, higher concentration

Hypotonic: below strength, lower concentration

Isotonic: equal concentrations

1. (1 points) The invention of the \_\_\_\_\_microscope\_\_\_\_\_\_\_\_\_ lead to the discovery of cells.
2. (6 points) What does a membrane receptor do? What kind of macromolecule is it made of? Why are receptors needed in the membrane and not just in the cytoplasm?

A membrane receptor is a protein that receives signals from outside the cell, and transmits them inward. Membrane receptors are needed because large, polar (or charged) molecules cannot move across the cell membrane.

1. (2 points) The head of a phospholipid is *polar/nonpolar*, and the tails are *polar/nonpolar*.
2. (4 points) Was the egg lab an example of active or passive transport? Justify your answer.

The egg was dead, it was definitely passive transport.

1. (18 points) Match the cell organelles to their job in the cell:

|  |  |
| --- | --- |
| \_\_i\_\_Nucleus | a. supports cell shape, internal transport, cell movement |
| \_\_f\_\_Ribosomes | b. modifies, sorts, and packages proteins |
| \_\_h\_\_Mitochondria | c. stores carbohydrates, ions, and other cell materials |
| \_\_g\_\_Lysosome | d. regulates the movement of substances into and out of the cell |
| \_\_c\_\_Vacuole | e. where many proteins and lipids are assembled |
| \_\_d\_\_Membrane | f. make proteins |
| \_\_a\_\_Cytoskeleton | g. break down cell waste |
| \_\_e\_\_Endoplasmic reticulum | h. convert energy in food into ATP energy the cell can use to do work |
| \_\_b\_\_Golgi Apparatus | i. stores the DNA and controls cell functions |

1. (4 points) What are the two kinds of passive transport, and how are they different?

Simple diffusion is movement of a solute from high to low concentration; facilitated is the same thing through a protein channel in the membrane.

Osmosis is the diffusion of water from water’s high to low concentration.

1. (4 points) Which is more certain when the egg reaches its minimum volume in lab: that the two sides of the membrane are isotonic? Or that the solutions inside and outside are in equilibrium? How can you tell?
2. (4 points) Did water enter the egg in lab? How can you tell?
3. (4 points) If you put an animal cell in very salty water will it shrink or burst? What happens to a plant cell in salt water?

Shrink, and the plant cell will shrivel up and wilt.

1. (4 points) What two features of molecular transport make it a kind of active transport?

Consumes ATP energy, and moves a solute from low to high concentration.

1. (4 points) Name and describe the two kinds of bulk transport.
2. (6 points) Two students investigate the effect of temperature on diffusion. What are their dependent and independent variables, and what is the experimental result?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Initial Volume | Final Volume | Initial Mass | Final Mass |
| Vinegar | 150mL | 130mL | 50g | 70g |
| Corn Syrup | 150mL | 130mL | 70g | 50g |
| Water | 150mL | 170mL | 50g | 70g |

1. (9 points) Does this data make sense? Explain exactly where it does and where it does not, and justify your answer with what we have learned about membrane transport.
2. If oxygen gas were removed from a yeast cell’s environment, what would you expect to happen to the cell’s production of ethanol? (2 points)

The production of ethanol would increase through anaerobic fermentation.

2. The law of conservation of energy says energy is never created or destroyed. So, after living things use energy from the sun, where does the energy go? (2 points)

All of the energy is eventually lost as heat to the atmosphere.

3. What are the reactants and products of the light-dependent reactions? (3 points)

Reactants are H2O, ADP, NADP+

Products are O2, ATP, and NADPH

4. What are the reactants and products of the light independent reactions? (3 points)

Reactants are ATP, NADPH, and CO2

Products are ADP, NADP+, and Glucose

5. A student is collecting the gas given off from a plant in bright sunlight at a temperature of 27°C. The gas is probably \_\_\_\_\_O2\_\_\_\_\_\_\_. (2 points)

6. Compare how photosystem I and photosystem II move H+ ions. (3 points)

This is not on your test, I promise.

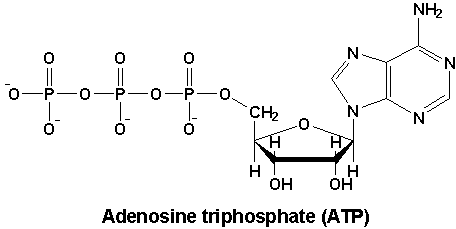
7. Which can you see with a microscope, a chlorophyll or a chloroplast? Explain. (2 points)

A chloroplast because it is an organelle. A chlorphyll is a molecule, so it is too small to see.

9. Per molecule of pyruvate, compare the ratio of carbon dioxide gas production in aerobic respiration and alcoholic fermentation? (3 points)

3CO2 from respiration; 1CO2 from alcoholic fermentation

10. Draw a slash to show where a bond is broken to release energy from ATP. (2 points)



11. Write balanced equations for photosynthesis and respiration. In which one is the energy of the reactants lower than the energy of the products? (4 points)

In photosynthesis the energy of the reactants is lower than the energy of the products.

14. What kind of biological process is used to make cheese? What kind of biological process is used to make beer? (2 points)

Lactic acid fermentation. Alcoholic fermentation.

15. Per molecule of glucose, compare the ratio of ATP generated by anaerobic fermentation and aerobic respiration. (3 points)

2 ATP from fermentation per glucose; 36 with aerobic respiration. So that’s a 1:16 ratio.

16. Predict whether blue light would or would not promote photosynthesis. Justify your answer. (2 points)

Yes, because plants reflect green light, and absorb blue. That’s why plants are green.

17. Why do cells ferment pyruvic acid (pyruvate) in the absence of oxygen? (3 points)

To free up high energy electron carriers (NADH -> NAD+) and recycle the carriers back to glycolysis.

18. Use the concept of density to explain why the leaf discs sunk and then began to float in the photosynthesis lab. (2 points)

This is not on your test, obviously.

19. Where do the two stages of aerobic respiration happen in cells? In which one is CO2 gas a product? In which one is water a product? (4 points)

Both happen in the mitochondria. CO2 gas is a product of the krebs cycle. Water is a product of electron transport.

20. Plants do not eat with a mouth, but they still need a source of carbon in order to grow. You are what you eat, so what is food for a plant? Please explain. (4 points)

Air is food for a plant, they consume carbon dioxide to make glucose sugar.

21. What are yeast? Was it yeast that turned into CO2 gas in our lab? Explain why or why not. (4 points)

Yeast are single celled eukaryotic fungi. The yeast consumed the sugar, and converted the sugar into ethanol and CO2 gas.

Bonus #1: What is the pigment that makes some trees orange in the fall? (2 points)

Carotenoids

Bonus #2: Does the krebs cycle require oxygen? Think of the electron transport chain to justify your answer. (4 points)