Name:_____ Due Date:_____

Regents Review # 3: Levels of Organization & Cell Structures and Functions

The Big Ideas:

Important levels of organization for structure and function include organelles, cells, tissues, organs, organ systems, and whole organisms.

Humans are complex organisms. They require multiple systems for digestion, respiration, reproduction, circulation, excretion, movement, coordination, and immunity. The systems interact to perform the life functions.

The components of the human body, from organ systems to cell organelles, interact to maintain a balanced internal environment.

The organs and systems of the body help to provide all the cells with their basic needs. The cells of the body are of different kinds and are grouped in ways that enhance how they function together.

Cells have particular structures that perform specific jobs. These structures perform the actual work of the cell. Just as systems are coordinated and work together, cell parts must also be coordinated and work together.

Each cell is covered by a membrane that performs a number of important functions for the cell. These include: separation from its outside environment, controlling which molecules enter and leave the cell, and recognition of chemical signals. The processes of diffusion and active transport are important in the movement of materials in and out of cells.

Inside the cell a variety of specialized structures, formed from many different molecules, carry out the transport of materials (cytoplasm), extraction of energy from nutrients (mitochondria), protein building (ribosomes), waste disposal (cell membrane), storage (vacuole), and information storage (nucleus).

The structures present in some single-celled organisms act in a manner similar to the tissues and systems found in multicellular organisms, thus enabling them to perform all of the life processes needed to maintain homeostasis.

Plant cells and some one-celled organisms contain chloroplasts, the site of photosynthesis. The process of photosynthesis uses solar energy to combine the inorganic molecules carbon dioxide and water into energy-rich organic compounds (e.g., glucose) and release oxygen to the environment.

In all organisms, the energy stored in organic molecules may be released during cellular respiration. This energy is temporarily stored in ATP molecules. In many organ- isms, the process of cellular respiration is concluded in mitochondria, in which ATP is produced more efficiently, oxygen is used, and carbon dioxide and water are released as wastes.

Important Facts:

- Cells are the basic unit of life. All living things (except viruses) are made of cells.

- Organelles are cell parts with specific functions.
  • Vacuoles - store waste and water (large in plant cells, small in animal cells)
  • Ribosome - (very small and is often represented by a dot) located on the ER or in cytoplasm. Ribosomes are where proteins are made (protein synthesis).
  • Mitochondria - Site of cellular respiration in both plant and animal cells where ATP (energy usable by the cell) is made. The formula for cellular respiration:
  glucose + oxygen → carbon dioxide + water + ENERGY (ATP)
  • Chloroplasts - only in plant cells; where the process of photosynthesis occurs.
  The formula for photosynthesis:
  Sun's ENERGY + carbon dioxide + water → glucose + oxygen
  • Nucleus - is the control center of the cell and contains DNA.
  • Cytoplasm - is the gel-like fluid that fills the inside of the cell.
  • Cell Membrane - separates the contents of the cell from the outside environment, controls the transport of materials into and out of the cell (selectively permeable) and does cellular communication (recognizes and responds to chemical signals by using receptor molecules).

- ALL cells have a cell membrane, including those with cell walls (plants, fungi, some bacteria and protists). The cell wall is mostly for protection; the cell membrane is needed to control movement into and out of the cell.

- Organization:
  Cells are specialized into tissues.
  Tissues are groups of cells specialized to do certain jobs. Examples of tissues include muscle tissue and nerve tissue.
  Tissues work together to form organs (heart, lungs, kidney).
  Organs work together in organ systems (digestive system, nervous system, etc).

- Organization of living things -
  (smallest) Cells → Tissues → Organs → Systems → Organism [biggest]

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RLE Regents review #3 Levels of Organization & Cell Structure & Function

1. The cytoplasm in a single-celled organism and the circulatory system in a human both

   A) break down molecules into smaller components
   B) release energy to be used by the organism
   C) transport substances throughout the organism
   D) distribute blood to all of the parts of the organism

2. During gas exchange, the cell membrane of a single-celled organism has the same function as which organ system in humans?

   A) nervous B) reproductive
   C) digestive D) respiratory

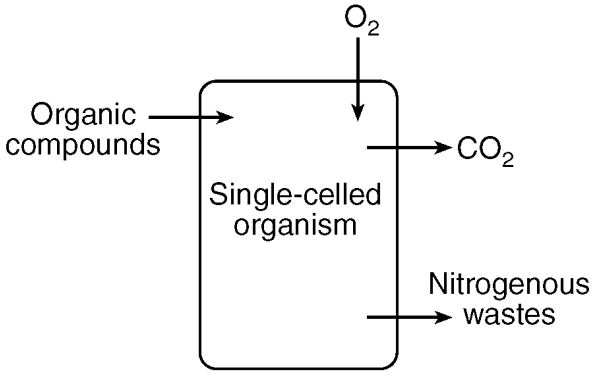
3. Single-celled organisms are able to maintain internal stability because they

   A) have multiple organ systems
   B) work with other cells
   C) contain structures that perform life functions
   D) carry out photosynthesis to produce food

4. Homeostasis is maintained in a single-celled organism by the interaction of

   A) organs B) systems
   C) tissues D) organelles

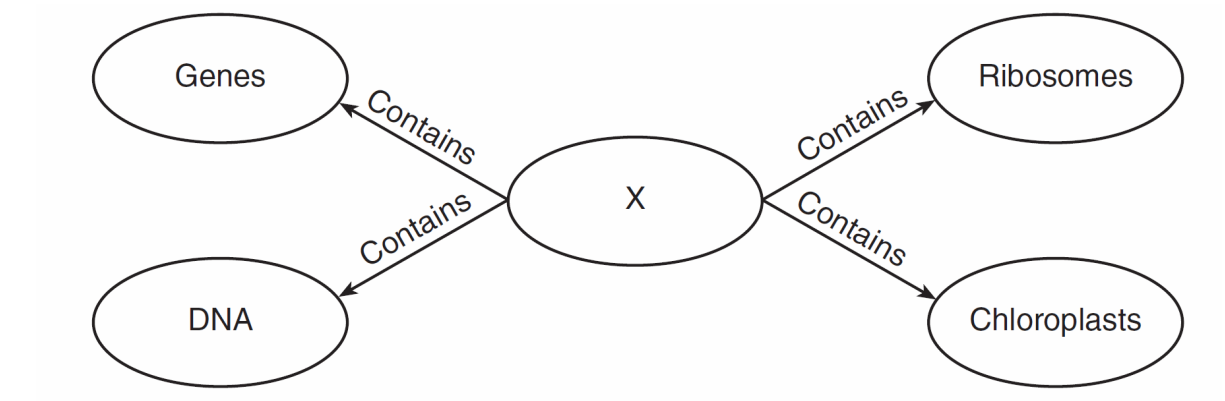
5. The arrows in the diagram below indicate the movement of materials into and out of a single-celled organism.



   The movements indicated by all the arrows are directly involved in

   A) the maintenance of homeostasis
   B) photosynthesis, only
   C) excretion, only
   D) the digestion of minerals

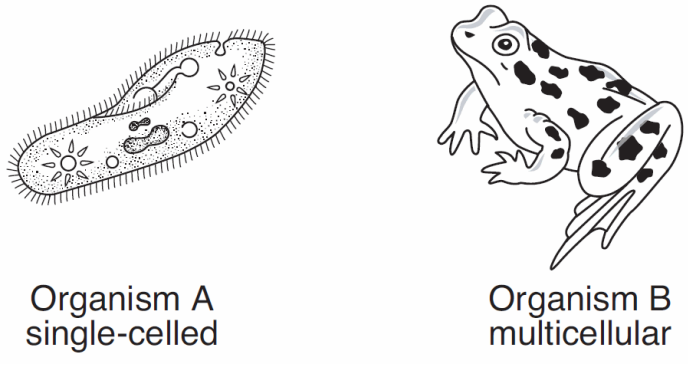
6. The diagram below shows a concept map.



Which label correctly identifies what *X represents in the concept map?*

A) nucleus
B) chromosome
C) autotrophic cell
D) heterotrophic cell

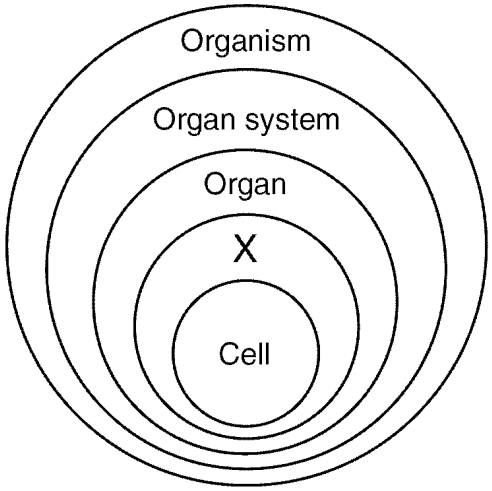
7. The diagram below represents two organisms.



Which statement concerning organism *A* and organism *B* is correct?

A) Organism *A* contains organs, where as organism *B* lacks organs.
B) Organism *A* and organism *B* have the same organ systems.
C) Organism *A* and organism *B* both have structures that perform life processes.
D) Organism *A* lacks structures that help maintain dynamic equilibrium.

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



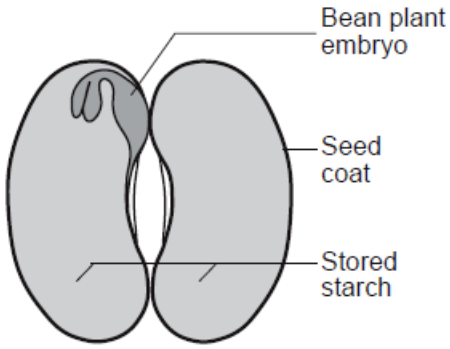
Which term would best represent *X*?

A) human
B) tissue
C) stomach
D) chloroplast

9. Which sequence of terms is in the correct order from simplest to most complex?

A) cells → tissues → organs → organ systems
B) tissues → organisms → cells → organ systems
C) cells → tissues → organ systems → organs
D) organs → organisms → organ systems → cells

Base your answers to questions **10** and **11** on the diagram and information below and on your knowledge of biology. The diagram represents a germinating bean seed that has been split open.



Germinating bean seed (split open)

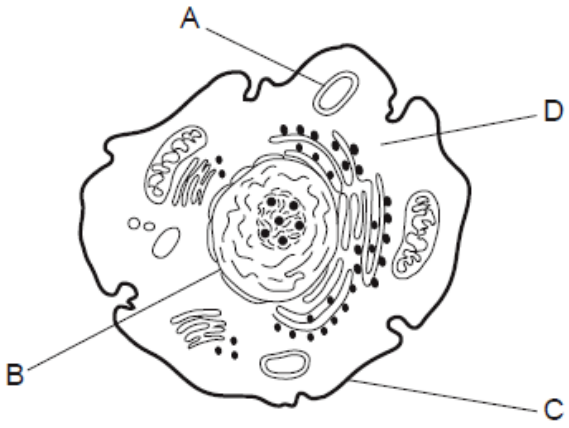
10. Plants are able to continue to grow and develop once the starch supply in the seed is gone, because they

A) develop roots to absorb starch from the environment
B) grow leaves, which use light energy for cell respiration
C) have chloroplasts and use light energy to make more food
D) produce more seeds, which contain additional food reserves

11. When water is available and growth begins, the plant embryo inside the seed secretes enzymes to digest the starch stored in the seed. The enzymes in cells of the plant embryo are produced directly by the

A) ribosomes B) nuclei
C) mitochondria D) vacuoles

12. A cell is represented in the diagram below.



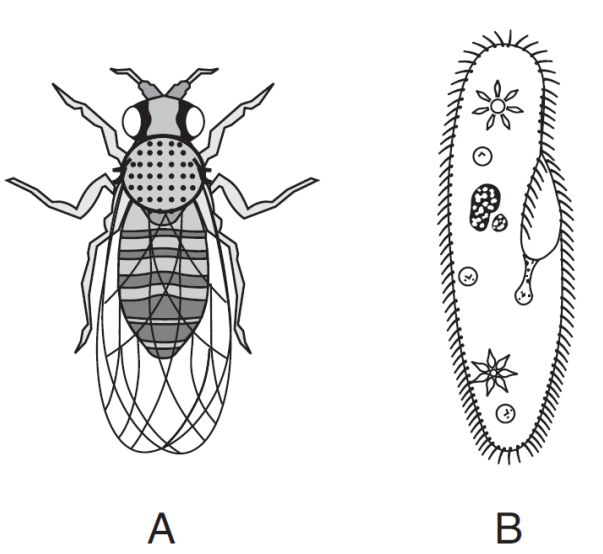
The coded information that the cell uses to synthesize many different proteins is stored in structure

A) *A* B) *B* C) *C* D) *D*

13. Which cell structure is mainly responsible for releasing energy from food molecules in some single-celled organisms?

A) ribosome B) chloroplast
C) cell membrane D) mitochondrion

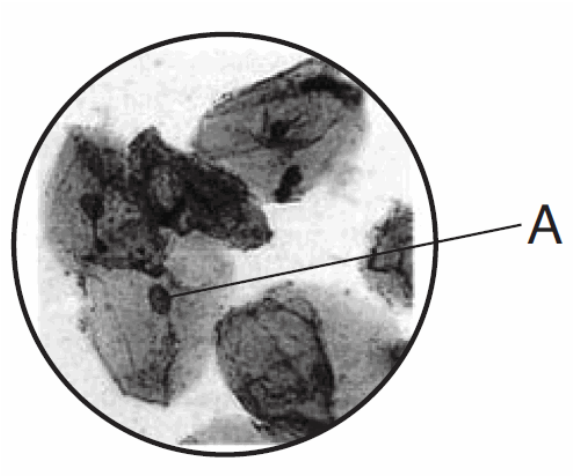
14. A land-dwelling organism, *A*, and an aquatic single-celled organism, *B*, are represented below.



Which statement best explains how *A* and *B* are able to survive in their environments?

A) The organelles in *B* perform similar functions to the organ systems in *A*.
B) The transport system in *B* is more complex than the transport system in *A*.
C) Both *A* and *B* take in oxygen from the water.
D) Only *A* can pass on traits to offspring.

15. A photograph of human cells as seen with a compound light microscope is shown below. A cell structure is labeled *A*.



Structure *A* is most likely a

A) mitochondrion that synthesizes food for the cell
B) nucleus that is the site of food storage
C) mitochondrion that absorbs energy from the Sun
D) nucleus that is responsible for the storage of information

16. Which statement best describes the organelles in a cell?

A) All organelles are involved directly with communication between cells.
B) Organelles must work together and their activities must be coordinated.
C) Organelles function only when there is a disruption in homeostasis.
D) Each organelle must function independently of the others in order to maintain homeostasis.

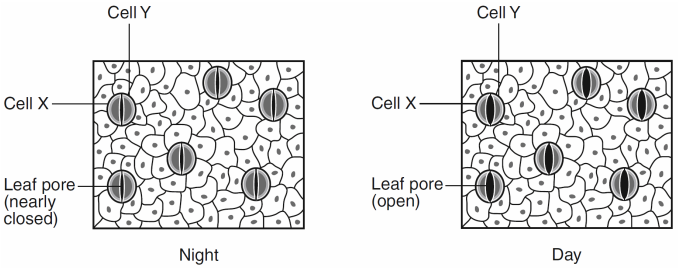
17. Which cell structures are correctly paired with their functions?

A) The mitochondria produce enzymes, and ribosomes transport them.
B) The ribosomes make proteins, and the nucleus stores genetic information.
C) The cell membrane make enzymes, and cytoplasm transports them.
D) The vacuole stores genetic information, and chloroplasts make proteins.

18. In a multicellular organism, organs carry out a variety of life functions. In a single-celled organism, these functions are performed by

A) tissues B) organelles
C) organ systems D) organs

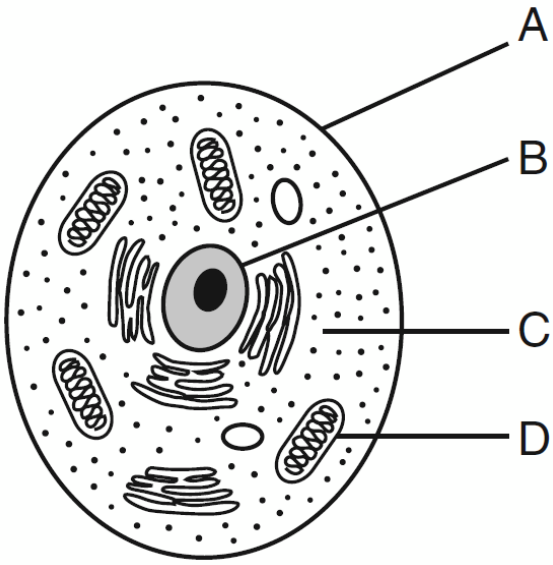
19. The diagram below represents changes in the sizes of openings present in leaves as a result of the actions of cells *X* and *Y*.



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

A) maintain homeostasis by controlling water loss
B) store excess heat during the day and remove the heat at night
C) absorb light energy necessary for cellular respiration
D) detect changes in the biotic factors present in the environmen

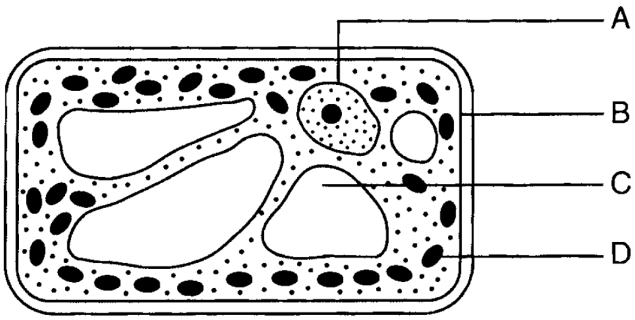
20. The letters in the diagram below indicate some parts of a cell.



The function of which cell part is most similar to that of the human excretory system?

A) *A* B) *B* C) *C* D) *D*

21. The cell represented below produces oxygen.



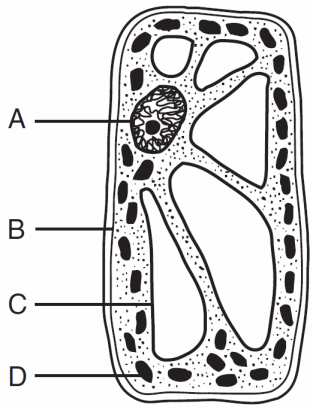
Which structure allows the passage of this oxygen to the environment?

A) *A* B) *B* C) *C* D) *D*

22. Which two cell structures work together in the process of protein synthesis?

A) nucleus and chloroplast
B) ribosome and vacuole
C) nucleus and ribosome
D) mitochondrion and cell membrane

23. The diagram below represents a cell of a green plant.



Solar energy is used to produce energy-rich compounds in structure

A) A B) B C) C D) D

24. Within which structure of an animal cell does DNA replication take place?

A) vacuole B) cell membrane
C) nucleus D) ribosome

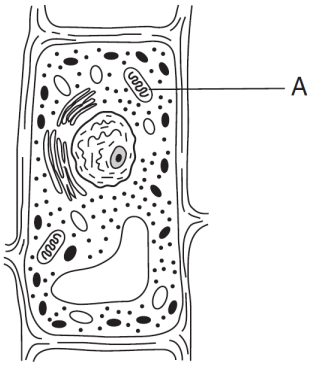
25. The swordfish contains a heat generating organ that warms its brain and eyes up to 14°C above the surrounding ocean water temperature. Which structures are most likely to be found at relatively high concentrations within the cells of this heat generating organ?

A) nuclei B) chloroplasts
C) chromosomes D) mitochondria

26. What is the main function of a vacuole in a cell?

A) storage
B) coordination
C) synthesis of molecules
D) release of energy

27. The diagram below represents a plant cell.



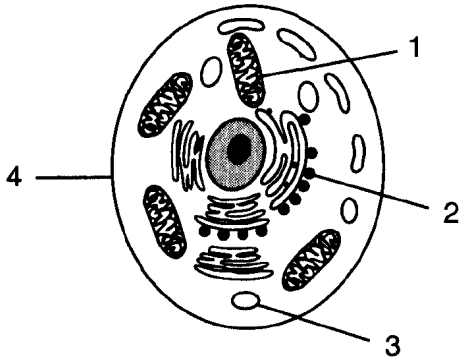
Which process takes place in structure *A*?

A) cellular respiration B) photosynthesis
C) digestion of fats D) protein synthesis

28. If the ribosomes of a cell were destroyed, what effect would this most likely have on the cell?

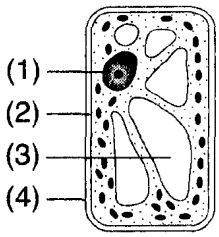
A) It would stimulate mitotic cell division.
B) The cell would be unable to synthesize proteins.
C) Development of abnormal hereditary features would occur in the cell.
D) Increased protein absorption would occur through the cell membrane.

29. Within which structure shown in the diagram below are energy-rich organic compounds used to produce ATP?



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

30. Which cell structure contains information needed for protein synthesis?



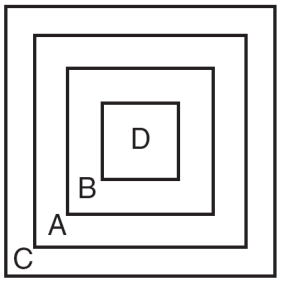
A) 1 B) 2 C) 3 D) 4

31. Which diagram represents the relative sizes of the structures listed below?

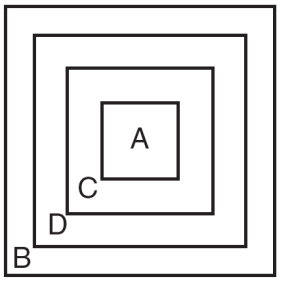
Structures

A	gene
B	cell
C	chromosome
D	nucleus

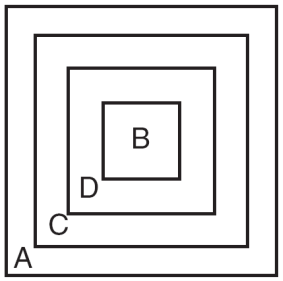
A)



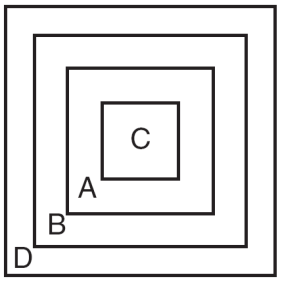
B)



C)



D)



32. The data table below shows the presence or absence of DNA in four different cell organelles.

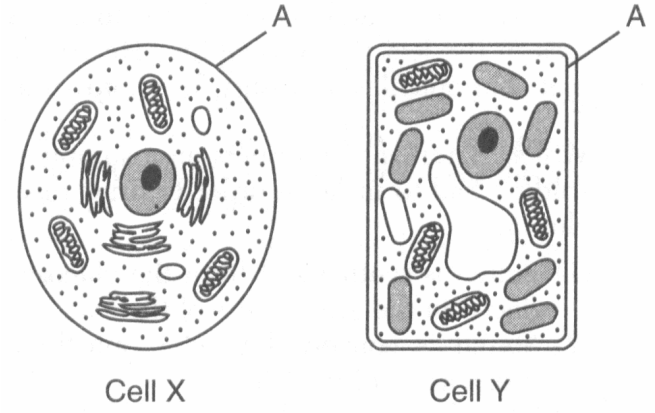
Data Table

Organelle	DNA
cell membrane	absent
cell wall	absent
mitochondrion	present
nucleus	present

Information in the table suggests that DNA functions

A) within cytoplasm and outside of the cell membrane
B) both inside and outside of the nucleus
C) only within energy-releasing structures
D) within cell vacuoles

33. The diagram below represents two cells, *X* and *Y*.



Which statement is correct concerning the structure labeled A?

A) It aids in the removal of metabolic wastes in both cell *X* and cell *Y*.
B) It is involved in cell communication in cell *X*, but not in cell *Y*.
C) It prevents the absorption of CO_2 in cell *X* and 0_2 in cell *Y*.
D) It represents the cell wall in cell *X* and the cell membrane in cell *Y*.

34. Certain poisons are toxic to organisms because they interfere with the function of enzymes in mitochondria. This results directly in the inability of the cell to

A) store information
B) build proteins
C) release energy from nutrients
D) dispose of metabolic wastes

35. As a human red blood cell matures, it loses its nucleus. As a result of this loss, a mature red blood cell lacks the ability to

A) take in material from the blood
B) release hormones to the blood
C) pass through artery walls
D) carry out cell division

36. Hereditary information is stored inside the

A) ribosomes, which have chromosomes that contain many genes
B) ribosomes, which have genes that contain many chromosomes
C) nucleus, which has chromosomes that contain many genes
D) nucleus, which has genes that contain many chromosomes

37. Which sequence of terms represents a decrease from the greatest number to the least number of structures present in a cell?

A) nucleus → gene → chromosome
B) gene → nucleus → chromosome
C) gene → chromosome → nucleus
D) chromosome → gene → nucleus

38. In a cell, information that controls the production of proteins must pass from the nucleus to which organelle?

A) cell membrane B) chloroplasts
C) mitochondria D) ribosomes

39. In a cell, all organelles work together to carry out

A) diffusion
B) active transport
C) information storage
D) metabolic processes

40. Which sequence represents structures organized from least complex to most complex?

A) nerve cell → nucleus → nervous system → brain
B) nucleus → nerve cell → brain → nervous system
C) brain → nervous system → nucleus → nerve cell
D) nervous system → brain → nerve cell → nucleus

41. A similarity between humans and many other multicellular animals is that they

A) occupy the same niche in most food webs
B) are composed of organ systems
C) have the same DNA sequences
D) carry out autotrophic nutrition

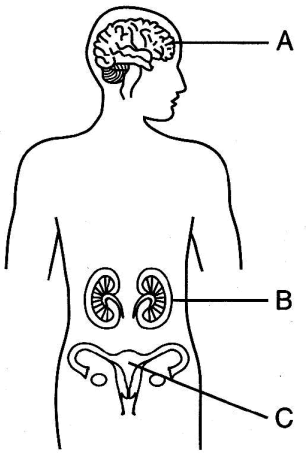
42. The diagram below represents an incomplete sequence of levels of organization.

organelles → tissues → organs → organ systems → organism

This sequence can be completed correctly by inserting

A) "cells" → between organelles and tissues
B) "proteins" → between tissues and organs
C) "populations" → between organs and organ systems
D) "molecules" → between organ systems and organisms

43. Base your answer to the following question on the diagram below and on your knowledge of biology.



Structure *B* represents

A) cells, only
B) cells and tissues, only
C) an organ with cells and tissues
D) a complete system with organs, tissues, and cells

44. Specialized cells and organs are necessary in multicellular organisms because in these organisms

A) fewer cells are in direct contact with the external environment
B) all cells are in direct contact with the external environment
C) a body type evolved that relied on fewer body cells
D) a body type evolved that required larger sized cells

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

A) plant cell, leaf, chloroplast, rose bush
B) chloroplast, plant cell, leaf, rose bush
C) chloroplast, leaf, plant cell, rose bush
D) rose bush, leaf, plant cell, chloroplast

46. The function of a cell depends primarily on its

A) life span
B) color
C) structure
D) movement

47. The respiratory system includes a layer of cells in the air passages that clean the air before it gets to the lungs. This layer of cells is best classified as

A) a tissue
B) an organ
C) an cell membrane
D) an organ system

48. Which sequence shows a *decreasing* level of complexity?

A) organs $\rightarrow$organism $\rightarrow$cells $\rightarrow$ tissues
B) organism $\rightarrow$ cells $\rightarrow$organs $\rightarrow$ tissues
C) cells $\rightarrow$ tissues $\rightarrow$ organs $\rightarrow$ organism
D) organism $\rightarrow$organs $\rightarrow$ tissues $\rightarrow$cells

49. Humans require organ systems to carry out life processes. Single-celled organisms do not have organ systems and yet they are able to carry out life processes. This is because

A) human organ systems lack the organelles found in single-celled organisms
B) a human cell is more efficient than the cell of a single-celled organism
C) it is not necessary for single-celled organisms to maintain homeostasis
D) organelles present in single-celled organisms act in a manner similar to organ systems

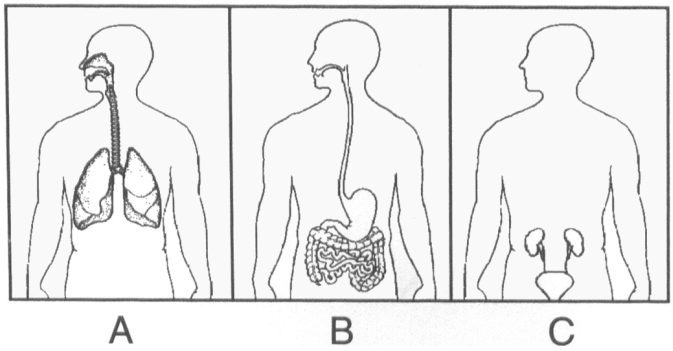
50. The table below provides some information concerning organelles and organs.

Function	Organelle	Organ
gas exchange	cell membrane	lung
nutrition	food vacuole	stomach

Based on this information, which statement accurately compares organelles to organs?

A) Functions are carried out more efficiently by organs than by organelles.
B) Organs maintain homeostasis while organelles do not.
C) Organelles carry out functions similar to those of organs.
D) Organelles function in multicellular organisms while organs function in single-celled organisms

51. The diagram below represents three human body systems.



Which row in the chart below correctly shows what systems A, B, and C provide for the human body?

Row	System A	System B	System C
(1)	blood cells	glucose	hormones
(2)	oxygen	absorption	gametes
(3)	gas exchange	nutrients	waste removal
(4)	immunity	coordination	carbon dioxide

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

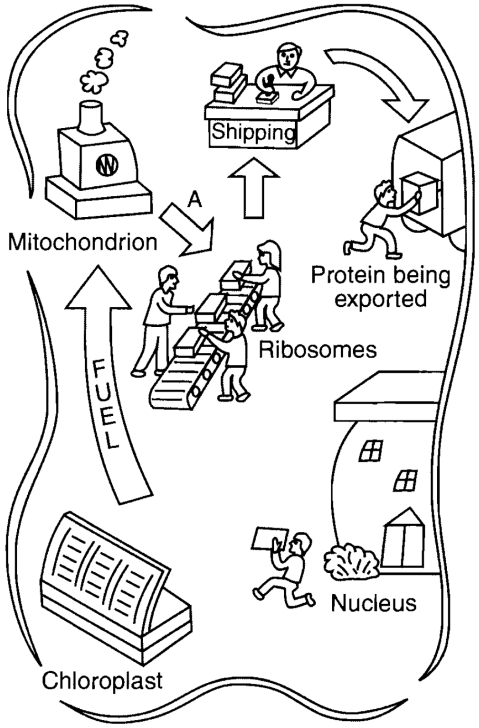
52. Some levels of organization in a multicellular organism are shown in the sequence below.

A → *cells* → *tissues* → *B* → *organ systems* → *organism*

Which terms represented by letters A and B would complete the sequence?

A) *A*–gametes; *B*–zygote
B) *A*–zygote; *B*–gametes
C) *A*–organs; *B*–organelles
D) *A*–organelles; *B*–organs

Base your answers to questions **53** through **55** on the diagram below and on your knowledge of biology. The diagram compares cell functions with jobs in a factory.



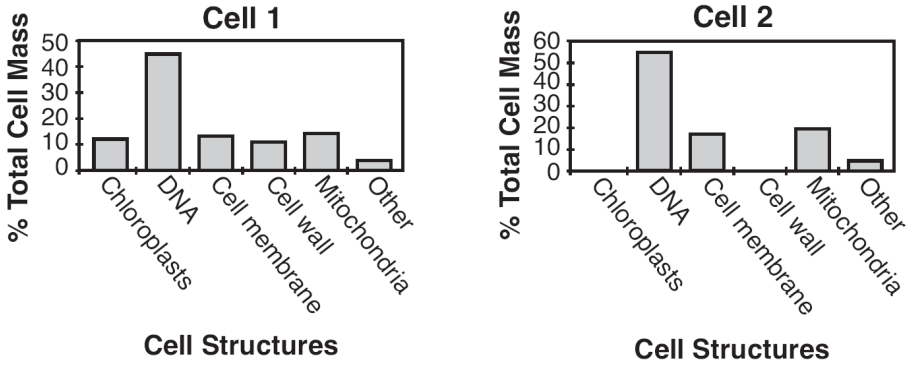
53. Which cell structure synthesized the "Protein being exported"?

54. What chemical substance produced by the mitochondrion is represented by arrow *A*?

55. Which *two* chemical waste products are most likely represented by the smoke above the mitochondrion?

_____ and _____

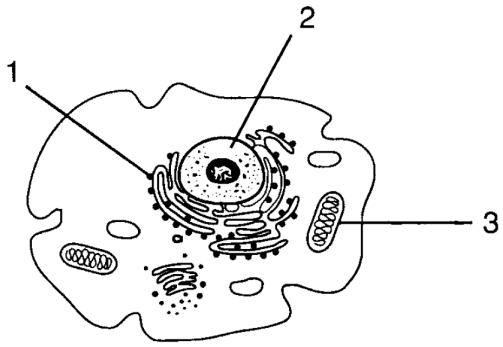
56. Base your answer to the following question on Data from two different cells are shown in the graphs below.



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

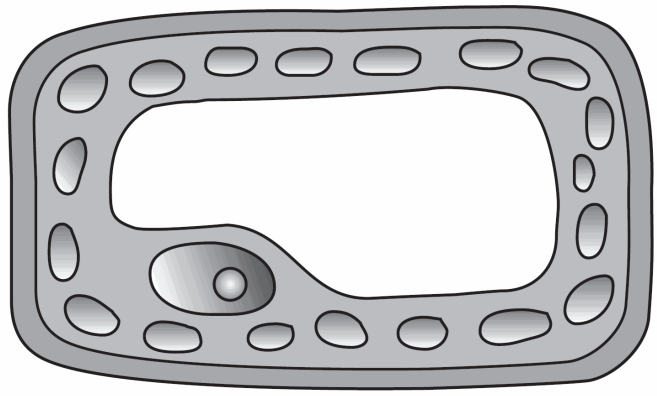
57. Base your answer to question on the diagram below and on your knowledge of biology.

In a cell, a variety of structures perform specific functions and interact to maintain homeostasis. The diagram below represents a typical cell with three cell structures labeled 1, 2, and 3.

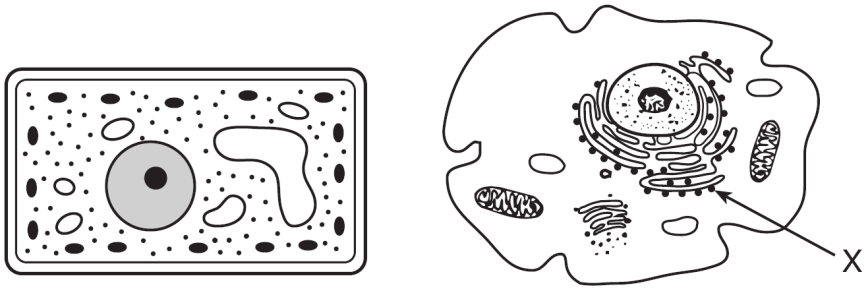


Select *one* cell structure labeled in the diagram and write its number in the space below. Explain how the cell structure you selected helps maintain homeostasis in a cell.
In your answer, be sure to:• identify the cell structure you selected
- state *one* function of this cell structure
- identify *one* substance that is often associated with the cell structure you selected and state how that substance is associated with the cell structure
- identify *one* other cell structure and explain how it interacts with the cell structure you selected to maintain homeostasis in the cell

58. Draw an arrow to indicate, *one* part of the plant cell below that would *not* be found in an animal cell. The tip of the arrow must touch the part being identified.



Base your answers to questions **59** through **61** on on the information below and on your knowledge of biology. The diagrams represent two different cells and some of their parts. The diagrams are not drawn to scale.



Cell A Cell B

59. Which statement best describes these cells?

A) Cell B lacks vacuoles while cell A has them.
B) DNA would not be found in either cell A or cell B.
C) Both cell A and cell B use energy released from ATP.
D) Both cell A and cell B produce antibiotics.

60. Identify an organelle in cell A that is the site of autotrophic nutrition.

61. Identify the organelle labeled X in cell B.

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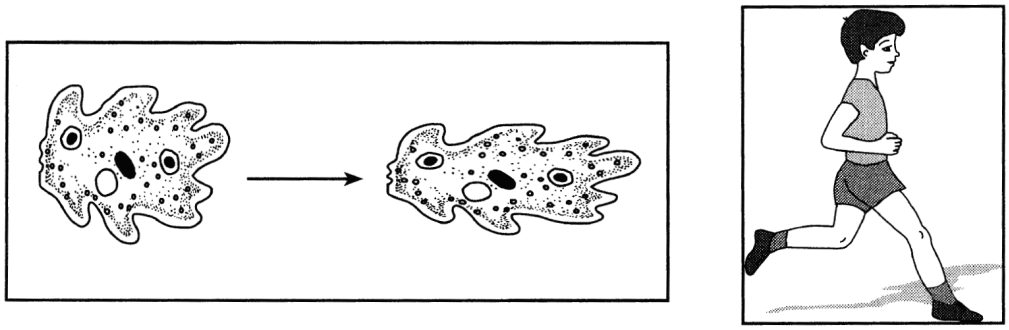
62. Organelles carry out specific processes involving chemical reactions. In the chart below, identify *two* organelles and, for each, identify a process involving chemical reactions that occurs there. Describe *one* specific way each process identified is important to the functioning of the organism.

63. Just like complex organisms, cells are able to survive by coordinating various activities. Complex organisms have a variety of systems, and cells have a variety of organelles that work together for survival. Describe the roles of two organelles. In your answer be sure to include:
a the names of two organelles and the function of each
b an explanation of how these two organelles work together
c the name of an organelle and the name of a system in the human body that have similar functions

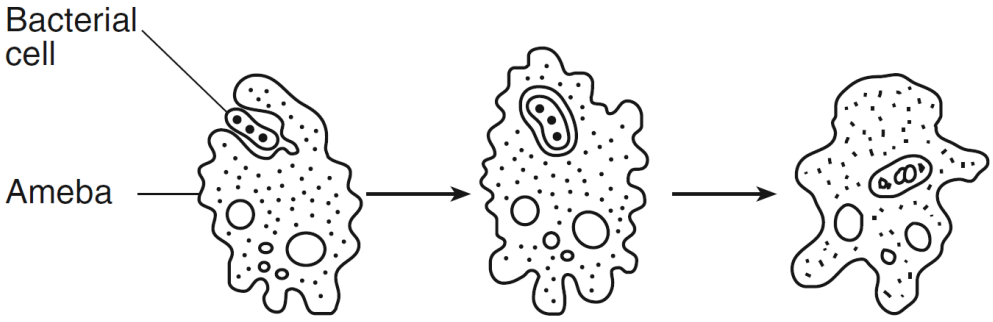
64. Two methods of moving from place to place are represented below. The single-celled ameba moves by a process that involves the flow of cytoplasm.



Which statement is best supported by these diagrams?

A) Both simple and complex organisms move directly by the movement of cytoplasm.
B) Single-celled organisms, like complex organisms, are able to move; however, they differ in the way they carry out this activity.
C) Cytoplasm is a fluid substance in simple cells and a solid substance in cells of complex organisms.
D) Cells in complex organisms function in the exact same way as cells in simple organisms.

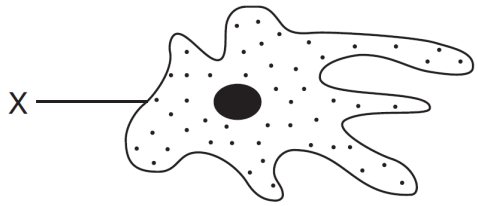
65. Base your answer to the following question on the diagram below and your knowledge of biology. The diagram represents an ameba, a single-celled organism, carrying out an essential life process.



Which two body systems allow humans to carry out the same life process as the ameba in the diagram?

A) endocrine and immune
B) respiratory and reproductive
C) digestive and circulatory
D) nervous and excretory

66. A Single-celled organism is represented below.



Structure *X* carries out a function most similar to which structure in a human?

A) lung B) brain
C) ovary D) heart

67. Some human structures and their functions are listed below.

Human Structures	Functions
alveoli	absorption of oxygen, excretion of carbon dioxide
kidney	excretion of salts and nitrogenous wastes
large intestine	absorption of water

In a single-celled organism such as an amoeba, all these functions can be performed by the

A) nucleus B) ribosomes
C) mitochondria D) cell membrane

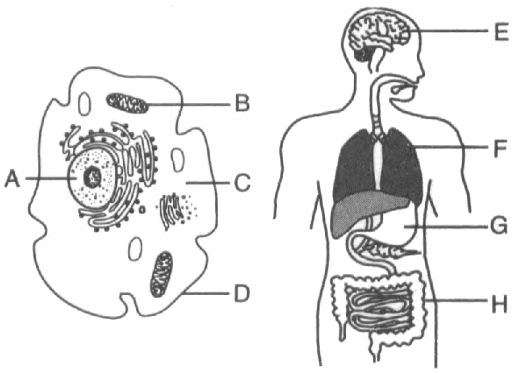
68. Damage to which structure will most directly disrupt water balance within a single-celled organism?

A) ribosome B) cell membrane
C) nucleus D) chloroplast

69. Fish absorb oxygen through the gills, earthworms absorb oxygen through the skin, amebas take in oxygen through the cell membranes, and cows inhale oxygen through the nasal passages into their lungs. This statement demonstrates that living things

A) rely on similar or the same processes, but accomplish them in different ways
B) rely on different processes and accomplish them in different ways
C) rely on different processes, but perform them in the same or related ways
D) have no relationship to one another, and are all independent individuals

70. A single cell and a multicellular organism are represented below.

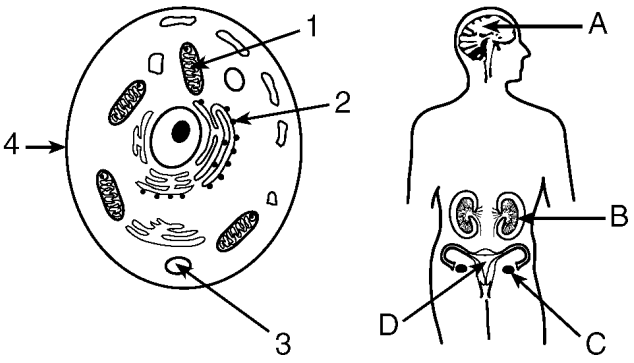


Which structures are correctly paired with their primary function?

A) *A* and *G*—transmission of nerve impulses
B) *B* and *E*—photosynthesis
C) *C* and *H*—digestion of food
D) *D* and *F*—gas exchange

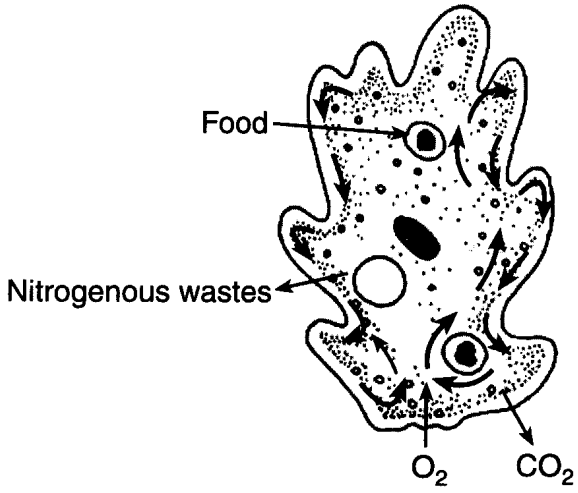
71. Which structures in diagram I and diagram II carry out a similar life function?

I II



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

72. In the diagram of a single-celled organism shown below, the arrows indicate various activities taking place.



Which systems perform these same activities in humans?

A) digestive, circulatory, and immune
B) excretory, respiratory, and reproductive
C) respiratory, excretory, and digestive
D) respiratory, nervous, and endocrine

Base your answers to questions **73** and **74** on the two sets of cell organelles in the chart below and on your knowledge of biology.

	Set A	Set B
Organelle 1	Ribosome	Mitochondrion
Organelle 2	Nucleus	Cell membrane

73. Select *one* set of organelles and record the letter of the set. Identify a cellular process that is accomplished by organelle 1 in the set you selected.

74. Explain how the two organelles in the set you selected interact to carry out the cellular process you identified in the previous question .

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75. The cytoplasm in a cell carries out a function similar to a function of which human system?

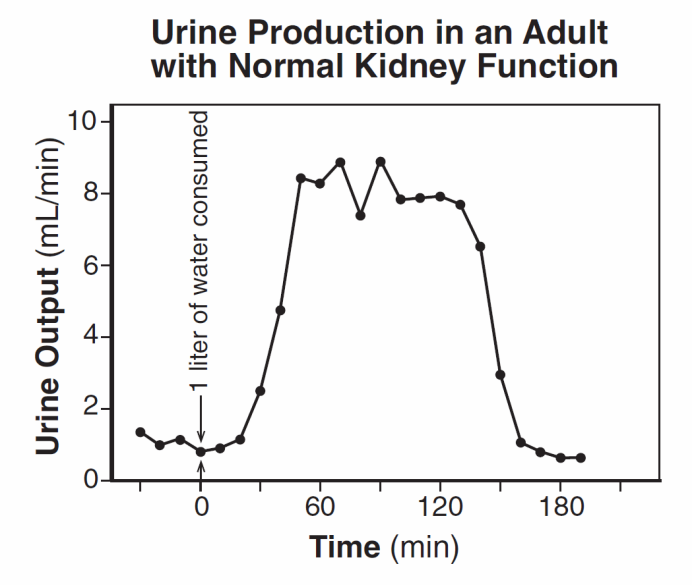
A) respiratory system
B) reproductive system
C) circulatory system
D) nervous system

76. The nucleus of a cell coordinates processes and activities that take place in the cell. Which two systems perform a similar function in the human body?

A) nervous and endocrine
B) digestive and reproductive
C) circulatory and respiratory
D) skeletal and muscular

77. Base your answer to the following question on the information and graph below and on your knowledge of biology.

An investigation was carried out to determine the effect of drinking an excessive amount of water on urine flow. A subject drank 1 liter of water in 5 minutes, and then urine output was measured. The graph shows how the human adult kidneys responded to regulate water balance in the body. Urine output was measured every 10 minutes for a little over 3 hours. Normal output for an average adult is approximately 0.5–1 mL/min.



Identify a structure, in organisms that do *not* have kidneys, that is adapted to regulate water balance.