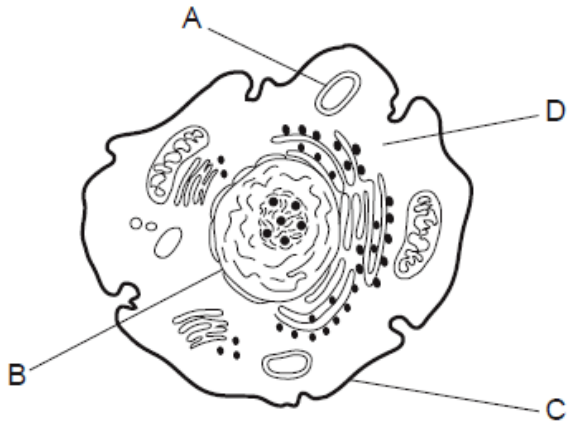
1. All of the following are true regarding cells except?

   1) All cells have genetic material
   2) All cells have cell walls
   3) All cells have plasma membranes
   4) All cells can divide to form new cells

2. What is common to all cells?

   1) All cells have a cell wall
   2) All cells are photosynthetic
   3) All cells divide to form new cells
   4) All cells have a nucleus

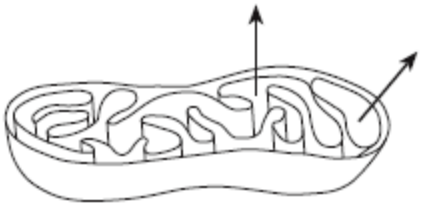
3. A cell is represented in the diagram below.



   The coded information that the cell uses to synthesize many different proteins is stored in structure

   1) *A* **2) *B*** 3) *C* 4) *D*

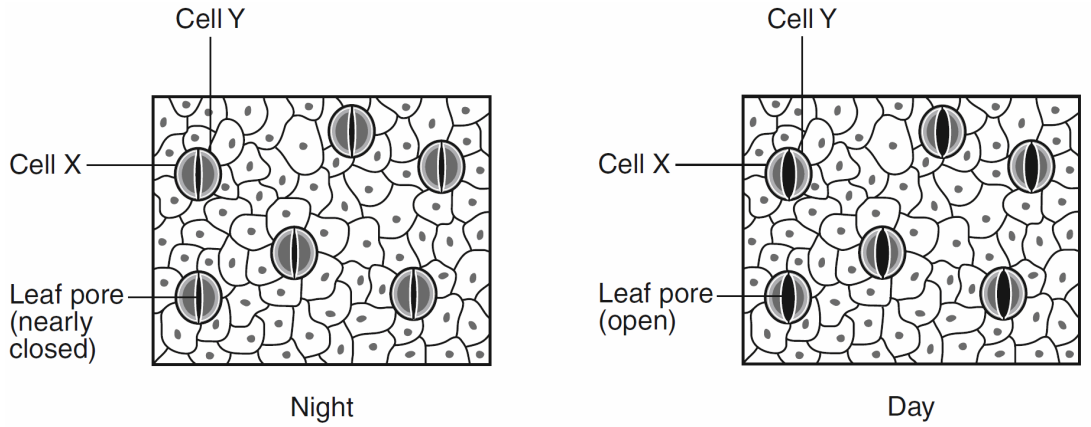
4. The diagram below represents a cell structure involved in converting energy stored in organic molecules into a form used by animal cells.



   The arrows represent the movement of which substances?

   1) carbon dioxide and sugar
   2) oxygen and ATP
   3) ATP and carbon dioxide
   4) oxygen and sugar

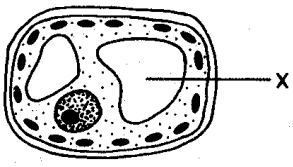
5. The diagram below represents changes in the sizes of openings present in leaves as a result of the actions of cells *X* and *Y*.



The actions of cells *X* and *Y* help the plant to

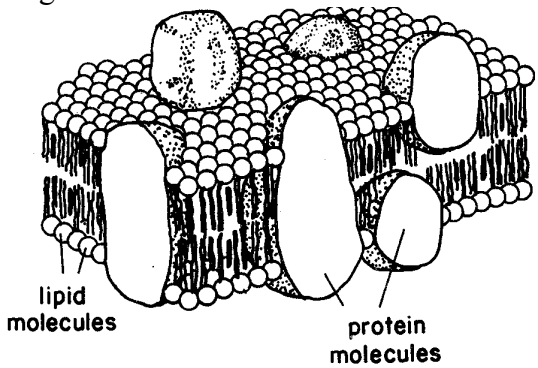
1) maintain homeostasis by controlling water loss
2) store excess heat during the day and remove the heat at night
3) absorb light energy necessary for cellular respiration
4) detect changes in the biotic factors present in the environment

6. In the diagram of a cell below, the structure labeled *X* enables the cell to



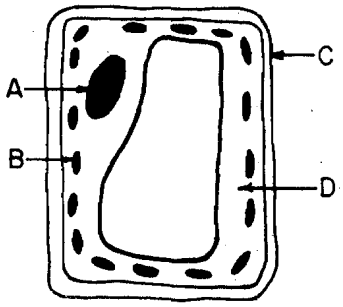
1) release energy
2) store waste products
3) control nuclear division
4) manufacture proteins

7. Which cellular organelle is represented by the diagram below?



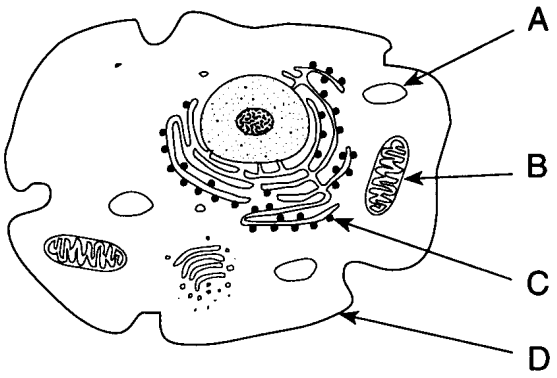
1) cell wall
2) molecules
3) plasma membrane
4) protein

8. Which structures in the diagram below enable the observer to identify it as a plant cell?



1) *A* and *B*
2) *B* and *C*
3) *A* and *C*
4) *B* and *D*

9. Which letter in the diagram below indicates an organelle that functions primarily in the synthesis of long chains of amino acids?



1) *A* 2) *B* **3) *C*** 4) *D*

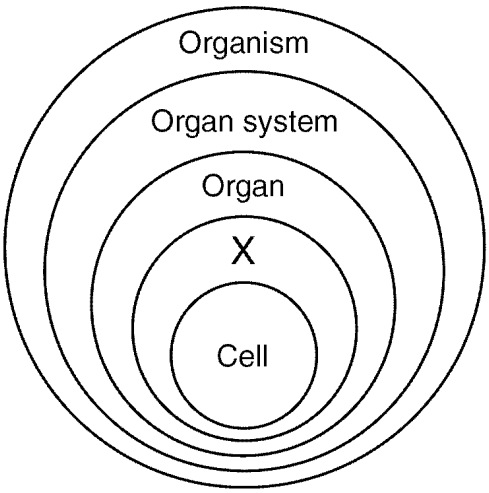
10. The function of a cell depends primarily on its

1) life span 2) color
3) structure 4) movement

11. Which structures are listed in order from the ***least*** complex to the ***most*** complex?

1) plant cell, leaf, chloroplast, rose bush
2) chloroplast, plant cell, leaf, rose bush
3) chloroplast, leaf, plant cell, rose bush
4) rose bush, leaf, plant cell, chloroplast

12. The diagram below represents levels of organization in living things.

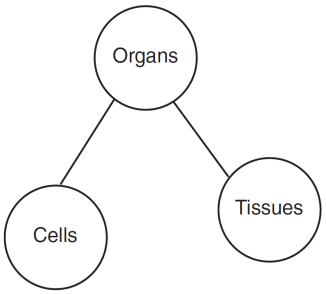


Which term would best represent *X*?

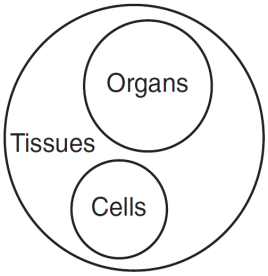
1) human **2) tissue**
3) stomach 4) chloroplast

13. Which diagram best illustrates the relationship between the number of cells, tissues, and organs in a complex multicellular organism?

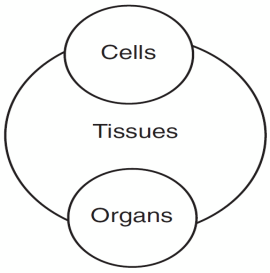
1)



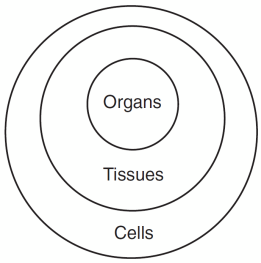
2)



3)



4)



14. Which sequence best represents increasing complexity?

1) tissues → cells → organelles → organs
2) cells → organelles → organs → organism
3) organelles → cells → tissues → organs
4) organism → cells → tissues → organelle

15. Which group consists entirely of organic molecules?

1) protein, oxygen, fat
2) protein, starch, fat
3) water, carbon dioxide, oxygen
4) water, starch, protein

16. Most organisms contain

1) organic compounds, only
2) inorganic compounds, only
3) both organic and inorganic compounds
4) neither organic nor inorganic compounds

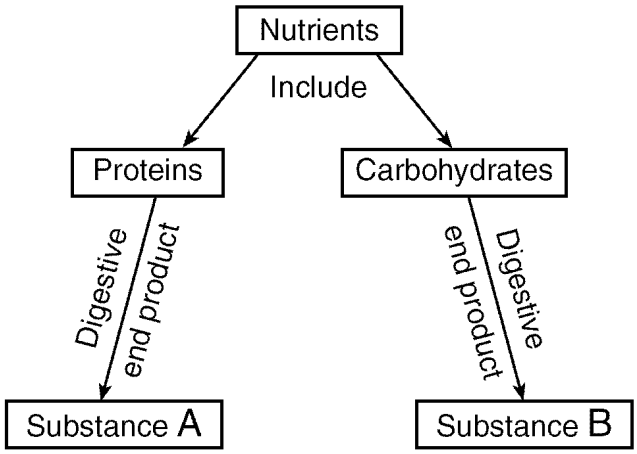
17. Water is classified as an inorganic compound because it

1) does not contain carbon
2) does not contain nitrogen
3) contains hydrogen
4) contains oxygen

18. Glucose molecules are the building blocks of what class of macromolecule?

1) Proteins
2) Lipids
3) Nucleotides
4) Carbohydrates

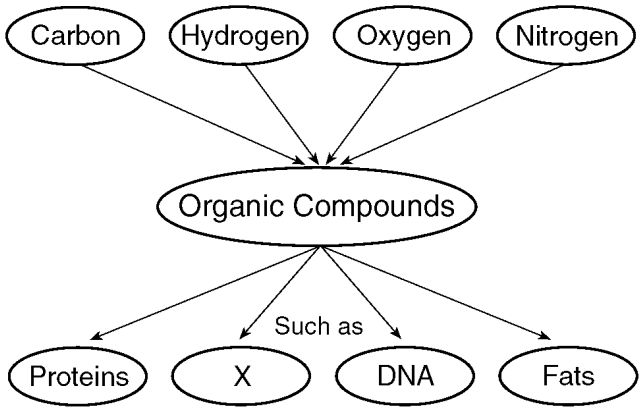
19. Base your answer to the following question on the information in the diagram below and on your knowledge of biology.



In an autotrophic organism, substance *B* functions as a

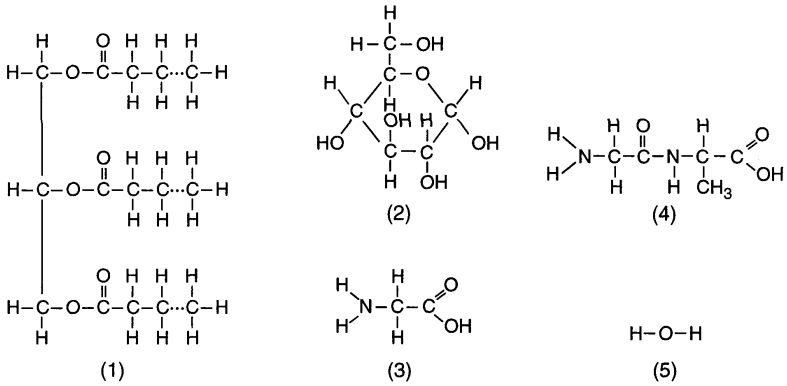
1) source of energy
2) hormone
3) vitamin
4) biotic resource

20. What substance could be represented by the letter *X* in the diagram below?



1) carbohydrates 2) ozone
3) carbon dioxide 4) water

21. Base your answer to the following question on the diagram below. For each of the following phrases, select the molecule, chosen from those shown below, which is best described by that phrase.



An example of a carbohydrate

1) 1 **2) 2** 3) 3 4) 4 5) 5

22. Which compound is a polysaccharide?

1) glucose 2) maltase
3) ribose **4) starch**

23. Two examples of carbohydrates are

1) fatty acids and glycerol
2) fats and waxes
3) sugars and starches
4) amino acids and alcohol

24. Butter and oil are examples of food composed of

1) carbohydrates **2) lipids**
3) proteins 4) nucleotides

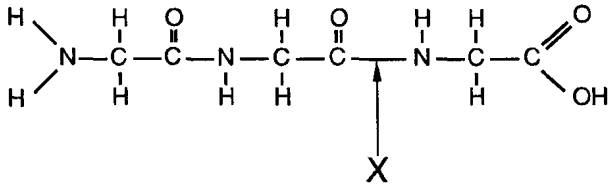
25. What are the building blocks of lipids?

1) Glucose
2) Amino acids
3) Fatty acids and glycerol
4) Nucleic acids

26. Animals commonly store energy in the form of

1) fat and glycogen
2) waxes and oils
3) minerals and urea
4) water and carbon dioxide

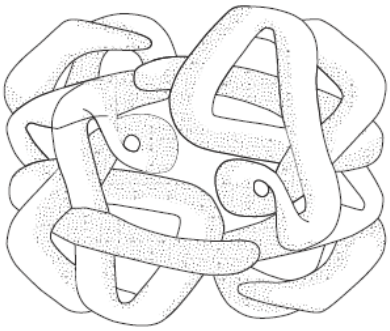
27. Base your answer to the following question on the structural formula of a molecule shown below.



What macromolucule is represented by the diagram?

1) carbohydrate 2) nucleic acid
3) protein 4) lipid

28. The diagram below represents a protein molecule present in some living things.



This type of molecule is composed of a sequence of

1) amino acids arranged in a specific order
2) simple sugars alternating with starches arranged in a folded pattern
3) large inorganic subunits that form chains that interlock with each other
4) four bases that make up the folded structure

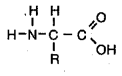
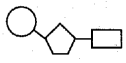
29. The shape of a protein molecule directly determines its

1) movements through the cytoplasm
2) functions inside and outside of cells
3) roles in building water molecules
4) circulation throughout the body

30. Enzymes are a type of

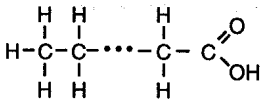
1) Carbohydrate **2) Protein**
3) Nucleotide 4) Fatty acid

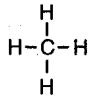
Base your answers to questions **31** and **32** on on the chart below and your knowledge of Biology.

Class of Substance	Basic Unit of Structure	One Possible Function	Examples
A		*B*	*C*
Carbohydrate	*D*	Structural component of cell walls	*E*
F	*G*	Structural component of cell membranes	Fats, waxes
H		Protein synthesis	*I*

31. Which belongs in section **G** ?

1) 

2) 

3) 

4) 

32. In which section of the chart do nucleic acids belong?

1) **F** 2) **B** **3) H** 4) **D**

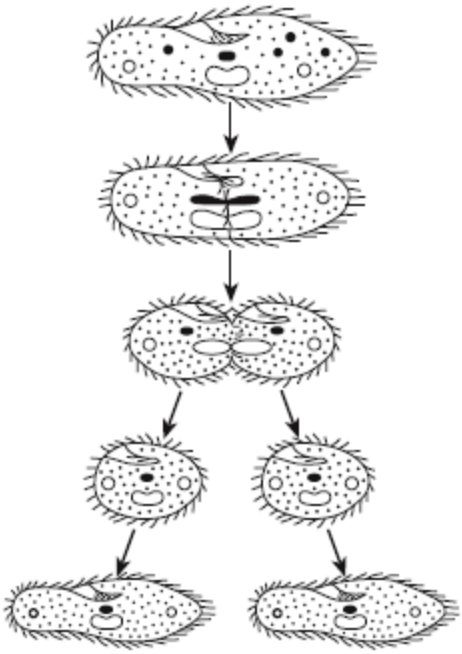
33. The shape of a protein is most directly determined by the

1) amount of energy available for synthesis of the protein
2) kind and sequence of amino acids in the protein
3) type and number of DNA molecules in a cell
4) mistakes made when the DNA is copied

34. When an organism reproduces asexually, it usually has

1) only one parent, and half as much DNA as the parent
2) only one parent, and the same chromosome number as the parent
3) two parents, and twice as much DNA as either parent
4) two parents, and the same chromosome number as each parent

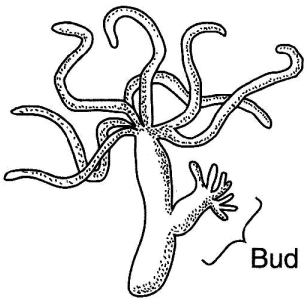
35. A student used a microscope to observe a single-celled organism. As he watched, it looked as if the organism split into two cells. He made drawings, shown below, of the organism over a short period of time.



Which process did the student record in his drawings?

1) genetic engineering
2) asexual reproduction
3) selective breeding
4) gamete formation

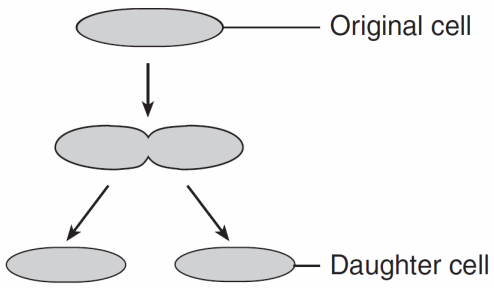
36. The bud shown in the diagram below was produced by asexual reproduction.



Which process is responsible for the formation of the bud?

1) fertilization
2) recombination
3) mitosis
4) meiosis

37. The diagram below represents division of a cell that produces two daughter cells.



Which statement most likely describes the daughter cells produced?

1) The daughter cells will pass on only half of the genetic information they received from the original cell.
2) The daughter cells will each produce offspring that will have the same genetic information as the original cell.
3) The daughter cells will each undergo the same mutations as the original cell after reproduction has occurred.
4) The daughter cells will not pass on any of the genes that they received from the original cell.

38. The chart below lists substances involved in the process of photosynthesis.

	Substance
A	glucose
B	oxygen
C	carbon dioxide
D	water

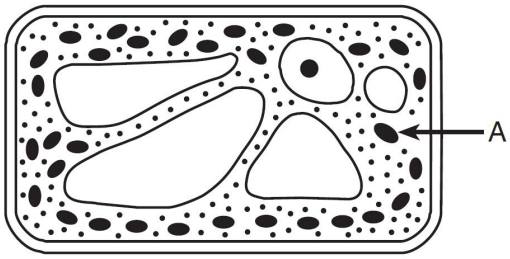
Which statement best describes how these substances interact in photosynthesis?

1) *A* and *B* combine to produce *C* and *D*.
2) *B* and *C* combine to produce *A* and *D*.
3) *C* and *D* combine to produce *A* and *B*.
4) *A* and *C* combine to produce *B* and *D*.

39. During the process of photosynthesis, energy from the Sun is converted into

1) chemical energy in the bonds of inorganic molecules
2) chemical energy in the bonds of organic molecules
3) enzymes used to produce inorganic molecules
4) enzymes used to produce organic molecules

40. The diagram below represents a plant cell.



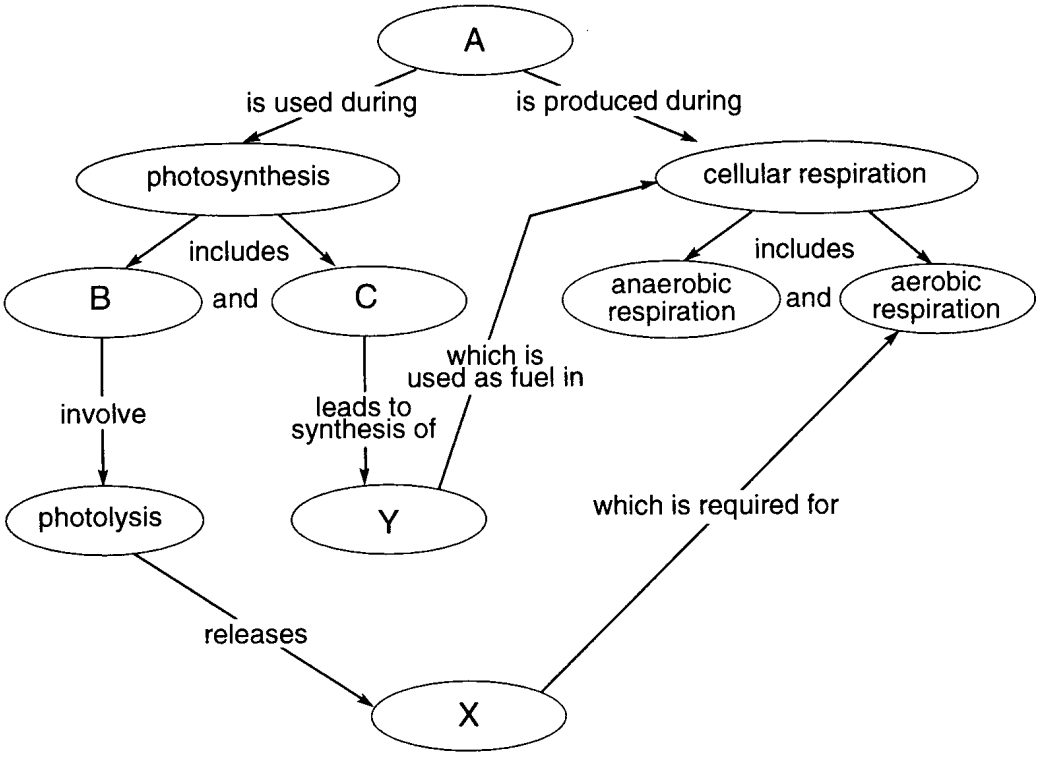
For the process of photosynthesis, the arrow labeled A would most likely represent the direction of movement of

1) carbon dioxide, water, and solar energy
2) oxygen, sugar, and solar energy
3) carbon dioxide, oxygen, and heat energy
4) sugar, water, and heat energy

41. By which process are CO_2 and H_2O converted to carbohydrates?

1) transpiration
2) respiration
3) fermentation
4) photosynthesis

Base your answers to questions **42** and **43** on the diagram below, which is a concept map that shows the relationship between photosynthesis and respiration, and on your knowledge of biology.



42. Which molecule belongs in area *Y*?

1) water 2) oxygen **3) glucose** 4) hydrogen

43. Which molecule belongs in area *X*?

1) lactic acid 2) carbon dioxide 3) water **4) oxygen**

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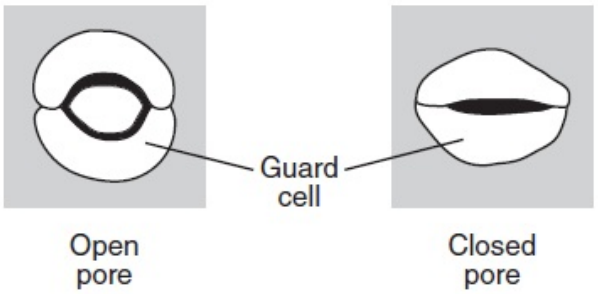
44. The diagram below represents a change in guard cells that open and close pores in a plant.



This change directly helps to

1) increase heterotrophic nutrition 2) absorb minerals
3) regulate water loss 4) reduce seed production

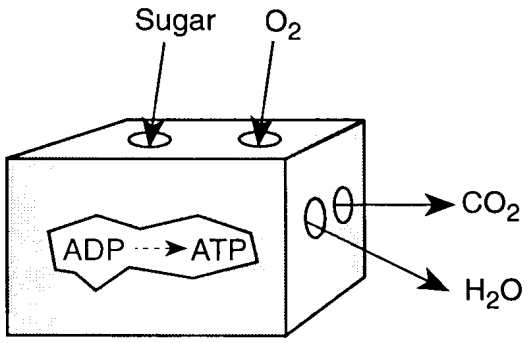
45. In the cells of the human body, oxygen molecules are used directly in a process that

1) releases energy
2) digests fats
3) synthesizes carbohydrate molecules
4) alters the genetic traits of the cell

46. The energy used to obtain, transfer, and transport materials within an organism comes directly from

1) ATP 2) DNA
3) sunlight 4) starch

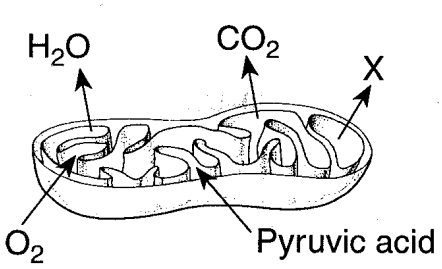
47. The diagram below represents some events that take place in a plant cell.



In which organelle would these events most likely occur?

1) mitochondrion 2) chloroplast
3) lysosome 4) centriole

Base your answers to questions **48** and **49** on the diagram below of a mitochondrion and on your knowledge of biology.



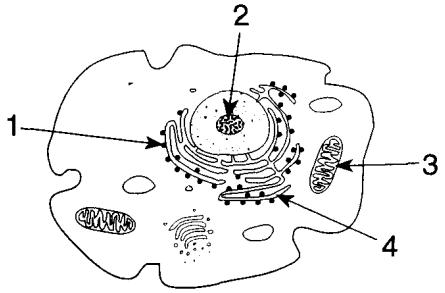
48. Letter *X* most likely represents

1) ATP 2) maltose
3) lactic acid 4) PGAL

49. All the arrows are associated with the process of

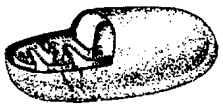
1) carbon fixation
2) photochemical reaction
3) anaerobic respiration
4) aerobic respiration

50. In the diagram of a cell shown below, which number indicates the structure in which most of the enzymes involved in aerobic cellular respiration function?



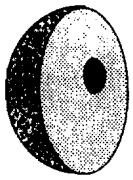
1) 1 2) 2 **3) 3** 4) 4

51. Which diagram represents an organelle that contains the enzymes needed to synthesize ATP in the presence of oxygen?

1)


2)

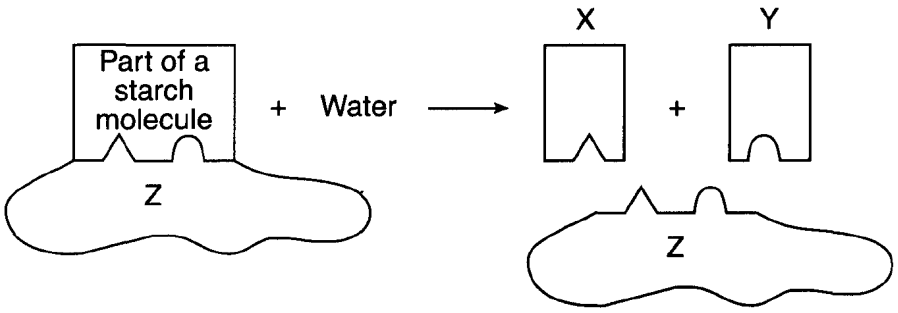

3)


4)


52. Which statement best describes enzymes?

1) Every enzyme controls many different reactions.
2) **The rate of activity of an enzyme might change as pH changes.**
3) Temperature changes do not affect enzymes.
4) Enzymes are produced from the building blocks of carbohydrates.

53. Base your answer to the following question on the diagram below, which represents a chemical reaction that occurs in the human body, and on your knowledge of biology.



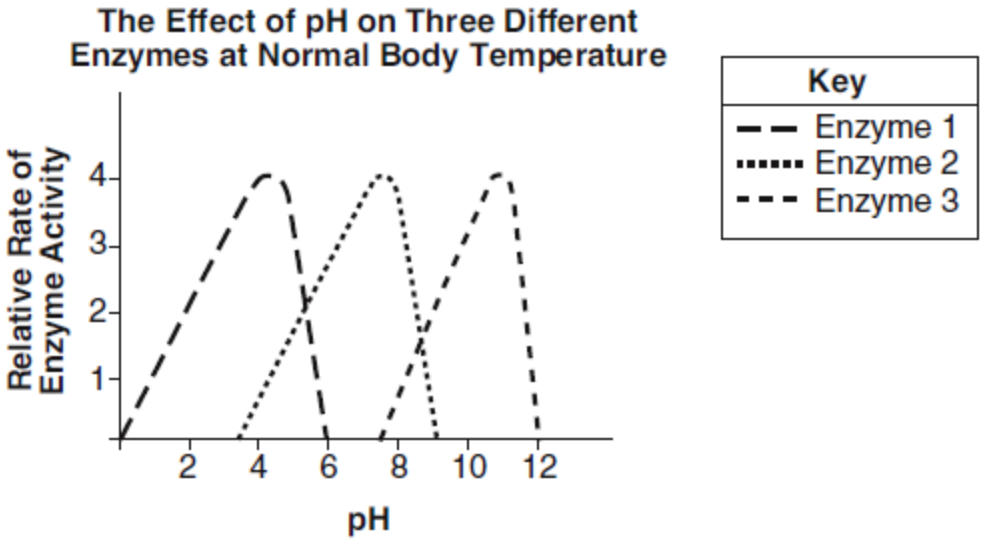
Which statement describes a characteristic of molecule Z?

1) Molecule Z will function at any temperature above 20°C.
2) Molecule Z is composed of a string of molecular bases represented by A, T, G, and
3) **Molecule Z will function best at a specific pH.**
4) Molecule Z is not specific, so this reaction can be controlled by any other chemical in the body.

54. Which statement about enzymes is *not* correct?

1) Enzymes are composed of polypeptide chains.
2) Enzymes form a temporary association with a reactant.
3) **Enzymes are destroyed when they are used and must be synthesized for each reaction.**
4) Enzymes are specific because of their shape and catalyze only certain reactions.

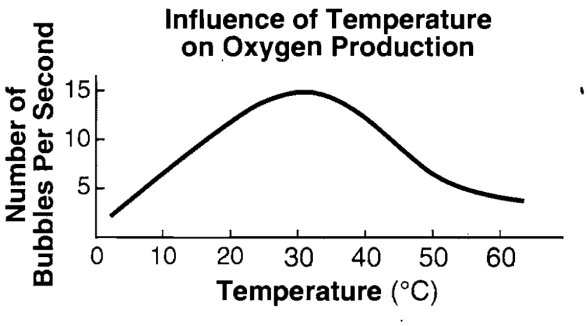
55. The graph below represents the effect of pH on three different enzymes at normal body temperature.



The graph illustrates that enzymes 1, 2, and 3

1) are not affected by pH
2) work best at different pH levels
3) work best in an acidic environment
4) work best in a basic environment

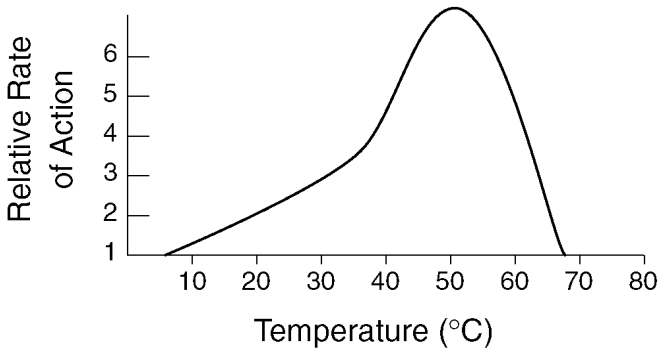
56. The graph below shows the results of an action of the enzyme catalase on a piece of meat. Evidence of enzyme activity is indicated by bubbles of oxygen.



Which statement best summarizes the activity of catalase shown in the graph?

1) The enzyme works better at 10°C than at 50°C.
2) The enzyme works better at 5°C than at 65°C.
3) The enzyme works better at 35°C than at either temperature extreme.
4) The enzyme works at the same level in all environments.

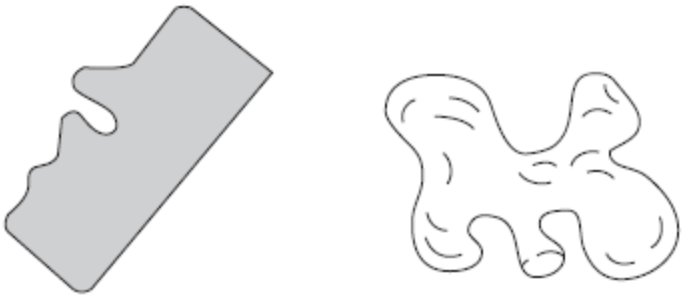
57. The graph below shows the effect of temperature on the relative rate of action of enzyme *X* on a protein.



Which change would *not* affect the relative rate of action of enzyme *X*?

1) the addition of cold water when the reaction is at 50°C
2) an increase in temperature from 70°C to 80°C
3) the removal of the protein when the reaction is at 30°C
4) a decrease in temperature from 40°C to 10°C

58. The diagrams below represent two molecules that are involved in metabolic activities in some living cells.



The shape of each of the molecules is important because

1) molecules having different shapes are always found in different organisms
2) the shape of a molecule determines how it functions in chemical reactions
3) the shape of a molecule determines the age of an organism
4) if the shape of any molecule in an organism changes, the DNA in that organism will also change

59. The function of a specific enzyme is most directly influenced by its

1) molecular size **2) physical shape**
3) carrying capacity 4) stored energy

60. The enzyme amylase will affect the breakdown of carbohydrates, but it will not affect the breakdown of proteins. The ability of an enzyme molecule to interact with specific molecules is most directly determined by the

1) shapes of the molecules involved
2) number of molecules involved
3) sequence of bases present in ATP
4) amount of glucose present in the cell

Base your answers to questions **61** through **64** on the reading passage below and on your knowledge of biology.

Take Two and Call Me in the Morning

Hippocrates observed that pain could be relieved by chewing the bark of a willow tree. We now know that this bark contains salicylic acid, which is similar to acetylsalicylic acid, the active ingredient in aspirin. Over 2,300 years after this observation by Hippocrates, scientists have learned how aspirin works.

When people get the flu or strain their backs, the body responds by making prostaglandins (PG), a group of hormone-like substances. The presence of certain prostaglandins may result in fever, headaches, and inflammation. Scientists have determined that aspirin interferes with prostaglandin H2 synthase (PGHS-2), an enzyme that the body uses to make pain-causing prostagiandins. In 1994, the structure of this enzyme was found to be a crystal with a tube running up the middle of it. Raw materials move through this tunnel to reach the core of the enzyme, where they are transformed into prostaglandin molecules. Research has shown that aspirin blocks this tunnel. Part of the aspirin molecule attaches to a particular place inside the tunnel, preventing the raw materials from passing through the tunnel. This blockage interferes with the production of prostaglandins, thus helping to prevent or reduce fever, headaches, and inflammation.

The body makes two forms of the enzyme. PGHS-1 is found throughout the body and has a variety of uses, including protecting the stomach. PGHS-2 usually comes into play when tissue is damaged or when infections occur. Its action results in pain and fever. Aspirin plugs up the tunnel of PGHS-1 completely and often causes stomach irritation in some people. Aspirin plugs up the tunnel partially in PGHS-2, thus helping to relieve pain and fever.

Perhaps further research could result in a drug targeting PGHS-2 but not PGHS-I, relieving the aches, pains, and fever, but not irritating the stomach as aspirin does now.

61. Using one or more complete sentences, explain why chewing the bark of a willow tree could help relieve the symptoms of headache and fever.

62. Using one or more complete sentences, describe the molecular structure of prostaglandin H2 synthase.

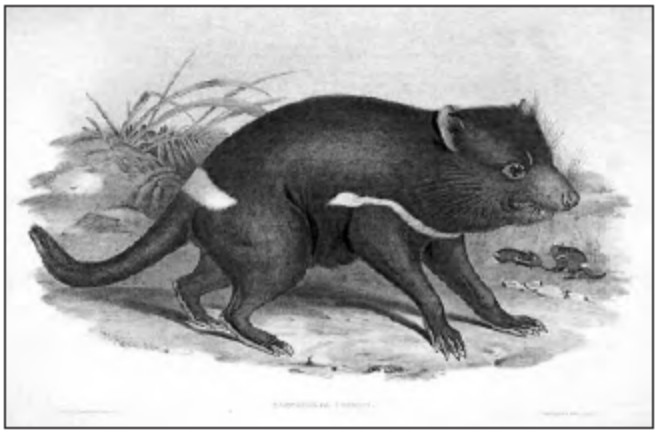
63. Why does aspirin irritate the stomach of some people who take it?

1) It interferes with the activity of an enzyme that helps to protect the stomach.
2) It is the only acid in the stomach and irritates the stomach lining.
3) It stimulates prostaglandin production in the stomach.
4) It is obtained from willow bark, which cannot be digested in the stomach.

64. How does aspirin relieve the symptoms of the flu?

1) It forms a barrier around the outer surface of PGHS-2 molecules, separating them from the prostaglandins.
2) It dissolves the crystal of the enzyme, preventing it from producing prostaglandins.
3) It is an acid that dissolves the prostaglandins that cause the symptoms.
4) It reduces the amount of raw material reaching the active site of the enzyme that produces prostaglandins.

Base your answers to questions **65** and **66** on the illustration and information below and on your knowledge of biology. The illustration is of a Tasmanian devil.



Source: http://www.statelibrary.tas.gov.au

The Tasmanian devil is the largest surviving carnivorous marsupial in Australia. It is in danger of extinction due to an unusual type of cancer called Devil Facial Tumor Disease (DFTD). It can be passed from one individual to another through wounds that occur when they fight over food. Tumor cells in the mouth of an infected animal break off and enter the wound on an uninfected animal. The tumor cells multiply in the body of the newly infected devil, forming new tumors that eventually kill the animal.

Recent research has shown that the immune system of a Tasmanian devil accepts tumor cells from another devil as if they were cells from its own body. The tumor cells are ignored by the immune system. No immune response develops against them, and the cancerous cells multiply. Scientists predict that DFTD could wipe out all the remaining Tasmanian devils in 25 years, unless a treatment is developed.

65. Describe *one* possible way to maintain a population of healthy, uninfected Tasmanian devils until a treatment or cure can be found.

66. Explain how cancer cells differ from normal cells.

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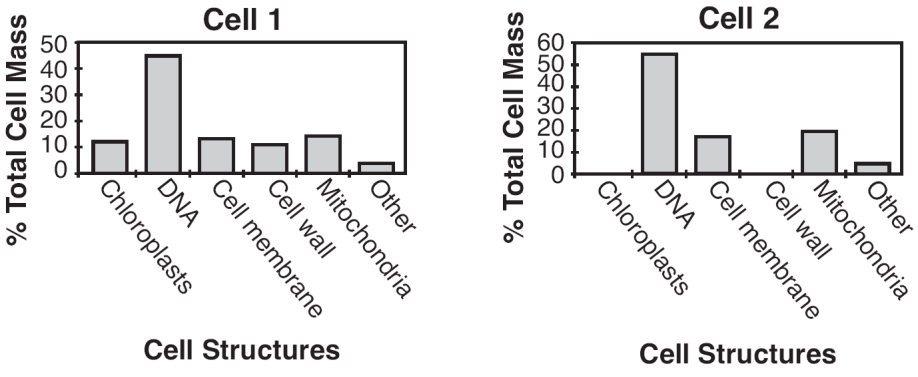
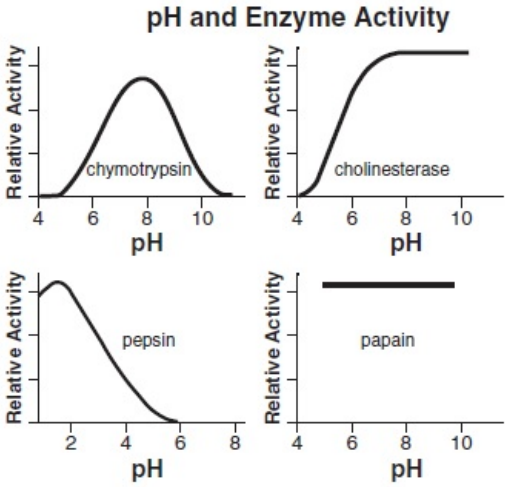
67. Data from two different cells are shown in the graphs below.



Which cell is most likely a plant cell? Support your answer. 2pts

Base your answers to questions **68** through **70** on the information and graphs below and on your knowledge of biology. The graphs show the relative enzymatic activity of four different enzymes in acidic (below pH 7) and basic (above pH 7) environments.



Part of Digestive System	pH Range
mouth	6.5 – 7.5
stomach	1.5 – 4.0
small intestine	4.0 – 7.0
large intestine	4.0 – 7.0

68. Which enzyme would most likely function in the stomach? Support your answer. 2pts

Enzyme: _____

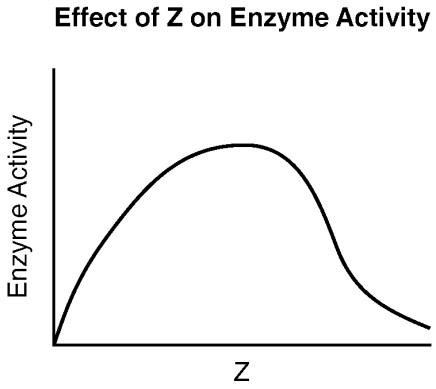
69. The activity of which enzyme decreases in both acidic and basic environments?

1) chymotrypsin 2) pepsin 3) cholinesterase 4) papain

70. Which enzyme would most likely function in the stomach? Support your answer.

Enzyme: _____

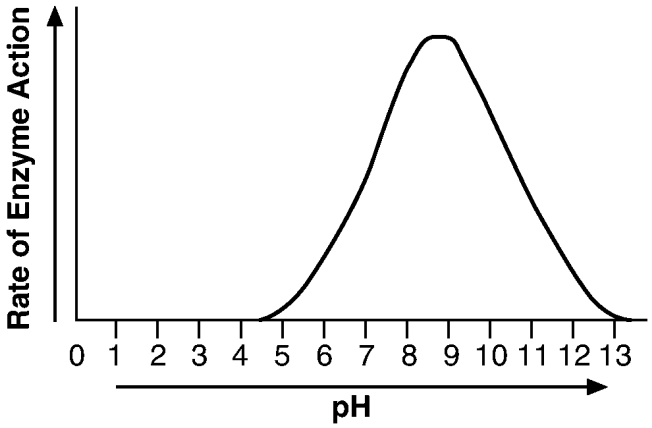
71. An incomplete graph is shown below.



What label could appropriately be used to replace letter *Z* on the axis?

72. Base your answer to the following question on the information below.

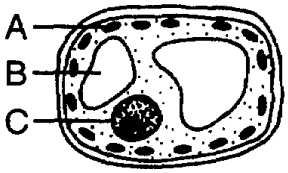
The effect of pH on a certain enzyme is shown in the graph below.



At what pH would the enzyme be most effective?

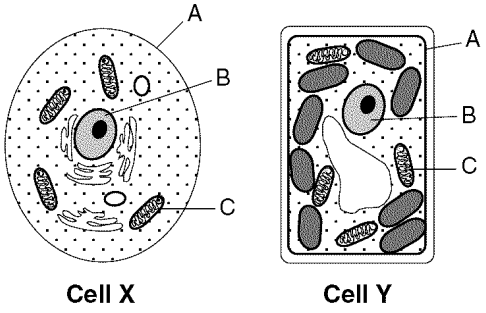
1) above 10
2) between 8 and 10
3) between 5 and 7
4) below 5

73. The diagram below represents a cell viewed using a compound light microscope.



Select *one* of the lettered parts from the diagram. Record the letter of the part chosen in the space *provided on your answer paper* and, using one or more complete sentences, state the function of the part. 2pts

Base your answers to questions **74** through **76** on the diagrams below of two cells, *X* and *Y,* and on your knowledge of biology.



74. Select one lettered organelle and write the letter of that organelle in the space below. Identify the organelle you selected.

75. State one function of the organelle that you identified in the previous question.

76. Identify one process that is carried out in cell Y that is not carried out in Cell X

Base your answers to questions **77** and **78** on the information below and your knowledge of Biology.

Nutrients in a diet, such as proteins, carbohydrates, and minerals, play an important role in homeostasis within the human body. Lack of these nutrients can lead to malfunctions that disrupt this internal balance. Explain how diet can influence homeostasis. In your answer, be sure to:

77. Describe, using *one* specific example, how a *decrease* in this nutrient can alter homeostasis

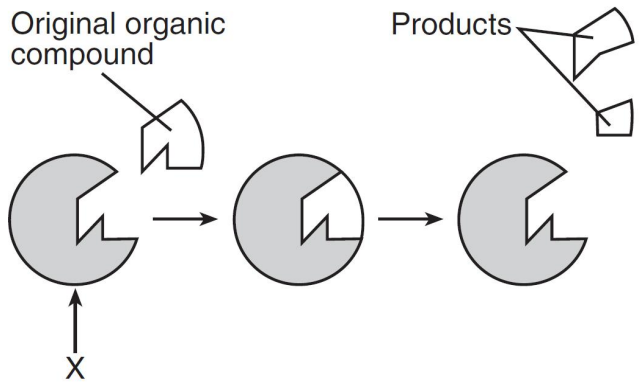
Nutrient: _____

78. Select a nutrient from the passage and write it on the line below and state *one* role this nutrient plays in the body.

---

79. Cardinals are birds that do not migrate but spend the winter in New York State. Many people feed these birds sunflower seeds during the winter months. Explain how the starches present in the sunflower seeds help the cardinals to survive. In your answer, be sure to:
    - identify the building blocks of starches
    - identify the process used to produce these building blocks
    - state *one* way cardinals use these building blocks to survive

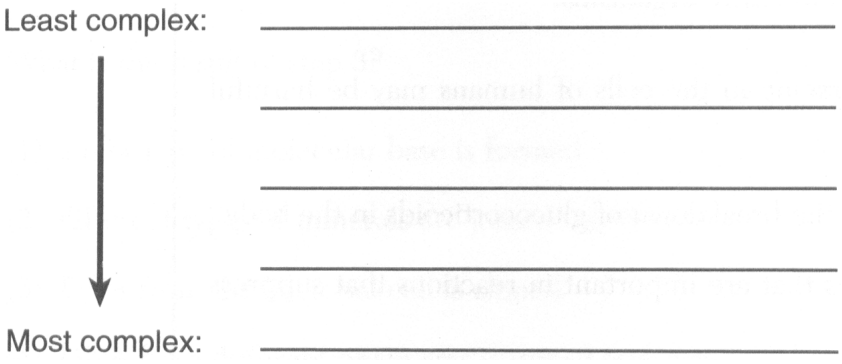
80. The diagram below represents stages in the digestion of an organic compound.



Explain why substance *X* would *not* be likely to digest a different organic compound.

81. Write the structures listed below in order from least complex to most complex.

organ
cell
organism
organelle
tissue



Base your answers to questions **82** through **85** on the spaces provided.

Daphnia are freshwater organisms sometimes referred to as "water fleas." Design an experiment that could be used to test the effects of temperature on the size of a daphnia population. In your experimental design, be sure to:

82. Identify the type of data that will be collected.

83. Identify the independent variable in the experiment.

84. Describe how the control group will be treated differently from the experimental group.

85. State a hypothesis to be tested.

Answer Key
LE Practice midterm

1. **2**
2. **3**
3. **2**
4. **3**
5. **1**
6. **2**
7. **3**
8. **2**
9. **3**
10. **3**
11. **2**
12. **2**
13. **4**
14. **3**
15. **2**
16. **3**
17. **1**
18. **4**
19. **1**
20. **1**
21. **2**
22. **4**
23. **3**
24. **2**
25. **3**
26. **1**
27. **3**
28. **1**
29. **2**
30. **2**
31. **2**
32. **3**
33. **2**
34. **2**
35. **2**
36. **3**
37. **2**
38. **3**
39. **2**
40. **1**
41. **4**
42. **3**
43. **4**
44. **3**
45. **1**
46. **1**
47. **1**
48. **1**
49. **4**
50. **3**
51. **1**
52. **2**
53. **3**
54. **3**
55. **2**
56. **3**
57. **2**
58. **2**
59. **2**
60. **1**
61. The willow tree bark contains salicylic acid, which is similar to acetylsalicylic acid, the active ingredient in aspirin.
62. The molecule is a crystal with a tube running up the middle of it.
63. **1**
64. **4**
65. — Move some uninfected animals to an area where they will not come into contact with infected animals. — Remove baby devils from the population and place them in a zoo or wildlife refuge. — Separate the animals while they are feeding. — Provide more food to decrease competition/fighting.
66. — Cancer cells undergo uncontrolled cell division. — Cancer cells have more mutations. — Cancer cells are more harmful and disrupt homeostatis.
67. *Example:* - Cell 1, because it contains chloroplasts. - Cell 1, because it has a cell wall.
68. – The pH of the stomach is acidic (1.5–4.0). and pepsin works best at very low pH values.
69. **1**
70. – The pH of the stomach is acidic (1.5–4.0). and pepsin works best at very low pH values.
71. *Examples:* temperature pH time
72. **2**
73. *Examples:* A - It is the organelle in which photosynthesis takes place. *or* B - It is the organelle which stores materials. *or* C - It directs the activities of the cell.
74. *Examples*: — *A* (cell membrane) regulates what enters and leaves the cell. — *B* (nucleus) controls cell activities or contains the genetic codes. (Do *not* accept "bra- in" or "control center" without further explanation.) — *C* (mitochondrion) respiration or energy release or production of ATP (Do *not* accept "power house" without further explanation.)
75. *Examples:* — photosynthesis — production of cellulose — produces chlorophyll — producing its own food
76. *Examples: A* — cell/plasma membrane *or B* — nucleus *or C* — mitochondrion.

Answer Key
LE Practice midterm

77. — Decreased levels of carbohydrates might result in fatigue/less energy. — Lack of protein in the diet might lead to muscle loss/enzyme deficiency. — Lack of minerals might cause loss of bone density.

78. — Carbohydrates are a source of energy. They can be used to produce the ATP needed for carrying out body activities. — Proteins are necessary for growth and repair. — Minerals are needed for strong bones and teeth.

79. • identifying the building blocks of starches (simple sugars; glucose)
• identifying the process used to produce these building blocks (photosynthesis; digestion; synthesis)
• stating one way cardinals use these building blocks to survive: (as an energy source; as a building unit for some cell parts)

80. *Examples*: — A different organic compound would have a different shape. — A different organic compound would not fit with substance X. — The active site of X does not fit a different substrate. — Substance X is specific to only certain materials.

81. organelle
cell
tissue
organ
organism

82. –change in the number of daphnia in the population
–number of daphnia at each temperature

83. Identifying the independent variable in the experiment as temperature.

84. –The control group will be at normal temperature for the species. –The control group will be at normal freshwater pond temeperature, while the experimental groups will be at other temperatures.

85. –As temperature increases, the daphnia population decreases.
–Temperature has an effect on the size of a daphnia population. –If the temperature decreases, then the size of the daphnia population decreases.