INSERT STUDENT I.D. NUMBER (PEN)

STICKER IN THIS SPACE

JUNE 1999

PROVINCIAL EXAMINATION

MINISTRY OF EDUCATION

BIOLOGY 12

GENERAL INSTRUCTIONS

1. Insert the stickers with your Student I.D. Number (PEN) in the allotted spaces above and on the **back** cover of this booklet. **Under no circumstance is your name or identification, other than your Student I.D. Number, to appear on this booklet.**

2. Ensure that in addition to this examination booklet, you have an **Examination Response Form**. Follow the directions on the front of the Response Form.

3. **Disqualification** from the examination will result if you bring books, paper, notes or unauthorized electronic devices into the examination room.

4. All multiple-choice answers must be entered on the Response Form using an **HB pencil**. Multiple-choice answers entered in this examination booklet will **not** be marked.

5. For each of the written-response questions, write your answer in **ink** in the space provided in this booklet.

6. 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.

7. At the end of the examination, place your Response Form inside the front cover of this booklet and return the booklet and your Response Form to the supervisor.

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BIOLOGY 12 PROVINCIAL EXAMINATION

		Value	Suggested Time
1.	This examination consists of **two** parts:		
	PART A: 50 multiple-choice questions	50	45
	PART B: 11 written-response questions	50	75
	Total:	**100 marks**	**120 minutes**

2. Electronic devices, including dictionaries and pagers, are **not** permitted in the examination room.

3. The time allotted for this examination is **two hours**.

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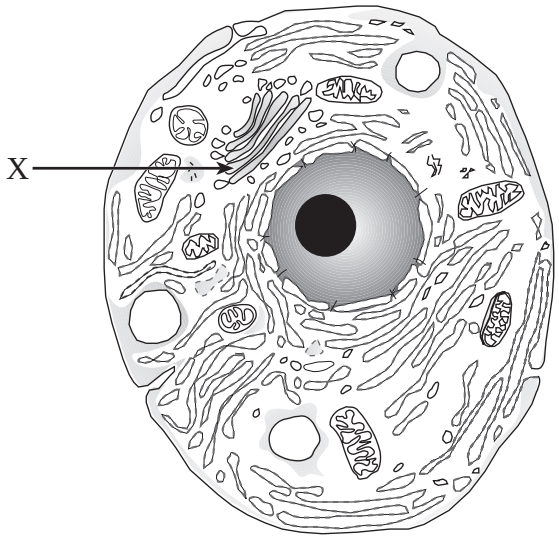
PART A: MULTIPLE CHOICE

Value: 50 marks **Suggested Time: 45 minutes**

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

Use the following diagram to answer question 1.



1. The structure labelled **X** is a(n)

   A. vacuole.
   B. Golgi body.
   C. mitochondrion.
   D. endoplasmic reticulum.

---

2. During the metamorphosis from tadpole to frog, which of the following organelles would cause the cells of the tail of a tadpole to be broken down and digested?

   A. ribosomes
   B. lysosomes
   C. Golgi bodies
   D. endoplasmic reticulum

3. Two functions of rough endoplasmic reticulum are to

   A. detoxify and transport drugs.
   B. modify and activate hormones.
   C. synthesize and transport enzymes.
   D. join with and hydrolyze food vacuoles.

OVER

4. In which of the following is the greatest amount of deoxyribonucleic acid (DNA) found?

   A. nucleus
   B. ribosome
   C. nucleolus
   D. nuclear envelope

5. If the pH of a solution changes from 2 to 5, then the solution has

   A. become a base.
   B. lost hydrogen ions.
   C. become more acidic.
   D. gained hydrogen ions.

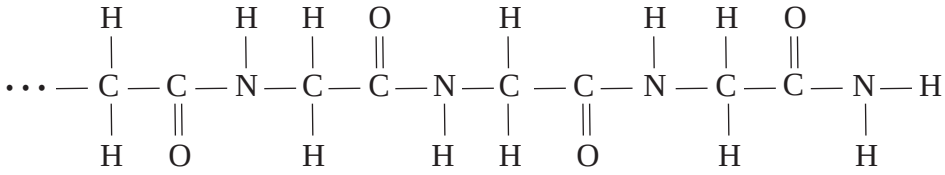
6. The process that joins amino acids together to make enzymes is

   A. oxidation.
   B. hydrolysis.
   C. denaturation.
   D. dehydration synthesis.

7. **Most** of the cell membrane is made from

   A. steroids.
   B. proteins.
   C. phospholipids.
   D. polysaccharides.

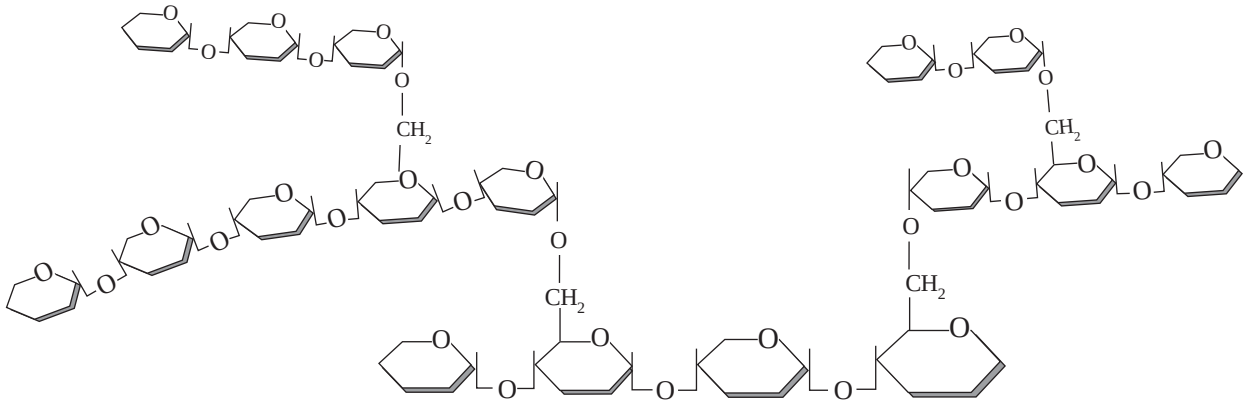
Use the following diagram to answer question 8.



8. The molecule shown above is part of

   A. ATP.
   B. DNA.
   C. a steroid.
   D. an enzyme.

Use the following diagram to answer question 9.



9. The diagram shows a molecule that is found in the

   A. liver.
   B. blood.
   C. pancreas.
   D. gall bladder.

---

10. How many double bonds are there between carbon atoms in a saturated fatty acid?

    A. 0
    B. 1
    C. 2
    D. more than 2

11. Which of the following types of bonding occurs during complementary base pairing?

    A. ionic
    B. peptide
    C. covalent
    D. hydrogen

OVER

12. A polypeptide found in the cytoplasm of a cell contains 12 amino acids. How many nucleotides would be required in the mRNA for this polypeptide to be translated?

A. 4
B. 12
C. 24
D. 36

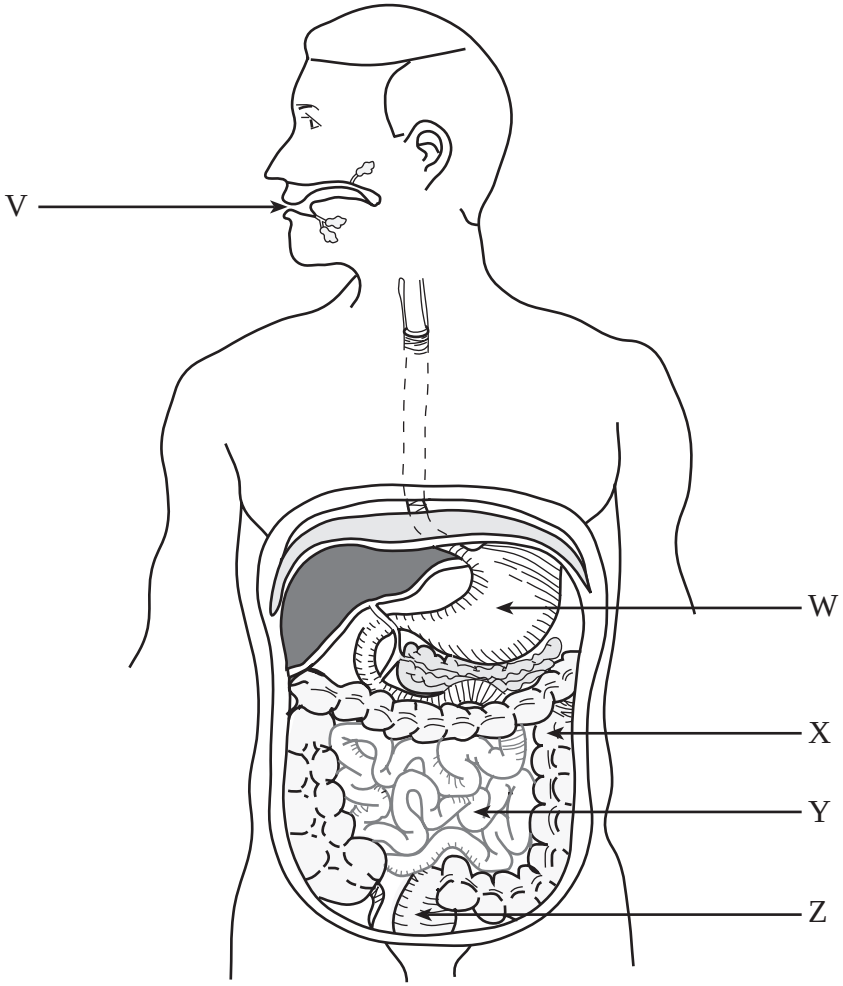
13. A biologist determined the surface area and volume of four cells: two flat cells with the same thickness and two spherical cells. Which of the four cells would have the greatest surface area to volume ratio?

A. The small, flat cell with a volume of 5 microlitres.
B. The small, spherical cell with a volume of 5 microlitres.
C. The large, flat cell with a volume of 10 microlitres.
D. The large, spherical cell with a volume of 10 microlitres.

14. An increase in thyroxin will have which of the following effects?

A. increased CO_2 production
B. increased glycogen production
C. decreased rate of ATP production
D. decreased rate of glucose metabolism

Use the following diagram to answer question 15.

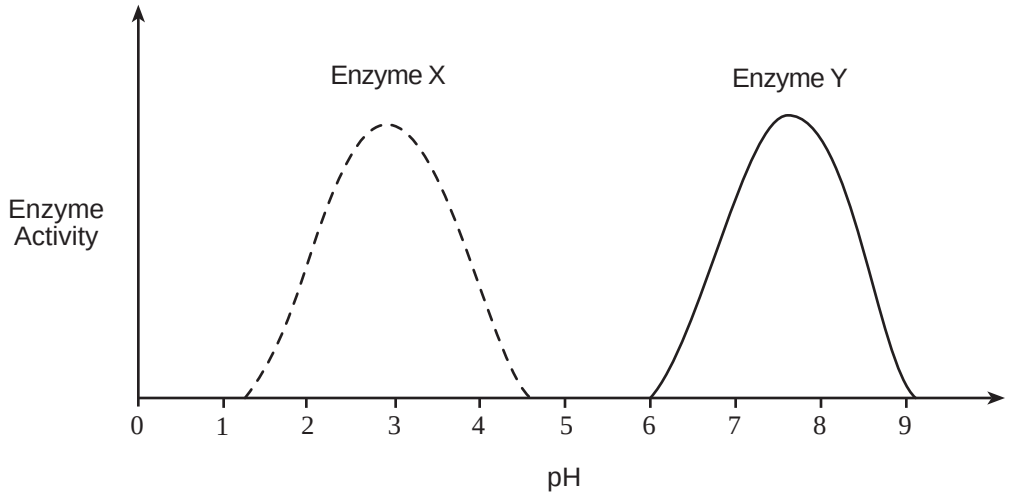


15. Hydrolysis of peptide bonds found in food occurs in

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

OVER

Use the following graph to answer question 16.



16. The graph shows the activity of two different enzymes in the digestive tract that have the same substrate. What is enzyme **Y**?

    A. pepsin
    B. trypsin
    C. amylase
    D. peptidase

Use the following information to answer question 17.

- colon
- pancreas
- gall bladder
- small intestine
- salivary glands

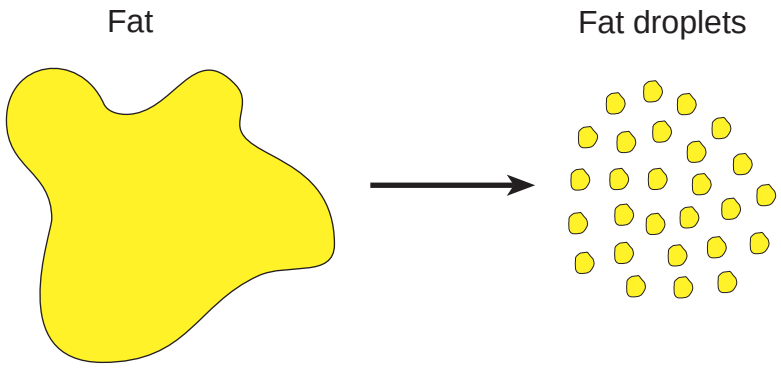
17. How many of the structures above produce enzymes that digest carbohydrates?

    A. two
    B. three
    C. four
    D. five

18. The chemical digestion of fats is a result of the release of secretions from the

A. pancreas.
B. gall bladder.
C. small intestine.
D. salivary glands.

Use the following diagram to answer question 19.



19. Secretions from which of the following would have the effect shown in the diagram?

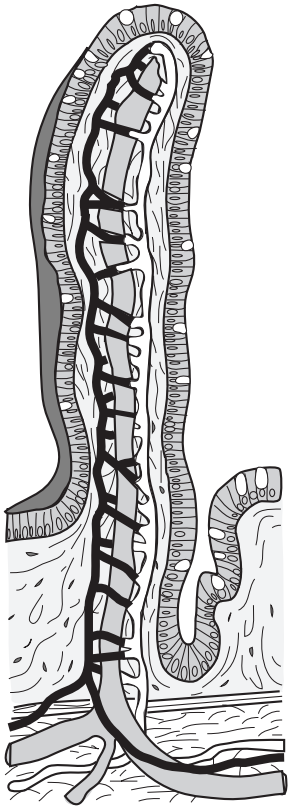
A. liver
B. mouth
C. stomach
D. large intestine

---

20. Which of the following is **not** a function of the liver?

A. production of urea
B. synthesis of plasma proteins
C. secretion of digestive enzymes
D. regulation of blood glucose levels

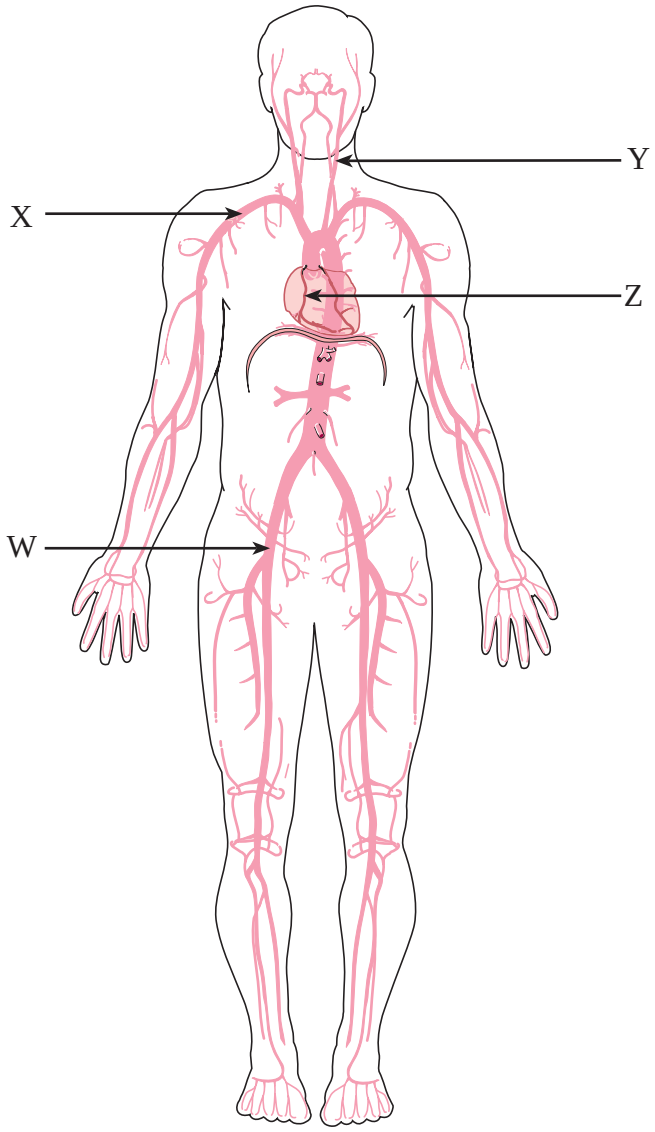
Use the following diagram to answer question 21.



21. The structure above is found lining the walls of the

    A. colon.
    B. stomach.
    C. esophagus.
    D. small intestine.

Use the following diagram to answer question 22.



22. Which letter indicates the carotid artery?

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

OVER

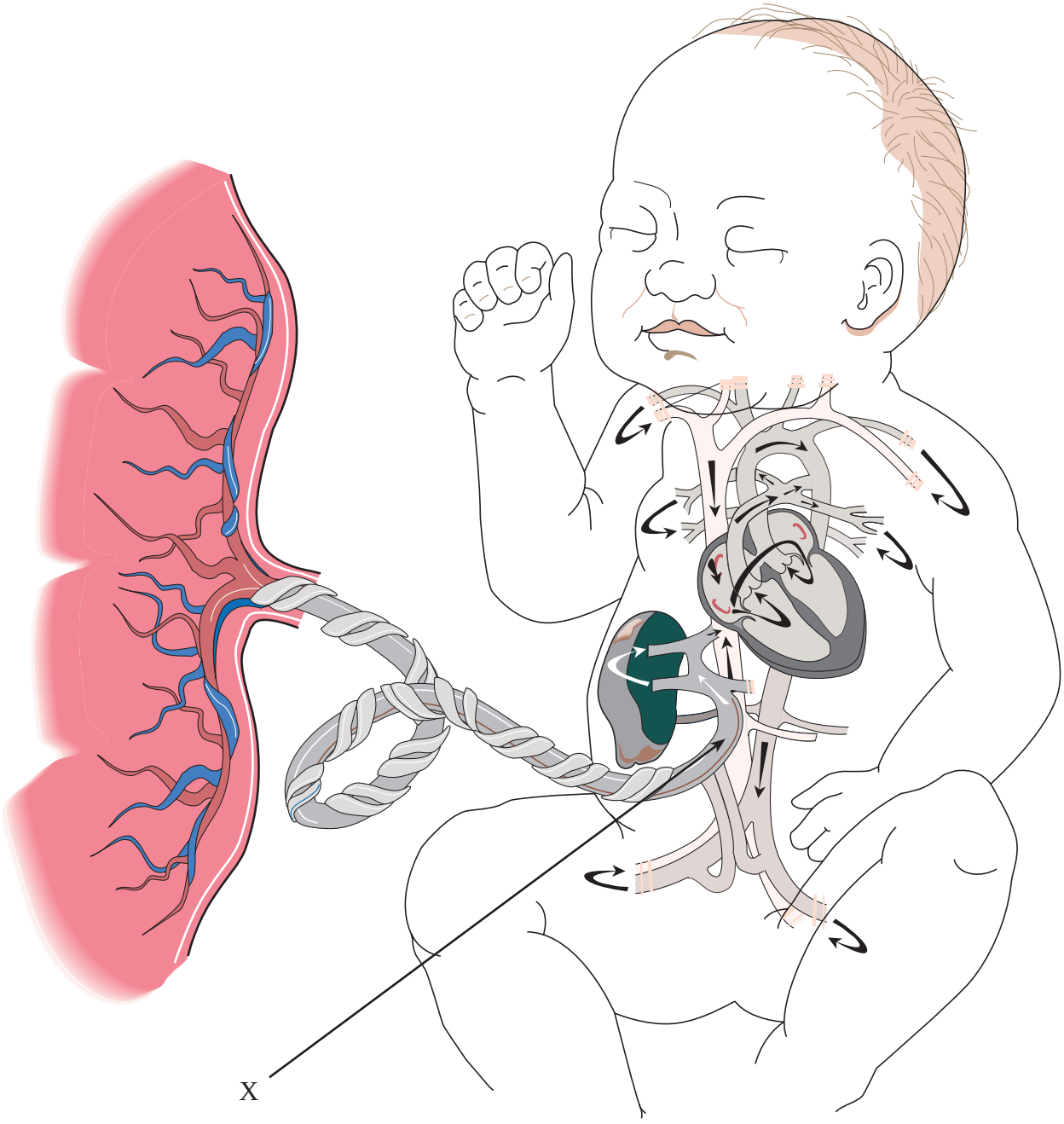
Use the following information to answer question 23.

BLOOD VESSEL	PRESSURE (mm of mercury)	VELOCITY (cm/sec.)
S	less than 5	15
T	20	80
U	10	2
V	40	100

23. Blood vessel **U** is a(n)

A. vein.
B. artery.
C. venule.
D. capillary.

Use the following diagram to answer question 24.



24. The blood vessel found in adults that contains oxygen levels similar to the blood vessel labelled **X** is the

    A. renal vein.
    B. pulmonary vein.
    C. pulmonary artery.
    D. hepatic portal vein.

OVER

25. A red blood cell is located in an artery in your right arm. How many capillary beds must this cell pass through before it is returned to the left ventricle?

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

26. The function of the nodes in the lymphatic system is to

A. filter debris.
B. produce platelets for clotting.
C. break down worn-out red blood cells.
D. help maintain a constant blood pressure.

27. What occurs when an antigen enters the body?

A. There is increased platelet production.
B. Red blood cells phagocytize the antigen.
C. Antibodies change shape to fit the antigen.
D. Specific antibodies are produced and released.

28. An irregular heartbeat where contraction of the atria does **not** always result in contraction of the ventricles, likely indicates a problem with the

A. SA node.
B. AV node.
C. AV valve.
D. semi-lunar valve.

29. An increase in which of the following would cause hypotension?

A. heart rate
B. cardiac output
C. arteriole dilation
D. reabsorption of water by the kidneys

30. What happens during atrial diastole?

A. Atria fill with blood.
B. Semi-lunar valves close.
C. Ventricles fill with blood.
D. Atrioventricular valves open.

31. What is the correct sequence of structures through which an oxygen molecule passes from the nostrils to the alveolus?

A. larynx, right bronchus, trachea, bronchioles
B. right bronchus, larynx, bronchioles, trachea
C. larynx, trachea, right bronchus, bronchioles
D. trachea, larynx, bronchioles, right bronchus

32. Mucus is moved along the respiratory tract by

A. cilia.
B. flagella.
C. peristalsis.
D. active transport.

33. Which of the following would cause a decrease in the pH of the blood during internal respiration?

A. running for ten minutes
B. digestion of an acidic food
C. taking in several deep breaths
D. prolonged period of inactivity

34. Most of the carbon dioxide produced by tissues is carried back to the lungs as

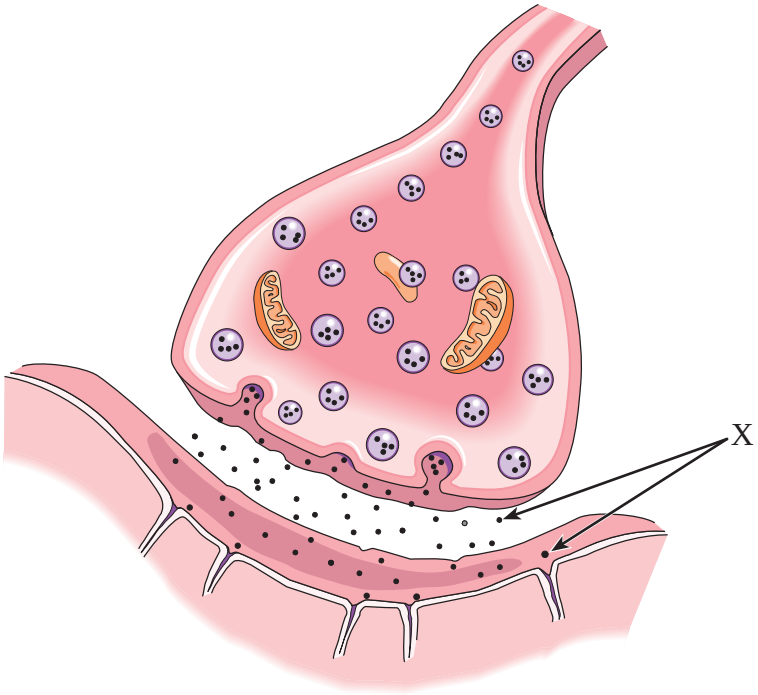
A. bicarbonate ions.
B. reduced hemoglobin.
C. carbaminohemoglobin.
D. a gas dissolved in plasma.

OVER

35. The part of a sensory neuron that transmits nerve impulses from a receptor to the cell body is the

A. axon.
B. synapse.
C. dendrite.
D. neurotransmitter.

Use the following diagram to answer question 36.



36. The molecules labelled **X** function to

A. open sodium ion gates.
B. speed up the transmission of impulses.
C. provide an energy source for the resting potential.
D. tell the brain the kind of stimulus that is being received.

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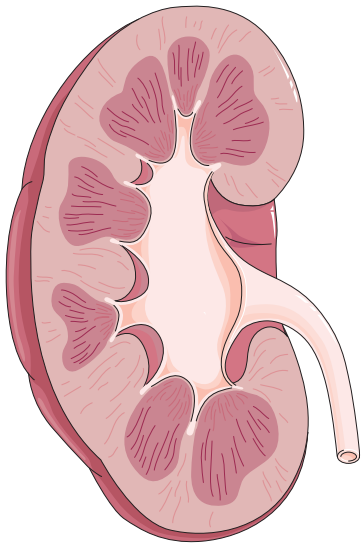
37. The parasympathetic nervous system

A. controls the central nervous system.
B. lowers blood pressure and promotes digestion.
C. uses noradrenalin as the neurotransmitter at synapses.
D. initiates the “fight or flight” response in times of stress.

38. How does the hypothalamus increase the metabolic rate of cells in the body?

A. It produces and releases thyroxin.
B. It secretes a specific releasing hormone.
C. It increases autonomic nerve stimulation.
D. It causes cells to become permeable to blood glucose.

Use the following diagram to answer question 39.



39. Which of the following is **not** a function of the organ shown?

A. to produce urea
B. to excrete metabolic wastes
C. to regulate the acidity of the blood
D. to maintain a constant blood volume

---

40. Filtrate enters the Bowman's capsule by

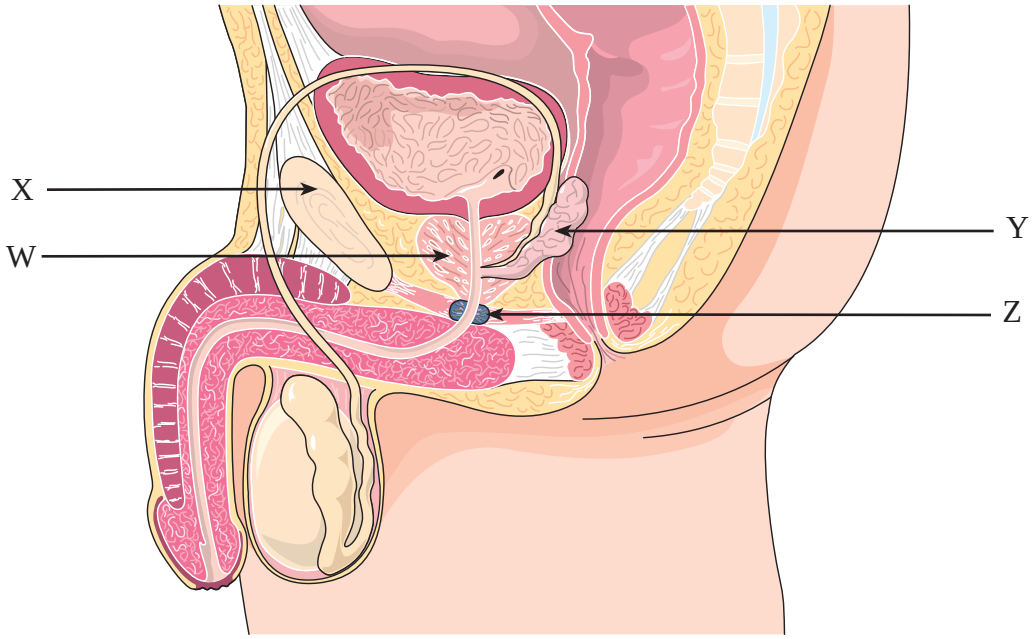
A. active transport.
B. tubular excretion.
C. pressure filtration.
D. selective reabsorption.

OVER

41. Which of the following occurs in the distal tubule to return acidic blood back to a normal pH?

A. Both sodium and hydrogen ions are excreted.
B. Bicarbonate ions are excreted and hydrogen ions are reabsorbed.
C. Ammonia and hydrogen ions are excreted and sodium ions are reabsorbed.
D. Ammonia and hydrogen ions are reabsorbed and bicarbonate ions are excreted.

Use the following diagram to answer question 42.



42. Which letter indicates the seminal vesicle?

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

---

43. The duct that is used by both the reproductive and excretory systems in males is the

A. ureter.
B. urethra.
C. renal pelvis.
D. vas deferens.

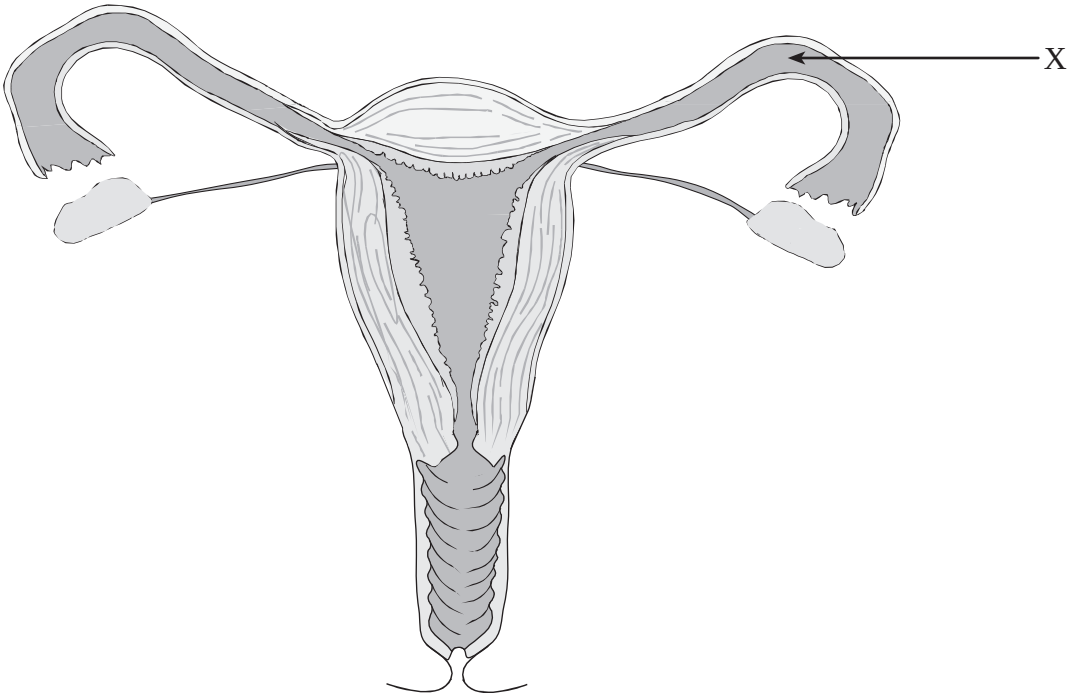
44. Testosterone is produced in the

A. epididymis.
B. interstitial cells.
C. seminal vesicles.
D. seminiferous tubules.

45. The part of the sperm that contains hydrolytic enzymes is the

A. tail.
B. nucleus.
C. acrosome.
D. mid-piece.

Use the following diagram to answer question 46.



46. The structure labelled **X** is the

A. uterus.
B. cervix.
C. follicle.
D. oviduct.

OVER

47. The function of the endometrium is to

A. carry the egg to the uterus.
B. release an egg once a month.
C. produce hormones for the uterine cycle.
D. provide nourishment for the developing embryo.

48. A rise in blood levels of FSH at the beginning of the ovarian cycle causes

A. menopause.
B. the release of the egg.
C. the maturation of the follicle.
D. the breakdown of the endometrium.

49. Low levels of estrogen and progesterone in the blood will result in

A. fertilization.
B. no ovulation.
C. menstruation.
D. destruction of the corpus luteum.

50. Which of the following, if present in urine samples, would indicate pregnancy?

A. estrogen
B. progesterone
C. luteinizing hormone (LH)
D. human chorionic gonadotropin (HCG)

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

PART B: WRITTEN RESPONSE

Value: 50 marks **Suggested Time: 75 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) Define recombinant DNA. **(1 mark)**

_____

_____

b) Describe **two** uses for recombinant DNA. **(2 marks)**

i) _____

_____

ii) _____

_____

OVER

2. Give the purpose of each of the following steps in the process of protein synthesis.

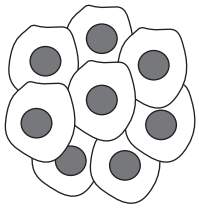
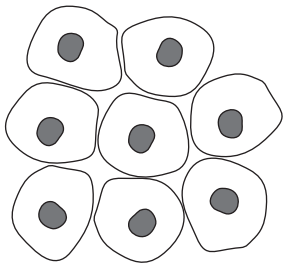
a) Ribosome moving along a mRNA: **(1 mark)**

b) Adenine bonding to thymine: **(1 mark)**

c) An amino acid bonding to a specific tRNA: **(1 mark)**

d) Forming of peptide bonds: **(1 mark)**

Use the following diagrams to answer question 3.

Tissue Sample A	Tissue Sample B
Top View  Side View 	Top View  Side View 

3. a) The diagrams above were made from samples of epithelial cells taken from healthy tissue and cancerous tissue. Which tissue sample is from the cancerous tissue? **(1 mark)**

_____

b) Give **two** reasons for your answer in a) above. **(2 marks)**

i) _____

_____

ii) _____

_____

OVER

4. An experiment was conducted to determine the concentration of molecules in the cytoplasm of potato cells. The following steps were taken:

    1. Five different sugar solutions were added to five numbered test tubes as shown in the data table below.
    2. Five potato discs (cut from the same potato) were weighed and one disc was added to each test tube.
    3. After 24 hours, the potato discs were removed, blotted dry, and weighed again.

TEST TUBE	CONCENTRATION OF SUGAR SOLUTION (%)	INITIAL POTATO MASS (grams)	FINAL POTATO MASS (grams)	CHANGE IN MASS (%)
1	30.0	5.0	4.0	– 20
2	20.0	4.8	4.3	– 10
3	10.0	5.2	5.5	+ 6
4	5.0	4.7	5.4	+ 15
5	0.0 (distilled water only)	5.1	6.1	+ 20

a) Name and describe the process that allowed the potato cells to gain and lose mass when placed in the sugar solutions. **(2 marks: 1 mark for name; 1 mark for description)**

Name of Process: _____

Description of Process: _____

_____

_____

b) Explain the change in mass of the potato disc in **test tube 1.** **(2 marks)**

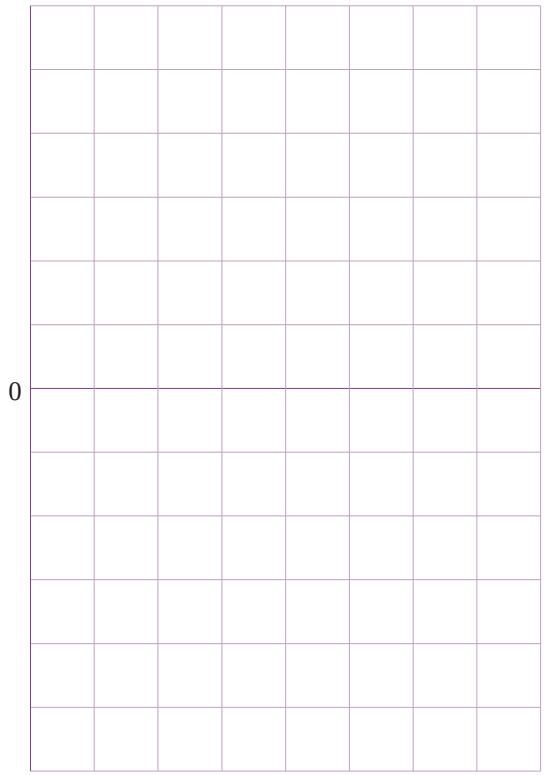
_____

_____

_____

_____

c) Draw a graph that compares the concentration of sugar solution (%) to the change in mass (%) of the potato discs. Label the *x*-axis as the concentration of sugar solution (%).
(2 marks)



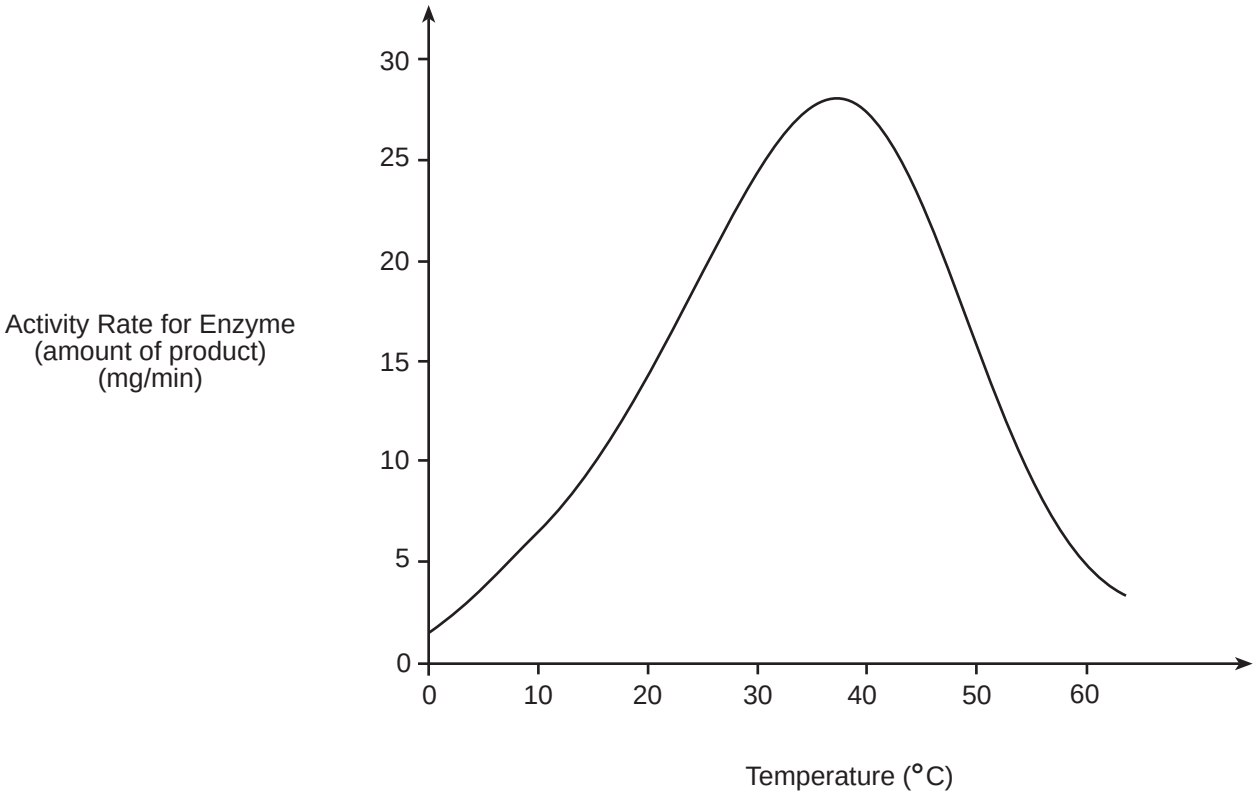
d) Use your graph to determine the concentration of sugar solution (%) that would be isotonic to the cytoplasm of the potato cells. **(1 mark)**

_____

_____

OVER

5. An experiment was conducted to measure the effect of temperature on an enzyme isolated from the small intestine. Data was collected and graphed as shown below.



Explain why the following temperatures change the activity rate of the enzyme.

0°C to 35°C: **(1 mark)**

37°C: **(1 mark)**

45°C to 55°C: **(2 marks)**

6. The following substances were isolated from organs found in the digestive system. Name the organ in which each substance was produced and give **one** function of the substance.

(4 marks)

SUBSTANCE	ORGAN WHERE PRODUCED	FUNCTION
pepsin		
nuclease		

OVER

7. a) Describe **one** function of each of the following. **(3 marks)**

Red blood cells:

White blood cells:

Platelets:

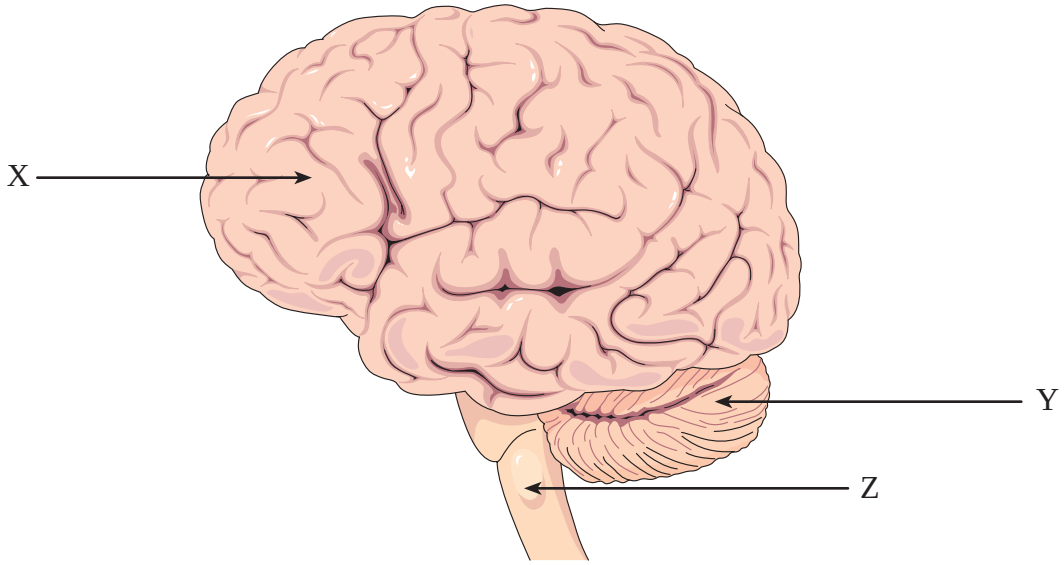
b) Where are red blood cells produced? **(1 mark)**

8. Describe the interaction of the lungs, pleural membranes, ribs, and diaphragm during inhalation. **(4 marks)**

OVER

9. Explain how an action potential is generated in a neuron. **(4 marks)**

Use the following diagram to answer question 10.



10. Identify structures **X, Y** and **Z** and give **one** function of each.
(6 marks: 1 mark each for name; 1 mark each for function)

Structure **X**:

Name: _____

Function: _____

_____

Structure **Y**:

Name: _____

Function: _____

_____

Structure **Z**:

Name: _____

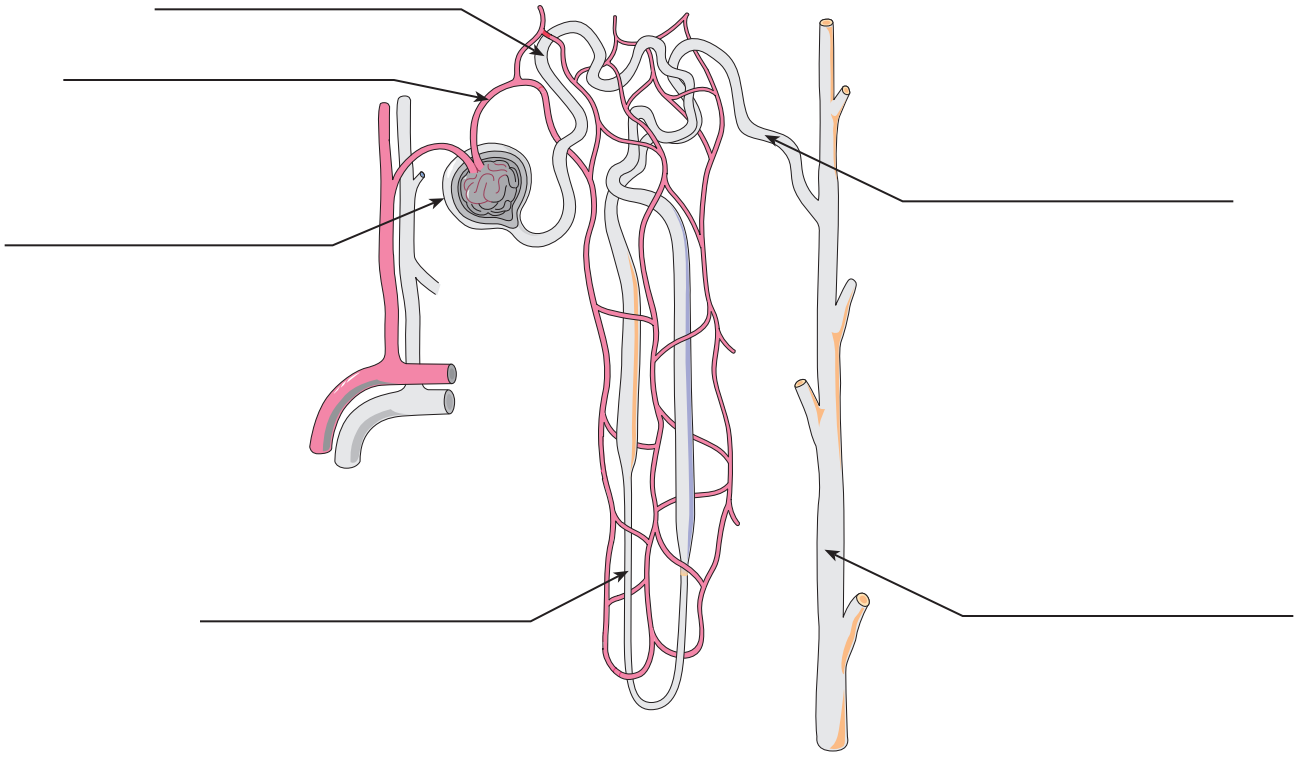
Function: _____

_____

OVER

11. a) Using the following diagram, label the parts of a nephron in the blanks provided.

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



b) Identify **one** hormone that responds to a decrease in blood volume and explain how this hormone functions to return blood volume to normal levels.

(4 marks: 1 mark for name; 3 marks for explanation)

Name: _____

Explanation: _____

_____

_____

_____

_____

_____

_____

END OF EXAMINATION

INSERT STUDENT I.D. NUMBER (PEN)

STICKER IN THIS SPACE

BIOLOGY 12

June 1999

Course Code = BI

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BIOLOGY 12

June 1999

Course Code = BI

Score for Question 1:	Score for Question 8:
1. _____ (3)	8. _____ (4)
Score for Question 2:	Score for Question 9:
2. _____ (4)	9. _____ (4)
Score for Question 3:	Score for Question 10:
3. _____ (3)	10. _____ (6)
Score for Question 4:	Score for Question 11:
4. _____ (7)	11. _____ (7)
Score for Question 5:	
5. _____ (4)	
Score for Question 6:	
6. _____ (4)	
Score for Question 7:	
7. _____ (4)	