Test #2 - Chapters 4-6

Review Guide

1. What are the three principles of the cell theory:
   1. Cells come from cells
   2. Cells are the basic unit of life
   3. All living things are composed of cells
2. Many scientists made observations that led to the development of this theory. Who are they and what were their observations?
   1. Hooke looked at cork cells and thought they looked like cells, coining the term cells
   2. Leeuwenhoek was the first to observe living cells
   3. Schleiden concluded that all plants are made up of cells
   4. Schwann concluded all animals are made up of cells
3. What are the similarities and differences of prokaryotes and eukaryotes?

Similarities: both have DNA, cytoplasm, and a cell membrane

Differences: eukaryotic cells have a nucleus and membrane bound organelles; Prokaryotes do NOT have a nucleus or organelles

1. What are the functions of the following cell organelles?
   1. Cell Wall –structural support
   2. Nucleus – Contain DNA; Controls processes in the cell
   3. Cell Membrane – provides protection to the cell and allows for transport in and out of the cell
   4. Ribosomes – Produce proteins
   5. Endoplasmic Reticulum – Manufacture lipids and proteins
   6. Golgi Apparatus –processes proteins
   7. Lysosomes – Digestive system of the cell; breaks down nutrients and waste
   8. Vacuoles – store nutrients and waste
   9. Chloroplasts – responsible for photosynthesis
   10. Mitochondria –production of ATP/energy; “powerhouse” of the cell
2. What organelles do plant cells contain that animal cells do not? What organelles do animal cells contain that plant cells do not?
   1. Plants contain a central vacuole, cell wall, and chloroplasts
   2. Animals contain centrioles and lysosomes
3. A. What is passive transport? B. Which direction do molecules move in passive transport? C. What are the three types of passive transport?
   1. Transport of molecules through a membrane without the use of energy
   2. from high concentration to low concentration
   3. Diffusion, Osmosis, and Facilitated diffusion
4. If a cell is placed into each of the following solutions, in which direction would water move?
   1. Hypertonic (Salt water): out of the cell
   2. Hypotonic (Fresh water): into the cell
   3. Isotonic: into and out of the cell at the same rate; at equilibrium
5. A. What is active transport? Which direction do molecules move in active transport? C. What are the three types of active transport?

a. Movement of molecules through a membrane with the use of energy

b. From low concentration to high concentration

c. Endocytosis (into the cell), Exocytosis (out of the cell), Phagocytosis (within the cell in organelles)

1. Explain how cells ensure that there are identical amounts of DNA in each cell after division. (What happens in mitosis to ensure that DNA is equally divided?)

During the cell cycle, all DNA is duplicated to form chromosomes. These chromosomes are composed of sister chromatids that are like “twins”. During mitosis, 1 chromatid goes to one side of the cell and the other chromatid goes to the other side of the cell. So, when the parent cell splits into the 2 daughter cells, each cell will have matching, “twin,” DNA

1. What is ATP? How is this molecule used to store energy?

Adenosine Triphosphate is a high energy molecule that contains, in its bonds, energy for the cell. When ADP + P is bonded together to for ATP, the bond that is formed hold energy. When this bond is broken, energy is released for the cell to use

1. What is the photosynthesis equation? CO2+H2O+sunlight🡪 O2+ glucose(C6H12O6)
2. Explain where (location) each reactant is taken in and how each product is produced in the photosynthesis reactions. Be sure to use the following words: chloroplast, thylakoid, grana, stroma, light dependent reactions, NADPH, ATP, Calvin Cycle, NADP and ADP.

All photosynthesis occurs inside the **chloroplast**. Water and sunlight enter **chloroplast** and a **light dependent reactions** occur in the **grana. Grana** is composed of **thylakoids**. It is within these thylakoids that the reaction occurs where water is broken apart into O2 (oxygen) and H (hydrogen). Once oxygen is produced it leaves the chloroplast. The energy from the sunlight is also used to bond **ADP+P** to form **ATP** at this time. Then, the Hydrogen will bond to **NADP+** to make **NADPH** as a sort of “shuttle bus” to carry hydrogen to the **calvin cycle**. The **calvin cycle** occurs in the **stroma** of the **chloroplast**. In the **calvin cycle**, CO2 (carbon dioxide) enters the **chloroplast**. Then, in the **calvin cycle**, CO2 and H bond together to for glucose. The bond in **ATP** is broken to release energy for this process to occur. Then, the glucose leaves the cell to be used to create more energy for the cell. After the **calvin cycle**, the now **ADP+P** and **NADP+** travel back to the **light dependent reactions** to start the cycle over.

1. What types of cells does photosynthesis occur in? What types of cells does cellular respiration occur in?

Photosynthesis: Plant cells; Cellular Respiration: animal cells

1. How are the reactions of photosynthesis and cellular respiration linked? The reactions are opposites of each other
2. Explain where (location) each reactant is taken in and how each product is produced in the cellular respiration reactions. Be sure to use the following words: glycolysis, cytoplasm, mitochondria, Krebs cycle, NADH, Electron Transport Chain, and NAD.

Glycolysis: cytoplasm

Krebs Cycle: cytoplasm and mitochondria

Electron Transport Chain: Mitochondria

Glucose + 2ATP🡪4ATP + 2Pyruvic Acid

Pyruvic Acid🡪CO2 + Many Electrons

Electron + ADP🡪 AT

Krebs cycle creates NADH and brings it into the mitochondria where the H is taken for the production of ATP, leaving NAD+

1. What happens to glucose when oxygen is not available to break it down? Fermentation