

Chapter Three Study Guide
Cell Form and Function (0723)

- 1 What is the most important theory in biology? Three key ideas? When did first cell form?
- 2 What is the average size for a human cell? What is the size of a red blood cell?
- 3 Compare and contrast diffusion, osmosis, and filtration? What are the key features? Explain and give examples.
- 4 What is osmolarity? What is tonicity? Define each using proper units. What is the osmolarity of your body fluids? What occurs if the osmolarity is different between fluid compartments within your body (vascular vs interstitial, vs cellular)?
- 5 How do red blood cells change when placed in either an isotonic, hypotonic, or hypertonic solution?
- 6 What are the two main fluid compartments in the human body? What are the volume of these spaces expressed as a percent? Which compartment is divided again?
- 7 What is an organelle? What organelle encapsulates our cells? Is this an active or passive structure? Significance of this structure? Explain.
- 8 What are the different parts of the “fluid mosaic model”? What is the significance of this phrase, phospholipid bilayer? Draw a picture of the bilayer and highlight the areas that are hydrophilic and hydrophobic?
- 9 How is it possible for a fragile phospholipid bilayer to form a protective wrapper around our cells? Draw a picture to show the role played by transmembrane proteins and peripheral proteins? What is another name for a transmembrane proteins?
- 10 What are six functions of transmembrane proteins? What is the difference between an ion channel and a “gated” ion channel?
- 11 How many transmembrane proteins are used to complete a second messenger system? Explain. Draw picture.
- 12 What are the terms used to describe a solute’s movement and its direction across a plasma membrane?
- 13 You Grandmother may have called you a “sweet child”? Why was she right? What term could your Grandmother had used to describe why you are sweet?
- 14 What terms are used to describe “how” small solute move across the plasma membrane? Which process requires a carrier? Which process requires energy? What is the role of the gradient across the membrane?
- 15 What is the difference between simple diffusion, channel mediated facilitated diffusion, carrier mediated facilitated diffusion, and regulated facilitated diffusion? Is ATP required? Explain

- 16 What three “forces” are used to open a gated facilitated diffusion channel?
- 17 Describe the sodium potassium pump? Is it active or passive? Why is it called a pump? How many ions are moved by each ATP? Direction of movement of ions across membrane? What is the net change in the number and charge of ion movement? Significance. How many calories of your diet is used each day to keep the sodium potassium pump? What are the four key functions of the sodium potassium pump?
- 18 Glucose moves from the lumen (i.e. this is the interior space of a tube) of the small intestine and must cross two sides of an “absorptive cell” to enter your body. Glucose enters the cell from the lumen via a facilitated diffusion symport. What “pump” creates the condition that allows sodium to diffuse into the cell and cotransport glucose with the sodium? The movement of the glucose is diffusion but is ATP still used? Why is this mechanism called secondary active transport?
- 19 What is the significance of “transport maximums”? What organ uses this mechanism?
- 20 Large particles can not move through membrane channels. What terms describe the movement of large particles into and out of a cell? Why are these movements called active? Explain. What is phagocytosis and when is this term used?
- 21 What is the cytoplasm? What are the three major components of cytoplasm?
- 22 Tall buildings have hidden in their interior a steel framework to provide support and structure to the building. Your cells also have a framework called the cytoskeleton. What three structures are the building blocks for your cytoskeleton?
- 23 How is the cytoskeleton connected to the interstitial space? Significance?
- 24 About Organelles: You need to know the structure and function of 13 organelles (see slide #74). Six of these organelles will be questions on the first unit exam.
- 25 What is the relative volume of a nucleus? What is the main content of the nucleus? Why is the nucleus compared to a “hard drive”?
- 26 What three functions are associated with centrioles? Are centrioles also basal bodies? Explain. Why are centrioles called birthing stations? For what?
- 27 What are the two forms of cilia? What is the function of the cilia lining your trachea? What disease occurs if an active chloride uniporter is not installed in the apical surface of a ciliated epithelial cell lining the trachea? Why is this called a genetic disease?
- 28 What is the function of microvilli? What is the role of the cytoskeleton’s actin filaments to the microvilli?
- 29 What is the function of ribosomes? Nickname?
- 30 What is the structure of the endoplasmic reticulum? Two forms? What is the function associated with each type?
- 31 What is the structure and function of the golgi complex? What is its nickname? What is the difference between a transport vesicle and secretory vesicles?

- 32 What is the structure and function of lysosomes? Nickname?
- 33 What are peroxisomes? In what organs are these highly concentrated? Function?
- 34 What is the structure and function of proteasomes?
- 35 What is the structure and function of mitochondria? Nickname? Which gender contributes all of the mitochondria that are in our cells? Are mitochondria actually another form of life that has been living inside our cells for over three billion years? Explain.