# *Biology Exploring the Diversity of Life (Canadian) 4th edition Russell Test Bank*

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# SHORT RESPONSE

1 : In general, how are prokaryotic and eukaryotic cells different and how are they similar?

Correct Answer : Both mitochondria and chloroplasts contain DNA, RNA, and ribosomes that resemble those found in bacteria. In prokaryotic cells, the genetic material is found in a central region called the nucleoid, while in eukaryotic cells, it is contained in the membrane-bound nucleus. Also, eukaryotic cells contain membrane systems that form organelles, while prokaryotic cells do not. A plasma membrane surrounds both prokaryotic and eukaryotic cells.

2 : If prokaryotic cells do not have mitochondria, where do they produce their cellular energy?

Correct Answer : The plasma membrane contains most of the molecular systems needed to metabolize food molecules to ATP.

3 : Compare animal and plant cells. How are they different? How are they the same?

Correct Answer : Both animal cells and plant cells have a plasma membrane, nucleus, mitochondria, endoplasmic reticulum, ribosomes, and Golgi complex. Animal cells, however, do not have a cell wall, central vacuole, or chloroplasts.

4 : Explain how a cell isolated from the pancreas would be the same as a muscle cell. How would the two cell types be different?

Correct Answer : Both cell types would contain the same organelles; however, due to the very different functions of the two cells, the proportion of certain organelles would be different. For example, the pancreatic cell, which is involved in the production of digestive enzymes, would have an extensive rough ER network, while a muscle cell would have a large proportion of mitochondria to make the large amount of energy necessary for muscle contraction.

5 : Why are chloroplasts and mitochondria believed to have originated from ancient prokaryotes?

Correct Answer : Both mitochondria and chloroplasts contain DNA, RNA, and ribosomes that resemble those found in bacteria.

6 : Explain what makes tendons work at the cellular level.

Correct Answer : The extracellular matrix supports and protects cells, and provides mechanical linkage between muscles and bones.

# MULTIPLE CHOICE

7 : Which tissue did the first observed cells come from?
A : cork
B : pollen
C : leaf
D : skin

Correct Answer : A

8 : Which scientist was first credited for observing the cell nucleus?
A : Theodor Schwann
B : Anton van Leeuwenhoek
C : Matthias Schleiden
D : Robert Brown

Correct Answer : D

9 : Which of the following is synonymous with cellulae?
A : “small rooms”
B : “small compartments”
C : “small spaces”
D : “small particles”

Correct Answer : A

10 : Who played the most influential role in the discovery of the cell?
A : Matthias Schleiden
B : Theodor Schwann
C : Rudolf Virchow
D : Robert Hooke

Correct Answer : D

11 : Who played the most influential role in discovering protists?
A : Rudolf Virchow
B : Anton van Leeuwenhoek
C : Theodor Schwann
D : Matthias Schleiden

Correct Answer : B

12 : Who played the most influential role in discovering the importance of the nucleus?
A : Matthias Schleiden
B : Theodor Schwann
C : Robert Hooke
D : Rudolf Virchow

Correct Answer : A

13 : Which early scientist proposed that cells arise only from pre-existing cells?
A : Theodor Schwann
B : Robert Brown
C : Matthias Schleiden
D : Rudolf Virchow

Correct Answer : D

14 : Who proposed that all animals and plants consist of cells that contain a nucleus?
A : Matthias Schleiden
B : Rudolf Virchow
C : Theodor Schwann
D : Anton van Leeuwenhoek

Correct Answer : C

15 : Who discovered and described bacteria?
A : Anton van Leeuwenhoek
B : Matthias Schleiden
C : Theodor Schwann
D : Rudolf Virchow

Correct Answer : A

16 : Which statement most correctly describes living cells?
A : They grow, reproduce, and respond to outside stimuli in an uncoordinated fashion.
B : They grow and respond to outside stimuli in a coordinated fashion.
C : They grow, reproduce, and respond to outside stimuli in a coordinated fashion.
D : They reproduce and respond to outside stimuli in a coordinated fashion.

Correct Answer : C

17 : Which unit of measurement is most commonly used for expressing cell size?
A : centimetre (cm)
B : decimetre (dm)
C : micrometre (µm)
D : millimetre (mm)

Correct Answer : C

18 : A human egg is approximately 100 µm in size. What is this equal to?
A : 10.0 mm
B : 0.10 mm
C : 0.010 mm
D : 0.0010 mm

Correct Answer : B

19 : Why can the human eye NOT see cells?
A : because cells are only about 0.1 mm in diameter
B : because cells are only about 0.5 ìm in diameter
C : because cells are only about 1.0 mm in diameter
D : because cells are only about 5.0 ìm in diameter

Correct Answer : D

20 : Which cell structure regulates the movement of molecules in and out of the cell?
A : the nucleus
B : the ribosome
C : the plasma membrane
D : the cytoplasm

Correct Answer : C

21 : Staining with dye is a technique typically used to enhance contrast and visualization of cellular structures. Which microscope magnifies passing light directly through a specimen?

A : a fluorescence microscope
B : a bright field microscope
C : a confocal laser scanning microscope
D : a phase-contrast microscope

Correct Answer : B

22 : Which of the following is synonymous with organelles?
A : “little cells”
B : “little organisms”
C : “little organs”
D : “little particles”

Correct Answer : C

23 : If organs are analogous to the body, which of the following are organelles analogous to?
A : an eukaryote
B : a prokaryote
C : a cell
D : an animal

Correct Answer : C

24 : Where is the cell’s hereditary information stored?
A : in RNA
B : in DNA
C : in glucose
D : in protein

Correct Answer : B

25 : Which of the following is a cell structure that distinguishes prokaryotic from eukaryotic cells?
A : the ribosomes
B : the nucleus
C : the cell wall
D : the plasma membrane

Correct Answer : B

26 : In what way are prokaryotic and eukaryotic cells different?
A : A prokaryotic cell does not have cytoplasm, but a eukaryotic cell does.
B : A prokaryotic cell does not have a nucleus, but a eukaryotic cell does.
C : A prokaryotic cell does not have genetic material, but a eukaryotic cell does.
D : A prokaryotic cell does not have a flagellum, but a eukaryotic cell does.

Correct Answer : B

27 : What would a comparison of prokaryotic and eukaryotic cells reveal?
A : That they both have a cell wall.
B : That they both have a nucleus.
C : That they both have an endomembrane system.
D : That they both have DNA.

Correct Answer : D

28 : In what way are prokaryotic and eukaryotic cells different?
A : A prokaryotic cell has a cell wall, but a eukaryotic cell does not.
B : A prokaryotic cell does not have a cell wall, but a eukaryotic cell does.
C : A prokaryotic cell has a capsule, but a eukaryotic cell does not.
D : A prokaryotic cell does not have a capsule, but a eukaryotic cell does.

Correct Answer : C

29 : Which of the following shapes are most common among prokaryotes?
A : rodlike, cylindrical, and spherical
B : rodlike, spiral, and spherical
C : rodlike, circular, and spherical
D : rodlike, spiral, and cylindrical

Correct Answer : B

30 : Which of the following groups belong to the domain of the prokaryotes?
A : bacteria
B : protists
C : fungi
D : animals

Correct Answer : A

31 : If a plasma membrane is analogous to the cell, which of the following is analogous to the animal body?
A : a reproductive system
B : a muscle system
C : the skin
D : a digestive system

Correct Answer : C

32 : Which network of protein filaments reinforce the inner surface of the nuclear envelope in animal cells?
A : actins
B : tubulins
C : lamins
D : chromatins

Correct Answer : C

33 : What do mitochondria and chloroplasts have in common?
A : Both are found in the majority of animal cells.
B : Both are engaged in cellular respiration.
C : Both are transforming energy.
D : Both are engaged in photosynthesis.

Correct Answer : C

34 : If a cell contains centrioles, which type of cell must it be?
A : an animal cell
B : a prokaryotic cell
C : a plant cell
D : a fungal cell

Correct Answer : A

35 : If a cell contains lysosomes, what type of cell must it be?
A : a fungal cell
B : a prokaryotic cell
C : an animal cell
D : a plant cell

Correct Answer : C

36 : If a cell contains chloroplasts, what type of cell is it most likely?
A : a prokaryotic cell
B : a fungal cell
C : a plant cell
D : an animal cell

Correct Answer : C

37 : If a cell contains tonoplast, what type of cell must it be?
A : an animal cell
B : a fungal cell
C : a prokaryotic cell
D : a plant cell

Correct Answer : D

38 : What does chromatin consist of?
A : only RNA
B : only DNA
C : both DNA and RNA
D : DNA and associated proteins

Correct Answer : D

39 : What is the eukaryotic chromosome composed of?
A : DNA and carbohydrate
B : DNA only
C : DNA and protein
D : RNA only

Correct Answer : C

40 : What is the semi-liquid substance within the nucleus called?
A : chromatin
B : nuclear gel
C : cytoplasm
D : nucleoplasm

Correct Answer : D

41 : Which of the following is synthesized in the nucleoli?
A : mRNAs
B : ribosomal subunits
C : chromatin
D : proteins

Correct Answer : B

42 : What makes large quantities of proteins in the cells?
A : numerous cilia
B : numerous ribosomes
C : numerous centrioles
D : numerous chromosomes

Correct Answer : B

43 : Which organelle is NOT a part of the endomembrane system?
A : the endoplasmic reticulum
B : the lysosome
C : the nucleolus
D : the Golgi complex

Correct Answer : C

44 : What do mitochondria and chloroplasts have in common?
A : Both contain chlorophyll.
B : Proteins made on free ribosomes may pass into both of them.
C : Both are members of the endomembrane system.
D : Both are found in most animal cells.

Correct Answer : B

45 : Which organelles contain DNA?
A : lysosomes and ribosomes
B : lysosomes and mitochondria
C : chloroplasts and mitochondria
D : chloroplasts and ribosomes

Correct Answer : C

46 : Which organelle is involved in the synthesis of lipids?
A : the ribosome
B : the smooth endoplasmic reticulum
C : the Golgi complex
D : the rough endoplasmic reticulum

Correct Answer : B

47 : What is the function of the Golgi complex?
A : It synthesizes lipids.

B : It synthesizes proteins for export from the cell.
C : It receives proteins made in the rough ER and chemically modifies them.
D : It receives proteins made in the smooth ER and chemically modifies them.

Correct Answer : C

48 : Which of the following is the correct path in the endomembrane system for a protein synthesized on a ribosome attached to the rough ER?

smooth ER  Golgi complex  plasma membrane
vesicle  smooth ER  plasma membrane
vesicle  lysosome  plasma membrane
Golgi complex  vesicle  plasma membrane

Correct Answer : D

49 : Which cellular component is capable of digestion?
A : the rough endoplasmic reticulum
B : the Golgi complex
C : the ribosome
D : the lysosome

Correct Answer : D

50 : Cells that are more active in secreting enzymes would most likely exhibit which one of the following?
A : exocytosis
B : endocytosis
C : diffusion
D : osmosis

Correct Answer : A

51 : When molecules are brought into the cell from the exterior, they need to be placed onto one of the following organelles for further routing to other locations. Which of the following organelles serve(s) the purpose of further routing?
A : the nucleus
B : lysosomes
C : mitochondria
D : ribosomes

Correct Answer : B

52 : At one point in human development, tissue that connected the fingers and the hand appeared to be “webbed.” Enzymes eventually destroy the cells of the webbing and the fingers separate. Where are these enzymes probably liberated from?
A : from the nucleus
B : from the smooth endoplasmic reticulum
C : from the chromosomes
D : from the lysosomes

Correct Answer : D

53 : At which pH do lysosomes function best?
A : 3.2
B : 5.0
C : 6.5
D : 7.4

Correct Answer : B

54 : Which organelle contains hydrolytic enzymes for the digestion of proteins, lipids, nucleic acids, and polysaccharides?
A : the Golgi complex
B : the rough endoplasmic reticulum
C : the nucleus
D : the lysosome

Correct Answer : D

55 : If a lysosome is analogous to the animal cell, which of the following is analogous to the plant cell?
A : a chloroplast
B : a cell wall
C : a tonoplast
D : a vacuole

Correct Answer : D

56 : If a lysosome is analogous to the cell, which of the following is analogous to the animal body?
A : a digestive system
B : a muscle system
C : a nervous system
D : a reproductive system

Correct Answer : A

57 : Where does cellular respiration occur?
A : in lysosomes
B : in mitochondria
C : in chloroplasts
D : in peroxisomes

Correct Answer : B

58 : In the process of cellular respiration, what is converted to water and carbon dioxide during the formation of energy?
A : $O_2$ and $CO_2$
B : $CO_2$ and glucose
C : $CO_2$ and fats
D : $O_2$ and glucose

Correct Answer : D

59 : What greatly increases the interior surface area of mitochondria?

A : centrioles
B : microfilaments
C : cristae
D : the matrix

Correct Answer : C

60 : What comprises cytoskeletal elements?
A : proteins
B : triglycerides
C : phospholipids
D : glycogen

Correct Answer : A

61 : What comprises microfilaments?
A : keratins
B : tubulins
C : actins
D : myosins

Correct Answer : C

62 : Which protein comprises microtubules?
A : tubulins
B : actins
C : myosins
D : keratins

Correct Answer : A

63 : If a cell contains intermediate filaments, to which organism must the cell then belong?
A : to a unicellular organism
B : to a multicellular organism
C : to a protist
D : to a bacterium

Correct Answer : B

64 : Which pair is NOT matched correctly?
A : plant cell wall; cellulose
B : intermediate filaments; tubulin
C : microfilaments; actin
D : cell membrane; phospholipid bilayer

Correct Answer : B

65 : Which of the following radiate from the centre of the cell and anchor the ER, Golgi complex, lysosomes, and secretory vesicles in place?
A : microfilaments
B : microtubules
C : actins
D : laminins

Correct Answer : B

66 : In what way are cilia and flagella similar?
A : They both propel a cell in the same way.
B : They both occur in great numbers.
C : They are identical in structure.
D : They are both of the same length.

Correct Answer : C

67 : If a cell is propelled through a medium in a whip-like motion, what does it most likely possess?
A : a capsule
B : cilia
C : a cell wall
D : a flagellum

Correct Answer : D

68 : If a cell moves through water by moving the fluid over its surface, what does the cell mostly likely possess?
A : a capsule
B : a cell wall
C : cilia
D : a flagellum

Correct Answer : C

69 : From which cellular component do cilia and flagella arise?
A : the chromosome
B : the centriole
C : the nucleus
D : the Golgi complex

Correct Answer : B

70 : What does the 9 + 2 system refer to?
A : both the Golgi complex and the endoplasmic reticulum
B : both the cilia and the nucleus
C : both the flagella and the plasma membrane
D : both the flagella and the cilia

Correct Answer : D

71 : What are the principal structural components of cilia and flagella?
A : intermediate filaments
B : myosin microfilaments
C : actin microfilaments
D : microtubules

Correct Answer : D

72 : If a flagellum is analogous to the cell, which of the following is analogous to the animal body?
A : a muscle system
B : a nervous system
C : a reproductive system
D : a digestive system

Correct Answer : A

73 : Which of the following extend as a bundle from the base to the tip of a flagellum or cilium?
A : microfilaments
B : intermediate filaments
C : actins
D : microtubules

Correct Answer : D

74 : Where are cell walls found?
A : in plant and fungal cells
B : in plant cells only
C : in fungal cells only
D : in animal cells only

Correct Answer : A

75 : Which cell structures store starch in plants?
A : plastids
B : mitochondria
C : vacuoles
D : nucleus

Correct Answer : A

76 : Which of the following processes occurs in chloroplasts?
A : DNA synthesis
B : photosynthesis
C : protein synthesis
D : cellular digestion

Correct Answer : B

77 : Why do scientists believe that mitochondria may have evolved from ancient bacteria?
A : because both have their own DNA and ribosomes
B : because both have five chromosomes
C : because both are surrounded by a double membrane
D : because the shapes and size of both are exactly the same

Correct Answer : A

78 : With which organelle(s) do chloroplasts share many similarities?
A : the lysosomes
B : the rough endoplasmic reticulum
C : the mitochondria

D : the nucleus

Correct Answer : C

79 : What do chloroplasts utilize light energy for?
A : to make carbohydrates
B : to make proteins
C : to make nucleic acids
D : to make fats

Correct Answer : A

80 : In which organelles are grana and thylakoids found as structural components?
A : ribosomes
B : mitochondria
C : chloroplasts
D : lysosomes

Correct Answer : C

81 : Which of the following may occupy more than 90% of a mature plant cell's volume?
A : chloroplasts
B : the rough endoplasmic reticulum
C : the central vacuole
D : the nucleus

Correct Answer : C

82 : What is another name for the membrane that surrounds the central vacuole?
A : tonoplast
B : ionoplast
C : chloroplast
D : chromoplast

Correct Answer : A

83 : In plant cells, what provides cellular support and protects cells from pathogens?
A : the cell wall
B : the cell membrane
C : the cytoplasm
D : the plasmodesmata

Correct Answer : A

84 : In what way are lysosomes and plant vacuoles similar to each other?
A : They are both involved in cell movement.
B : They are both involved in cell digestion.
C : They are both involved in cell sensitivity.
D : They are both involved in cell reproduction.

Correct Answer : B

85 : If a cell wall is analogous to the plant cell, which of the following is analogous to the animal

cell?
A : the cytoskeleton
B : the capsule
C : the plasma membrane
D : the extracellular matrix

Correct Answer : D

86 : What are plant cell walls composed of?
A : carbohydrates
B : proteins
C : phospholipids
D : steroids

Correct Answer : A

87 : What connects the cytoplasm of adjacent cells in plants?
A : the plasma membrane
B : plasmodesmata
C : the primary cell wall
D : the secondary cell wall

Correct Answer : B

88 : Which of the following is the component of plant cell wall?
A : protein
B : chitin
C : cellulose
D : nucleic acid

Correct Answer : C

89 : Plant cells permit ions and small molecules to move between adjacent cells by means of cytoplasmic channels in their cell walls. What are these channels called?
A : plasmodesmata
B : cell junctions
C : desmosomes
D : gap junctions

Correct Answer : A

90 : Over time, cancerous cells typically lose the cell adhesion molecules embedded in their plasma membrane. Loss of these molecules is best associated with which of the following traits of cancer cells?
A : production of new proteins
B : angiogenesis
C : increased rate of cell division
D : migration to new locations in the body

Correct Answer : D

91 : What are cell adhesion molecules in normal cells partially responsible for?
A : the ability of cells to migrate to new locations in the body

B : the ability of cells to do endocytosis
C : the ability of cells to recognize other cells as “self”
D : the ability of cells to do exocytosis

Correct Answer : C

92 : What are desmosomes?
A : a type of anchoring junction
B : a type of gap junction
C : a type of tight junction
D : a type of cell adhesion molecule

Correct Answer : A

93 : What is the function of tight junctions?
A : to seal the spaces between cells
B : to give the cell its shape
C : to allow ions and small molecules to pass between cells
D : to allow cells to communicate with each other

Correct Answer : A

94 : What is the function of gap junctions?
A : to allow plant cells to communicate with each other
B : to allow ions and small molecules to pass between cells
C : to give the cell its shape
D : to seal the spaces between cells

Correct Answer : B

95 : Which of the following allow communication between the cells of the heart muscle tissue, resulting in the coordinated beating of the heart?
A : tight junctions
B : anchoring junctions
C : desmosomes
D : gap junctions

Correct Answer : D

96 : What are the main components of the extracellular matrix?
A : glycoproteins
B : phospholipids
C : cellulose
D : glycolipids

Correct Answer : A

# MATCHING

97 : Match each type of microscopy with the best description.
A : phase-contrast microscopy A : utilizes a thin beam of electrons to examine

| | |
|---|---|
| | structures within a cell |
| B : confocal laser scanning microscopy | B : utilizes lasers to scan a fluorescently stained specimen; a computer focuses the light to show a single plane through a cell |
| C : bright field microscopy | C : utilizes differences in the way light is bent (refraction) in areas of various cellular density to visualize living cells |
| D : transmission electron microscopy (TEM) | D : requires light passing through the specimen; typically involves staining with dye to enhance contrast; usually “fixes” and kills the cell |
| E : scanning electron microscopy (SEM) | E : a beam of electrons scanned over a whole cell allows visualization of surface structures; gives a 3D-appearing image |

Correct Answer :
A : C

B : B

C : D

D : A

E : E

98 : Match each description with the cellular structure that best corresponds.

| | |
|---|---|
| A : smooth ER | A : contain enzymes for intracellular digestion |
| B : mitochondria | B : location of genetic material |
| C : ribosomes | C : synthesize subunits that will be used to assemble ribosomes |
| D : chloroplast | D : site of protein synthesis |
| E : nucleus | E : composed of cellulose; provides support and protection |
| F : lysosomes | F : synthesis of lipids |
| G : nucleoli | G : conversion of fuel molecules into energy |
| H : central vacuole | H : conversion of light energy into chemical energy |
| I : Golgi complex | I : storage site in plant cells |
| J : cell wall | J : synthesis of proteins for secretion |
| K : rough ER | K : chemically modifies proteins |
| L : vesicle | L : membrane-bound transport structure |

Correct Answer :
A : F

B : G

C : D

D : H

E : B

F : A

G : C

H : I

I : K

J : E

K : J

L : A11

99 : Match each description of a cellular structure to the cell type it would be found in. A cell type may be used once, more than once, or not at all.

A : nucleus
B : chloroplast
C : ribosome
D : mitochondria
E : nucleoid
F : plasma membrane

A : found in all living cells
B : found in prokaryotic cells only
C : found in eukaryotic cells only
D : found in plant cells only
E : found in animal cells only

Correct Answer :
A : C

B : D

C : A

D : C

E : B

F : A

100 : For each descriptive phrase, choose the most appropriate structure of the cytoskeleton from the list of terms. A term may be used once, more than once, or not at all.

A : composed of the hollow cylinders of tubulin dimers
B : involved in the process of cytoplasmic streaming
C : involved in moving chromosomes during cell division
D : composed of two helically coiled actin polymers

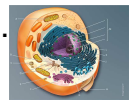
A : microfilaments
B : microtubules
C : intermediate filaments

Correct Answer :
A : B

B : A

C : B

D : A

101 : In this drawing of a eukaryotic animal cell, identify the cellular structures indicated. 

A : cytosol
B : microtubules
C : lysosome
D : attached ribosomes
E : plasma membrane
F : Golgi complex
G : vesicle
H : pair of centrioles
I : free ribosome
J : rough ER
K : mitochondrion
L : nucleus

A : 1
B : 2
C : 3
D : 4
E : 5
F : 6
G : 7
H : 8
I : 9
J : 10
K : 11
L : 12

Correct Answer :
A : G

B : D

C : C

D : K

E : H

F : F

G : E

H : B

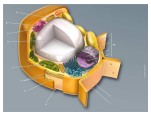
I : J

J : A11

K : A

L : A12

102 : In this drawing of a eukaryotic plant cell, identify the cellular structures indicated.



A : chloroplast
B : mitochondrion
C : plasma membrane
D : vesicle
E : free ribosomes
F : Golgi complex
G : microtubules
H : cell wall
I : central vacuole
J : nucleus
K : smooth ER

A : 1
B : 2
C : 3
D : 4
E : 5
F : 6
G : 7
H : 8
I : 9
J : 10
K : 11

Correct Answer :
A : E

B : A

C : H

D : C

E : J

F : B

G : F

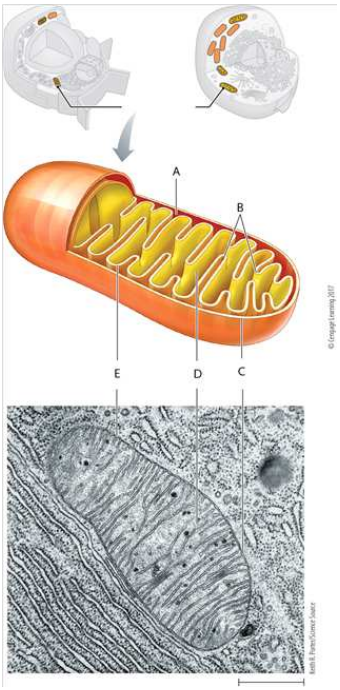
H : G

I : D

J : A12

K : I

103 : In this drawing of a mitochondrion, identify the structures indicated.




A : cristae
B : outer mitochondrial membrane
C : intermembrane compartment
D : inner mitochondrial membrane
E : matrix

A : 1
B : 2
C : 3
D : 4
E : 5

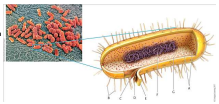
Correct Answer :
A : B

B : C

C : A

D : E

E : D

104 : In this drawing of a prokaryotic cell, identify the cellular structures indicated. 

A : cell wall
B : cytoplasm
C : ribosomes
D : capsule
E : plasma membrane
F : nucleoid
G : pili

A : 1
B : 2
C : 3
D : 4
E : 5
F : 6
G : 7

Correct Answer :
A : D

B : G

C : H

D : E

E : C

F : F

G : B