

Review for Cells Quiz: The Origin, Structure and Function of Cells

1. Know and understand the definitions and meanings of the following terms. Be able to write a definition or explanation of the terms in **bold**.

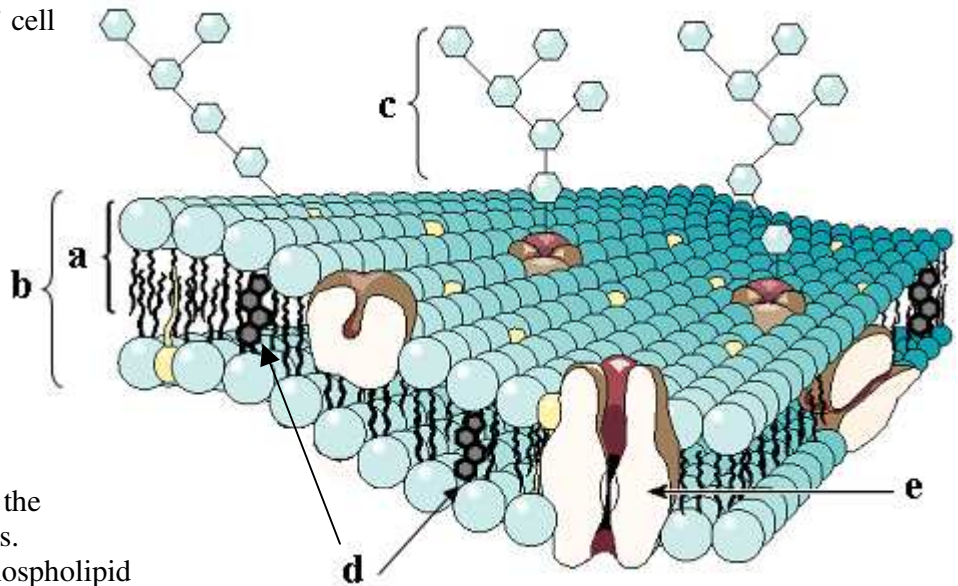
Abiogenesis theory
 phospholipid bilayer
 vesicle
 prokaryotic cell
 eukaryotic cell
 intracellular fluid
 extracellular fluid
 semi-permeable
 selectively permeable

passive transport
 active transport
 concentration gradient
 hypertonic solution
 hypotonic solution
 isotonic solution
 turgor pressure
 cytolysis
diffusion

facilitated diffusion
osmosis
 bulk transport
 endocytosis
 exocytosis
 phagocytosis
 pinocytosis
Endosymbiosis Theory
 chromatin

2. Label the diagram of a 'typical' cell membrane shown to the right:

- a) _____
 b) _____
 c) _____
 d) _____
 e) _____



3. Regarding the cell membrane:

- a) Describe the basic steps of Abiogenesis theory that lead to the creation of membranes and cells.
 b) Explain how the structure of phospholipid molecules is ideal for the formation of membranes.
 c) Explain how the structure of cell membranes is critical to the function of cells.
 d) Why are 'modern' cell membranes described as a 'fluid mosaic'?
 e) What three major macromolecules make up 'modern' cell membranes?
 f) Explain how the saturation of phospholipids affects the fluidity of a cell membrane.
 g) What three MAIN ways can substances move into, and out of, cells? Describe each.

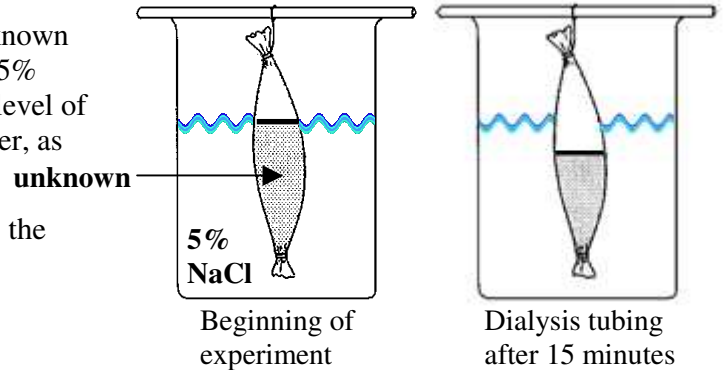
4. Complete the chart below to summarize the types of transport across a membrane.

	Type(s) of substances transported	Membrane proteins involved?	Up or down the concentration gradient?	Is energy required?
Simple Diffusion				
Facilitated Diffusion				
Osmosis				
Active Transport				

5. Although we don't know how, at some point chemistry became biology and groups of molecules became alive as cells. What are the seven characteristics of living things?

6. If an animal cell is placed in a hypertonic solution:
- Which solution has a higher solute concentration, the ICF or ECF? _____
 - Which solution has a higher concentration of water, the ICF or ECF? _____
 - In which direction will water move, into or out of, the cell? _____
 - Describe what will happen to the **animal** cell. _____
7. If an animal cell is placed in a hypotonic solution:
- Which solution has a higher solute concentration, the ICF or ECF? _____
 - Which solution has a higher concentration of water, the ICF or ECF? _____
 - In which direction will water move, into or out of, the cell? _____
 - Describe what will happen to the **animal** cell. _____

8. A piece of dialysis tubing was filled with an unknown solution and suspended in a solution containing 5% sodium chloride solution. After 15 minutes, the level of the solution in the dialysis tubing was much lower, as shown in the diagram.



Based on these results, which of the following is the unknown solution? Defend your answer.

- 10% glucose solution
- 5% glucose solution
- pure distilled water

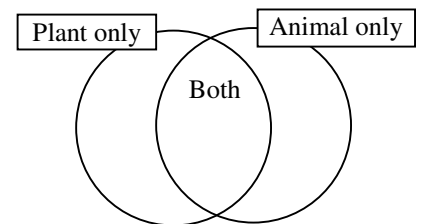
9. Complete the chart below to identify ONE of the methods by which the following substances could move across the cell membrane (there is more than one correct answer for some substances):

Substance	Most likely method of crossing the membrane	Active or Passive?	Is Energy Required?
a calcium ion Ca^{2+}			
water			
CO_2			
fragments of dead cells			
a chloride ion Cl^{1-}			
glucose			
a large protein molecule			
estrogen (a steroid hormone)			
O_2			

10. Give three significant differences between prokaryotic and eukaryotic cells.

11. What structures (organelles) are found in **ALL** cells?

12. Draw a Venn diagram to compare the organelles that are found in only plant cells, only animal cells and both plant and animal cells.



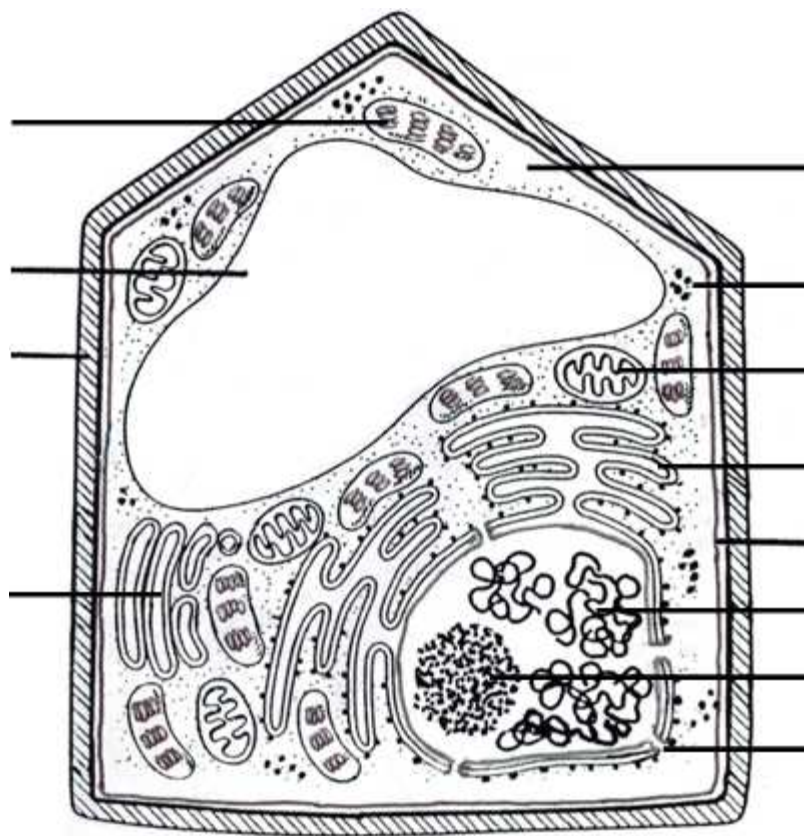
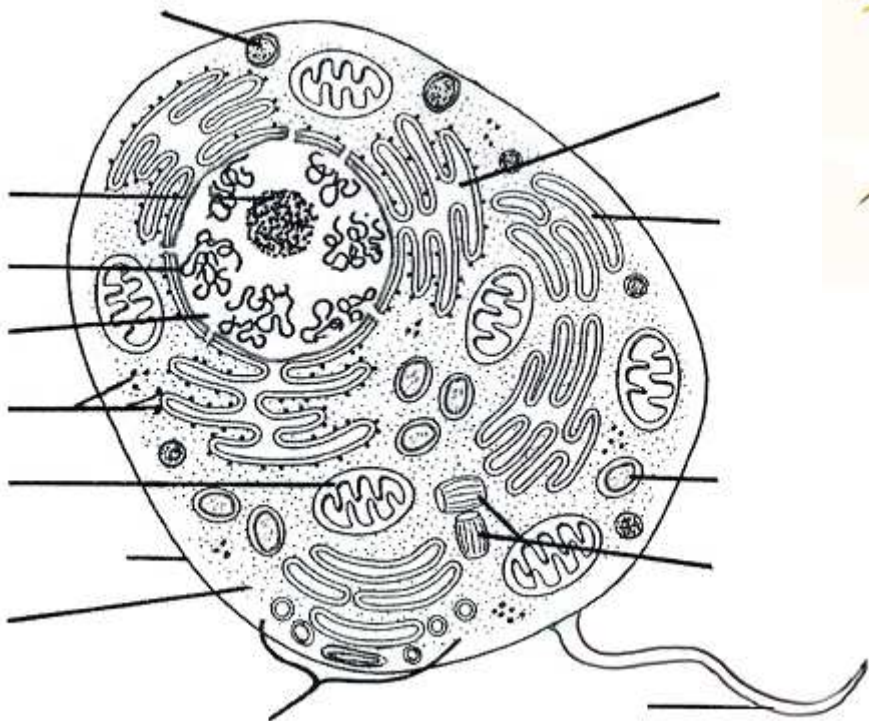
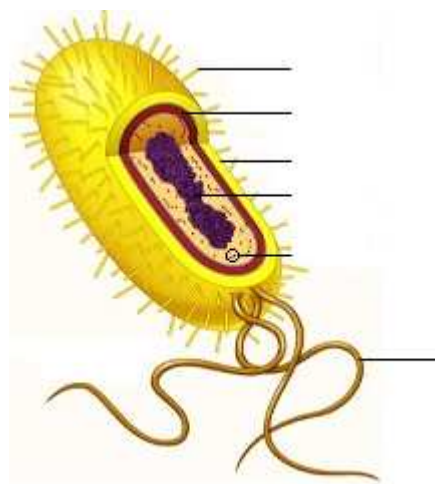
13. Compare and contrast:

- passive transport and active transport
- facilitated diffusion and active transport
- active transport and bulk transport

14. Regarding Endosymbiosis Theory:

- What is the main idea of Endosymbiosis Theory?
- Briefly describe the steps that may have happened, according to Endosymbiosis Theory.
- Which two organelles were most likely incorporated into eukaryotic cells by endosymbiosis?
- What are three pieces of evidence that support Endosymbiosis Theory?

15. Label the following generalized diagrams of typical bacterial, animal and plant cells (assume that the cell membranes are phospholipid bilayers)



16. Write the letter of the appropriate cell part beside each description. Some cell parts may be used more than once and some may not be used at all.

Description of Cell Part or Function	Cell Parts (in alphabetical order)
_____ The organelle that manufactures proteins.	A. cell membrane
_____ Organelles that store starch. They do not contain coloured pigments.	B. cell wall
_____ The microtubules and microfilaments that give cells their shape.	C. central vacuole
_____ Uncoiled chromosomes. The form that DNA takes when the cell is not dividing.	D. centrioles(s)
_____ The region within plant and animal cells from which microtubules and microfilaments originate.	E. centrosome
_____ Small hair-like projections on the cell surface that move with a sweeping motion.	F. chloroplast(s)
_____ Flattened stacks of membranes that process and then package proteins into secretory vesicles.	G. chromatin
_____ Small openings that connect the nucleus with the cytoplasm.	H. chromoplast(s)
_____ The organelle that stores water, salts and sugars in plant cells.	I. cilia
_____ The area in the cell where ribosomes are manufactured.	J. cytoplasm
_____ The membrane-bound structure where the majority of a cell's DNA is found.	K. cytoskeleton
_____ A series of membranes and tubules where steroids and phospholipids are made.	L. flagellum
_____ A specialized vesicle for breaking down long chain fatty acids and alcohol.	M. Golgi apparatus
_____ This structure controls the movement of substances into and out of the cell.	N. leucoplast(s)
_____ These organelles contain colourful pigments in only certain parts of plants.	O. lysosome(s)
_____ A series of membranes which has ribosomes embedded on its surface.	P. mitochondria
_____ Long, whip-like projections which are used for locomotion by animal cells.	Q. nuclear pore(s)
_____ A set of two microtubules found at right angles to one another in animal cells.	R. nucleolus
_____ The contents of the cell, excluding the nucleus.	S. nucleus
_____ Organelles that contain DNA, ribosomes and chlorophyll.	T. peroxisome(s)
_____ The organelle where cellular respiration takes place and ATP is produced.	U. plastids
_____ Small vesicles in animal cells which are used for storage.	V. ribosome(s)
_____ Vesicles that contain digestive enzymes and break down and recycle worn out organelles.	W. rough ER
	X. smooth ER
	Y. vacuole(s)

17. Using the list of cell parts in the chart above, list all cell parts which:

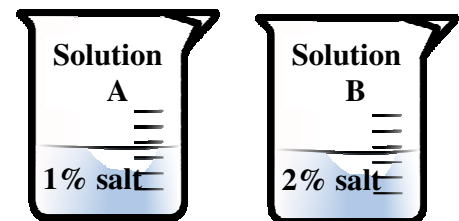
- contain DNA _____
- are considered vesicles _____
- are surrounded by two membranes _____
- are found only in plant cells _____
- are found only in animal cells _____

Practice Multiple Choice Questions

- A very large molecule contains several H – O bonds. This molecule will:
 - dissolve well in water
 - be hydrophobic
 - cross the cell membrane by simple diffusion
 - all of the above
- Active transport occurs when substances move across membranes:
 - from lower to higher concentrations
 - by simple diffusion
 - from higher to lower concentrations
 - by osmosis
- Which of the following substances can enter the cell **ONLY** by endocytosis?
 - glucose
 - bacteria
 - water
 - small lipid molecules
- Which of the following are found in the cell membrane?
 - phospholipids
 - cholesterol
 - proteins
 - DNA
 - i and ii only
 - i and iii only
 - i, ii and iii only
 - i, ii, iii and iv
- Molecules that act as channels to transport ions through the cell membrane are made of:
 - lipids
 - proteins
 - glycogen
 - phospholipids
- Cell membranes are composed mainly of:
 - sugars and phosphates
 - phospholipids and proteins
 - carbohydrates and cellulose
 - nucleotides and carbohydrates
- Diffusion:
 - requires energy
 - only happens in living cells
 - moves substances against a concentration gradient
 - none of the above
- Which of the following conditions would cause red blood cells to burst?
 - being put in a solution with pH of 7.5
 - being placed in distilled water
 - being heated to a temperature of 30°C
 - being placed in an 11% salt solution
- Frog eggs placed in an isotonic solution will:
 - burst
 - shrink
 - remain the same
 - get heavier
- In a hypertonic environment, an animal cell will:
 - swell up
 - start to divide
 - shrink
 - remain unchanged
- In an experiment, frog's eggs were placed in a salt solution. After several hours they were significantly larger. Compared to the frog's eggs, the salt solution must have been:
 - isotonic
 - saturated
 - hypotonic
 - hypertonic
- A cell will tend to **lose** water if it is moved from:
 - an isotonic solution to a hypotonic solution
 - a hypertonic solution to an isotonic solution
 - an isotonic solution to a hypertonic solution
 - a hypertonic solution to a hypotonic solution

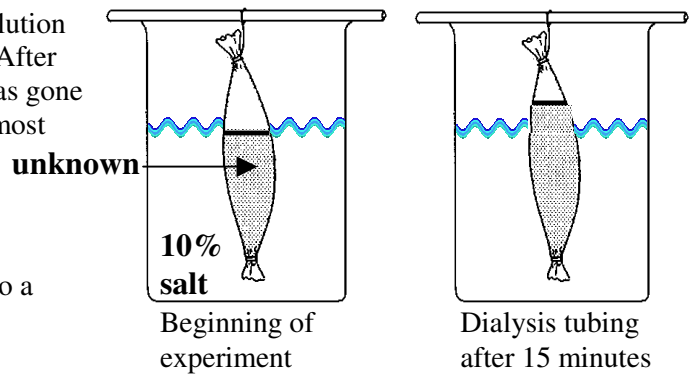
13. Referring to the solutions in the diagram to the right:

- solution A is isotonic with solution B
- solution A is hypotonic compared to solution B
- solution B is hypotonic compared to solution A
- solution A is hypertonic compared to solution B



14. Which of the following processes moves material against a concentration gradient?
- osmosis
 - active transport
 - diffusion
 - facilitated diffusion

15. A piece of dialysis tubing is filled with an unknown solution and placed in a beaker containing a 10% salt solution. After 15 minutes, the water level inside the dialysis tubing has gone up (see diagram). Which of the following solutions is most likely the unknown solution?



- a) distilled water c) 10% glucose solution
b) 5% glucose solution d) 20% glucose solution

16. Which of the following processes moves molecules into a cell using cellular energy?

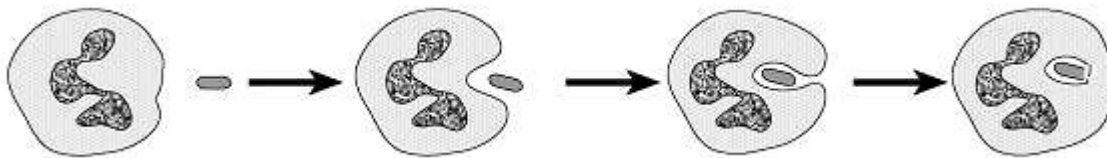
- a) osmosis c) pinocytosis
b) diffusion d) facilitated diffusion

17. Red blood cells were placed in a solution. Two hours later, they were studied under a microscope and they were all shriveled up. If the ICF of red blood cells is usually 0.9% salt, identify the solution into which the red blood cells were placed:

- a) 10% salt b) 0.9% salt c) 0.01% salt d) 0.1% salt

18. The diagram shows a white blood cell ingesting a bacterium. This is called:

- a) diffusion b) pinocytosis c) phagocytosis d) facilitated diffusion



19. The function of the rough endoplasmic reticulum is to:

- a) process and package proteins c) manufacture long chain fatty acids
b) make ribosomes d) all of the above

20. The organelle which is important in plant cells for storing water, salts and sugar is the:

- a) centrosome b) peroxisome c) lysosome d) central vacuole

21. Which of the following organelles are surrounded by two membranes?

- i) chloroplasts
ii) ribosomes
iii) mitochondria
iv) lysosomes
v) centrioles

- a) i, ii and iii only b) i and iii only c) i, iii and iv only d) iv and v only

22. In animal cells, the centrosome is made up of:

- a) the nucleus, nucleolus and chromatin c) both the smooth and rough ER
b) two centrioles d) vesicles and vacuoles

23. Which of the following are found **ONLY** in plant cells?

- i) centrioles
ii) cell wall
iii) flagella
iv) chloroplasts
v) mitochondria

- a) i, ii and iv only b) i and iv only c) ii and iv only d) iv only

24. What is/are the advantage(s) of organelles within eukaryotic cells?

- a) they can keep dangerous substances separate from the rest of the cytoplasm
b) they can create a specialized environment which allow certain enzymes to function better
c) they can store specific substances for later use by the cell
d) all of the above

25. Which of the following is a type of vesicle produced by the Golgi apparatus?
 a) lysosomes b) central vacuoles c) centrosomes d) microtubules
26. Which of the following parts of the cell contain DNA:
 i) chloroplasts
 ii) ribosomes
 iii) mitochondria
 iv) lysosomes
 v) nucleus
 a) i, ii and iii only b) i, iii and v only c) iii and v only d) i, ii, iii, iv and v
27. Which of the following statements is/are true?
 a) plant cells have centrosomes which are made up of two centrioles
 b) flagella and cilia are part of the cytoskeleton of some plant cells
 c) centrioles are important in the organization of microtubules and microfilaments
 d) all of the above
28. Ribosomes are:
 a) surrounded by a membrane c) important in making fatty acids and lipids
 b) manufactured in the nucleolus d) all of the above
29. Pancreatic cells make and secrete large quantities of proteins (enzymes). They must have a large number of:
 a) nuclei b) Golgi apparatus c) lysosomes d) peroxisomes
30. In what way do mitochondria resemble bacteria? They both contain:
 a) the same type of ribosomes c) chlorophyll for photosynthesis
 b) a loop of DNA d) both a) and b)
31. Which part of a plant would most likely contain chromoplasts?
 a) the roots b) the stem c) the flower d) all of the above
32. A protein is manufactured and will be secreted outside of the cell. It will travel from the:
 a) rough ER → smooth ER → Golgi → transport vesicle → outside the cell
 b) rough ER → transport vesicle → Golgi → secretory vesicle → outside the cell
 c) smooth ER → transport vesicle → Golgi → secretory vesicle → outside the cell
 d) ribosome → cytoplasm → secretory vesicle → outside the cell
33. Cell walls:
 a) are made of a polysaccharide c) control how substances move into and out of cells
 b) replace the cell membrane in plant cells d) all of the above
34. Cilia are:
 a) found on the outer surface of some animal cells c) a type of vesicle
 b) important in making proteins d) all of the above
35. Which of the following is/are vesicles?
 a) lysosomes b) peroxisomes c) vacuoles d) all of these
36. Which of the following organelles is responsible for breaking down long chain fatty acids and some drugs?
 a) lysosomes b) peroxisomes c) ribosomes d) Golgi apparatus
37. Nuclear pores allow:
 a) only water to enter the nucleus c) DNA to enter and leave the nucleus
 b) only proteins to enter and leave the nucleus d) ribosomes to leave the nucleus
38. Which cell part(s) most closely resemble bacteria in their size and composition?
 a) lysosomes b) nuclei c) plastids d) Golgi apparatus

39. The _____ gives shape and internal organization to all eukaryotic cells.
 a) nucleus b) cytoskeleton c) endoplasmic reticulum d) cell wall
40. Chromatin contains:
 a) DNA but not RNA c) both DNA and RNA
 b) RNA but not DNA d) neither DNA nor RNA
41. Which organelle contains enzymes that digest worn out organelles?
 a) nucleus b) ribosome c) lysosome d) Golgi apparatus
42. Which organelle is important in organizing the filaments and tubules that form an animal cell's cytoskeleton?
 a) centrioles b) nucleolus c) lysosomes d) vacuoles
43. Cells such as muscle cells which require large amounts of energy will have large numbers of:
 a) centrioles b) lysosomes c) chloroplasts d) mitochondria
44. The chemical reactions that take place in lysosomes are classified as:
 a) photosynthesis reactions c) cellular respiration reactions
 b) anabolic reactions d) catabolic reactions
45. The cell's cytoskeleton is composed, in part, of:
 a) plastids b) cytoplasm c) microtubules d) chromatin
46. Which organelle functions as a storage and packaging site?
 a) ribosomes b) lysosomes c) mitochondria d) Golgi apparatus
47. Plant cells have:
 a) chloroplasts instead of mitochondria c) cell walls instead of cell membranes
 b) smooth ER instead of rough ER d) a large central vacuole instead of smaller vacuoles
48. In which of the following organelles is light energy used to produce simple sugars?
 a) lysosomes b) chloroplasts c) endoplasmic reticulum d) mitochondria
49. Which of the following organelles is correctly matched with its product?
 a) nucleolus & DNA c) mitochondria & ATP
 b) Golgi apparatus & ribosomes d) smooth endoplasmic reticulum & glucose
50. Which of the following organelle(s) is/are surrounded by two membranes?
 a) nucleus b) chloroplasts c) mitochondria d) all of the above
51. When a protein is ready to leave the rough endoplasmic reticulum, it travels to the Golgi bodies in:
 a) transport vesicles b) secretory vesicles c) lysosomes d) vacuoles
52. The fluid-mosaic membrane model describes the cell membrane as a:
 a) sheet of protein around a cell c) sugar-phosphate backbone around the cell
 b) phospholipid bilayer and proteins d) network of cellulose that surrounds the cell
53. In which of the following organelles is a large membrane surface area important?
 a) chloroplasts b) mitochondria c) endoplasmic reticulum d) all of these
54. Ribosomes:
 a) are made of two equally sized subunits c) are enclosed in a phospholipid membrane
 b) are found by the thousands in eukaryotic cells d) all of the above
55. Plant cells are green because they:
 a) are surrounded by a green cell wall c) contain chlorophyll
 b) contain leucoplasts d) have chloroplasts instead of mitochondria

56. Which organelle is responsible for maintaining the amount of cell membrane that surrounds the cell?
 a) lysosomes b) Golgi apparatus c) ribosomes d) cytoskeleton
57. Which organelle is responsible for producing the majority of the ATP needed by a cell?
 a) chloroplasts b) lysosomes c) leucoplasts d) mitochondria
58. Which organelle is responsible for maintaining the turgor pressure of plant cells?
 a) nucleus b) chloroplasts c) central vacuole d) cytoskeleton
59. Most eukaryotic cells have only one:
 a) nucleus b) mitochondria c) centriole d) all of the above
60. Which of the following organelles can be seen using an ordinary light microscope (like those at school)?
 a) mitochondria b) leucoplasts c) cytoskeleton d) ribosomes

Answers:

1. a	11. c	21. b	31. c	41. c	51. a
2. a	12. c	22. b	32. b	42. a	52. b
3. b	13. b	23. c	33. a	43. d	53. d
4. c	14. b	24. d	34. a	44. d	54. b
5. b	15. d	25. a	35. d	45. c	55. c
6. b	16. c	26. b	36. b	46. d	56. b
7. d	17. a	27. c	37. d	47. d	57. d
8. b	18. c	28. b	38. c	48. b	58. c
9. c	19. a	29. b	39. b	49. c	59. a
10. c	20. d	30. d	40. a	50. d	60. b