

**JANUARY 1997**

## **PROVINCIAL EXAMINATION**

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**MINISTRY OF EDUCATION, SKILLS AND TRAINING**

# **BIOLOGY 12**

### **GENERAL INSTRUCTIONS**

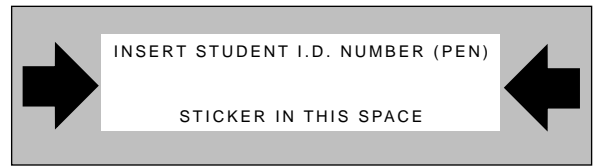
1. Insert the stickers with your Student I.D. Number (PEN) in the allotted spaces above. **Under no circumstance is your name or identification, other than your Student I.D. Number, to appear on this paper.**
2. Take the separate Answer Sheet and follow the directions on its front page.
3. Be sure you have an **HB pencil** and an eraser for completing your Answer Sheet. Follow the directions on the Answer Sheet when answering multiple-choice questions.
4. For each of the written-response questions, write your answer in **ink** in the space provided.
5. When instructed to open this booklet, **check the numbering of the pages** to ensure that they are numbered in sequence from page one to the last page, which is identified by

**END OF EXAMINATION** .

6. At the end of the examination, place your Answer Sheet inside the front cover of this booklet and return the booklet and your Answer Sheet to the supervisor.

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**FOR OFFICE USE ONLY**



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**BIOLOGY 12 JANUARY 1997 PROVINCIAL**

**Course Code = BI Examination Type = P**

1. \_\_\_\_\_  
(4)

2. \_\_\_\_\_  
(4)

3. \_\_\_\_\_  
(6)

4. \_\_\_\_\_  
(5)

5. \_\_\_\_\_  
(5)

6. \_\_\_\_\_  
(4)

OPTIONS: Score **only two** of the following options.

Option I: 7. \_\_\_\_\_  
(10)

Option IV: 10. \_\_\_\_\_  
(10)

Option II: 8. \_\_\_\_\_  
(10)

Option V: 11. \_\_\_\_\_  
(10)

Option III: 9. \_\_\_\_\_  
(10)

Option VI: 12. \_\_\_\_\_  
(10)

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## BIOLOGY 12 PROVINCIAL EXAMINATION

	Value	Suggested Time
1. This examination consists of <b>three</b> parts:		
PART A: 52 multiple-choice questions	52	40
PART B: 6 written-response questions	28	50
PART C: Option section consisting of only written-response questions. Select <b>only two</b> options. Each option is worth 10 marks.	20	30
	<b>Total: 100 marks</b>	<b>120 minutes</b>
2. Multiple-choice questions must be answered in HB pencil on the answer sheet provided. All other questions are to be answered in INK in the spaces provided in this booklet.		
3. For written-response questions, organization and planning space has been incorporated into the space allowed for answering each question.		
4. You have <b>two hours</b> to complete this examination.		

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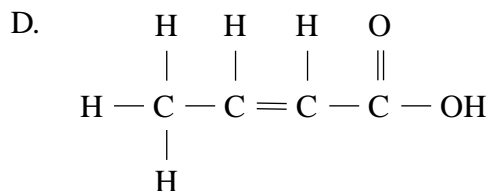
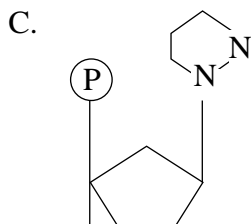
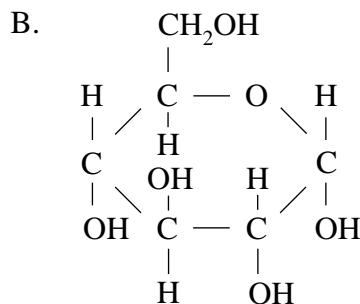
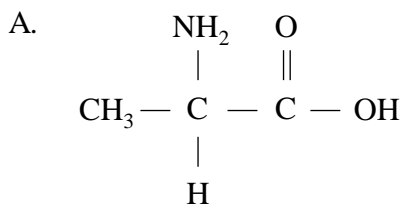
## PART A: MULTIPLE CHOICE

Value: 52 marks

Suggested Time: 40 minutes

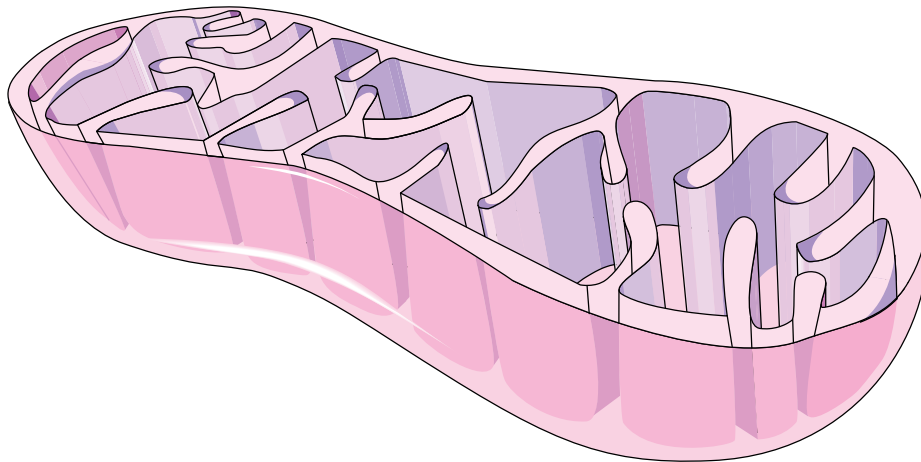
**INSTRUCTIONS:** For each question, select the **best** answer and record your choice on the Answer Sheet provided. Using an HB pencil, completely fill in the circle that has the letter corresponding to your answer.

1. Proteins may denature when
  - A. pH is changed.
  - B. oxygen is present.
  - C. they form enzymes.
  - D. substrate concentration is increased.
  
2. Which of the following is a unit molecule of hydrolysis?
  - A. ADP when it is being converted into ATP.
  - B. Cellulose when it is being converted into glucose.
  - C. Fatty acids when they are being converted into lipid.
  - D. Amino acids when they are being converted into protein.
  
3. Which of the following is a unit molecule of glycogen?



4. mRNA is produced in the process called
- A. respiration.
  - B. translation.
  - C. replication.
  - D. transcription.
5. Which of the following would **not** occur during complementary base pairing?
- A. A-T
  - B. U-G
  - C. C-G
  - D. A-U
6. During protein synthesis, peptide bonds are formed at the
- A. nucleus.
  - B. nucleolus.
  - C. lysosomes.
  - D. ribosomes.

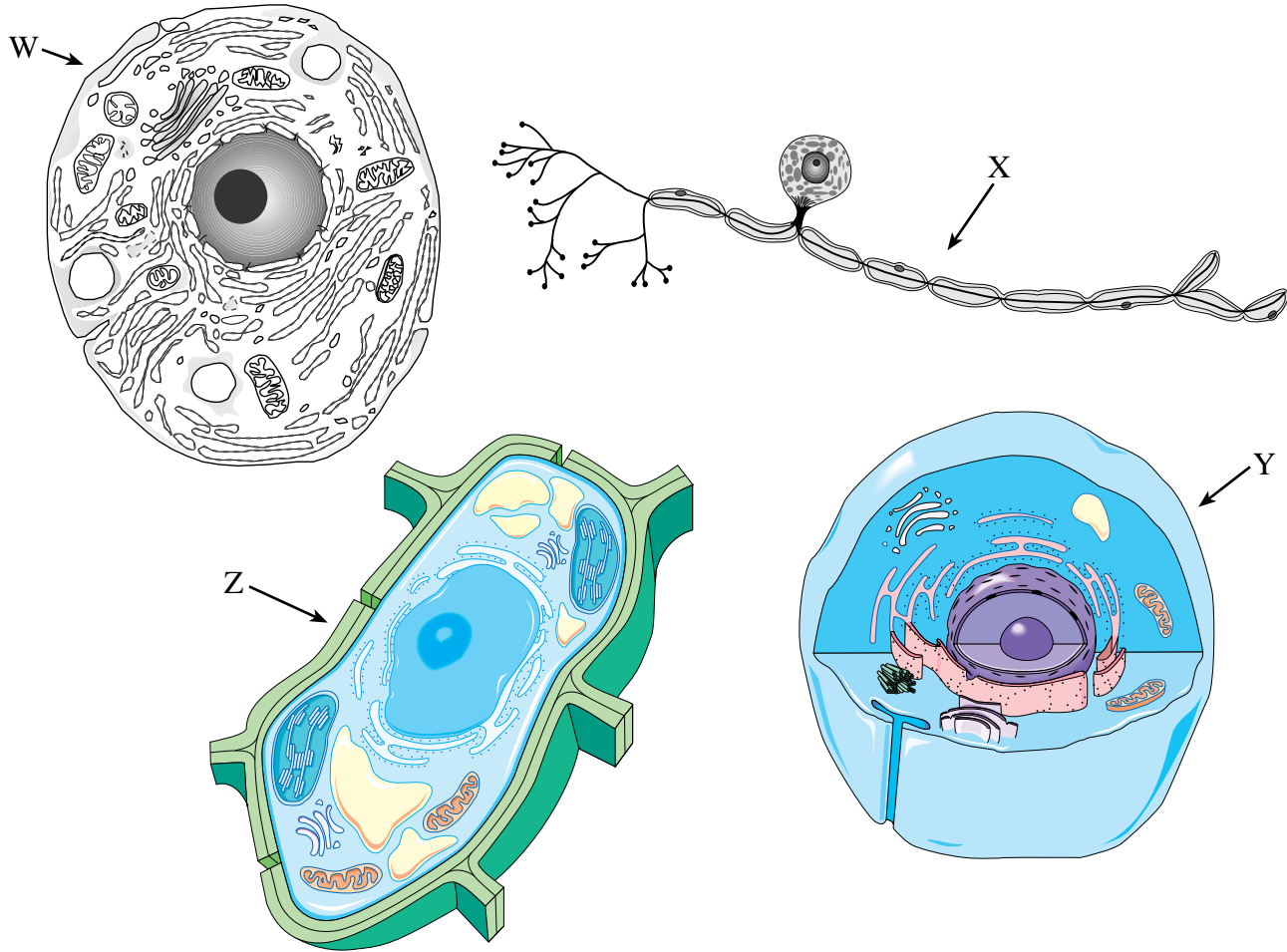
**Use the following diagram to answer question 7.**



7. Which of the following processes is carried out in the structure shown above?
- A. Photosynthesis.
  - B. Cellular respiration.
  - C. Intracellular digestion.
  - D. Secretion of cell products.



Use the following diagrams to answer question 8.



8. Which of the diagrams above is a plant cell?

- A. W
- B. X
- C. Y
- D. Z

9. Which of the following aids the movement of glucose across a cell membrane?

- A. Protein.
- B. Phosphate.
- C. Glycolipid.
- D. Cholesterol.

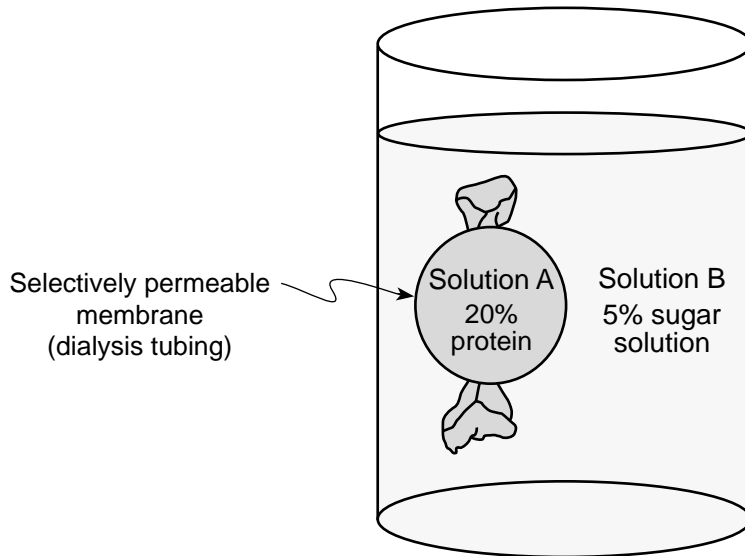
10. Which of the following is a component of **both** prokaryotic and eukaryotic cells?

- A. Cell wall.
- B. Chloroplasts.
- C. Golgi bodies.
- D. Mitochondria.

11. A shortage of available ATP would hinder a cell's ability to import

- A. water.
- B. protein.
- C. oxygen.
- D. carbon dioxide.

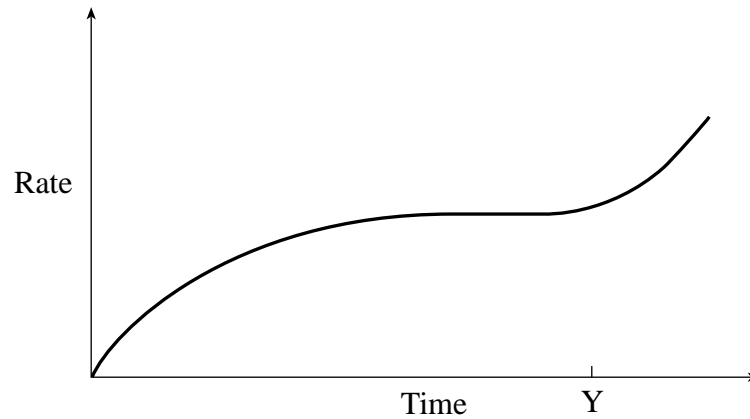
Use the following diagram to answer question 12.



12. In the situation shown in the diagram above,

- A. water will enter **A** and the concentration of the protein solution will increase.
- B. water will enter **A** and the concentration of the protein solution will decrease.
- C. water will enter **B** and the concentration of the protein solution will increase.
- D. water will enter **B** and the concentration of the protein solution will decrease.

Use the following graph to answer question 13.



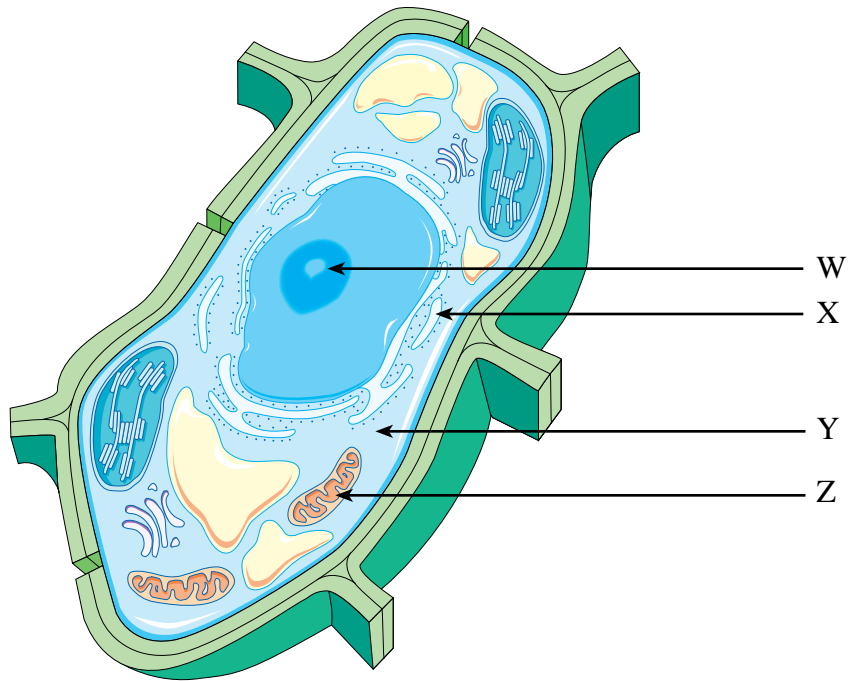
13. The graph above shows the rate of an enzyme-catalyzed reaction in the stomach. What was done at time Y?
- A. Lead ions were added.
  - B. More enzyme was added.
  - C. Temperature was increased by 50°C.
  - D. Substrate concentration was decreased.

Use the following diagram to answer question 14.



14. The cellular structure shown above is the
- A. nucleolus.
  - B. mitochondrion.
  - C. Golgi apparatus.
  - D. endoplasmic reticulum.
- 
15. When  $\text{NADH}_2$  becomes  $\text{NAD}$ , it has been
- A. reduced and energy is released.
  - B. oxidized and energy is released.
  - C. reduced and energy is absorbed.
  - D. oxidized and energy is absorbed.

Use the following diagram to answer question 16.



16. In the cell above, where does glycolysis occur?

- A. W
- B. X
- C. Y
- D. Z

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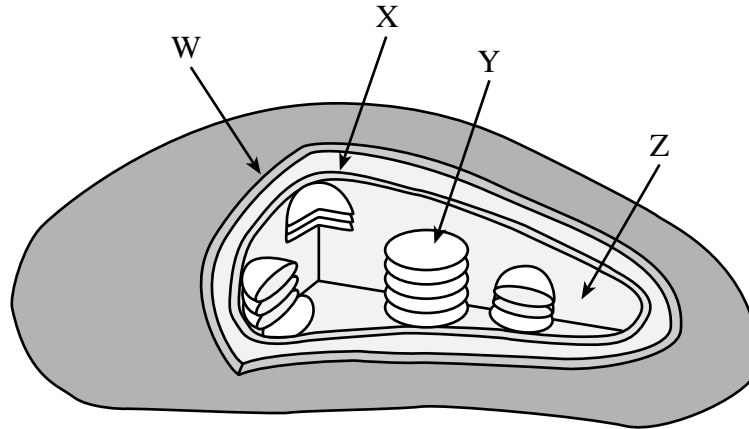
17. The majority of ATP is produced by

- A. glycolysis.
- B. the Krebs cycle.
- C. the respiratory chain.
- D. CO<sub>2</sub> reducing reactions.

18. The term used to describe an organism capable of using light energy for food production is

- A. eukaryotic.
- B. autotrophic.
- C. prokaryotic.
- D. heterotrophic.

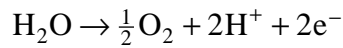
Use the following diagram to answer question 19.



19. In which area of the diagram above is NADP produced?

- A. W
  - B. X
  - C. Y
  - D. Z
- 

20. Where in the cell does the following reaction occur?



- A. Grana.
- B. Matrix.
- C. Stroma.
- D. Cytoplasm.

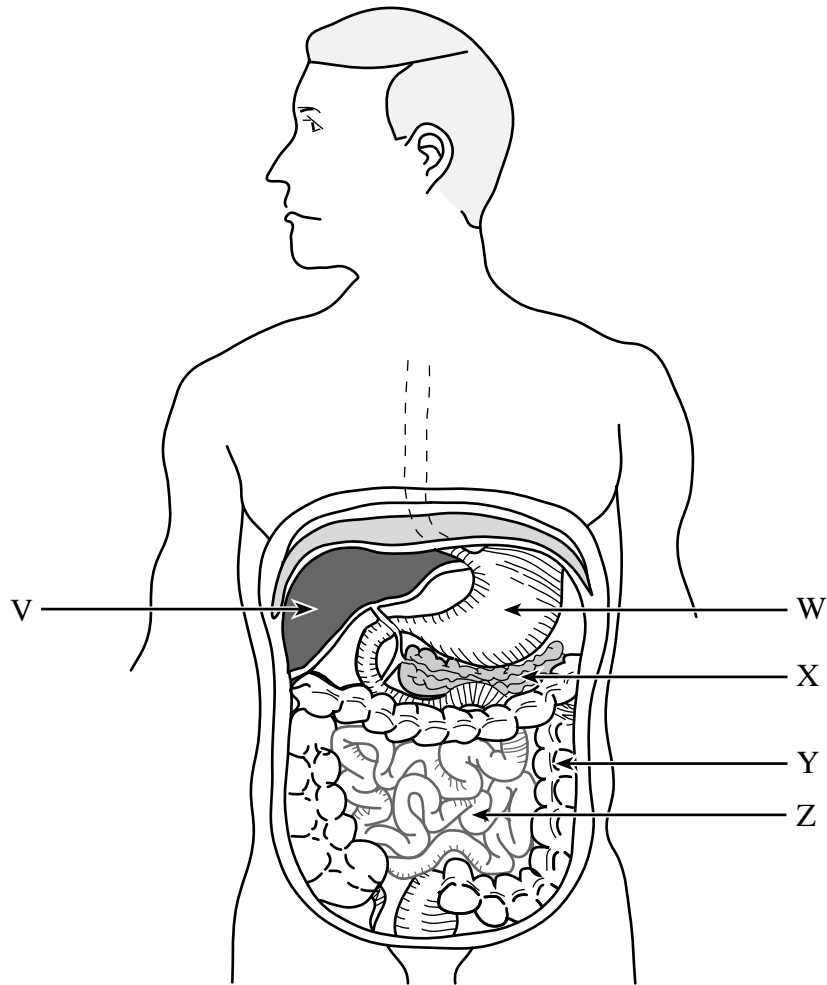
21. Which of the following statements is **false**?

- A.  $\text{O}_2$  is produced during photolysis.
- B. PGAL is produced in the thylakoids.
- C. ATP is produced in the absence of  $\text{CO}_2$ .
- D.  $\text{NADPH}_2$  is produced during photophosphorylation.

22. Tissue lining the esophagus is

- A. nervous.
- B. muscular.
- C. epithelial.
- D. connective.

Use the following diagram to answer questions 23 and 24.



23. In the diagram above, which arrow points to a structure where digestion does **not** occur?

- A. W
- B. X
- C. Y
- D. Z

24. An inability to convert lipids to fatty acids and glycerol might indicate malfunctioning of which organs?

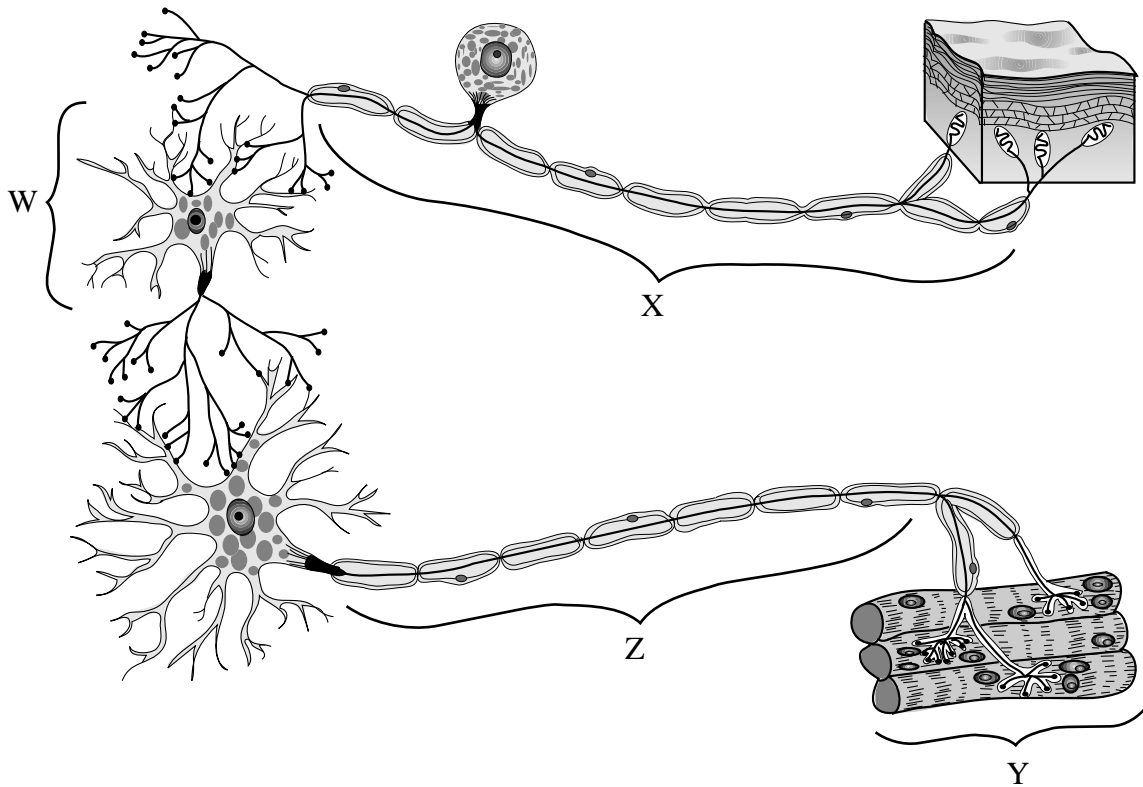
- A. V and W.
- B. W and X.
- C. V and X.
- D. W and Y.

25. Some vitamins are produced in the
- A. liver.
  - B. colon.
  - C. pancreas.
  - D. small intestine.
26. An increase in the amount of protein present in the stomach would initially result in higher blood levels of
- A. pepsin.
  - B. gastrin.
  - C. secretin.
  - D. cholecystokinin (CCK).
27. Which pair of enzymes have similar substrates?
- A. Pepsin and trypsin.
  - B. Pepsin and maltase.
  - C. Amylase and lipase.
  - D. Maltase and peptidase.
28. Difficulty in absorbing glucose could indicate malfunctioning of the
- A. colon.
  - B. stomach.
  - C. gall bladder.
  - D. small intestine.
29. Thick walls, elastic tissue and smooth muscle are characteristics of
- A. veins.
  - B. arteries.
  - C. arterioles.
  - D. capillaries.

30. Blockages in which of the following blood vessels reduces blood flow to the heart muscle?
- A. Aorta.
  - B. Carotid artery.
  - C. Coronary artery.
  - D. Pulmonary artery.
31. When blood enters a vein from a venule, the blood pressure will
- A. increase because of increased heart rate.
  - B. decrease because of increased vessel diameter.
  - C. increase because of stretch receptor stimulation.
  - D. remain constant due to the steady pumping of the heart.
32. Which of the following would be a homeostatic response to a blood pressure reading of 80/50?
- A. Dilation of the arteries.
  - B. Sympathetic stimulation.
  - C. Inhibited ACTH secretion.
  - D. Decreased ADH secretion.
33. Blood with a high oxygen concentration can be found in **both** the
- A. renal artery and the pulmonary artery.
  - B. umbilical vein and the pulmonary vein.
  - C. pulmonary vein and the umbilical artery.
  - D. pulmonary artery and the umbilical artery.



Use the following diagram to answer question 34.



34. In the diagram above, which letter indicates a structure that is part of the central nervous system?

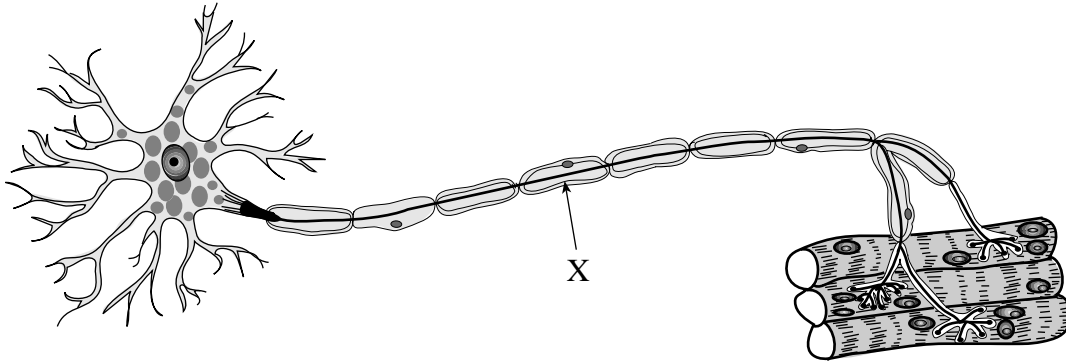
- A. W
- B. X
- C. Y
- D. Z

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35. Depolarization of an axon results from the movement of

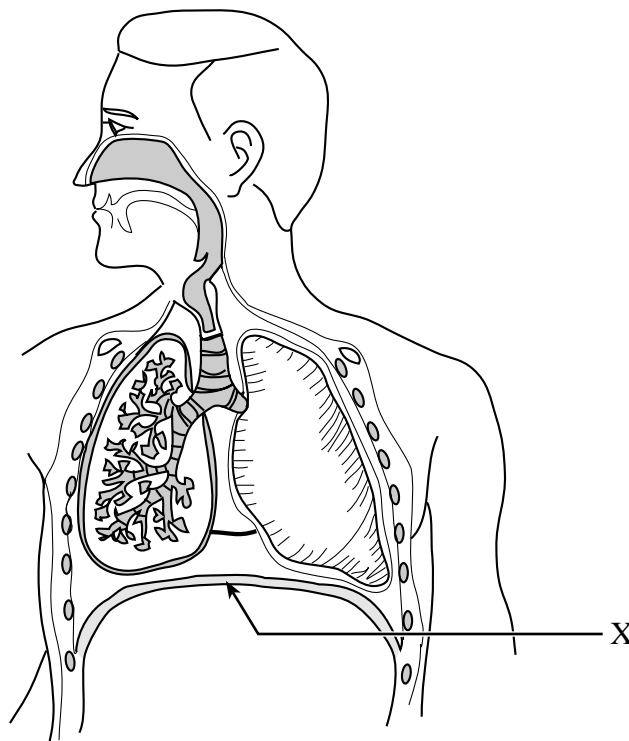
- A. sodium ions.
- B. hydrogen ions.
- C. potassium ions.
- D. bicarbonate ions.

Use the following diagram to answer question 36.



36. One of the functions of the structure labelled **X** in the diagram above is to
- A. increase the concentration of ions in the axon.
  - B. decrease the concentration of ions in the axon.
  - C. increase the speed of nerve impulse transmission.
  - D. decrease the speed of nerve impulse transmission.
- 
37. Damage to the medulla oblongata may result in
- A. hearing loss.
  - B. impaired growth.
  - C. breathing difficulty.
  - D. loss of coordination.
38. Which of the following explains why most organs are supplied by two separate autonomic nerves?
- A. One acts as a reserve neuron.
  - B. One is sensory and one is motor.
  - C. Both are needed in emergency situations.
  - D. One stimulates the organ and one inhibits it.

Use the following diagram to answer question 39.



39. The structure labelled **X** in the diagram above is the

- A. lung.
  - B. trachea.
  - C. bronchiole.
  - D. diaphragm.
- 

40. Alveoli are well-suited to their function because they

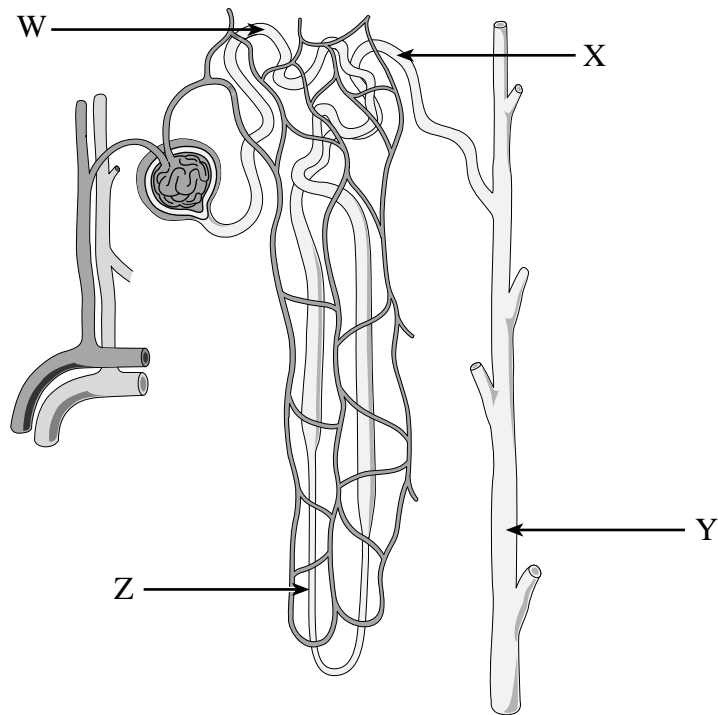
- A. possess cilia.
- B. have thick, muscular walls.
- C. are richly supplied with capillaries.
- D. are controlled by the autonomic nervous system.

41. Which of the following reactions would be considered a part of external respiration?

- A.  $O_2 + Hb \rightarrow HbO_2$
- B.  $CO_2 + Hb \rightarrow HbCO_2$
- C.  $O_2 + H_2O \rightarrow H_2O_2$
- D.  $CO_2 + H_2O \rightarrow H_2CO_3$

42. Pressure filtration occurs at the
- A. glomerulus.
  - B. loop of Henle.
  - C. collecting duct.
  - D. afferent arteriole.

Use the following diagram to answer question 43.



43. Which of the structures indicated in the diagram above is the distal convoluted tubule?
- A. W
  - B. X
  - C. Y
  - D. Z
- 

44. Which of the following structures would **not** be considered an organ of excretion?
- A. Skin.
  - B. Liver.
  - C. Colon.
  - D. Small intestine.

45. Which substance would normally be found in higher concentration in urine than in blood?
- A. Urea.
  - B. Protein.
  - C. Oxygen.
  - D. Glucose.

46. The part of the nephron having the **greatest** glucose concentration is the
- A. loop of Henle.
  - B. collecting duct.
  - C. Bowman's capsule.
  - D. distal convoluted tubule.

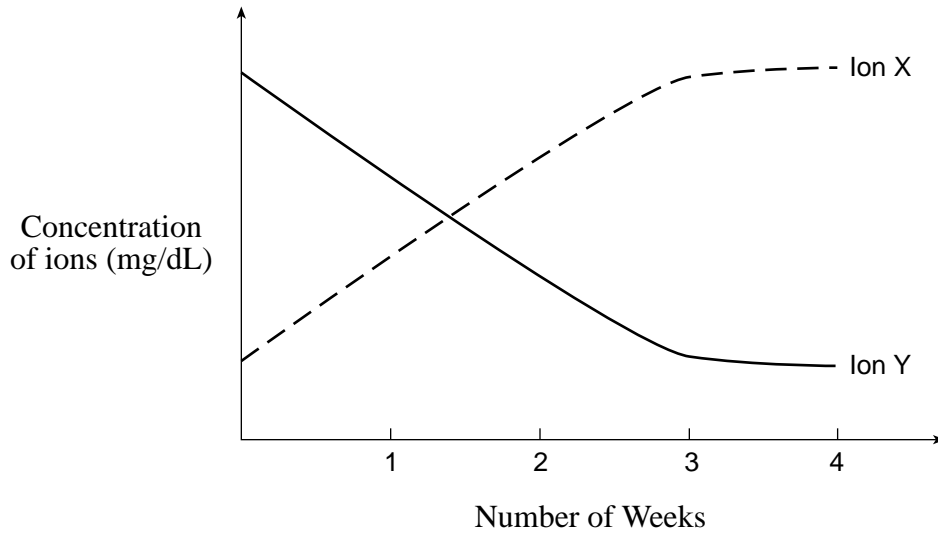
47. Plasma was analyzed from a student before and after a 50 km bicycle race and the results appear below.

PLASMA	SODIUM IONS (units/L)	GLUCOSE (mg/dL)	UREA (mg/dL)
Before	140	100	25
After	225	140	37

An increase in which of the following will help return plasma concentrations to normal levels?

- A. Thyroxin.
  - B. Adrenalin.
  - C. Antidiuretic hormone (ADH).
  - D. Adrenocorticotrophic hormone (ACTH).
48. Increasing the levels of aldosterone in the blood would result in
- A. increased blood volume.
  - B. decreased blood pressure.
  - C. decreased urea production.
  - D. increased urine production.

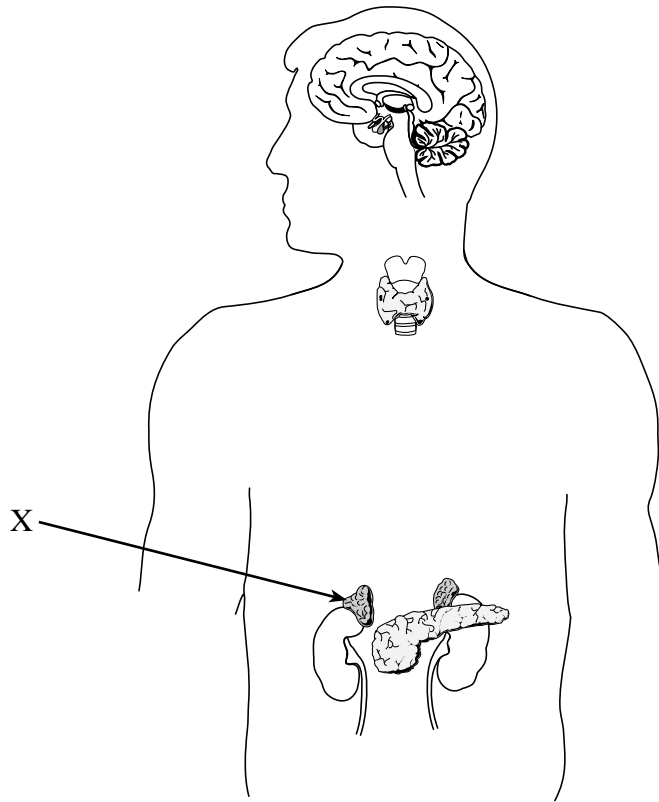
49. The graph below shows the concentrations of two ions found in plasma over a four week period. During the same time period, the level of a hormone in the plasma increased.



The hormone regulating the ion levels shown in the graph above is

- A. insulin.
  - B. cortisol.
  - C. parathormone (PTH).
  - D. growth hormone (GH).
50. Skeletal growth is promoted by a hormone secreted by the
- A. adrenal cortex.
  - B. adrenal medulla.
  - C. anterior pituitary gland.
  - D. posterior pituitary gland.
51. Positive feedback controls the secretion of which of the following hormones?
- A. Oxytocin.
  - B. Calcitonin.
  - C. Antidiuretic hormone.
  - D. Growth hormone (GH).

Use the following diagram to answer question 52.



52. Which of the following hormones is secreted by the gland indicated by **X** in the diagram above?
- A. Cortisol.
  - B. Secretin.
  - C. Glucagon.
  - D. Calcitonin.

**This is the end of the multiple-choice section.  
Answer the remaining questions directly in this examination booklet.**

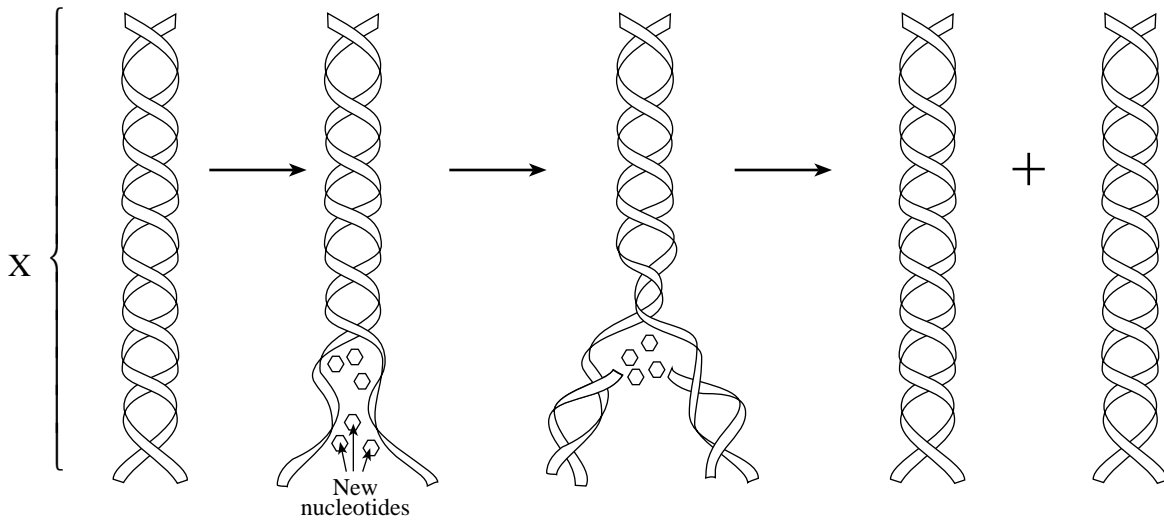
**PART B: WRITTEN RESPONSE**

**Value: 28 marks**

**Suggested Time: 50 minutes**

- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination.
  2. Write your answers in the space below the questions.
  3. Organization and planning space has been incorporated into the space allowed for answering each question.
  4. You may not need all of the space provided to answer each question.

**Use the following diagram to answer question 1.**



1. a) Name the molecule indicated by **X**.

**(1 mark)**

\_\_\_\_\_

b) Where in a human cell does the process shown above occur?

**(1 mark)**

\_\_\_\_\_

c) List **two** functions of molecule **X**.

**(2 marks: 1 mark each)**

i) \_\_\_\_\_

ii) \_\_\_\_\_

Score for  
Question 1:

1. \_\_\_\_\_  
(4)



2. Complete the following table contrasting photosynthesis and cellular respiration.

(4 marks:  $\frac{1}{2}$  mark each)

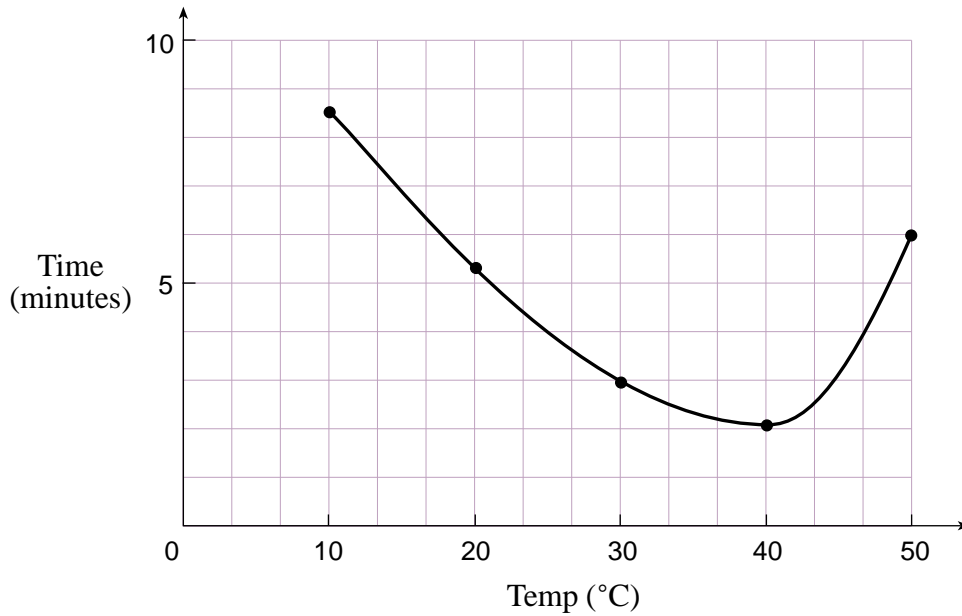
	PHOTOSYNTHESIS	CELLULAR RESPIRATION
Reactants		
End products		
Source of energy		
Organelle involved		

Score for  
Question 2:

2.           
(4)

**OVER**

3. An experiment was performed to determine the effect of changing temperature on the speed of blood clotting. Whole blood was placed in labelled test tubes. The tubes were then placed in water baths of various temperatures. Time required for a clot to form was then measured. The results are graphed below. **(6 marks: 2 marks each)**



Give the clotting times observed at 10°C, 40°C and 50°C and explain why these clotting times occur.

10°C: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

40°C: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

50°C: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

<p>Score for Question 3:</p> <p>3. _____ (6)</p>
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4. a) Name the components of pancreatic juice and state how each aids in the digestion of food. **(4 marks)**

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b) What is the function of water in pancreatic juice? **(1 mark)**

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Score for Question 4:
4. <u>          </u> (5)

5. Give **one** function of each of the following parts of the nervous system.  
(5 marks: 1 mark each)

Autonomic nervous system:

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Somatic nervous system:

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Thalamus:

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Cerebrum:

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Corpus callosum:

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Score for  
Question 5:

5.         
(5)

6. Describe how the endocrine system maintains blood sugar at homeostatic levels. (4 marks)

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Score for Question 6:
6. <u>        </u> (4)

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## PART C: OPTION SECTION

Value: 20 marks

Suggested Time: 30 minutes

- INSTRUCTIONS:**
1. Select **two** options from the six options listed below.
  2. Answer **all** of the questions in each option that you select.
  3. If you answer questions in more than two options, only the **first two** will be marked.
  4. You may not need all of the space provided to answer each question.

**OPTION I:** IMMUNOLOGY

**OPTION II:** SKELETAL SYSTEM AND MUSCLES

**OPTION III:** REPRODUCTION AND EMBRYOLOGY

**OPTION IV:** GENETIC DISORDERS AND ENGINEERING

**OPTION V:** CANCER

**OPTION VI:** SENSORY RECEPTORS

**OPTION I: IMMUNOLOGY**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
antigen	
booster shot	a) produced by hybridoma _____
interferon	b) involved in cell-mediated immunity _____
monoclonal antibody	c) brings about secondary immune response _____
T cell	d) phagocytic cell derived from monocytes _____
B cell	e) marker on a foreign cell surface _____
primary immune response	f) secreted by virus-infected cell _____
macrophage	

2. State **one** function of each of the following in the immune system. **(2 marks: 1 mark each)**

Antibodies:

\_\_\_\_\_

\_\_\_\_\_

Memory B cells:

\_\_\_\_\_

\_\_\_\_\_

3. Give **two** ways in which passive immunity can be acquired. **(2 marks: 1 mark each)**

- i) \_\_\_\_\_
- ii) \_\_\_\_\_

Score for Option I:  7. _____ (10)
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**OPTION II: SKELETAL SYSTEM AND MUSCLES**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
tendon	
cartilage	a) provides energy for muscle contraction _____
Haversian canal	b) thin filaments within muscle tissue _____
skeletal	c) tissue joining muscles to bones _____
ATP	d) contractile unit of a muscle _____
sarcomere	e) location of blood vessels in bone _____
actin	f) muscle under autonomic control _____
cardiac	

2. Give **one** function of each of the following. **(2 marks: 1 mark each)**

Spongy bone:

\_\_\_\_\_

\_\_\_\_\_

Compact bone:

\_\_\_\_\_

\_\_\_\_\_

3. Why can muscles **not** operate continuously during oxygen debt? **(2 marks)**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Score for Option II:
8. _____ (10)

**OPTION III: REPRODUCTION AND EMBRYOLOGY**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
epididymis	
blastula	a) contains enzymes allowing fertilization to occur _____
oögenesis	b) causes secondary sex characteristics _____
Cowper's gland	c) production of egg cells _____
in vitro fertilization	d) a hollow ball of cells _____
morphogenesis	e) area of sperm maturation _____
acrosome	f) artificial zygote implantation _____
estrogen	

2. Give **one** function of each of the following in the male reproductive system. **(2 marks: 1 mark each)**

Seminal vesicles:

\_\_\_\_\_

\_\_\_\_\_

Seminiferous tubules:

\_\_\_\_\_

\_\_\_\_\_

3. What is the function of each of the following hormones in the female reproductive system? **(2 marks: 1 mark each)**

Luteinizing hormone:

\_\_\_\_\_

\_\_\_\_\_

Follicle stimulating hormone:

\_\_\_\_\_

\_\_\_\_\_

Score for  
Option III:

9. \_\_\_\_\_  
(10)

**OPTION IV: GENETIC DISORDERS AND ENGINEERING**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
transformation	
protoplast	a) absorbing new genetic material _____
virus	b) a method of detecting genetic abnormalities before birth _____
mitosis	c) a type of bacterial DNA _____
amniocentesis	d) seals new gene into plasmid _____
plasmid	e) plant cell stripped of its cell wall _____
ligase	f) cell division _____
restriction enzyme	

2. List **two** characteristics of people with the following genetic disorders.

a) Turner's syndrome: **(1 mark:  $\frac{1}{2}$  mark each)**

i) \_\_\_\_\_

ii) \_\_\_\_\_

b) Trisomy XYY: **(1 mark:  $\frac{1}{2}$  mark each)**

i) \_\_\_\_\_

ii) \_\_\_\_\_

3. Describe the process involved in the production of recombinant DNA. **(2 marks)**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Score for Option IV:
10. _____ (10)

**OPTION V: CANCER**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
oncogene	
neoplasia	a) tumors that do not spread to new locations _____
retrovirus	b) increases blood supply to tumor _____
vascularization	c) new growth of cancerous cells _____
metastasis	d) cancer-causing segment of DNA _____
benign	e) uses RNA as genetic material _____
interferon	f) spreading of cancer cells throughout the body _____
anaplasia	

2. Name **two** types of cancer and the tissue in which each originates.

**(2 marks:  $\frac{1}{2}$  mark each)**

Type of Cancer 1: \_\_\_\_\_

Tissue: \_\_\_\_\_

Type of Cancer 2: \_\_\_\_\_

Tissue: \_\_\_\_\_

3. List **two** characteristics of cancer cells.

**(2 marks: 1 mark each)**

i) \_\_\_\_\_

\_\_\_\_\_

ii) \_\_\_\_\_

\_\_\_\_\_

Score for Option V:  11. _____ (10)
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**OPTION VI: SENSORY RECEPTORS**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
proprioceptor	
cone	a) taste bud _____
rod	b) light enters the eye through this structure _____
otolith	c) senses position of limbs _____
chemoreceptor	d) responsible for vision in low light _____
cornea	e) calcium carbonate granules _____
olfaction	f) the ability to smell _____
optic nerve	

2. a) What is *accommodation*? **(1 mark)**

\_\_\_\_\_

\_\_\_\_\_

- b) How does accommodation occur? **(2 marks)**

\_\_\_\_\_

\_\_\_\_\_

3. Where in the cochlea are different sound pitches detected? **(1 mark)**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Score for Option VI:
12. <u>        </u> (10)

**END OF EXAMINATION**