

*Please provide complete answers (mechanistic explanations) to the following questions. Please answer all parts of each question.*

Week 3 - Cells & Cellular Energy

- 1) Consider cellular energy production and use: (5)
  - a) What organelle is the main site of cellular energy (ATP) production?
  - b) What **organic** molecule do cells commonly metabolize (split/burn) to make ATP during intense exercise?
  - c) In comparison to me (I don't run marathons), would a marathon runner have **more, less**, or an **equal number** of mitochondria in his leg muscle cells and why?
  
- 2) Consider the cellular organelles and their jobs: (5)
  - a) Where, in the cell, are proteins synthesized?
  - b) Where are carbohydrates and lipids synthesized?
  - c) What organelle modifies, packages and ships proteins off for further processing at the Golgi apparatus?
  - d) What organelle deals with food absorbed by cells?
  - e) Where did that organelle originate?
  
- 3) Consider the cytoskeletal elements we discussed in class: (4)
  - a) Name **three** cytoskeletal elements that provide structure for a cell.
  - b) What type of organic molecule are they made of?
  
- 4) Consider cilia: (4)
  - a) **Why** would a cell have cilia on its surface?
  - b) **Where** in the body would you expect to find cells with cilia (tell me generally and give a specific example)?
  - c) Smoking damages cilia on your cells; please speculate on what might happen due to this impaired function.
  
- 5) Imagine that you are a cell that wants to import a large, polar molecule like glucose, for example. The concentration of glucose is already higher inside the cell than out: (6)
  - a) What **two** molecules must you use to import glucose?
  - b) Explain *why* you need each of those molecules (e.g. what is their function?)