

**JUNE 1997**

## **PROVINCIAL EXAMINATION**

**MINISTRY OF EDUCATION, SKILLS AND TRAINING**

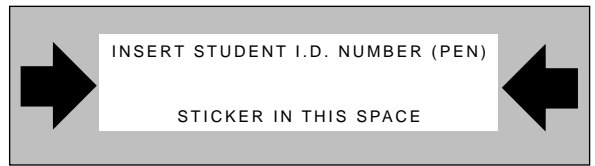
# **BIOLOGY 12**

### **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**



**BIOLOGY 12 JUNE 1997 PROVINCIAL**

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

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

2. \_\_\_\_\_  
(7)

3. \_\_\_\_\_  
(4)

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

5. \_\_\_\_\_  
(3)

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

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

Option I: 7.  $\frac{\quad}{(10)}$

Option IV: 10.  $\frac{\quad}{(10)}$

Option II: 8.  $\frac{\quad}{(10)}$

Option V: 11.  $\frac{\quad}{(10)}$

Option III: 9.  $\frac{\quad}{(10)}$

Option VI: 12.  $\frac{\quad}{(10)}$

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## BIOLOGY 12 PROVINCIAL EXAMINATION

	<b>Value</b>	<b>Suggested Time</b>
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1. This examination consists of **three** parts:

PART A:	52 multiple-choice questions	52	40
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PART B:	6 written-response questions	28	50
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PART C:	Option section consisting of only written-response questions. Select <b>only two</b> options. Each option is worth 10 marks.	20	30
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**Total: 100 marks      120 minutes**

- 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.
- For written-response questions, organization and planning space has been incorporated into the space allowed for answering each question.
- You have **two hours** to complete this examination.

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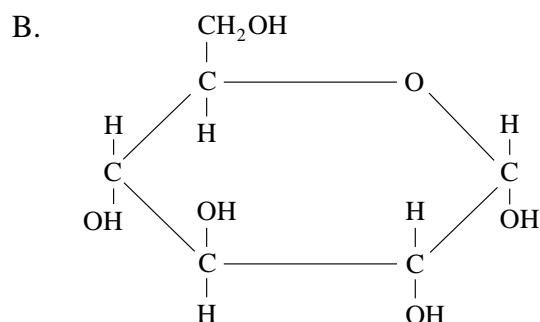
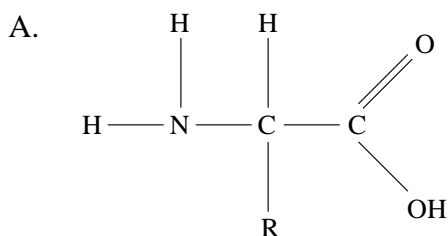
## PART A: MULTIPLE CHOICE

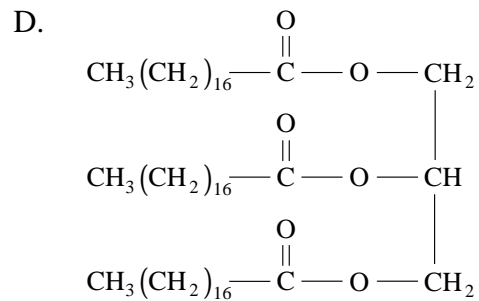
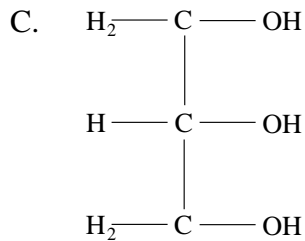
Value: 52 marks

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. A substance that combines with excess hydrogen or hydroxide ions in a solution is called
  - A. a salt.
  - B. a base.
  - C. an acid.
  - D. a buffer.
  
2. A lipid molecule is produced when
  - A. fatty acids bond to glycerol.
  - B. amino acids bond to glycerol.
  - C. monosaccharides bond to glycogen.
  - D. dehydration occurs between fatty acids and glycogen.
  
3. The building block of an enzyme is represented by





4. The **main** source of energy for the body's metabolic processes comes from the breakdown of
- lipids.
  - proteins.
  - nucleic acids.
  - carbohydrates.
5. The hydrolysis of which of the following substances will produce the greatest number of glucose molecules?
- Maltose.
  - Sucrose.
  - A disaccharide.
  - A polysaccharide.

**Use the following events to answer question 6.**

- mRNA is formed.
  - DNA segment opens (unzips).
  - mRNA attaches to ribosomes.
  - amino acids form peptide bonds.
  - tRNA carries amino acids to mRNA.
6. The correct order of events required for protein synthesis is
- 1, 2, 3, 4, 5.
  - 2, 1, 3, 4, 5.
  - 2, 1, 3, 5, 4.
  - 2, 1, 4, 5, 3.
7. The molecule that is responsible for carrying amino acids to ribosomes is
- DNA.

- B. tRNA.
- C. rRNA.
- D. mRNA.

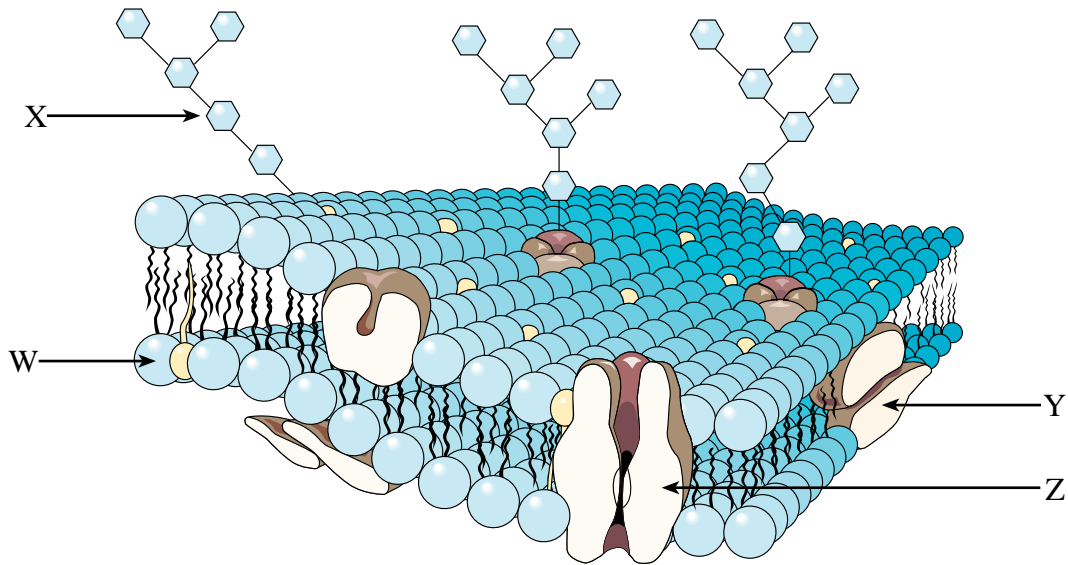
8. Which of the following is found in both prokaryotic and eukaryotic cells?

- A. Nucleus.
- B. Ribosome.
- C. Lysosome.
- D. Mitochondrion.

9. Which of the following contains large amounts of hydrolytic enzymes?

- A. Centriole.
- B. Ribosome.
- C. Nucleolus.
- D. Lysosome.

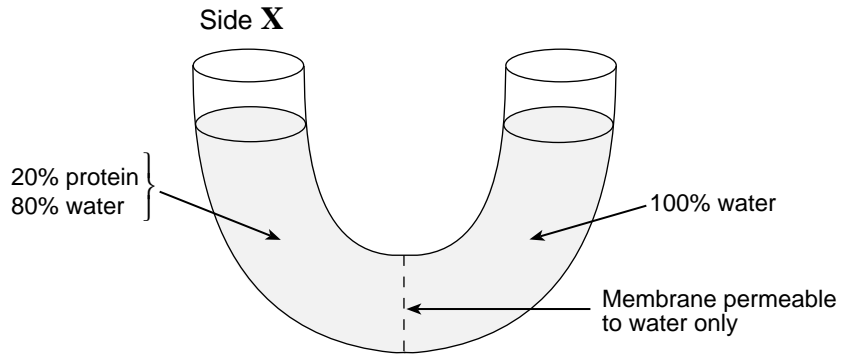
**Use the following diagram to answer question 10.**



10. Which molecule allows lipids to enter and exit the cell?

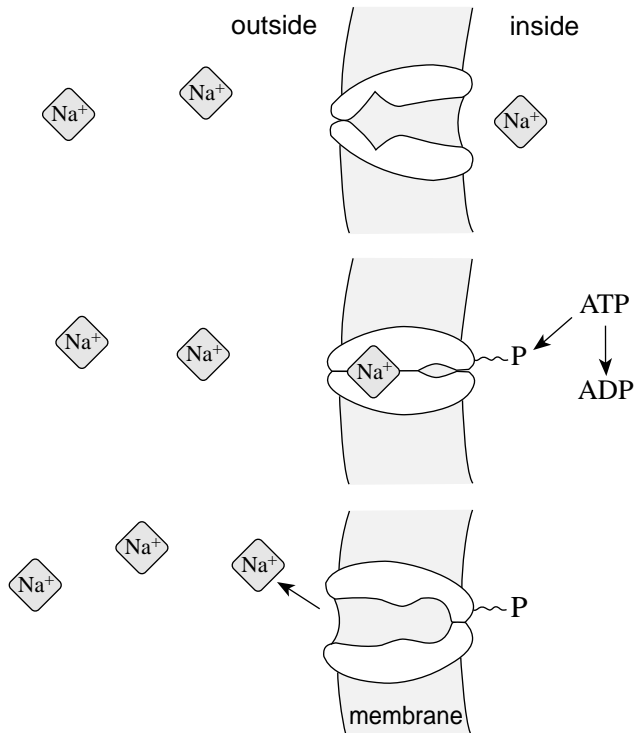
- A. W
- B. X
- C. Y
- D. Z

Use the following diagram to answer question 11.



11. In the diagram above, what happens to the fluid level and protein concentration on side X?
- A. Fluid level increases and protein concentration increases.
  - B. Fluid level increases and protein concentration decreases.
  - C. Fluid level decreases and protein concentration increases.
  - D. Fluid level decreases and protein concentration decreases.

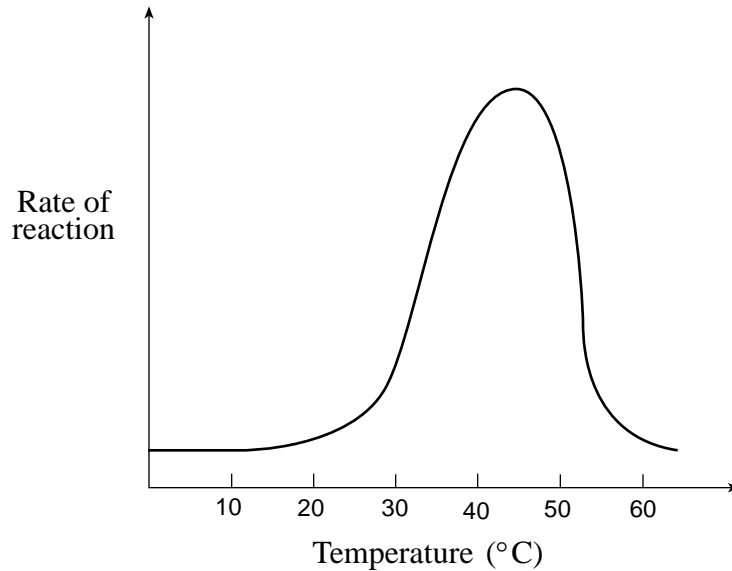
Use the following diagram to answer question 12.



12. The process taking place in the diagram above is
- A. diffusion.
  - B. phagocytosis.

- C. active transport.
- D. facilitated transport.

13. The following graph shows an enzyme catalyzed reaction.

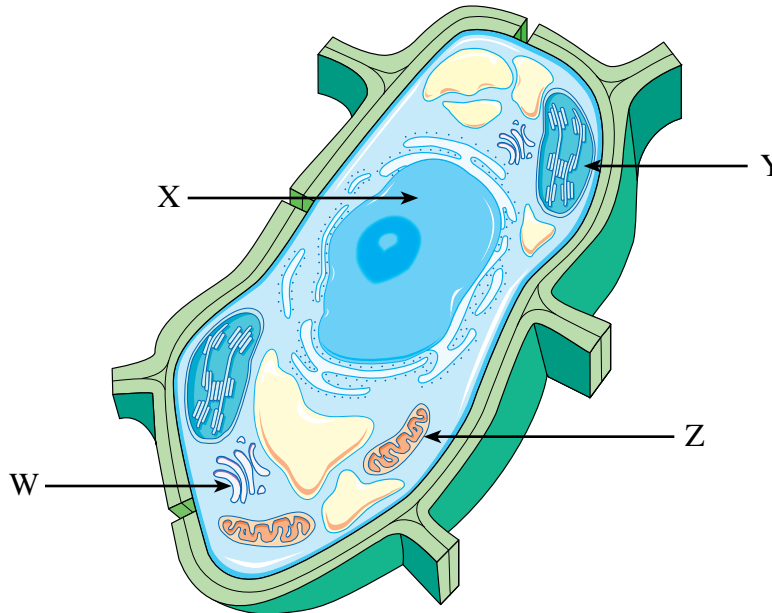


Which of the following might explain the change in the rate of reaction at temperatures greater than 50°?

- A. More enzyme was added.
  - B. More substrate was added.
  - C. Coenzymes compete for the enzyme's active site.
  - D. The tertiary shape of the enzyme has been altered.
14. The reaction  $\text{NAD} + \text{H}_2 \rightarrow \text{NADH}_2$  is an example of
- A. oxidation.
  - B. reduction.
  - C. hydrolysis.
  - D. polymerization.
15. The **anaerobic** respiration of one glucose molecule will result in the net production of
- A. 1 ATP.
  - B. 2 ATP.
  - C. 36 ATP.
  - D. 38 ATP.

16. In anaerobic respiration, lactic acid is formed in the
- A. ribosome.
  - B. cytoplasm.
  - C. Golgi body.
  - D. mitochondrion.

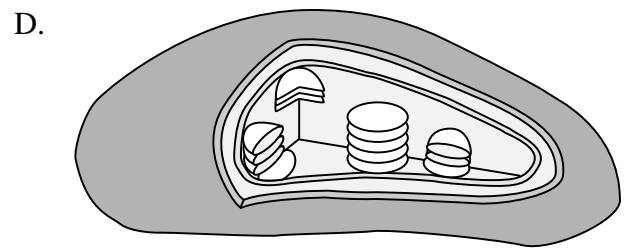
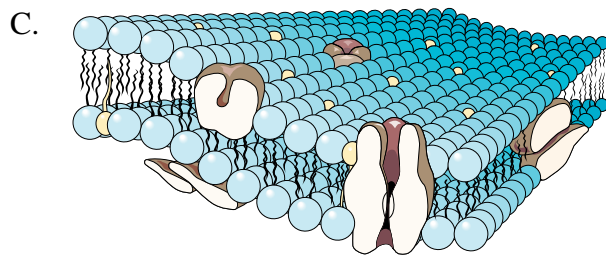
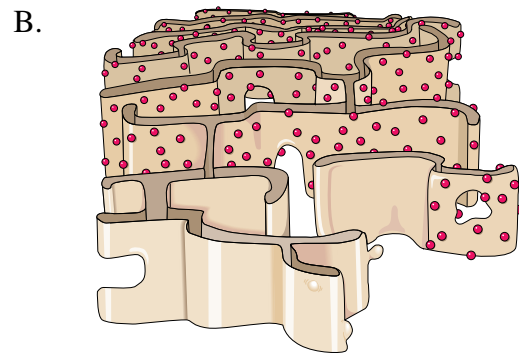
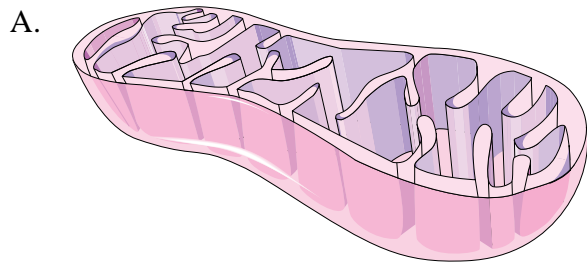
Use the following diagram to answer question 17.



17. In the diagram above, the light dependent reactions occur in the structure labelled
- A. W
  - B. X
  - C. Y
  - D. Z
- 

18. The correct pathway for an electron moving through non-cyclic photophosphorylation is
- A. photosystem I, electron transport system, photosystem I.
  - B. photosystem II, electron transport system, photosystem I.
  - C. photosystem II, photosystem I, electron transport system.
  - D. photosystem II, electron transport system, photosystem II.

19. Which of the following structures is the site of reduction of  $\text{CO}_2$ ?



20. The number of PGAL molecules required to produce one glucose molecule ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) is

- A. one.
- B. two.
- C. three.
- D. four.

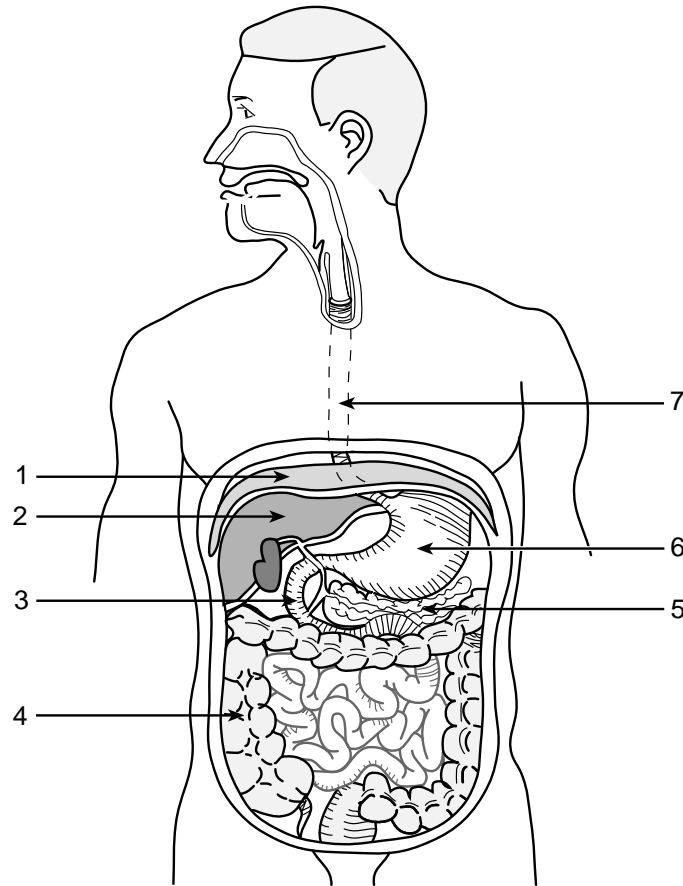
21. Red blood cells are formed by

- A. muscle tissue.
- B. nervous tissue.
- C. epithelial tissue.
- D. connective tissue.



22. Which of the following is required to convert pepsinogen into pepsin?
- A. Mucus secretions.
  - B. Hydrochloric acid.
  - C. Sodium bicarbonate.
  - D. Lipid in the stomach.
23. Which of the following enzymes is correctly matched with its site of production?
- A. Pepsin – liver.
  - B. Lipase – stomach.
  - C. Amylase – pancreas.
  - D. Trypsin – salivary glands.
24. People who have their gall bladder removed have the most difficulty digesting
- A. butter.
  - B. apples.
  - C. vitamins.
  - D. egg whites.

Use the following diagram to answer questions 25 and 26.



25. Organs associated with the production of glycogen are

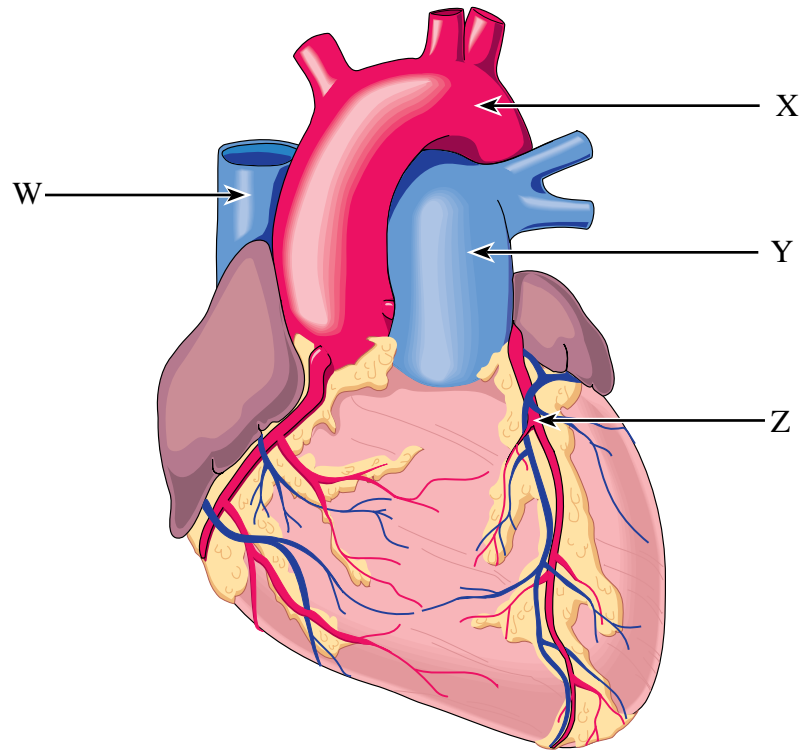
- A. 1 and 6
- B. 2 and 3
- C. 2 and 5
- D. 3 and 5

26. Enzymes that are required for the digestion of proteins are produced in organs

- A. 2 and 5
- B. 3 and 4
- C. 5 and 6
- D. 6 and 7

27. Which of the following are absorbed into the lymphatic system from the small intestine?
- A. Lipids.
  - B. Nucleotides.
  - C. Amino acids.
  - D. Monosaccharides.
28. A function of the liver is to
- A. produce glucagon.
  - B. break down blood cells.
  - C. regulate sodium and potassium levels.
  - D. secrete enzymes into the small intestine.
29. Blood leaves the liver by way of the
- A. iliac vein.
  - B. renal vein.
  - C. hepatic vein.
  - D. hepatic portal vein.

Use the following diagram to answer question 30.



30. Which blood vessel in the diagram above directly supplies the heart tissue with oxygen and nutrients?

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

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31. The sequence of structures through which the nerve impulse passes to cause contraction of the heart is

- A. AV node – SA node – Purkinje fibres.
- B. Purkinje fibres – AV node – SA node.
- C. Purkinje fibres – SA node – AV node.
- D. SA node – AV node – Purkinje fibres.

32. Carbonic anhydrase catalyzes a reaction between

- A. water + hydrogen.
- B. water + hemoglobin.

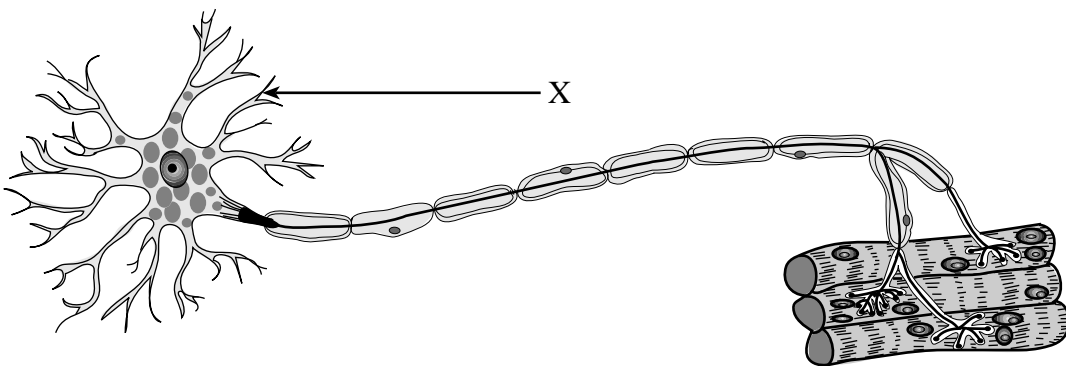
- C. water + carbon dioxide.
  - D. hydrogen + hemoglobin.
33. Erythroblastosis could occur when a second or third child is born to which of the following couples?
- A. Rh positive male and Rh positive female.
  - B. Rh negative male and Rh positive female.
  - C. Rh positive male and Rh negative female.
  - D. Rh negative male and Rh negative female.

Use the following table to answer question 34.

1.	Axon
2.	Dendrite
3.	Cell body
4.	Receptor

34. The correct order for the transmission of an impulse along a sensory neuron is
- A. 3, 1, 4, 2
  - B. 3, 2, 1, 4
  - C. 4, 1, 3, 2
  - D. 4, 2, 3, 1

Use the following diagram to answer question 35.



35. The function of the structure labelled **X** in the diagram above is to
- A. release adrenalin.
  - B. release acetylcholine.
  - C. carry an impulse to the brain.
  - D. carry an impulse to the cell body.

OVER



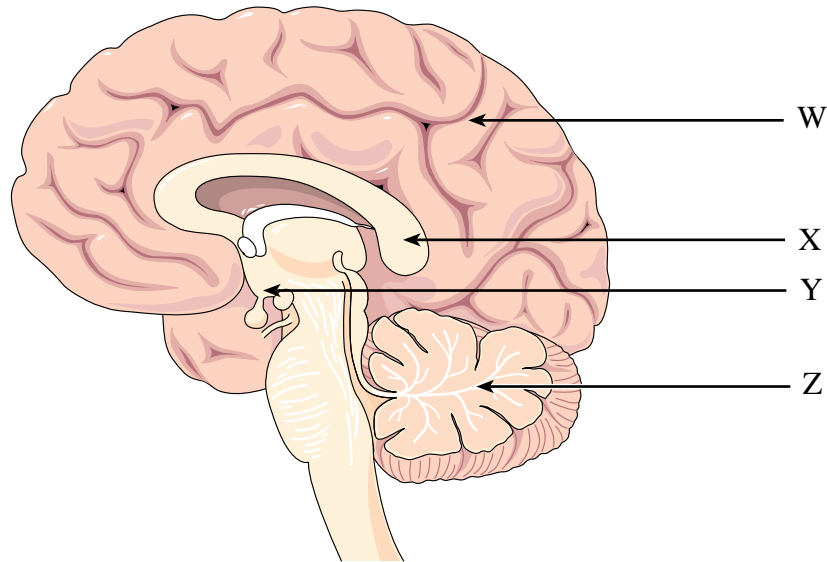
36. Which of the following **best** describes the location of ions during resting potential?
- A. A low concentration of sodium ions on the outside, and a high concentration of potassium ions on the inside of the neuron.
  - B. A low concentration of sodium ions on the outside, and a low concentration of potassium ions on the inside of the neuron.
  - C. A high concentration of sodium ions on the outside, and a low concentration of potassium ions on the inside of the neuron.
  - D. A high concentration of sodium ions on the outside, and a high concentration of potassium ions on the inside of the neuron.
37. A certain drug **inhibits** the action of a neurotransmitter. The effects of the drug are shown in the table below.

	BEFORE DRUG	AFTER DRUG
Breathing rate (breaths/minute)	40	30
Heart rate (beats/minute)	90	63
Blood flow to small intestine (mL/minute)	1 400	1 800

This drug affected the

- A. cerebellum.
- B. corpus callosum.
- C. sympathetic nervous system.
- D. parasympathetic nervous system.

Use the following diagram to answer question 38.



38. An inability to maintain your balance and to walk in a smooth, graceful manner could indicate damage to which of the labelled structures?

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

39. Damage to the occipital lobe could affect

- A. sight.
- B. hearing.
- C. heartbeat.
- D. water balance.

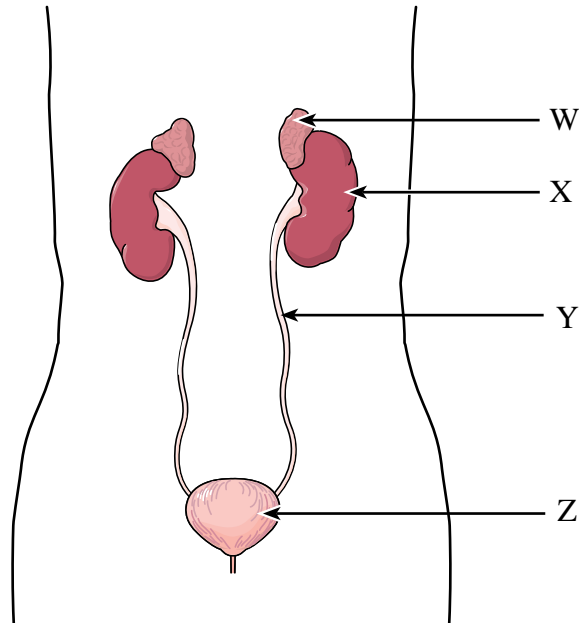
40. The correct sequence of structures through which air passes during inhalation is

- A. bronchi, bronchioles, alveoli, trachea.
- B. bronchioles, bronchi, trachea, alveoli.
- C. trachea, bronchi, alveoli, bronchioles.
- D. trachea, bronchi, bronchioles, alveoli.



41. The process of inhaling is accomplished in part by
- A. relaxation of the diaphragm.
  - B. contraction of the rib muscles.
  - C. a decrease in the volume of the thoracic cavity.
  - D. an increase in the pressure of the thoracic cavity.
42. Hemoglobin releases oxygen at the tissues if
- A. temperature decreases and the blood is more acidic.
  - B. temperature decreases and the blood is more basic.
  - C. temperature increases and the blood is more acidic.
  - D. temperature increases and the blood is more basic.
43. Cilia in the trachea
- A. remove debris.
  - B. produce mucus.
  - C. move by peristalsis.
  - D. increase the surface area.

Use the following diagram to answer question 44.



44. In the diagram above, pressure filtration occurs in

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

45. The composition of the glomerular filtrate in a healthy person is identical to plasma, **except** for the amount of

- A. salt.
- B. protein.
- C. glucose.
- D. carbon dioxide.

46. Antidiuretic hormone (ADH) has an effect on the

- A. glomerulus.
- B. loop of Henle.
- C. collecting duct.
- D. proximal tubule.



47. Which of the following could have an immediate effect on blood pressure?
- A. Gastrin.
  - B. Adrenalin.
  - C. Parathormone.
  - D. Growth hormone.
48. Increased secretions of cortisol will result in an increase in the
- A. concentration of glycogen in the blood.
  - B. concentration of amino acids in the blood.
  - C. concentration of calcium ions in the blood.
  - D. absorption of glucose by the cells of the body.
49. A patient is observed to have the following symptoms: a higher than normal concentration of glucose in the urine, increased urine production and constant fatigue. Which of the following glands is not functioning properly?
- A. Thymus.
  - B. Pancreas.
  - C. Parathyroid.
  - D. Adrenal medulla.
50. Which of the following statements best describes the effects of thyroxin on body cells?
- A. Increased glucose and increased oxygen consumption.
  - B. Increased glucose and decreased oxygen consumption.
  - C. Decreased glucose and increased oxygen consumption.
  - D. Decreased glucose and decreased oxygen consumption.

51. Which of the following is mismatched?
- A. Oxytocin – increased water retention.
  - B. Thyroxin – increased oxygen uptake by cells.
  - C. Adrenalin – increased sympathetic nervous activity.
  - D. Parathormone – increased plasma calcium concentration.
52. The level of  $\text{Ca}^+$  in the blood is controlled by
- A. thyroxin and oxytocin.
  - B. thyroxin and calcitonin.
  - C. parathyroid hormone and thyroxin.
  - D. parathyroid hormone and 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.

1. A cell lining the digestive system produces and secretes an enzyme into the digestive tract. State the role of the following in these processes. **(4 marks: 1 mark each)**

Ribosome:

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Endoplasmic reticulum:

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Golgi body:

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Vesicle:

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Score for Question 1:  1. _____ (4)
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2. a) Describe DNA replication. **(3 marks)**

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3. a) In the space below, draw a villus. On your diagram, clearly label the capillaries and lacteal. **(3 marks)**

b) Give **one** function of the villus. **(1 mark)**

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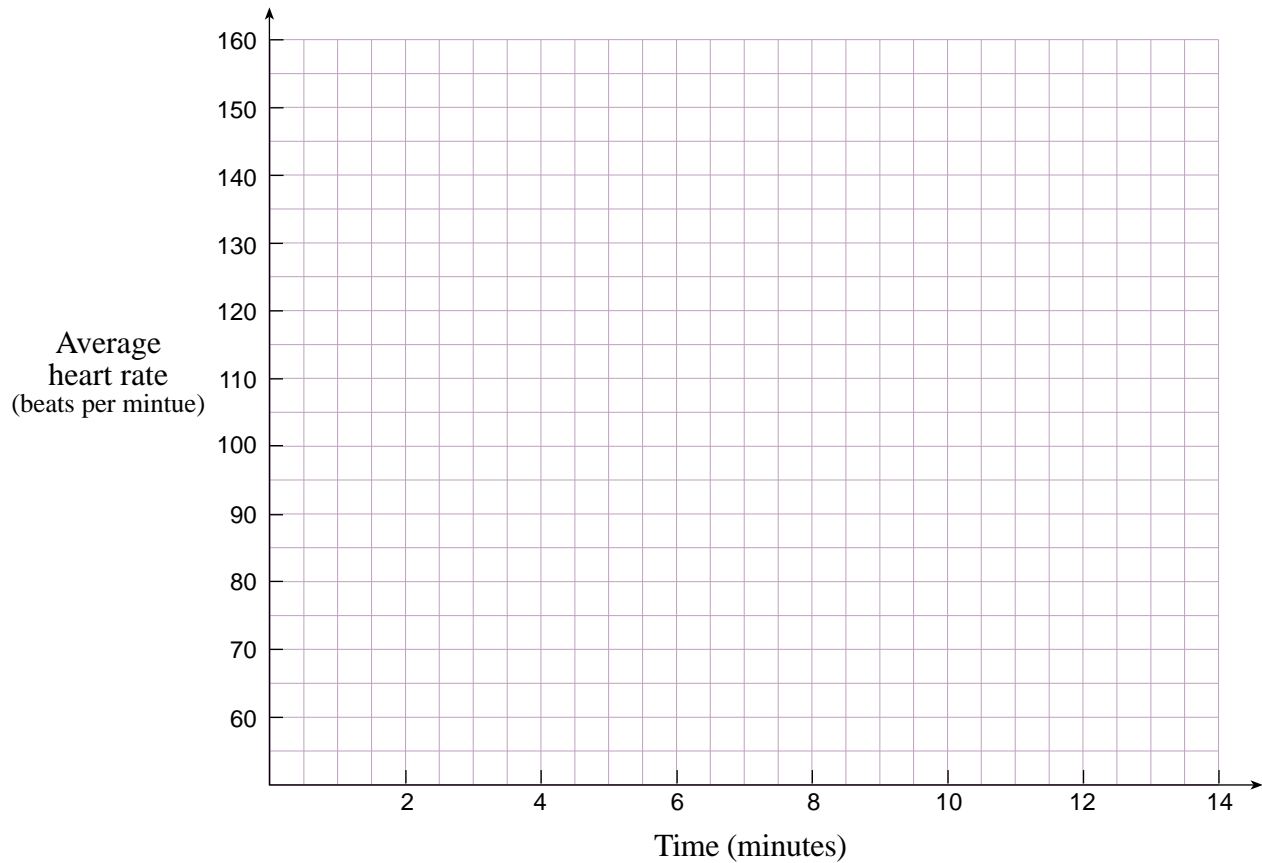
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Score for Question 3: <b>OVER</b> 3. <u>        </u> (4)
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4. The average heart rate (beats per minute) of a group of figure skaters was calculated every two minutes over a 14 minute period which included a ten minute skating exercise. Heart rates were recorded at both the beginning and end of the skating season. The results appear in the data table below.

		AVERAGE HEART RATE (beats per minute)	
ACTIVITY	TIME (minutes)	BEGINNING OF SEASON	END OF SEASON
At rest (before skating)	0	76	64
Skating	2	84	64
	4	100	72
	6	120	80
	8	134	84
	10	156	92
At rest (after skating)	12	110	70
	14	90	64

- a) Construct a graph of the data given above. Use a solid line for heart rates at the beginning of the season and a broken line for heart rates at the end of the season.  
(2 marks)



b) State **two** reasons for the change in heart rate during the skating exercise. **(2 marks: 1 mark each)**

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

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

c) Explain the difference in the time required for heart rates to return to resting levels at the beginning and at the end of the skating season. **(2 marks)**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**OVER**

5. a) List **two** substances that are selectively reabsorbed at the proximal convoluted tubule of a nephron. **(1 mark:  $\frac{1}{2}$  mark each)**

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

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

b) List **two** substances that are excreted at the distal convoluted tubule of a nephron. **(1 mark:  $\frac{1}{2}$  mark each)**

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

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

c) What effect does increased antidiuretic hormone (ADH) have on urine production? **(1 mark)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Score for  
Question 5:

5. \_\_\_\_\_  
(3)

6. Give **one** physiological response of the body to the following situations and explain why this response occurs. **(4 marks: 2 marks each)**

Lower than normal body temperature:

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Large amounts of protein in the stomach:

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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)**

<b>COLUMN A</b>	<b>COLUMN B</b>
interferon	
passive immunity	a) produces monoclonal antibodies _____
active immunity	b) produced by infected cells _____
hybridoma	c) causes airways to constrict _____
helper T cell	d) stimulates other cells of the immune system _____
histamine	e) lyses infected cells _____
cytotoxic (killer T) cell	f) results from circulating memory cells _____
neutrophil	

2. Define *auto immune disease*, and give **one** example of such a disease.  
(2 marks: 1 mark each)

Definition: \_\_\_\_\_  
\_\_\_\_\_

Example: \_\_\_\_\_

3. Identify **two** ways that the rejection of transplanted tissue may be prevented.  
(2 marks: 1 mark each)

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

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

Score for  
Option I:

7. \_\_\_\_\_  
(10)

**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
sarcolemma	
tendon	a) found in ears and between vertebrae _____
myofibril	b) connects bones to bones _____
ligament	c) portion of a muscle fibre with multiple sarcomeres _____
sarcoplasmic reticulum	d) capable of breaking down ATP _____
myosin	e) cell membrane of muscle cells _____
creatine phosphate	f) source of energy for contraction _____
cartilage	

2. Name **two** types of joints and give **one** example of each. **(2 marks)**

Name: \_\_\_\_\_

Example: \_\_\_\_\_

Name: \_\_\_\_\_

Example: \_\_\_\_\_

3. State **two** differences between smooth muscle and skeletal muscle. **(2 marks)**

	Smooth Muscle	Skeletal Muscle
i)		
ii)		

Score for Option II:  8. _____ (10)
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**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
acrosome	
corpus luteum	a) a hollow ball of cells _____
follicle	b) site of embryonic development _____
blastula	c) initial stage of cellular differentiation in embryo _____
neurula	d) produces progesterone _____
uterus	e) contains enzymes that dissolve the membrane of the egg _____
epididymis	f) site where sperm mature _____
seminiferous tubules	

2. Give **two** functions of seminal fluid. **(2 marks: 1 mark each)**

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

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

3. a) What gland is the source of luteinizing hormone (LH)? **(1 mark)**

\_\_\_\_\_

- b) What is the function of luteinizing hormone (LH) during the last half of the ovarian cycle (days 15 to 28)? **(1 mark)**

\_\_\_\_\_  
 \_\_\_\_\_

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
DNA probe	
protoplast	a) used to “cut up” DNA molecules _____
plasmid	b) enzyme that joins pieces of DNA _____
recombinant DNA	c) a circular segment of DNA _____
ligase	d) used to obtain fetal cells _____
restriction enzyme	e) a plant cell with wall removed _____
amniocentesis	f) results from a change in the genetic makeup of the cell _____
transformation	

2. List **two** characteristics of a person with Down’s Syndrome. **(2 marks: 1 mark each)**

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

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

Spindle fibres:

\_\_\_\_\_  
 \_\_\_\_\_

Centromeres:

\_\_\_\_\_  
 \_\_\_\_\_

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)**

<b>COLUMN A</b>	<b>COLUMN B</b>
neoplasia	
vascularization	a) a tumor that does not spread _____
contact inhibition	b) consumes cancerous cells _____
benign	c) capable of making DNA from RNA _____
malignant	d) increased development of blood vessels _____
oncogene	e) new growth of cancer cells _____
retrovirus	f) characteristic of non-cancerous cells _____
macrophage	

2. What is the role of the following in the development of cancer?

Initiator: **(1 mark)**

\_\_\_\_\_

\_\_\_\_\_

Promoter: **(1 mark)**

\_\_\_\_\_

\_\_\_\_\_

3. Give **two** danger signals that may indicate the presence of cancer.

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

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

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

Score for  
Option V:

11. \_\_\_\_\_  
(10)



**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
chemoreceptor	
cone	a) generates impulses that give sense of hearing _____
Organ of Corti	b) senses the body's position _____
rod	c) responsible for olfactory detection _____
fovea	d) light sensitive cell responsible for colour vision _____
proprioceptor	e) area of most acute vision _____
oval window	f) absorbs sound waves from the stirrup _____
round window	

2. When viewing a close-up object, the ciliary muscles contract, ligaments relax and the lens becomes round. What is this process called? **(1 mark)**

\_\_\_\_\_

3. a) Name **two** parts of the ear which are involved in maintaining balance. **(2 marks)**

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

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

- b) Choose **one** of the parts in 3a) above and describe briefly how it functions. **(1 mark)**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Score for Option VI:  12. _____ (10)
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**END OF EXAMINATION**