

AUGUST 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: 10 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

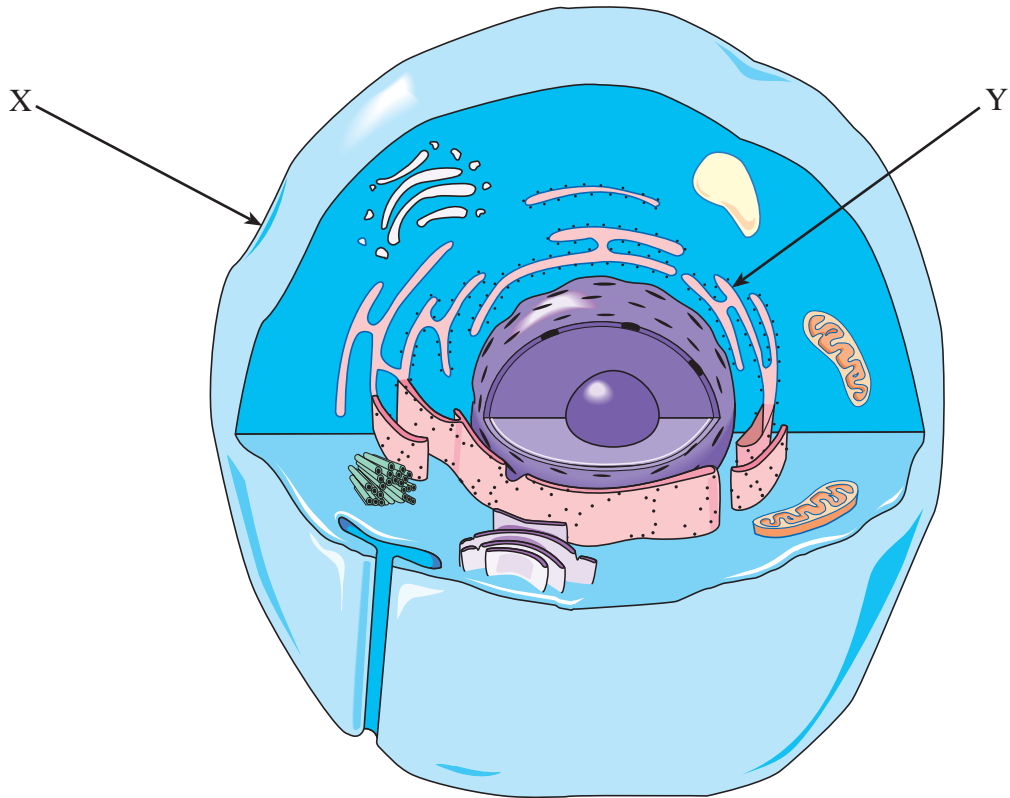
Suggested Time: 45 minutes

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.

1. Which of the following organelles is correctly matched with its product?
 - A. nucleolus — DNA
 - B. mitochondria — ATP
 - C. Golgi apparatus — lipid
 - D. smooth endoplasmic reticulum — protein

2. Which of the following organelles breaks down dead cells?
 - A. nucleus
 - B. lysosome
 - C. Golgi apparatus
 - D. rough endoplasmic reticulum

Use the following diagram to answer questions 3 and 4.



3. The structure labelled **X** is composed mostly of

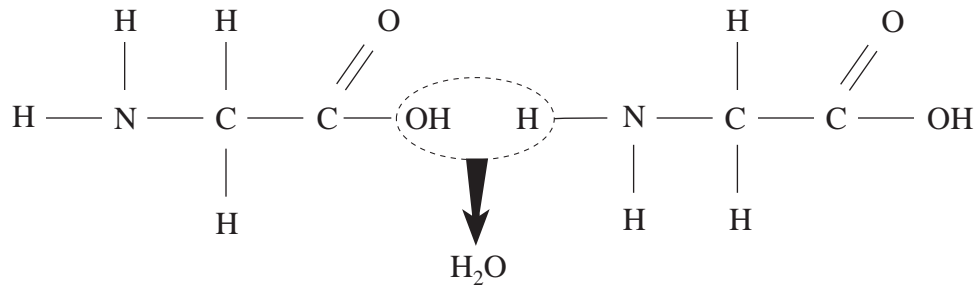
- A. glycogen and protein.
- B. nucleic acid and glycogen.
- C. protein and phospholipids.
- D. nucleic acid and phospholipids.

4. One function of the structure labelled **Y** is to

- A. replicate DNA.
- B. control cell division.
- C. digest food molecules.
- D. produce digestive enzymes.

5. A substance which helps maintain a constant pH in a solution is a(n)
- salt.
 - acid.
 - base.
 - buffer.

Use the following diagram to answer question 6.



6. The diagram illustrates a step in the
- hydrolysis of a protein.
 - synthesis of an enzyme.
 - production of nucleic acid.
 - conversion of glucose molecules to starch.
-
7. The building blocks or monomers that make up carbohydrates are
- nucleotides.
 - amino acids.
 - monosaccharides.
 - fatty acids and glycerol.
8. Compared to saturated fats, unsaturated fats contain less
- oxygen.
 - glycerol.
 - hydrogen.
 - fatty acids.

OVER

9. The number of adenine bases in a DNA molecule equals the number of thymine bases because

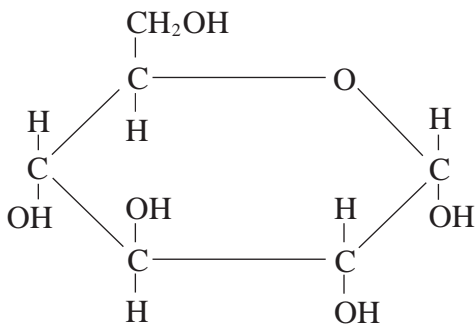
- A. DNA contains equal numbers of all four bases.
- B. thymine always follows adenine on each DNA strand.
- C. DNA is made of alternating adenine and thymine bases.
- D. adenine on one strand bonds to thymine on the other strand.

10. The product of transcription is

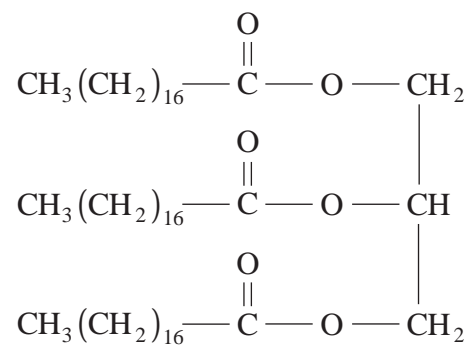
- A. DNA.
- B. protein.
- C. mRNA.
- D. a ribosome.

11. Which of the following molecules is a building block or monomer of RNA?

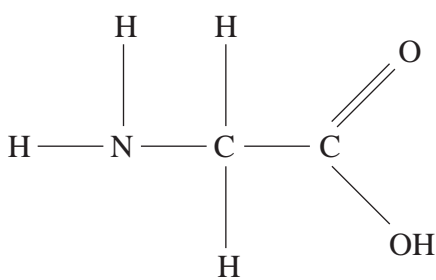
A.



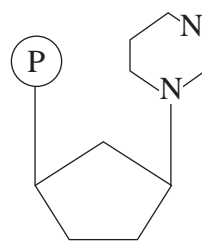
B.



C.



D.



Use the following chart to answer question 12.

Three-letter codons of messenger RNA, and the amino acids specified by the codons			
AAU } Asparagine AAC }	CAU } Histidine CAC }	GAU } Asparatic acid GAC }	UAU } Tyrosine UAC }
AAA } Lysine AAG }	CAA } Glutamine CAG }	GAA } Glutamic acid GAG }	UAA } Stop UAG }
ACU } ACC } Threonine ACA } ACG }	CCU } CCC } Proline CCA } CCG }	GCU } GCC } Alanine GCA } GCG }	UCU } UCC } Serine UCA } UCG }
AGU } Serine AGC }	CGU } CGC } Arginine CGA } CGG }	GGU } GGC } Glycine GGA } GGG }	UGU } Cysteine UGC }
AGA } Arginine AGG }			UGA – Stop UGG – Tryptophan
AUU } AUC } Isoleucine AUA }	CUU } CUC } Leucine CUA } CUG }	GUU } GUC } Valine GUA } GUG }	UUU } Phenylalanine UUC }
AUG – Methionine			UUA } Leucine UUG }

12. A strand of DNA has the following bases:

C A C G G C C

If the adenine base was deleted, which amino acids would be coded for?

- A. valine, proline
- B. glycine, alanine
- C. proline, arginine
- D. glycine, arginine

13. The process by which new blood vessels supply a growing tumour is

- A. metastasis.
- B. promotion.
- C. malignancy.
- D. vascularization.

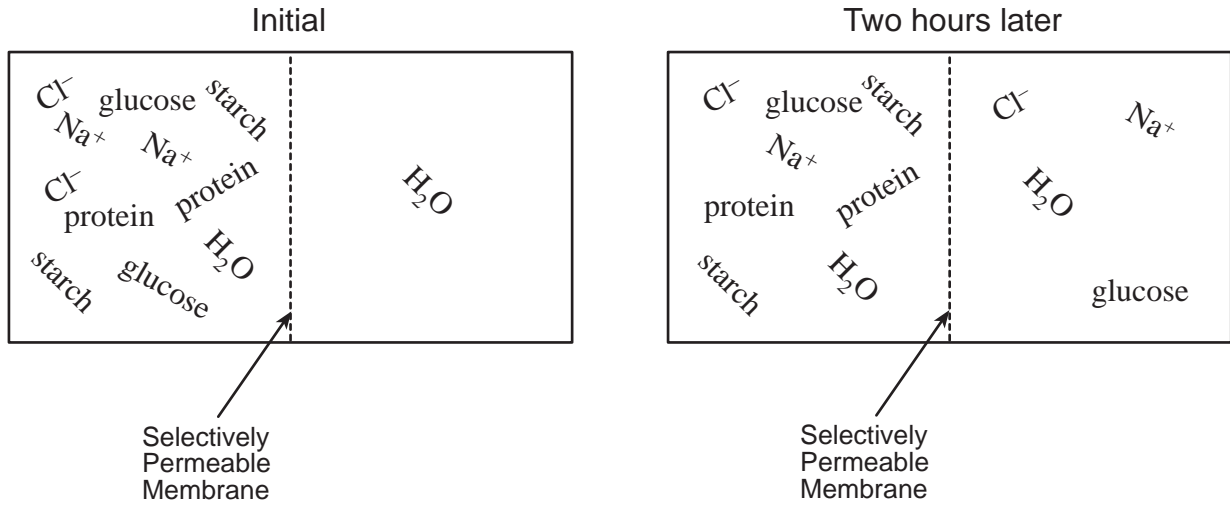
14. Which of the following is capable of changing a proto-oncogene into an oncogene?
- A. virus
 - B. antibody
 - C. bacterium
 - D. lymphocyte
15. An experiment was carried out to study the carcinogenic effects of certain chemicals on mice. Similar amounts of these chemicals were applied to their skins over a 6-month period. The results are shown below.

CHEMICAL X	CHEMICAL Y	CHEMICALS X AND Y	CONTROL (NO TREATMENT)
18% developed skin tumours	0% developed skin tumours	84% developed skin tumours	1% developed skin tumours

Given the results, which of the following statements is correct?

- A. Chemical **Y** is a promoter.
 - B. Chemical **X** can act only as a promoter.
 - C. Chemical **Y** can act only as an initiator.
 - D. Neither **X** nor **Y** is an initiator or a promoter.
16. Molecules in the cell membrane that function as receptors are
- A. proteins.
 - B. glycerol.
 - C. cholesterol.
 - D. phospholipids.

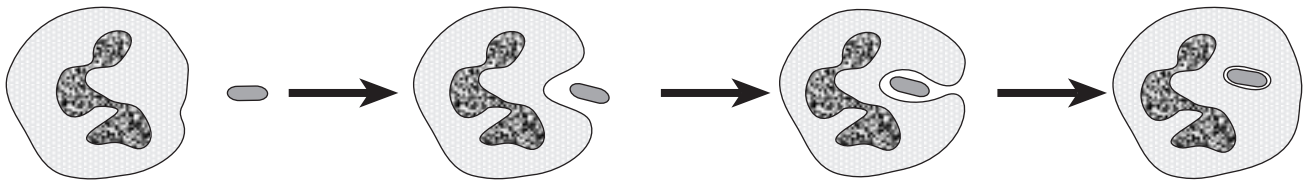
Use the following diagrams to answer question 17.



17. The diagrams illustrate that the membrane selects according to the

- A. size of the molecules.
- B. temperature of the solution.
- C. concentration of the molecules.
- D. electronic charge of the molecules.

Use the following diagram to answer question 18.

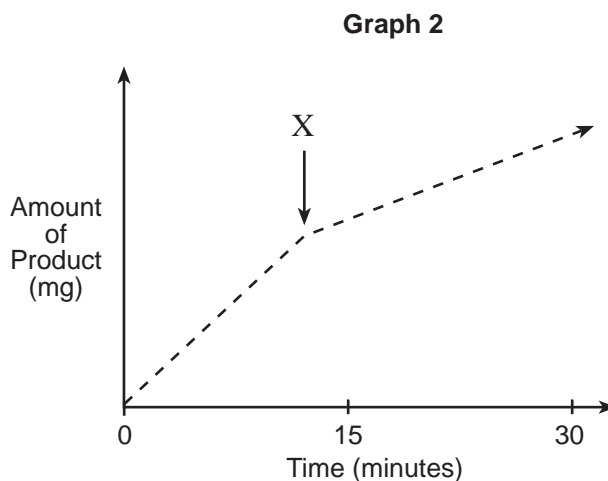
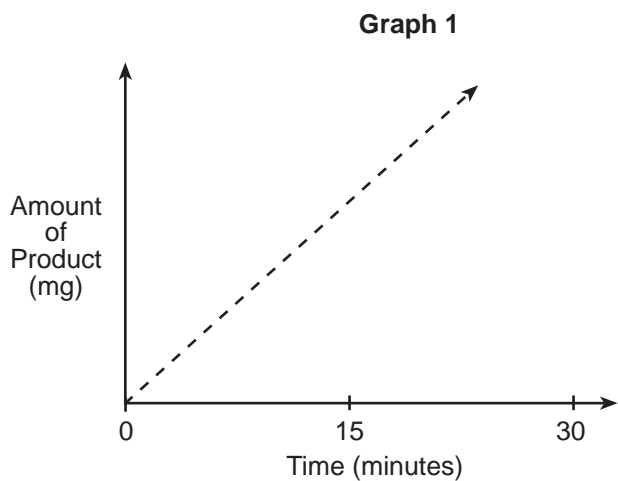


18. The diagram shows a white blood cell ingesting a bacterium. The bacterium enters the white blood cell by

- A. diffusion.
- B. pinocytosis.
- C. phagocytosis.
- D. active transport.

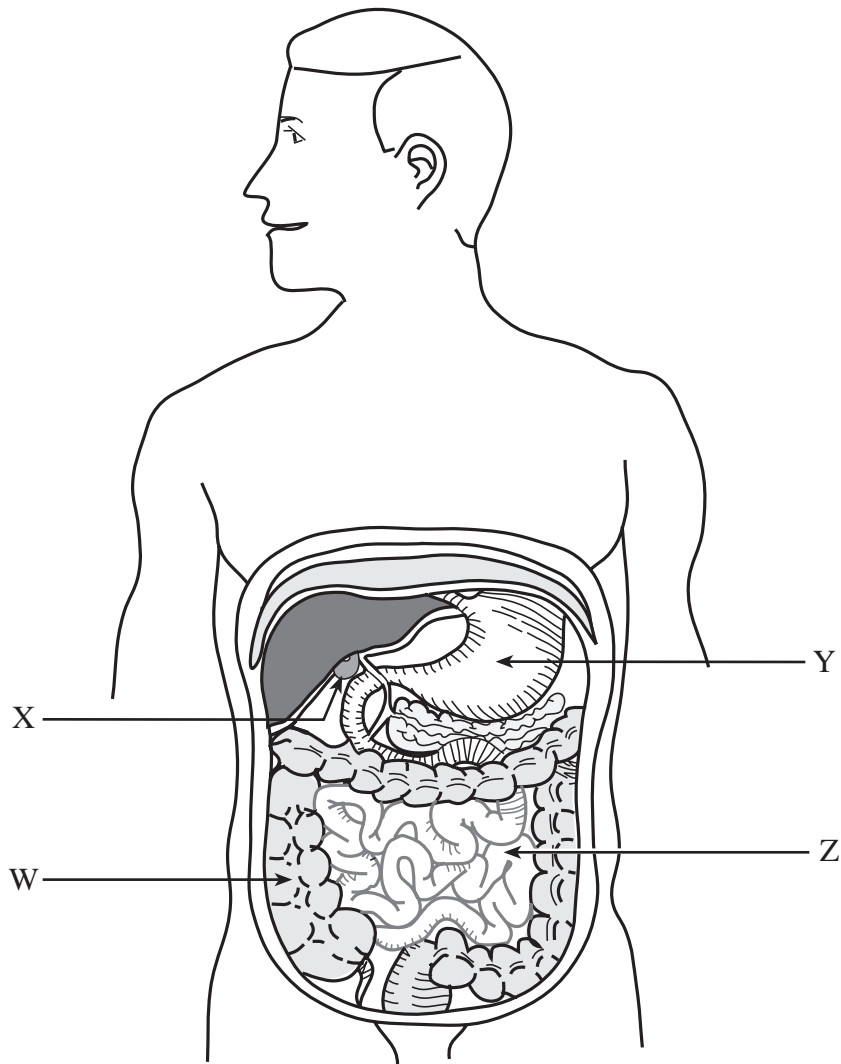
19. Enzymes function to increase the rate of a metabolic reaction by
- A. denaturing the substrate.
 - B. adding energy to the reaction.
 - C. decreasing the energy of activation.
 - D. increasing the concentration of the reactants.

Use the following graphs to answer question 20.



20. Graph 1 represents the rate of reaction between lipase and its substrate. In graph 2, what occurred at time **X** that caused the change in the reaction?
- A. Fat was added.
 - B. The pH was changed from 5 to 8.
 - C. A competitive inhibitor was added.
 - D. The temperature of the reaction was raised to 100°C .

Use the following diagram to answer questions 21 and 22.



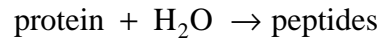
21. The structure labelled **X** releases a substance after the ingestion of

- A. fat.
- B. starch.
- C. protein.
- D. carbohydrate.

22. Digestion of peptides and absorption of their products occurs in which of the structures?

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

23. The reaction shown below is catalyzed by secretions from which organs?



- A. pancreas and liver
- B. liver and duodenum
- C. stomach and pancreas
- D. duodenum and stomach

24. Increasing the secretion of insulin would have which of the following effects?

- A. decreased blood sugar
- B. decreased metabolic rate
- C. increased protein synthesis
- D. increased digestion of carbohydrate

25. High levels of toxins in the blood may indicate a problem with the function of the

- A. liver.
- B. stomach.
- C. pancreas.
- D. small intestine.

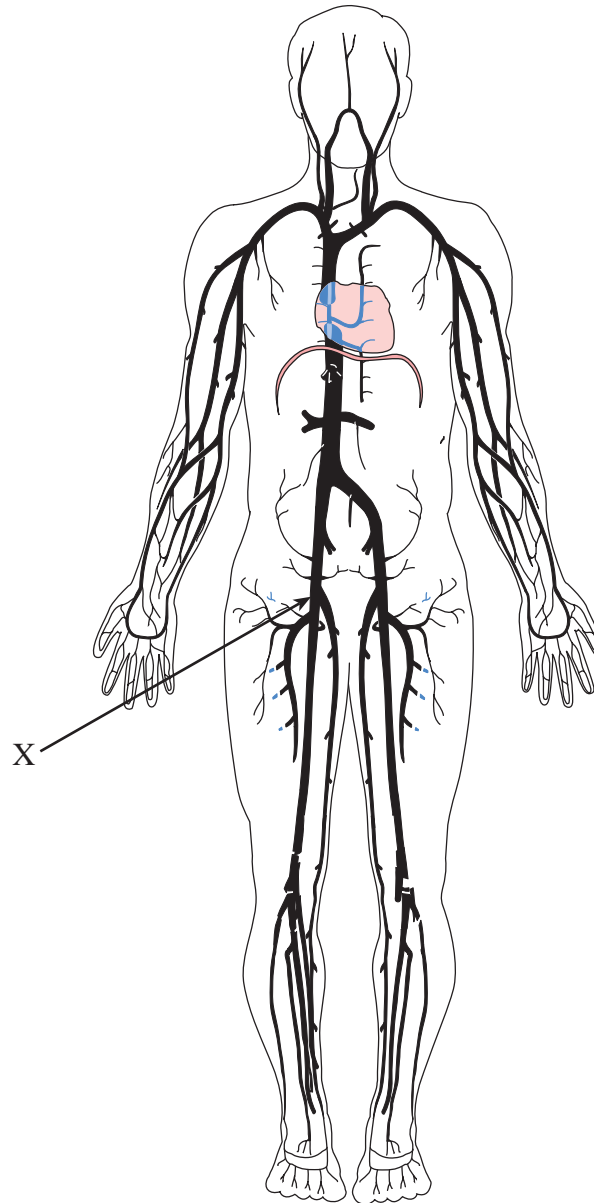
Use the following characteristics to answer question 26.

- one-way valves
- thin elastic layer
- near skeletal muscle

26. The characteristics above describe which type of vessel?

- A. vein
- B. artery
- C. arteriole
- D. capillary

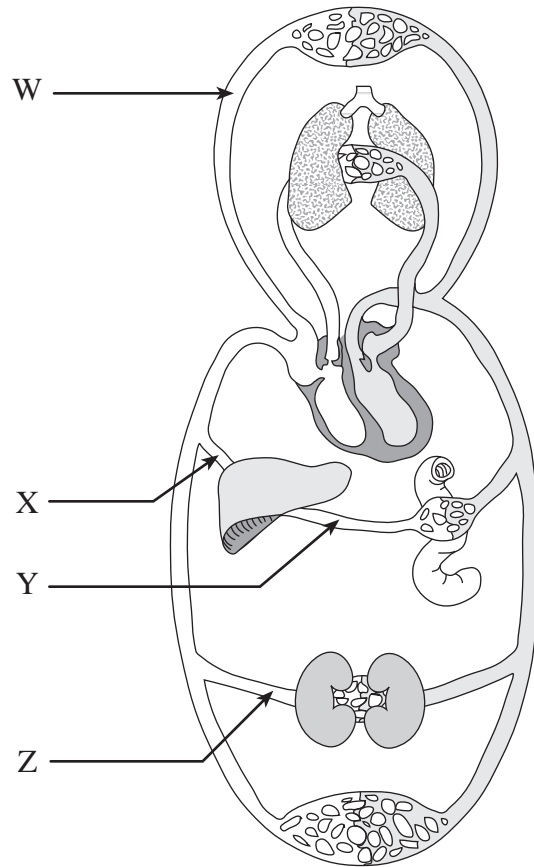
Use the following diagram to answer question 27.



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

- A. iliac vein.
- B. renal vein.
- C. subclavian vein.
- D. posterior vena cava.

Use the following diagram to answer question 28.



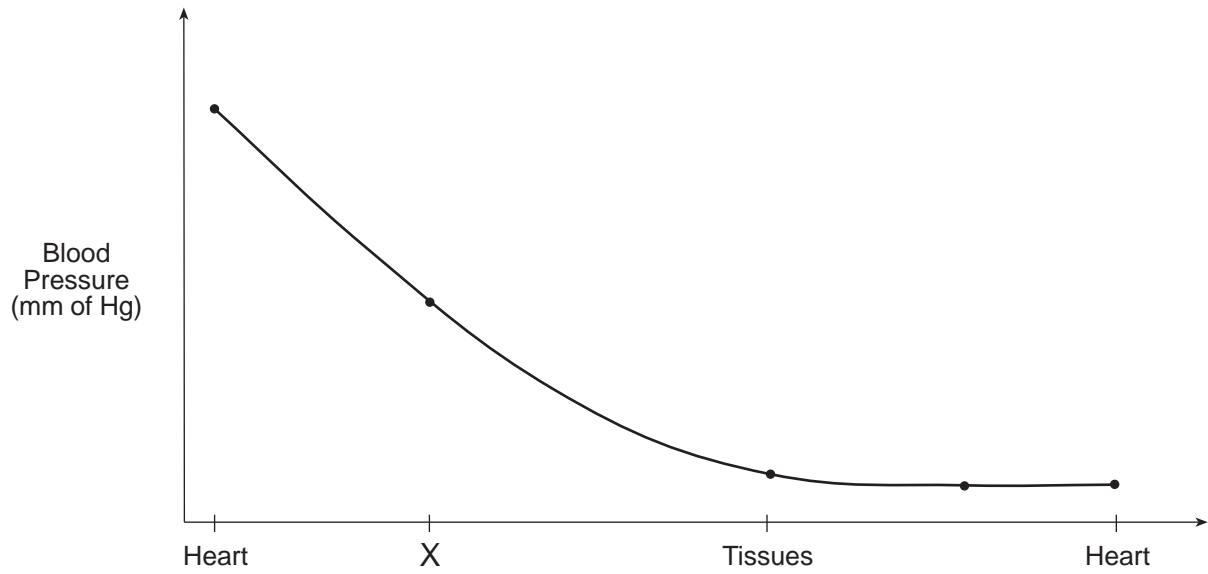
28. Which letter indicates a portal vein?

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

29. Oxygen is delivered to the heart muscle by the

- A. aorta.
- B. carotid artery.
- C. coronary artery.
- D. pulmonary artery.

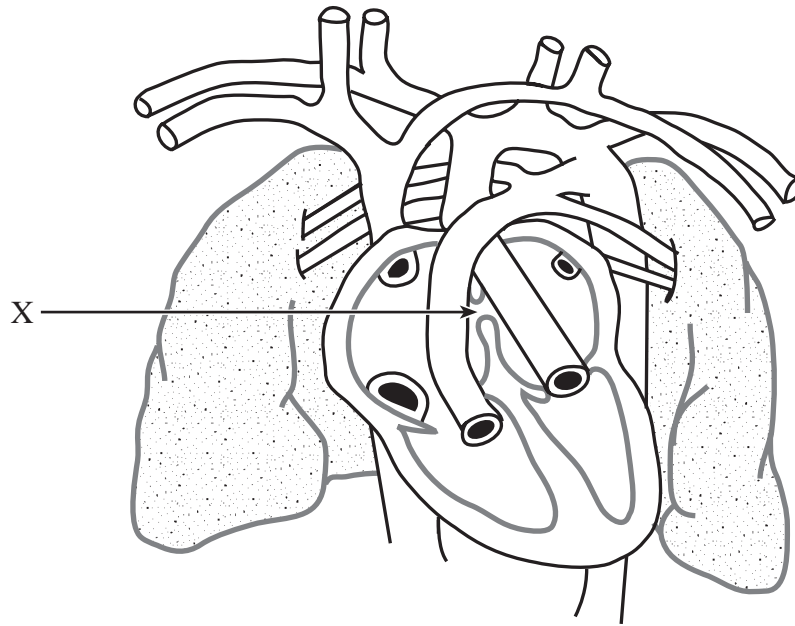
30. A person's blood pressure was measured at five blood vessels and plotted on the graph below.



The reading taken at **X** would be at the

- A. renal artery.
- B. pulmonary vein.
- C. posterior vena cava.
- D. peritubular capillaries.

Use the following diagram to answer question 31.



31. In the fetus, the function of the structure labelled **X** is to

- A. take blood to the lungs.
 - B. ensure adequate blood flow to the brain.
 - C. return blood from the placenta to the heart.
 - D. direct some of the blood away from the lungs.
-

32. Blood capillaries and lymph capillaries both

- A. filter bacteria.
- B. have one-way valves.
- C. contain red blood cells.
- D. have walls which are one-cell thick.

Use the following information to answer question 33.

- transport gases
- maintain body temperature
- protect the body against blood loss
- produce hormones that stimulate metabolism
- carry digestive enzymes to the small intestine

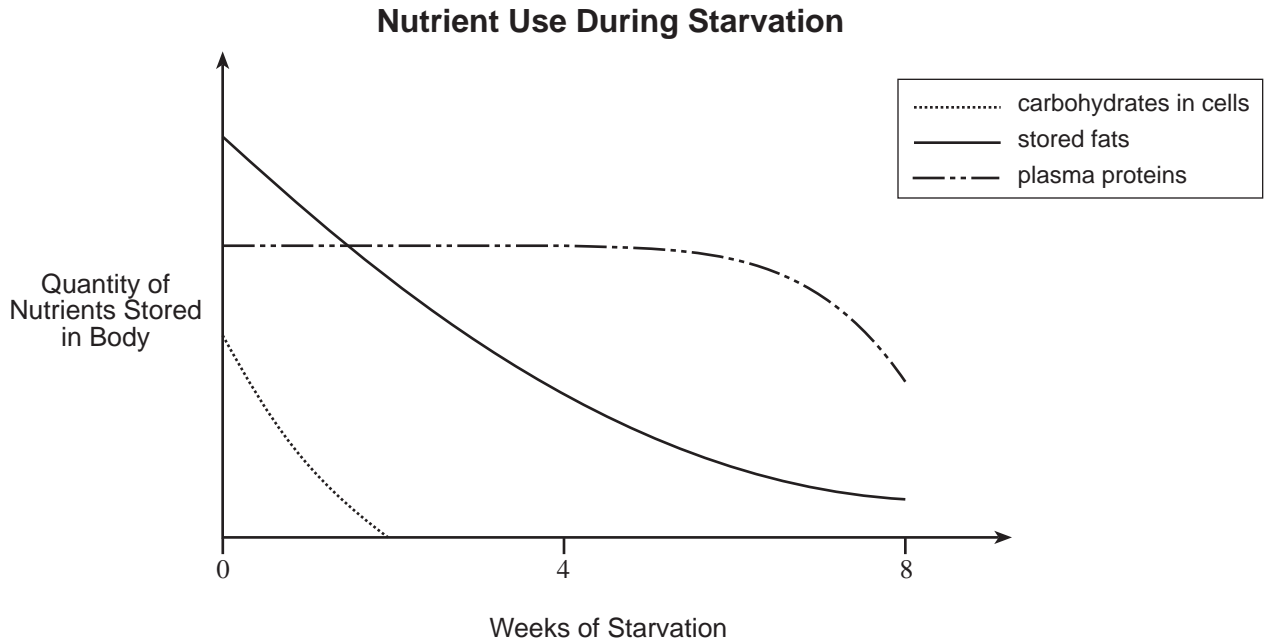
33. How many of the above are functions of the blood?

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

34. Which of the following correctly matches structure with function?

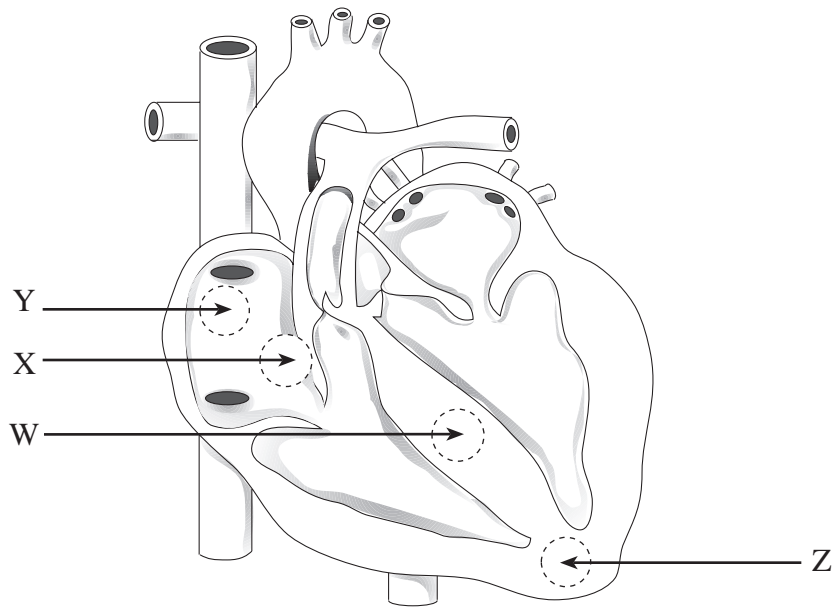
- A. platelets — provide immunity
- B. plasma proteins — carry oxygen
- C. red blood cells — carry carbon dioxide
- D. white blood cells — initiate blood clotting

Use the following graph to answer question 35.



35. The graph illustrates how the body consumes stored nutrients during a prolonged period of starvation. After eight weeks,
- A. blood pressure will increase.
 - B. fluids will accumulate in tissues.
 - C. glycogen production will increase.
 - D. hemoglobin will not release oxygen.

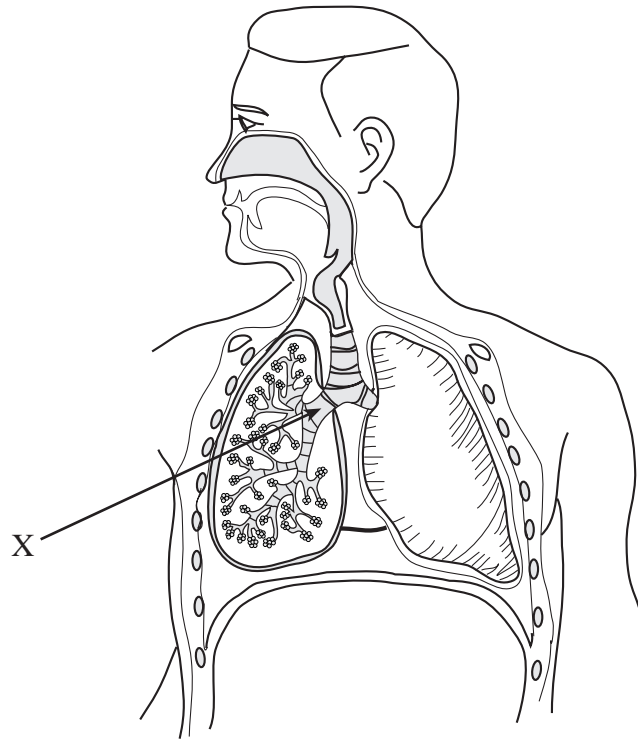
Use the following diagram to answer question 36.



36. Which area indicated in the diagram is the location of the AV node?

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

Use the following diagram to answer question 37.



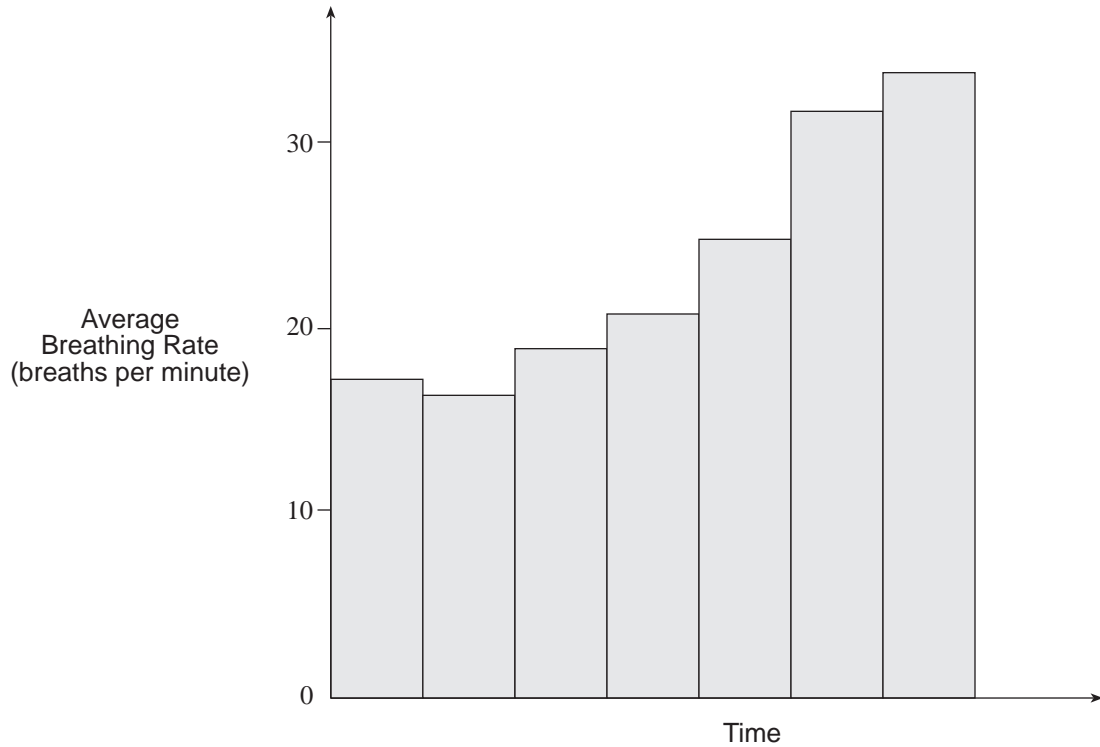
37. The structure labelled **X** is the

- A. larynx.
 - B. trachea.
 - C. bronchus.
 - D. diaphragm.
-

38. Inhalation is caused by

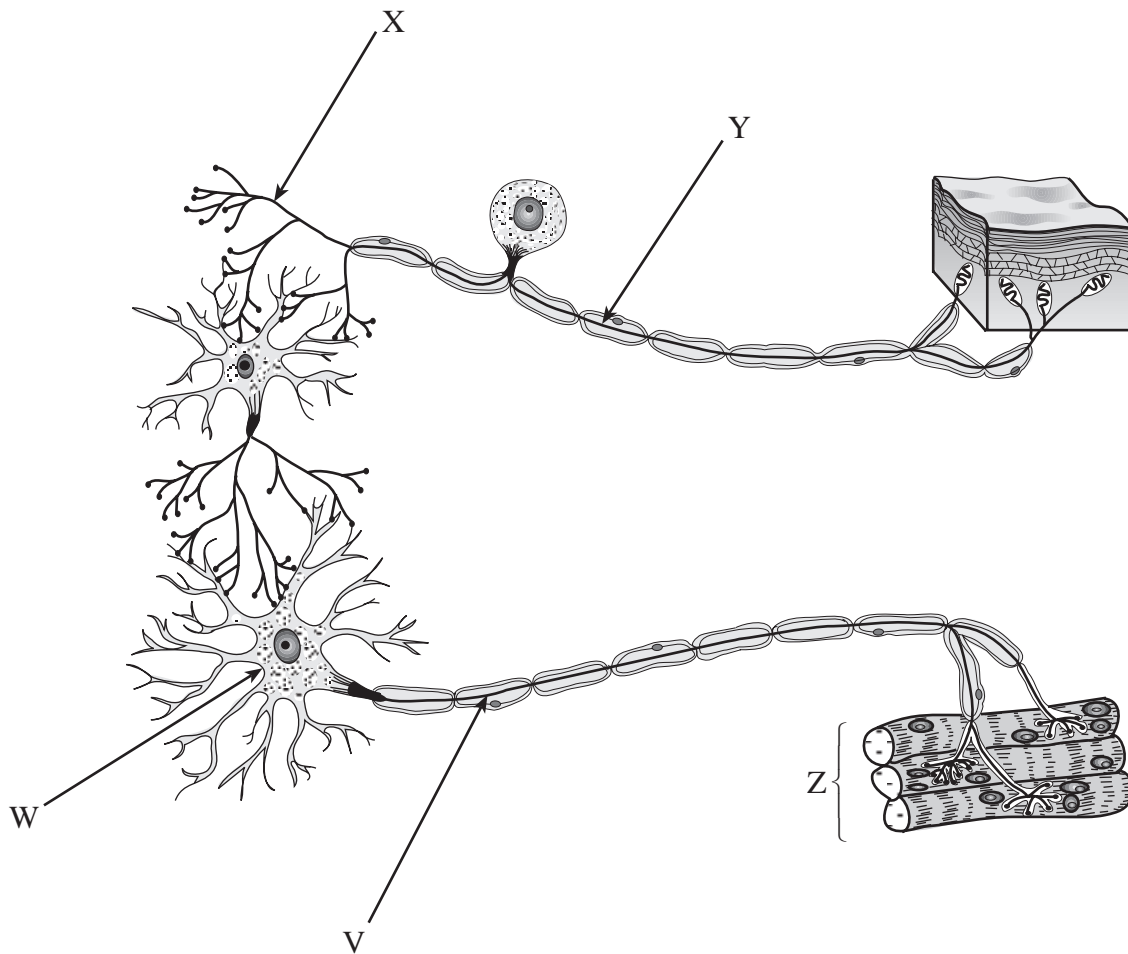
- A. the diaphragm moving up and the ribs moving in.
- B. the diaphragm moving up and the ribs moving out.
- C. the diaphragm moving down and the ribs moving in.
- D. the diaphragm moving down and the ribs moving out.

Use the following graph to answer question 39.



39. Which of the following would cause the effect shown?
- A. increased oxygen in the blood
 - B. increased numbers of red blood cells
 - C. increased carbon dioxide in the blood
 - D. decreased concentration of hydrogen ions
-
40. The exchange of oxygen and carbon dioxide in external respiration occurs by
- A. osmosis.
 - B. diffusion.
 - C. active transport.
 - D. facilitated diffusion.
41. Which of the following reactions occurs in a capillary of the leg?
- A. $\text{Hb} + \text{H}^+ \rightarrow \text{HHb}$
 - B. $\text{HbCO}_2 \rightarrow \text{Hb} + \text{CO}_2$
 - C. $\text{Hb} + \text{oxygen} \rightarrow \text{HbO}_2$
 - D. $\text{H}^+ + \text{HCO}_3^- \rightarrow \text{H}_2\text{CO}_3$

Use the following diagram to answer questions 42 and 43.



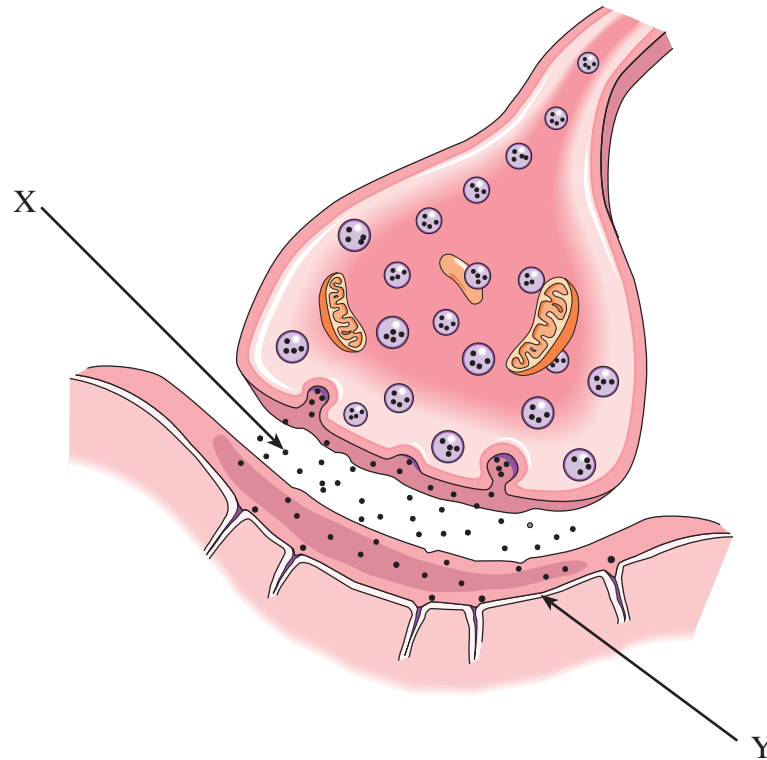
42. The structure labelled **X** is a(n)

- A. node.
- B. axon.
- C. synapse.
- D. dendrite.

43. If an impulse started at **V**, it would travel to

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

Use the following diagram to answer question 44.



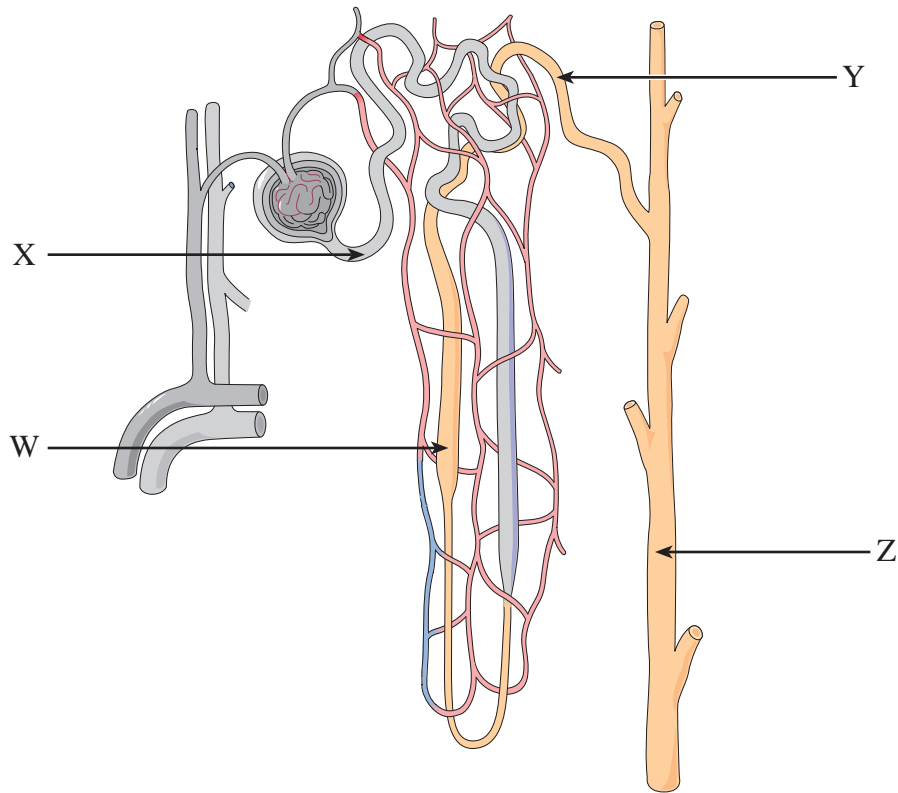
44. If molecule **X** causes depolarization at **Y**, what could **X** be?

- A. sodium ions
 - B. calcium ions
 - C. acetylcholine
 - D. acetylcholinesterase
-

45. Which of the following is a true statement about the sympathetic and parasympathetic nervous systems?

- A. Sympathetic system causes increased rates of digestion while the parasympathetic system causes decreased rates of digestion.
- B. Sympathetic system causes decreased breathing rate while the parasympathetic system causes increased breathing rate.
- C. Sympathetic system causes constriction of the iris while the parasympathetic system causes dilation of the iris.
- D. Sympathetic system causes increased heart rate while the parasympathetic system decreases heart rate.

Use the following diagram to answer question 46.



46. At which location would the greatest concentration of glucose be found?

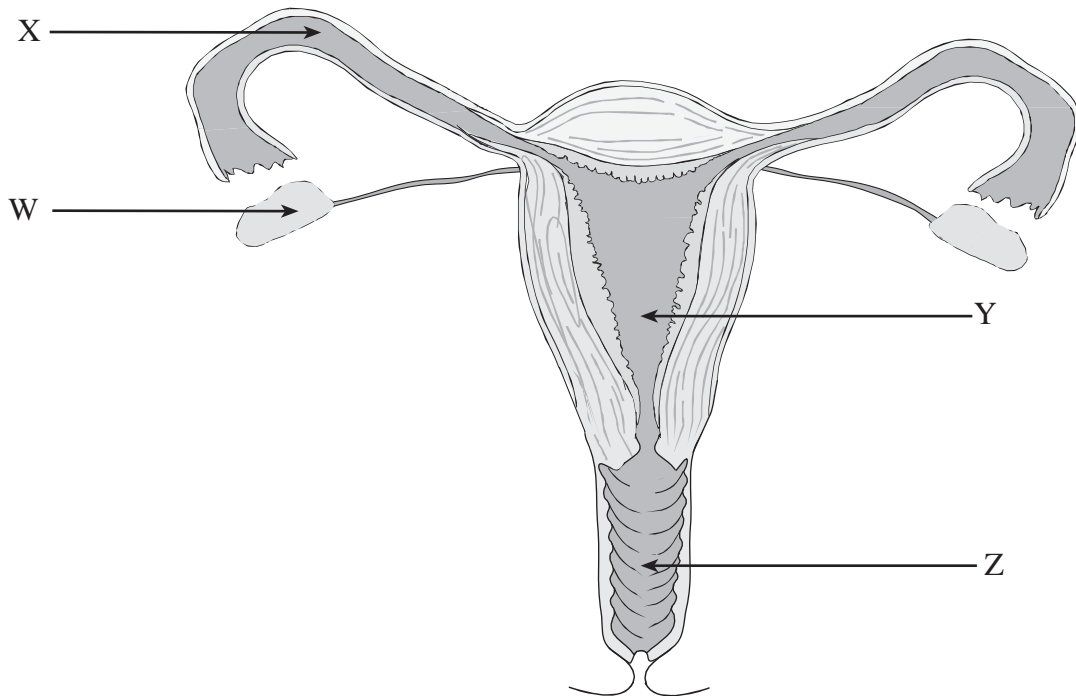
- A. W
- B. X
- C. Y
- D. Z

47. The inability to regulate the concentration of sodium ions in the blood could be due to improper functioning of the

- A. adrenal cortex, since it produces ADH.
- B. adrenal cortex, since it produces aldosterone.
- C. adrenal medulla, since it produces ADH.
- D. adrenal medulla, since it produces aldosterone.

48. Increased secretion of FSH (follicle-stimulating hormone) will result in increased production of
- A. sperm.
 - B. progesterone.
 - C. seminal fluid.
 - D. human chorionic gonadotropin (HCG).
49. The part of a sperm cell containing the greatest number of mitochondria is the
- A. head.
 - B. flagellum.
 - C. acrosome.
 - D. mid-piece.

Use the following diagram to answer question 50.



50. In which area does fertilization normally occur?
- A. W
 - B. X
 - C. Y
 - D. Z

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

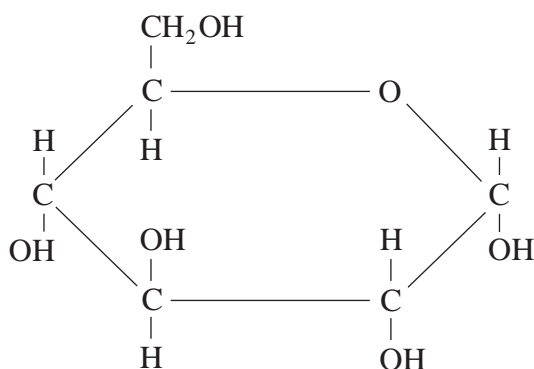
PART B: WRITTEN RESPONSE

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.

Use the following diagram to answer question 1.



1. a) Identify the molecule above. **(1 mark)**

- b) What is the **general** term given to polymers formed from this molecule? **(1 mark)**

- c) List **two** biological functions of these polymers. **(2 marks)**

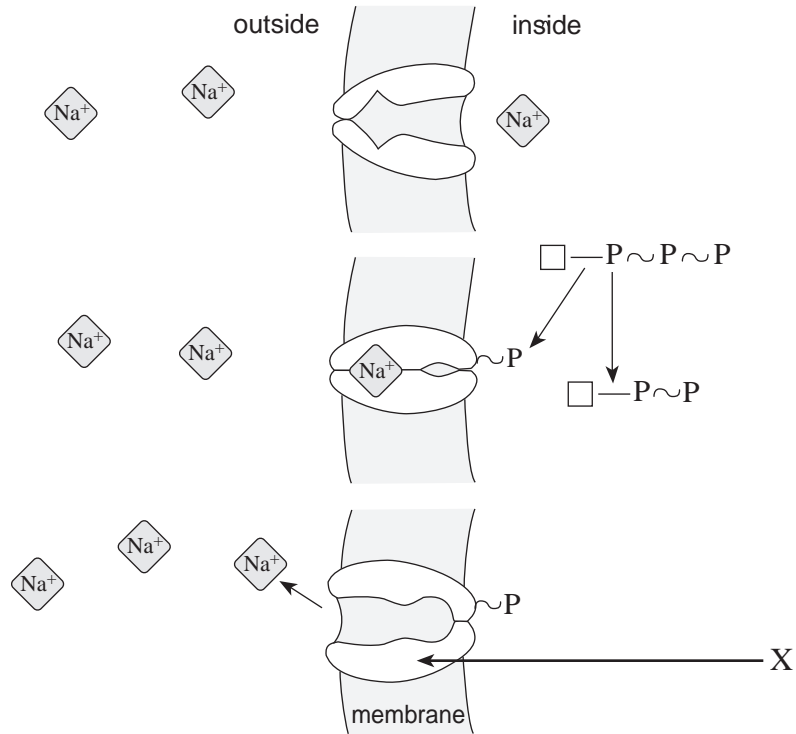
i) _____

ii) _____

2. Using the table below, list **three** differences between RNA and DNA.
(3 marks: 1 mark for each contrasting pair)

RNA	DNA

Use the following diagram to answer question 3.



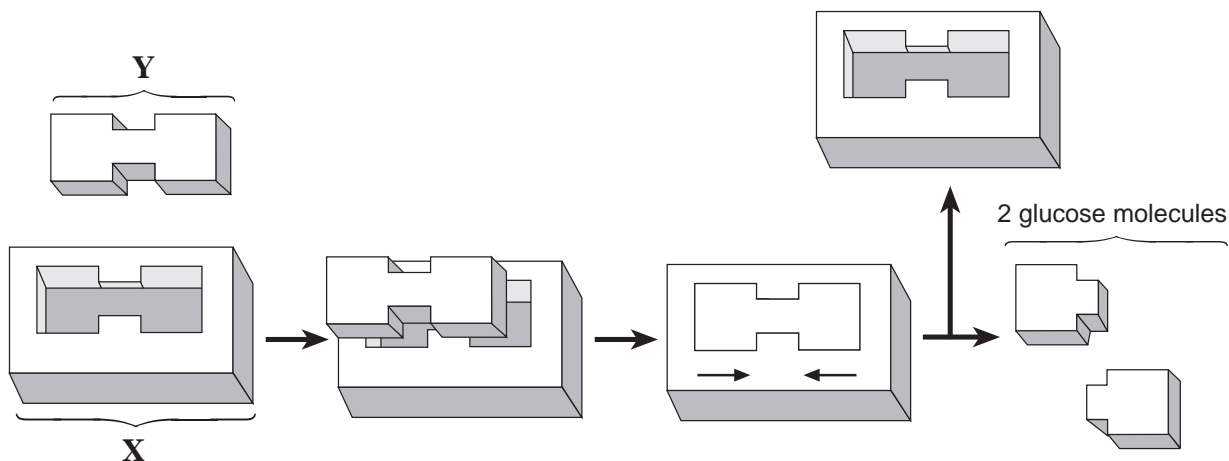
3. a) Identify the process shown in the diagram above. (1 mark)

b) Give **one** example in which this process is used in the body. (1 mark)

c) Describe the function of the molecule represented by $\square-\text{P}\sim\text{P}\sim\text{P}$: (1 mark)

d) What is the function of molecule **X**? (1 mark)

Use the following diagrams to answer question 4.



4. a) The diagrams illustrate a reaction that occurs in the small intestine. Give the specific name for each of the following.

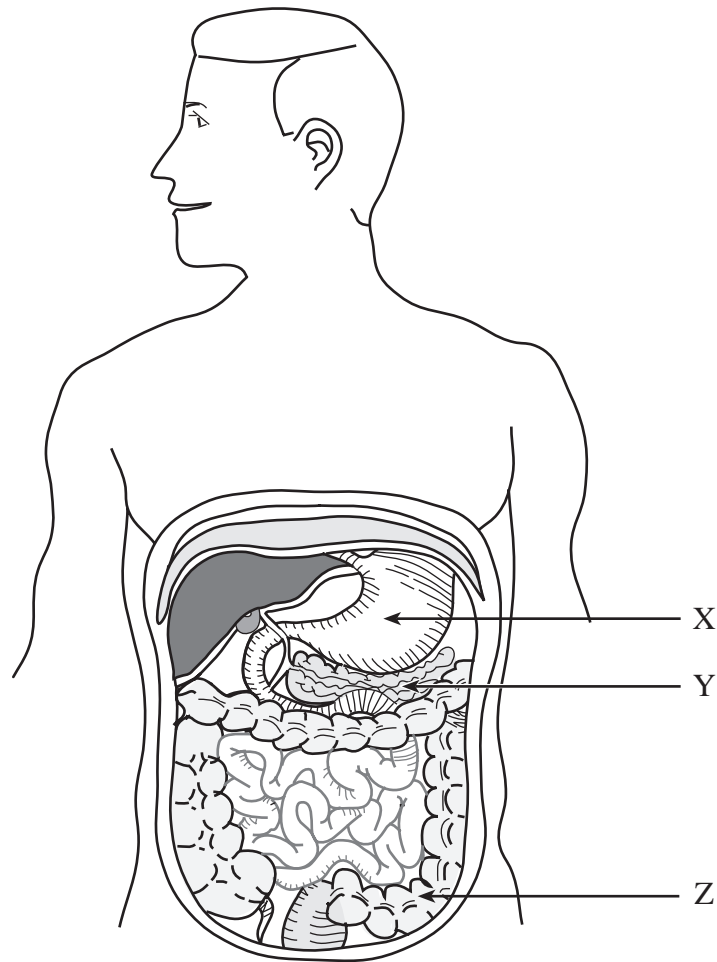
Molecule X: (1 mark)

Molecule Y: (1 mark)

b) In a laboratory experiment, substance Y was added in increasing amounts until it eventually had no effect on the rate of the reaction. Explain why. (1 mark)

c) A solution containing lead ions was added to the reaction. How will the addition of this solution affect the reaction? Explain why. (2 marks)

Use the following diagram to answer question 5.



5. a) State **two** functions of structure **Z**.

(2 marks)

i) _____

ii) _____

- b) For each of the following structures, list **one** enzyme it secretes and the substrate that the enzyme acts upon. (4 marks: 1 mark each for enzyme; 1 mark each for substrate)

Structure **X**:

Enzyme: _____

Substrate: _____

Structure **Y**:

Enzyme: _____

Substrate: _____

6. Describe how the structure of each of the following aids in its function. **(3 marks)**

Artery:

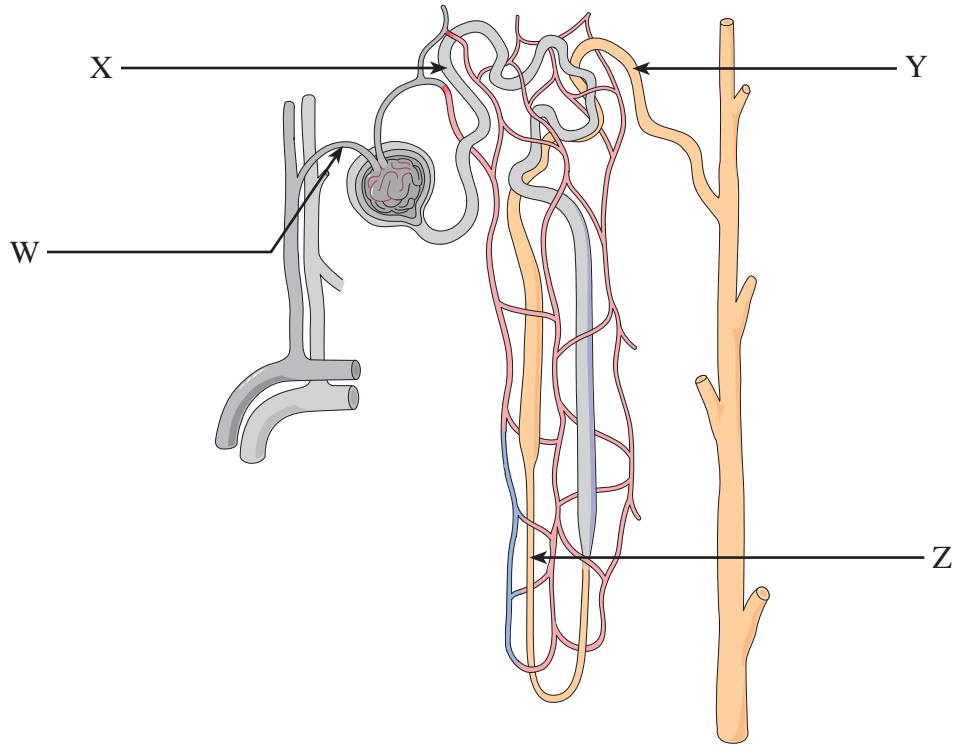
Semi-lunar valve:

Capillary:

7. Identify **three** substances transported by hemoglobin in the blood and give the name of each form of hemoglobin. **(3 marks: $\frac{1}{2}$ mark each)**

SUBSTANCE TRANSPORTED	FORM OF HEMOGLOBIN

Use the following diagram to answer question 9.



9. Identify the following structures and give a **different** function of each structure.
(8 marks: 1 mark each for name; 1 mark each for function)

Structure **W**:

Name: _____

Function: _____

Structure **X**:

Name: _____

Function: _____

Structure **Y**:

Name: _____

Function: _____

Structure **Z**:

Name: _____

Function: _____

10. a) Give **two** functions of each of the following hormones.

Estrogen:

(2 marks)

i) _____

ii) _____

LH (luteinizing hormone):

(2 marks)

i) _____

ii) _____

b) Describe **two** hormonal changes that occur in the mother as a result of implantation.

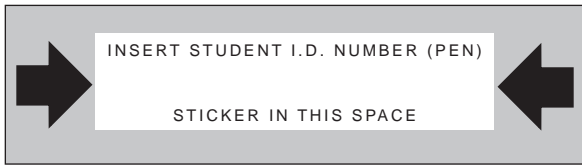
(2 marks)

i) _____

ii) _____

END OF EXAMINATION





BIOLOGY 12

August 1999

Course Code = BI

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Score for
Question 1:

1. $\frac{\quad}{(4)}$

Score for
Question 8:

8. $\frac{\quad}{(8)}$

Score for
Question 2:

2. $\frac{\quad}{(3)}$

Score for
Question 9:

9. $\frac{\quad}{(8)}$

Score for
Question 3:

3. $\frac{\quad}{(4)}$

Score for
Question 10:

10. $\frac{\quad}{(6)}$

Score for
Question 4:

4. $\frac{\quad}{(5)}$

Score for
Question 5:

5. $\frac{\quad}{(6)}$

Score for
Question 6:

6. $\frac{\quad}{(3)}$

Score for
Question 7:

7. $\frac{\quad}{(3)}$

