BIG Review sheet for Organelles, Membrane Transport, & Enzymes

Biology 12

Name:

1. Know the plant and animal cell diagrams.
2. Why is the nucleolus essential to an animal or plant cell?
3. Give 2 functions of the nucleus.
4. What is the difference between smooth ER and rough ER?
5. Where is smooth ER located in the cell?
6. Why would the cells of the testes and liver have large amounts of smooth ER?
7. What is the functional difference between attached and unattached ribosomes?
8. Describe the structure of polysomes/polyribosomes and their role in the cell.
9. Describe the physical appearance and function of the Golgi body/apparatus.
10. What do vacuoles and vesicles contain?
11. What do lysosomes contain and why are they often referred to as suicide sacs?
12. What is the main function of the mitochondria?
13. Sketch a mitochondrion and label the cristae and matrix.
14. Know the equation for cellular respiration.
15. Differentiate between the structure and function of microfilaments, intermediate filaments and microtubules.
16. Why do phospholipid molecules align themselves with the tails inward?
17. Differentiate between a prokaryotic and a eukaryotic cell.
18. Describe three cellular processes which make use of vesicles.
19. Describe how the RER, the Golgi, vesicles, and the cell membrane work together.
20. Within each of the three pairs, choose the more concentrated solution (ones with same solute)
   a) 80% water / 20% starch or b) 90% water / 10% starch
   a) 5g NaCl / 50g water or b) 5g NaCl / 25g water
   a) 85% solvent / 15% solute or b) 75% solvent / 25% solute

21. By which method of transport would you predict that these molecules would enter the cell
   a) oxygen c) potassium (K+)
   b) glucose d) water

22. List three ways in which active transport differs from diffusion

23. List two ways in which facilitated transport differs from active transport

24. True or false
   a) if a plant cell is placed in a salt solution, the central vacuole will shrink
   b) if a red blood cell is placed in distilled water, it will shrink
   c) if a red blood cell is placed in salt solution, salt will enter the cells, giving them a strange appearance

25. Sea urchin eggs are isotonic to seawater. Consider these conditions
   1) eggs are in seawater 2) eggs are in 65% sea water (35% distilled water) 3) eggs are in pure distilled water

   True or false
   a) under condition 1, the system is already in equilibrium
   b) under condition 2, the eggs will swell
   c) under condition 3, the eggs will shrink

26. Describe each of the solutions surrounding the cells as isotonic, hypertonic, or hypotonic.

27. Draw a diagram to explain the “lock and key” theory of enzyme reactions. Label the substrate, enzyme, enzyme-substrate complex, and the product.
28. Describe the effect of pH, substrate concentration, enzyme concentration on the rate of enzyme activity.
29. What is “Activation energy?” How does an enzyme lower the activation energy of a reaction?
30. Lead has the effect of being a non-competitive inhibitor to specific enzymes in the human body. What does this mean?
31. Briefly explain how Feedback Inhibition works.

32. Vitamin B functions as a coenzyme. Explain what coenzymes do. How are they different from enzymes?

33. If you had hyperthyroidism, would your thyroxin levels be low or high? What might your symptoms be?

34. Which structure regulates the passage of molecules into and out of the cell?
   a) cell membrane  b) nucleus  c) mitochondria  d) ribosome

35. The _____ is surrounded by a double membrane and carries the coding that determines protein synthesis.
   a) mitochondria  b) nucleolus  c) nucleus  d) rough ER

36. Which nuclear structure(s) contain the hereditary material?
   a) nucleolus  b) ribosomes  c) chromosomes  d) nucleoplasm

37. Which of the following structures are NOT found in the cytoplasm?
   a) mitochondria  b) nucleolus  c) ribosomes  d) lysosome

38. Surface-area-to-volume ratios indicate
   a) cells must exceed a certain minimum size
   b) as cells get larger, their surface area actually decreases
   c) largest cells have less proportionate need for food intake and waste removal
   d) as cells get larger, their surface area gets larger but at a slower rate than volume increases.

39. Which is NOT a correct association of cell organelles and function?
   a) lysosome – intracellular digestion  b) mitochondrion – cell respiration
   c) cell wall – regulates passage of molecules in and out of an animal cell
   d) vacuole – storage and water and dissolved substances

40. Ribosomal RNA is produced from the
   a) nucleolus  b) nucleus  c) ribosome  d) rough ER

41. When a lysosome fuses with a vacuole
   a) they both disappear  b) they both return to the Golgi body  c) protein synthesis begins  d) digestion begins

42. If a cell lacked ribosomes, it would NOT be able to
   a) synthesize proteins  b) respire  c) hydrolyze fat  d) form a Golgi body

43. Which organelle forms a membranous system of tubular canals for intracellular transport
   a) ER  b) Golgi body  c) lysosome  d) vacuole

44. The _____ will produce vesicles that can fuse with the cell membrane.
   a) rough ER  b) lysosome  c) mitochondria  d) Golgi body

45. If an active cell produces an important secretion, what sequence of events of organelles might we examine for the origin of that secretion?
   a) ER to ribosome to Golgi  b) ribosome to ER to Golgi  c) ER to Golgi to ribosome
   d) Golgi body to ER to ribosome  e) ribosome to Golgi to ER

46. Tissues that produce large amounts of secretions, such as the gastric glands of the stomach, would contain cells with large numbers of
   a) lysosomes  b) nucleoli  c) mitochondria  d) Golgi bodies

47. Both plant and animal cells have mitochondria because they both
   a) carry on photosynthesis  b) have a large central vacuole  c) have ER  d) need ATP for energy

48. Which organelle will use up O₂ and gives off CO₂ and H₂O?
   a) lysosomes  b) mitochondria  c) ER  d) nucleus

49. Which of the following is responsible for the breakdown of large molecules in the cell?
   a) mitochondria  b) vacuole  c) Golgi bodies  d) lysosomes
50. Which type of molecule forms a bilayer within the membrane?
   a) carbohydrate  b) protein  c) lipid  d) nucleic acid

51. Which organelle does NOT contain membrane?
   a) Golgi bodies  b) lysosomes  c) ribosomes  d) nucleus

52. Which of the following structures within the cytoplasm is connected to the nuclear envelope?
   a) nucleolus  b) ER  c) lysosome  d) vacuole

53. The cell membrane is made of
   a) a network of cellulose  b) cellulose and protein building blocks  c) an oil film of lipid only
d) lipid and protein building blocks  e) lipid and protein with glycolipids and cholesterol

54. The inside and outside of the membrane are
   a) identical in both the phospholipid bilayer and the embedded proteins
b) identical in phospholipid bilayer but have cytoskeletal filaments on the outside and proteins on the inside
c) identical in phospholipid bilayer but have cytoskeletal filaments on the inside and carbohydrate chains of glycolipid and proteins on the outside
d) different with a phospholipid bilayer on the inside and carbohydrate chains of glycolipids and proteins on the outside
e) different with a phospholipid bilayer on the outside and carbohydrate chains of glycolipids and proteins on the inside

55. According to the fluid-mosaic model, a cell membrane structure is assembled of
   a) only proteins functioning as enzymes  b) microtubules that keep it intact
c) charged and uncharged fatty acids  d) a bilayer of glycolipids on top of cholesterol
e) a phospholipid bilayer with embedded proteins

56. Which phrase does NOT describe one of the functions of proteins of the plasma membrane?
   a) increasing the rate of a chemical reaction  b) forming a channel through the membrane
c) acting as a receptor for substances external to the cell  d) initiating the replication of the genetic material
e) binding to a substance to carry it through the membrane

57. Which membrane transport process will continue on whether the cell is alive or dead?
   a) sodium – potassium pump  b) active transport  c) phagocytosis  d) diffusion  e) exocytosis

58. Which components of a cell membrane are used for cell-to-cell recognition?
   a) phospholipids  b) proteins  c) glycolipids  d) glycoproteins  e) both C and D are true

59. Which statement is false concerning the movement of molecules across a cell membrane
   a) water and gas molecules have no difficulty  b) small molecules easily pass through
c) large molecules do not pass through easily  d) charged molecules do not pass through easily
e) lipid molecules do not pass through easily

60. Carrier molecules are required for
   a) diffusion  b) osmosis  c) facilitated transport  d) active transport  e) both C and D are true

61. Proteins do NOT pass through cell membranes because
   a) the membrane is made of protein  b) they contain nitrogen  c) they are very large molecules
d) they cause emulsification  e) they cause digestion of the cell
62. What will happen to the protein solution of side A in this diagram?

- a) it will become less concentrated since protein will move from A to B
- b) it will become more concentrated since water passes from B to A
- c) it will become more concentrated since water passes from A to B
- d) it will become less concentrated since water passes from B to A
- e) nothing

63. What will happen to the water level in the diagram from the question above?

- a) it will rise in side A
- b) it will rise in side B
- c) it will remain the same on both sides
- d) it will rise on both sides of the membrane
- e) it will decrease on both sides of the membrane

64. Of the following conditions, which is absolutely necessary for diffusion to take place?

- a) a differentially permeable membrane
- b) a true solution
- c) a concentration difference
- d) a non-permeable membrane
- e) a living cell

65. What will happen to dye crystals initially in the bottom of a beaker of water over a long period of time?

- a) they will undergo osmosis to a different location
- b) they will undergo active transport to a different location
- c) they will all diffuse to the top of the beaker
- d) they will diffuse equally throughout the beaker
- e) they will stay at the bottom of the beaker

66. Once a solute and a solvent are evenly distributed in a solution, they will

- a) stop moving about
- b) move back toward a concentration of the solvent
- c) continue to move about but with no net movement to higher concentration
- d) be totally out of equilibrium
- e) move from a liquid to gaseous solution

67. A membrane sac filled with large molecules of oil is suspended in a beaker of water. What will happen?

- a) the oil will leave and the water will enter until both sides reach equal concentrations
- b) water will enter the sac and it will swell
- c) because the oil cannot leave, the water cannot enter
- d) we cannot determine the outcome unless we know the tonicity of the solutions
- e) nothing

68. If 0.9% NaCl were isotonic to a cell, then

- a) 0.9% NaCl is hypotonic
- b) 0.9% NaCl is hypertonic
- c) 1.0% NaCl is hypertonic
- d) 1.0% NaCl is hypotonic
- e) 0.1% NaCl is hypertonic

69. Osmosis requires

- a) a differentially permeable membrane
- b) an equal concentration of solvent on both sides of the membrane
- c) active transport of water molecules
- d) no osmotic pressure
- e) no turgor pressure

70. An isotonic solution means that the solute concentration outside the cell

- a) is greater than inside the cell
- b) is less than inside the cell
- c) is the same as inside the cell
- d) has no effect on the cell
- e) all of the above
71. A cell placed in a hypotonic solution will
   a) lose water  b) gain water  c) neither gain nor lose water  d) both gain and lose water equally
   e) gain water initially and then lose water

72. When water enters a plant cell
   a) it bursts  b) the vacuole becomes enlarged  c) the organelles are forced against the cell wall  d) nothing
   e) both B and C are true

73. A potato slice, when placed in water for several hours will become very stiff because
   a) water has passed into the potato cells  b) water has passed out of the potato cells
   c) cellulose synthesis has been stimulated  d) salt has entered the cells of the potato

74. Molecules such as glucose and amino acids are NOT lipid soluble and therefore,
   a) easily pass across the cell membrane
   b) require active transport to cross the cell membrane
   c) must be converted to lipids before they can enter a cell
   d) combine with a carrier protein and pass across by facilitated transport
   e) must be engulfed by a cell using endocytosis

75. Active transport
   a) moves molecules or ions against their concentration gradient  b) involves protein pumps
   c) is associated with large numbers of mitochondria  d) may use up to forty percent of a cell’s energy
   e) all of the above are true

76. If a cell lacks ATP, which of the following processes would cease to operate immediately?
   a) diffusion  b) sodium-potassium pump  c) facilitated diffusion  d) osmosis  e) passive transport

77. Pinocytosis and phagocytosis are accomplished in a cell by the
   a) nucleus  b) mitochondria  c) cell membrane  d) endoplasmic reticulum  e) cell wall

78. Macrophages are able to remove bacteria from our bloodstream and tissues by
   a) active transport  b) facilitated diffusion  c) osmosis  d) pinocytosis  e) phagocytosis

79. Secretory organs, such as the pancreas, release their products by
   a) exocytosis  b) endocytosis  c) phagocytosis  d) reverse phagocytosis  e) pinocytosis

80. Which is NOT a correct attribute of a metabolic pathway?
   a) reactants are input molecules  b) reactants act as substrates for specific enzymes
   c) the product of one reaction can become the reactant for the next
   d) if several metabolic pathways have a molecule in common, one pathway can lead to several others
   e) a constant supply of enzymes must be produced to keep the metabolic pathway active

81. If A=B=C=D=E represents a metabolic pathway, then letter E would be a(n)
   a) substrate  b) product  c) end product  d) enzyme  e) enzyme-substrate complex

82. Most enzymes are
   a) lipids  b) carbohydrates  c) proteins  d) nucleic acids  e) ATP molecules

83. When the active site undergoes a slight change in shape, this is called
   a) the R-group  b) energy of activation  c) substrate concentration  d) the induced fit model  e) denaturation
84. If there are twelve different intermediate products produced during production of a molecule in a cell, we can expect that there
   a) is one enzyme that carries this process through to the end product
   b) are about twelve enzymes, at least on responsible for each step in the metabolic pathway
   c) is one enzyme for breaking down and another enzyme for synthesis
   d) there may not be any enzymes involved if this is a natural cell product
   e) must be twelve different raw materials combined in the cell by one enzyme

85. Lactose is milk sugar and humans produce substantial lactase enzyme to digest it when we are infants. However, we soon lose some or even all of our lactase after childhood. In such cases, undigested lactose passes to the lower intestine where bacteria break it down into lactic acid and CO₂ causing painful gas bloating. This problem could be avoided by
   a) avoiding all dairy products containing lactose
   b) taking lactase enzyme tablets when consuming lactose products
   c) taking any enzyme tablets when consuming dairy products
   d) consuming lactose in tablet form
   e) both A and B are correct

86. Enzymatic action
   a) breaks down larger molecules into smaller molecules
   b) builds a larger molecule from smaller molecules
   c) requires a specific enzyme for each substrate
   d) occurs when the active site of an enzyme complexes with the substrate
   e) all of the above are correct
87. Which is true about energy of activation?
   a) energy of activation is measured as the energy that is released after a reaction occurs
   b) adding the correct enzyme can lower the energy of activation
   c) in one metabolic pathway, all steps will have the same energy of activation
   d) energy of activation is the difference between the energy of the reactant and the energy of the product
   e) the energy of activation is always lower than the energy of the reactant

88. Enzymes
   a) provide the energy for metabolic reactions  
   b) speed up metabolic reactions  
   c) change the direction of metabolic reactions  
   d) act as a buffer in metabolic reactions  
   e) raise the energy of activation for a reaction

89. Which of the following is NOT an enzyme?
   a) lipase  
   b) maltase  
   c) urease  
   d) lactose  
   e) ribonuclease

90. Enzymes are specific. This means that they
   a) have a preferred pH  
   b) have a preferred temperature  
   c) have a particular substrate  
   d) are only in certain cells  
   e) require ATP, hydrogen atoms, and nutrients in order to work properly

91. The specificity of an enzyme to a substrate is currently best explained by
   a) saying their shapes fit together as a key fits a lock  
   b) the induced fit model  
   c) the allosteric model  
   d) the receptor model  
   e) the synthase complex model

92. The place where the substrate fits onto the enzyme is called the
   a) active site  
   b) inhibitor site  
   c) receptor site  
   d) enzyme-substrate complex  
   e) enzyme – inhibitor complex

93. A coenzyme is
   a) an ionic cofactor that interacts with an enzyme to inhibit it  
   b) a protein cofactor that interacts with an enzyme to inhibit it  
   c) an ionic cofactor that interacts with an enzyme to allow it to work  
   d) a protein cofactor that interacts with an enzyme to allow it to work  
   e) a nonprotein organic cofactor that interacts with an enzyme to allow it to work

94. Coenzymes
   a) are merely large enzyme molecules that are made from two smaller enzymes  
   b) usually participate directly in a reaction  
   c) are readily synthesized by any animal that need them  
   d) include Mg²⁺, K⁺, and Ca²⁺

95. The maximum enzymatic rate occurs when __ of the active site is filled with the substrate
   a) 0%  
   b) 25%  
   c) 50%  
   d) 75%  
   e) 100%

96. If you wished to increase enzyme activity, you could most likely
   a) increase the temperature moderately  
   b) increase the concentration of the enzyme  
   c) increase the concentration of the substrate  
   d) change to optimum pH for the reaction  
   e) all of the above are correct

97. Which method regulates enzyme action?
   a) changing pH  
   b) changing temperature  
   c) chemical activation of the enzyme  
   d) a molecule of similar shape to the substrate competes for the active site  
   e) all of the above control enzyme action

98. In ___ inhibition, an inhibitor binds to an enzyme at a site other than the active site
   a) competitive reversible  
   b) competitive irreversible  
   c) noncompetitive  
   d) enzyme-substrate complex

99. Poisons are often
   a) enzyme inhibitors  
   b) cofactors  
   c) coenzymes  
   d) vitamins  
   e) mimicry molecules causing competitive inhibition