

Test 3 Study Guide: Cell Biology and Germ Theory

Date of Test: December 14 (4th, 6th and 8th blocks) or 15 (3rd block)

SOL: BIO. 3a-c; 4e-f

Online Resources:

- www.solpass.org/high.html (practice BIO SOL Review 5, 12)
- www.bozemanscience.com/biology-main-page/ (A Tour of the Cell, Cellular Organelles, Cellular Specialization, Cellular Variation, Viruses, Viral Replication)

Cell Theory

- **Describe the key events leading to the development of the cell theory.**
 - The cell theory is the unifying theme in biology because it emphasizes the similarity of all living things. The traditional cell theory states that 1) living things are **composed of one or more cells** and that cells **come from other cells** by the process of cell reproduction; 2) **cells are the basic units** of structure and function of all living things; and 3) cells contain specialized structures to perform life functions.
 - The development of the cell theory was accelerated by the ability to make observations on a microscopic level. The development and refinement of **magnifying lenses and light microscopes** made the observation and description of living cells possible.
 - Continued advances in microscopy allowed observation of cell organelles and ultrastructure. Current technology (e.g. **electron microscopes**) allows the observation of cellular processes underlying both cell structure and function.
 - Important scientists who played roles in the development of the cell theory include:
 - **van Leeuwenhoek** (invented the precursor of the modern microscope)
 - **Hooke** (“discovered” the “cell” by looking at pieces of cork)
 - **Schwann** (determined all animals are made of cells)
 - **Schlieden** (determined all plants are made of cells)
 - **Virchow** (stated all cells come from preexisting cells)

Eukaryotes and Prokaryotes

- **Compare and contrast characteristics of prokaryotic and eukaryotic cells.**
 - Cell structure is one of the ways in which organisms differ from each other. The diversity that exists ranges from **simple prokaryotic** cells to **complex multicellular** organisms.
 - The simplest life forms exhibiting cellular structure are the prokaryotes. Earth’s first cells were prokaryotes. Prokaryotic cells exist in two major forms: **eubacteria** and **archaeobacteria**. Prokaryotes are Earth’s most abundant inhabitants. They can survive in a wide range of environments and obtain energy in a variety of ways.
 - **Eukaryotes** differ from prokaryotes based on size, **genetic material** surrounded by a **nuclear membrane**, and the addition of **membrane bound organelles** (i.e., mitochondria and chloroplasts).
 - Eukaryotes arose from prokaryotes and developed into larger, more complex organisms, from single-celled **protists** to multicellular **protists, fungi, plants, and animals**.

- **Identify the following essential cell structures and their functions.**

- **the nucleus** (contains DNA; site where RNA is made)
- **ribosome** (site of protein synthesis)
- **mitochondrion** (site of cell respiration)
- **chloroplast** (site of photosynthesis)
- **endoplasmic reticulum** (transports materials through the cell)
- **Golgi** (site where cell products are packaged for export)
- **lysosome** (contains digestive enzymes)
- **cell membrane** (controls what enters and leaves the cell)
- **cell wall** (provides support)
- **vacuole** (storage of material)
- **cytoplasm** (contains organelles and site of many chemical reactions)
- **cytoskeleton** (protein fibers that hold cell shape and structure in place)

- Cellular differences between plant and animal cells include the presence of a **cell wall** that gives the plant cell a defined shape, the presence of **chloroplast**, and the **number of vacuoles**

Viruses

- **Compare and contrast a virus and a cell in relation to genetic material and reproduction.**

- **Viruses** do not share many of the characteristics of living organisms. Viruses are not cells. Basic viral structure consists of a **nucleic acid core** surrounded by a **protein coat**. Viruses can reproduce only inside a living cell, the **host cell**.
- The viral reproductive process includes the following steps:
 - A virus must **insert** its genetic material into the host cell.
 - The viral genetic material **takes control** of the host cell and uses it to **produce viruses**.
 - The newly formed viruses are **released** from the host cell.

Germ Theory

- **Describe how Pasteur's and Koch's experimentation and hypotheses led to an understanding of the presence of microorganisms and their relationship to diseases.**

- Throughout history, people have created explanations for **disease**. The introduction of the **germ theory** led to the understanding that many diseases are caused by **microorganisms**. Changes in health practices have resulted from the acceptance of the germ theory of disease.
- Modern health practices emphasize **sanitation**, the safe handling of food and water, **aseptic techniques** to keep germs out of the body, and the development of **vaccinations** and other chemicals and processes to destroy microorganisms.

Parents: By signing below, you indicate that you are aware of the knowledge and skills your child is expected to know and master for the upcoming test. To the best of your knowledge, your child has prepared for this test. (5 bonus points)

Parent Signature _____ Date _____