Review Questions: SAMPLE ANSWERS

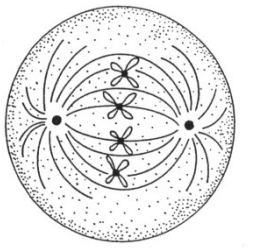
1. Two basic tasks that every cell must accomplish are to produce energy and remove waste. Explain how cells accomplish this using your knowledge of organelles.
   Mitochondria produce energy via cellular respiration (glucose + O_2 → CO_2 + H_2O + ATP energy)
   Lysosomes break down wastes, vesicles transport wastes out of the cell

2. a) Classify the cells in Figure 1 plant or animal cells. b) Explain your reasoning. Plant – cell walls are evident by rectangular & rigid shape

Figure 1: Cells

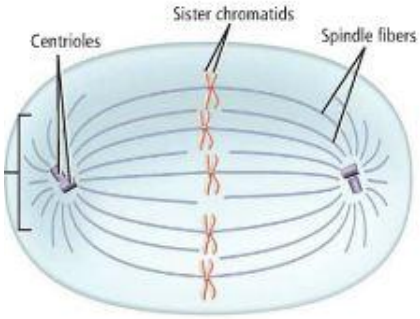
3. a) What happens in "S" phase of the cell cycle?
   New DNA is created/synthesized
   b) Explain why this step in the cell cycle is essential to produce a multicellular organism. Each new cell needs a copy of DNA to function. This step produces the new DNA so that each new daughter cell has a copy

4. Label the following parts of a cell In metaphase on Figure 2: centrioles, sister chromatids, spindle fibres.



5. Explain how cancer cells differ from normal cells. Cancer cells divide uncontrollably and as a result do not spend enough time in interphase – this causes cancer cells to be irregularly shaped, have an enlarged nucleus (small amount of cytoplasm), pile up on one another and be unable to perform intended functions. They invade and harm neighbouring cells.

6. a) Explain the difference between necrosis and apoptosis.
   Necrosis – cell death due to external factors
   Apoptosis – controlled cell death
   b) Give a specific example how or where each may occur.
   Necrosis – paper cut
   Apoptosis – white blood cells after an infections is gone



7. What are genes and why are they important in cell specialization?
Genes contain instructions for a particular trait. As cells specialize, or differentiate, certain genes are turned on and accessed while others are turned off.

8. a) Rank the following terms from the lowest to highest level of organization in an animal or plant: tissue, molecule, organelle, organ, cell, organism, organ system
Molecule, organelle, cell, tissue, organ, organ system, organism

9. What is the difference between a tissue and an organ?
Tissues are a group of similar cells performing a task/function (ie, squamous epithelial to protect lining of stomach)
An organ is a grouping of different tissues working together to perform a task (ie heart – cardiac muscle, nerve, connective)

10. The heart is a complex organ of the cardiovascular system. It contains both nervous tissue and muscle tissue. Explain the function of each type of tissue and describe how these cells are specialized to serve each purpose.
Nervous tissue – sends messages to muscle tissue telling it when to squeeze/contract, they are long thin and branched allowing them to connect with many muscle cells and spread the message quickly and efficiently.
Cardiac muscle tissue – highly branched tissue to allow for contraction in a variety of directions to allow for efficient pumping of the blood through the heart.

11. a) What is an organ system? A group of organs working together to perform a task
b) Use an example from an animal or plant to illustrate your definition. Include examples of specific organs in your definition
Circulatory system – heart, blood, arteries, veins, capillaries → circulation of blood to allow for movement of oxygen, carbon dioxide and nutrients to move around the body

12. For each of the following organs, name the organ system they belong to and state their function.
a) kidneys – Excretory system, filter blood
b) stomach - Digestive systems, mechanical & chemical digestion (breakdown) of food
c) lungs – Respiratory system, gas exchange
d) testes – Reproductive system, produce sperm
e) pancreas – Endocrine system, create hormones that regulate blood sugar
f) spinal cord – Nervous system, transmit messages to and from the brain
g) spleen – Lymphatic system, store white blood cells & filters blood

13. The alveoli of the lungs and the walls of the intestines are structured to increase their surface area. How would increasing their surface area help these organs carry out their function?
Increasing surface area provides more interactions with the environment which will speed up diffusion of molecules (oxygen, nutrients, $CO_{2...}$)

14. Organ systems often interact. Give an example of 2 systems that interact and explain how they work together.
Cardiovascular & Respiratory – respiratory allows for gas exchange into & out of the blood, while cardiovascular transports the gases to and from cells
Digestive & Cardiovascular – digestive allows for the breakdown and absorption of nutrients into the blood stream, cardiovascular transports the nutrients to all the cells in the body.

15. a) Humans stop growing after puberty and mitosis slows, but it never completely stops in adults. Explain why. Cells still get damaged and need to be replaced (ie skin cells – cuts…)
b) What types of tissues are likely to be undergoing mitosis in adults? Skin, hair, reproductive