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Biology 12

AUGUST 2002

Course Code = BI

### Student Instructions

1. Place the stickers with your Personal Education Number (PEN) in the allotted spaces above. **Under no circumstance is your name or identification, other than your Personal Education 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. 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**.
5. 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.

Question 1:

1.  .

(4)

Question 9:

9.  .

(3)

Question 2:

2.  .

(6)

Question 10:

10.  .

(5)

Question 3:

3.  .

(3)

Question 11:

11.  .

(5)

Question 4:

4.  .

(5)

Question 5:

5.  .

(8)

Question 6:

6.  .

(3)

Question 7:

7.  .

(3)

Question 8:

8.  .

(5)

**BIOLOGY 12**

**AUGUST 2002**

COURSE CODE = BI

## GENERAL INSTRUCTIONS

1. Electronic devices, including dictionaries and pagers, are **not** permitted in the examination room.
2. 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.
3. For each of the written-response questions, write your answer in **ink** unless otherwise instructed in the space provided in this booklet.
4. Ensure that you use language and content appropriate to the purpose and audience of this examination. Failure to comply may result in your paper being awarded a zero.
5. This examination is designed to be completed in **two hours**. *Students may, however, take up to 30 minutes of additional time to finish.*

## BIOLOGY 12 PROVINCIAL EXAMINATION

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

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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. Most of the protein produced by a cell is manufactured at the
  - A. nucleus.
  - B. vacuoles.
  - C. rough endoplasmic reticulum.
  - D. smooth endoplasmic reticulum.
  
2. Which structure is responsible for endocytosis?
  - A. nucleolus
  - B. Golgi body
  - C. cell membrane
  - D. endoplasmic reticulum

Use the following list to answer question 3.

- DNA
- pepsin
- maltose
- water molecules

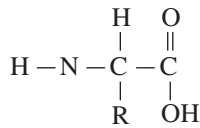
3. How many of the substances above have hydrogen bonding?
  - A. 1
  - B. 2
  - C. 3
  - D. 4

4. What is the function of a buffer in the bloodstream?

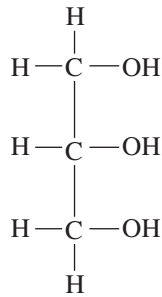
- A. destroy viruses
- B. transport oxygen
- C. initiate blood clotting
- D. keep the pH at a constant level

5. Which of the following molecules is used in the synthesis of lipids?

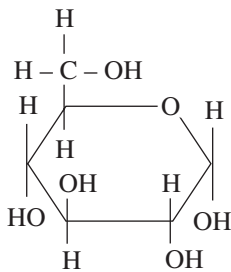
A.



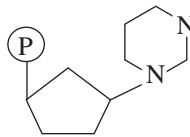
B.



C.



D.



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6. Two water molecules are produced by the union of glucose molecules during dehydration synthesis. What is the new molecule that is formed?

- A. a dipeptide
- B. a disaccharide
- C. a polysaccharide
- D. a monosaccharide

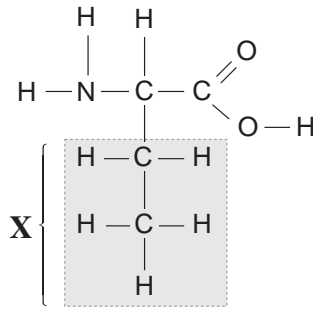
7. How do saturated fats differ from unsaturated fats?

- A. They are water soluble.
- B. They contain cholesterol.
- C. They form straight chains.
- D. Their hydrogen-to-carbon ratio is larger.





Use the following diagram to answer question 9.



9. The section labelled **X** is the

- A. acid.
  - B. amine.
  - C. R-group.
  - D. bicarbonate ion.
- 

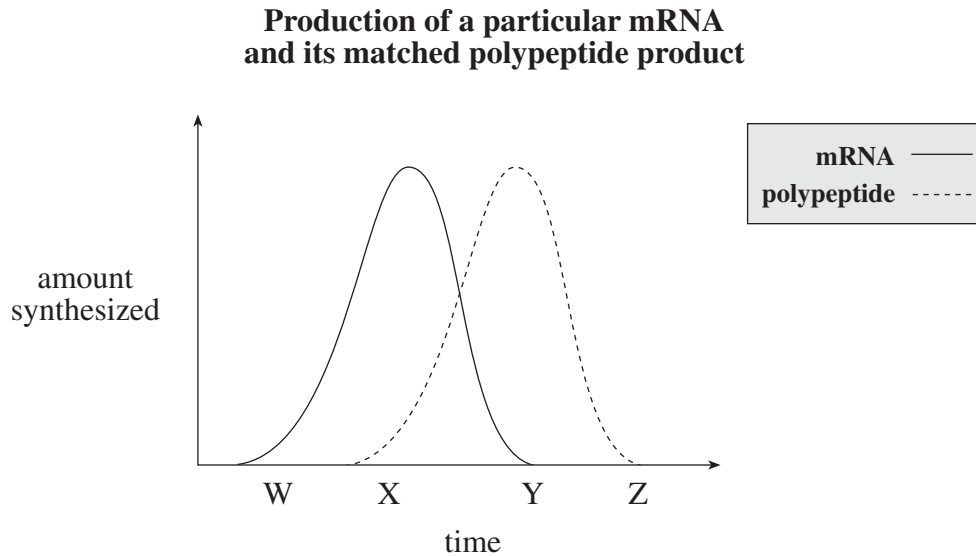
10. What is combined genetic material from two different organisms called?

- A. viral DNA
- B. ribosomal RNA
- C. transcription RNA
- D. recombinant DNA

11. The term codon is used to describe a sequence of bases in

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

Use the following graph to answer question 12.



12. At which of the following times is transcription, but **not** translation, occurring?

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

13. What term is used to describe the spread of cancer cells through the circulatory system to new locations?

- A. anaplasia
- B. metastasis
- C. vascularization
- D. contact inhibition

14. Which of the following is a function of an oncogene?

- A. fighting disease
- B. inhibiting protein synthesis
- C. becoming a proto-oncogene
- D. causing a cell to become cancerous

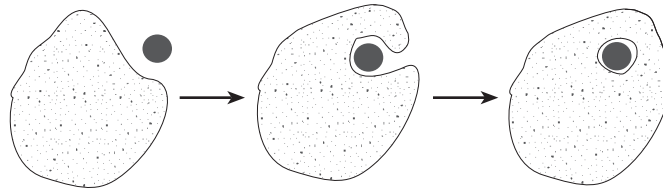
15. Which molecules function as pores and carriers in a cell membrane?

- A. lipids
- B. proteins
- C. nucleotides
- D. carbohydrates

16. By what process do lipid-soluble molecules and gases cross the cell membrane?

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

Use the following diagram to answer question 17.



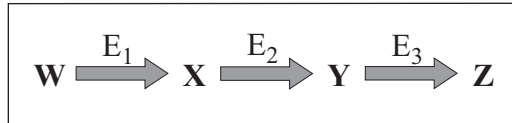
17. The diagram shows a white blood cell ingesting a bacterium. By what process does the bacterium enter the white blood cell?

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

18. An enzyme acts as a catalyst because it is capable of

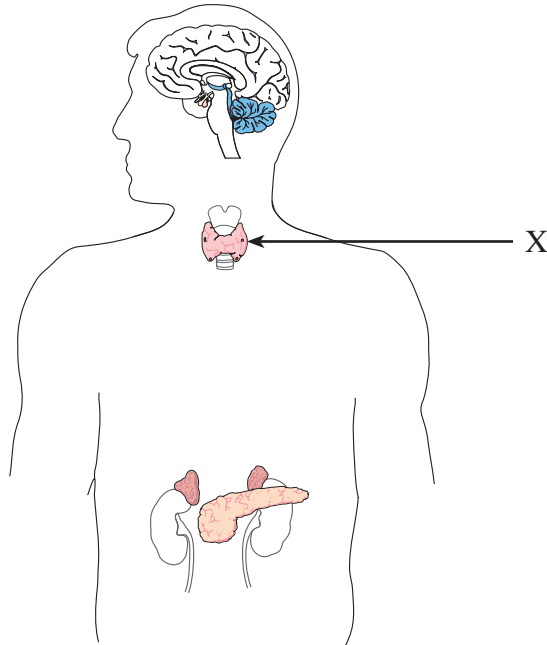
- A. slowing down many different reactions.
- B. acting as a reactant in a chemical reaction.
- C. lowering the energy required for the reaction to occur.
- D. providing hydrogen ions and electrons for a chemical reaction.

Use the following diagram to answer question 19.



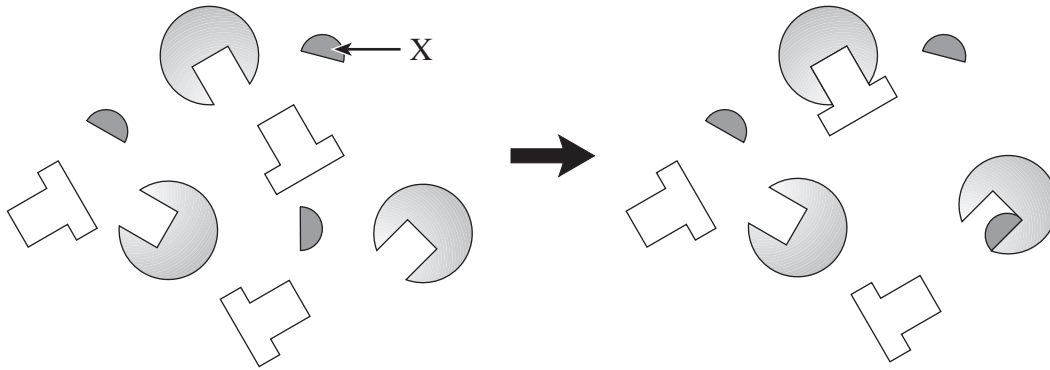
19. In the series of enzyme reactions shown above, product **Z** is able to occupy the active site of enzyme  $E_2$ . Product **Z** can therefore first inhibit the production of
- A. X
  - B.  $E_2$
  - C. Y
  - D. Z

Use the following diagram to answer question 20.



20. Secretions from gland **X** cause decreased
- A. body temperature.
  - B. oxygen uptake in cells.
  - C. production of carbon dioxide.
  - D. concentration of blood glucose.

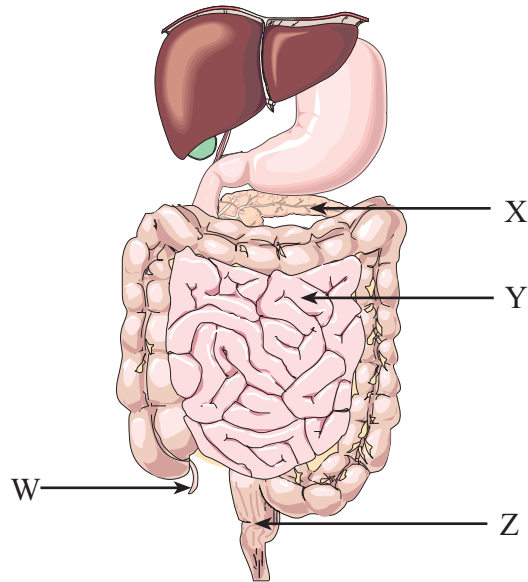
Use the following diagram to answer question 21.



21. In the diagram above, molecule **X** is acting as

- A. a substrate.
- B. an enzyme.
- C. a coenzyme.
- D. a competitive inhibitor.

Use the following diagram to answer questions 22 and 23.



22. What is the structure labelled **W**?

- A. liver
- B. pancreas
- C. appendix
- D. duodenum

23. Malfunctioning of which structure would result in higher than normal levels of glucose in the blood?

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

24. Which digestive structure has the greatest influence on blood volume?

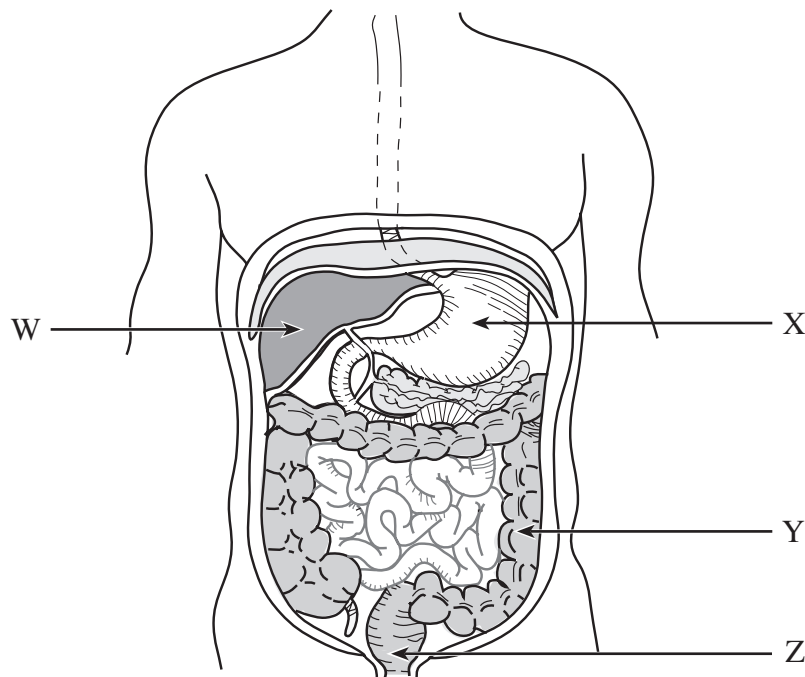
- A. colon
- B. stomach
- C. pancreas
- D. small intestine

**OVER**

25. Which structure is **not** correctly matched with an enzyme it produces?

	Structure	Enzyme Produced
A.	stomach	trypsin
B.	pancreas	amylase
C.	small intestine	peptidase
D.	salivary glands	amylase

Use the following diagram to answer question 26.



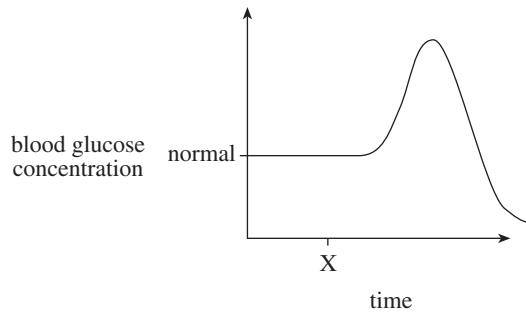
26. An individual has an abnormally high level of fat in the feces. Which structure could be malfunctioning?

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

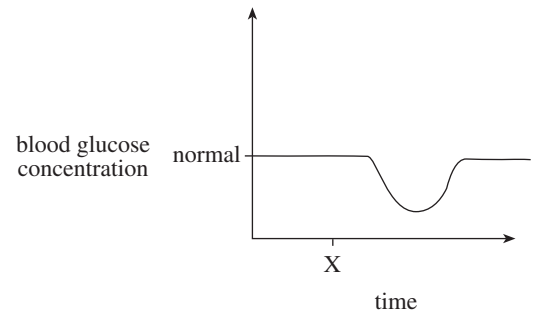


27. A student ingests a large amount of sugar at time X. Which of the following graphs correctly depicts blood glucose concentration in the hepatic vein?

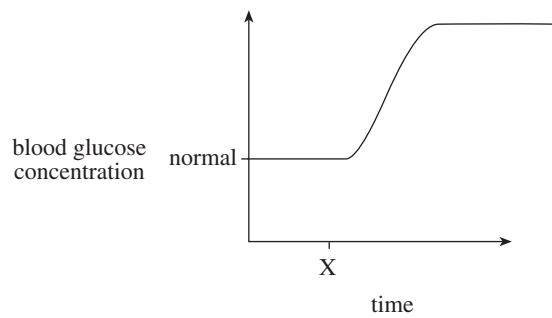
A.



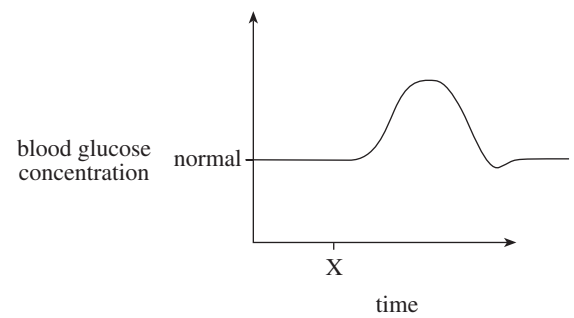
B.



C.



D.



28. Which structure allows blood to pass between the two atria of a fetal heart?

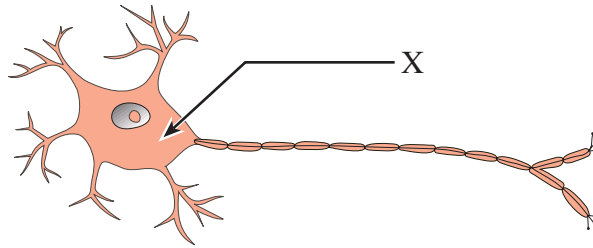
- A. arterial duct
- B. venous duct
- C. oval opening
- D. umbilical artery

29. In which of the following can DNA replication occur?

- A. platelets
- B. antibodies
- C. red blood cells
- D. white blood cells

30. What is produced in response to viruses entering the body?
- A. antigens
  - B. platelets
  - C. antibodies
  - D. red blood cells
31. The pleural membranes surround
- A. the lungs.
  - B. the trachea.
  - C. each alveolus.
  - D. the diaphragm.
32. Where does external respiration occur?
- A. larynx
  - B. alveoli
  - C. trachea
  - D. bronchi
33. During the expiration of air, the diaphragm moves
- A. up, resulting in a decrease in pressure in the thoracic cavity.
  - B. up, resulting in an increase in pressure in the thoracic cavity.
  - C. down, resulting in a decrease in pressure in the thoracic cavity.
  - D. down, resulting in an increase in pressure in the thoracic cavity.

Use the following diagram to answer questions 34 and 35.

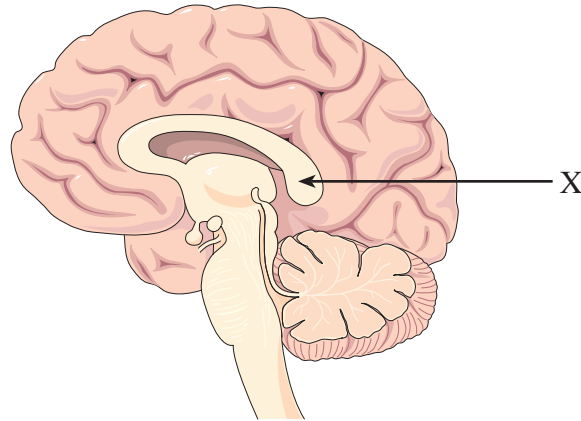


34. What is the function of the neuron above?
- A. to take an impulse to an interneuron
  - B. to send sensory information to the central nervous system
  - C. to take an impulse from a motor neuron to a sensory neuron
  - D. to carry a nerve impulse away from the central nervous system
35. What is the structure labelled **X**?
- A. synapse
  - B. cell body
  - C. node of Ranvier
  - D. myelinated dendrite
- 
36. Why can an impulse travelling along an axon **not** reverse its direction?
- A. The myelin sheath will only permit one-way travel of an impulse.
  - B. Sodium gates remain closed until the impulse reaches the synapse.
  - C. The threshold required to create an action potential behind the impulse is increased.
  - D. The sodium-potassium pump has not restored the resting potential immediately behind the action potential.
37. If potassium ions could not diffuse out of the axon, which of the following would result?
- A. Repolarization would not occur.
  - B. A neurotransmitter would be released.
  - C. The length of the recovery phase would be reduced.
  - D. The frequency of action potentials would be increased.

**OVER**

38. Which division of the nervous system is used to stimulate digestion after a “fight or flight” response?
- A. central
  - B. somatic
  - C. sympathetic
  - D. parasympathetic

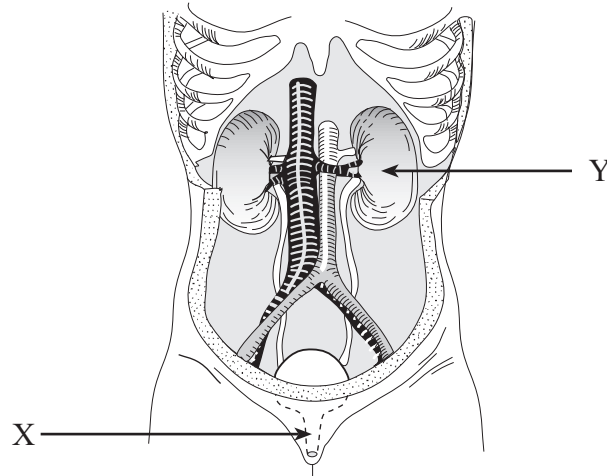
Use the following diagram to answer question 39.



39. What is the part of the brain labelled X?
- A. thalamus
  - B. hypothalamus
  - C. corpus callosum
  - D. medulla oblongata
- 

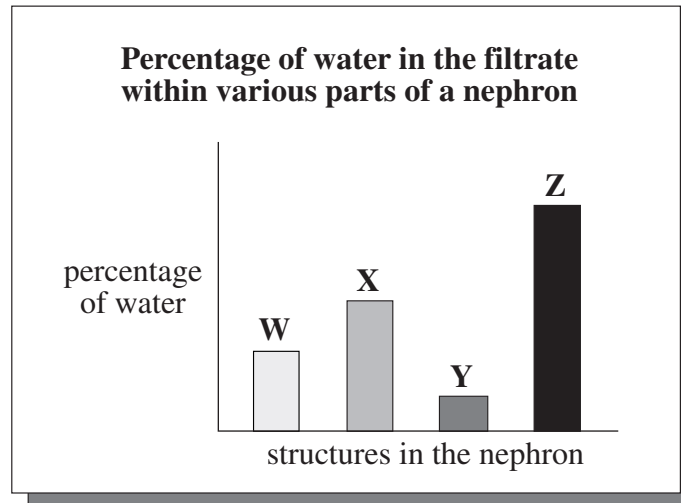
40. Which organ excretes urea and some salts?
- A. lung
  - B. colon
  - C. kidney
  - D. gallbladder

Use the following diagram to answer questions 41 and 42.



41. What is the structure labelled **X**?
- A. ureter
  - B. urethra
  - C. renal pelvis
  - D. urinary bladder
42. Which of the following is **not** a function of structure **Y**?
- A. control of blood pH
  - B. production of glycogen
  - C. excretion of histamines
  - D. maintenance of blood volume
- 
43. What is the correct order of the processes which would modify blood plasma as it passes through the nephron?
- A. filtration → tubular excretion → selective reabsorption → reabsorption of water
  - B. filtration → selective reabsorption → reabsorption of water → tubular excretion
  - C. selective reabsorption → reabsorption of water → filtration → tubular excretion
  - D. selective reabsorption → filtration → tubular excretion → reabsorption of water

Use the following graph to answer question 44.



44. Which structure is most likely the collecting duct?

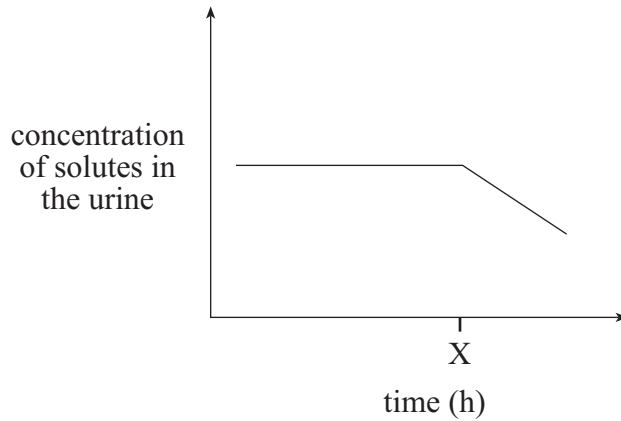
- A. W
- B. X
- C. Y
- D. Z

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45. Why is the loop of Henle important to the maintenance of blood volume?

- A. It reabsorbs glucose.
- B. It synthesizes blood proteins.
- C. It adjusts the pH of the urine.
- D. It produces a hypertonic renal medulla.

Use the following graph to answer question 46.



46. The concentration of solutes **in the urine** was measured over a one-day period. What might have caused the change that occurred at time **X**?

- A. The blood became more acidic.
  - B. Excess sodium ions were excreted.
  - C. The secretion of ADH was inhibited.
  - D. Aldosterone production was stimulated.
- 

47. Where do sperm mature?

- A. epididymis
- B. interstitial cells
- C. seminal vesicles
- D. ductus (vas) deferens

48. Where is follicle-stimulating hormone (FSH) produced?

- A. follicle
- B. hypothalamus
- C. corpus luteum
- D. anterior pituitary

49. Which of the following events results from positive feedback on the hypothalamus between days 1 to 13 of the menstrual cycle?
- A. ovulation
  - B. implantation
  - C. menstruation
  - D. thickening of the endometrium
50. What is one result of an embryo failing to implant in the endometrium?
- A. the degeneration of the corpus luteum
  - B. an increased production of progesterone
  - C. the release of human chorionic gonadotropin (HCG)
  - D. a decreased production of follicle-stimulating hormone (FSH)

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



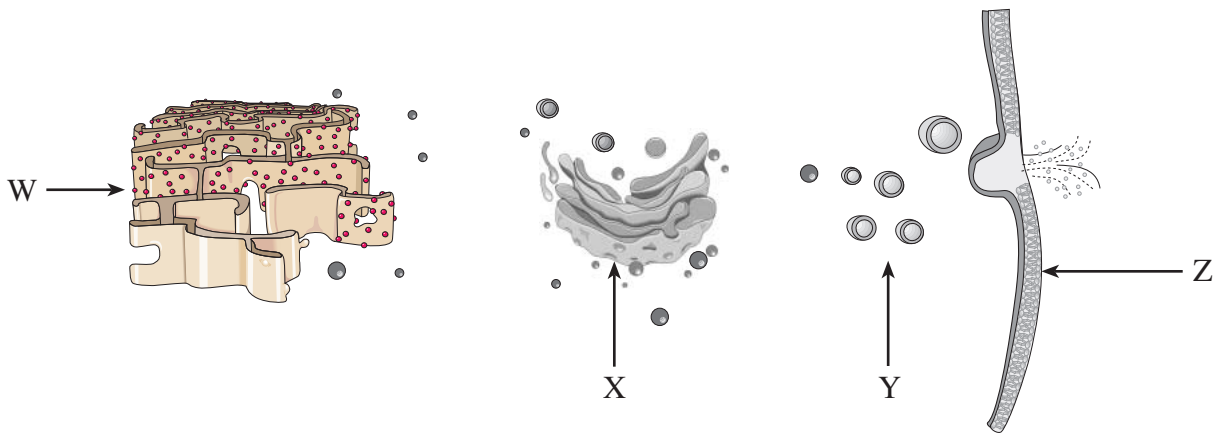
**PART B: WRITTEN RESPONSE**

**Value: 50 marks**

**Suggested Time: 75 minutes**

- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination unless otherwise instructed.
  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 diagrams to answer question 1.**



1. Describe how structures **W**, **X**, **Y** and **Z** work together.

**(4 marks)**

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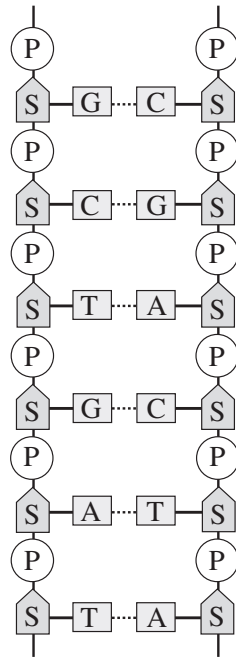
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Use the following diagram to answer question 2.



2. a) Describe replication of this molecule.

**(3 marks)**

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b) What is the role of this molecule in determining the structure of a protein? **(1 mark)**

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c) Reading top to bottom, determine the mRNA sequence that would be transcribed from the left-hand strand of this molecule. **(1 mark)**

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d) Give the anticodons that are complementary to this mRNA sequence. **(1 mark)**

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3. a) Why do oxygen molecules enter a cell at a different rate than protein molecules. **(1 mark)**

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b) State **two** ways to increase the rate of oxygen movement into a cell. **(2 marks)**

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

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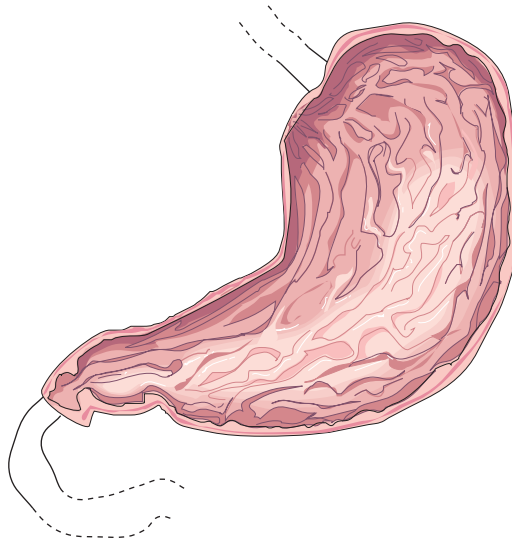
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ii) \_\_\_\_\_

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Use the following diagram to answer question 4.



4. Explain how the structure above is well-suited for its function.

**(5 marks)**

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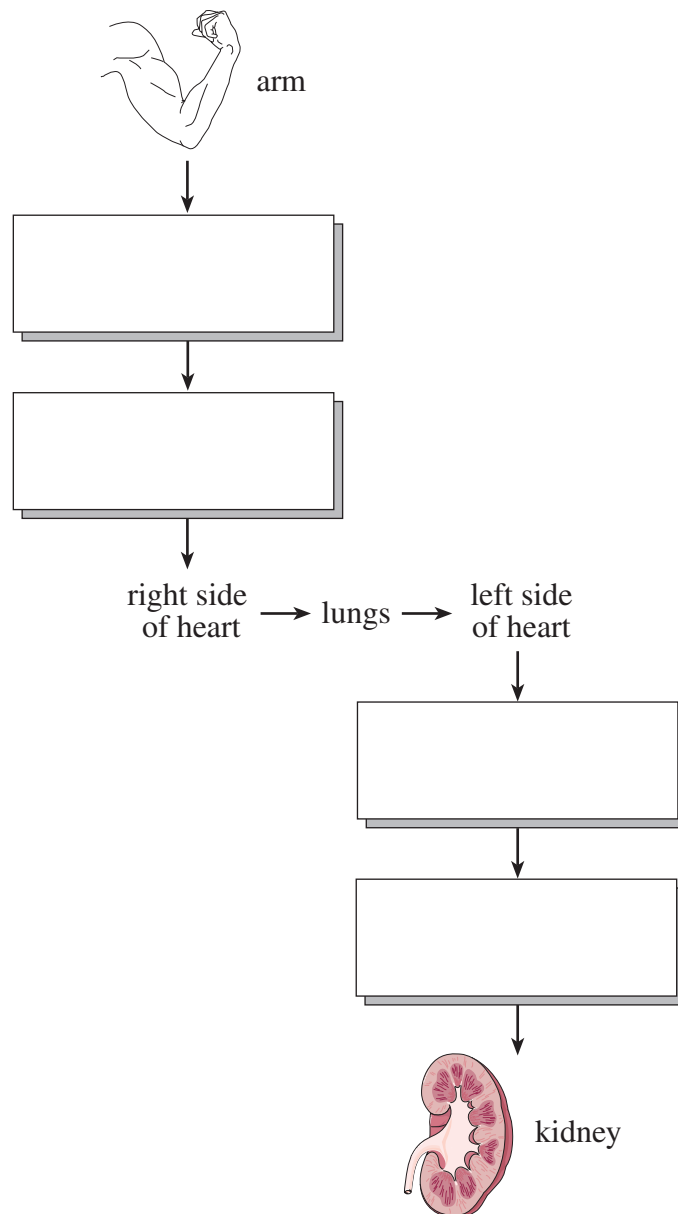
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Use the following list to answer question 5 a).

- aorta
- renal vein
- renal artery
- subclavian vein
- subclavian artery
- pulmonary artery
- anterior vena cava

5. a) Choose the vessel names from the list above to fill in the boxes that describe the path of blood from the arm to the kidney. (Use only one term per box. Not all of the terms will be used.) **(4 marks)**



b) Give **one** function of each of the following.

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

carotid arteries:

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lymph veins:

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antibodies:

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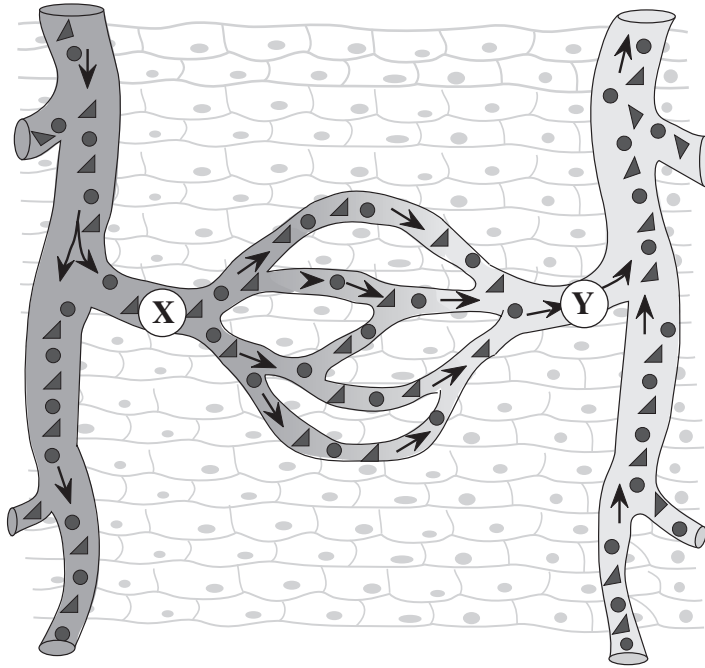
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chordae tendineae:

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Use the following diagram to answer question 6.



6. Describe what happens to the concentrations of oxygen, carbon dioxide and nutrients in the blood as it moves between points X and Y in the skin. (3 marks)

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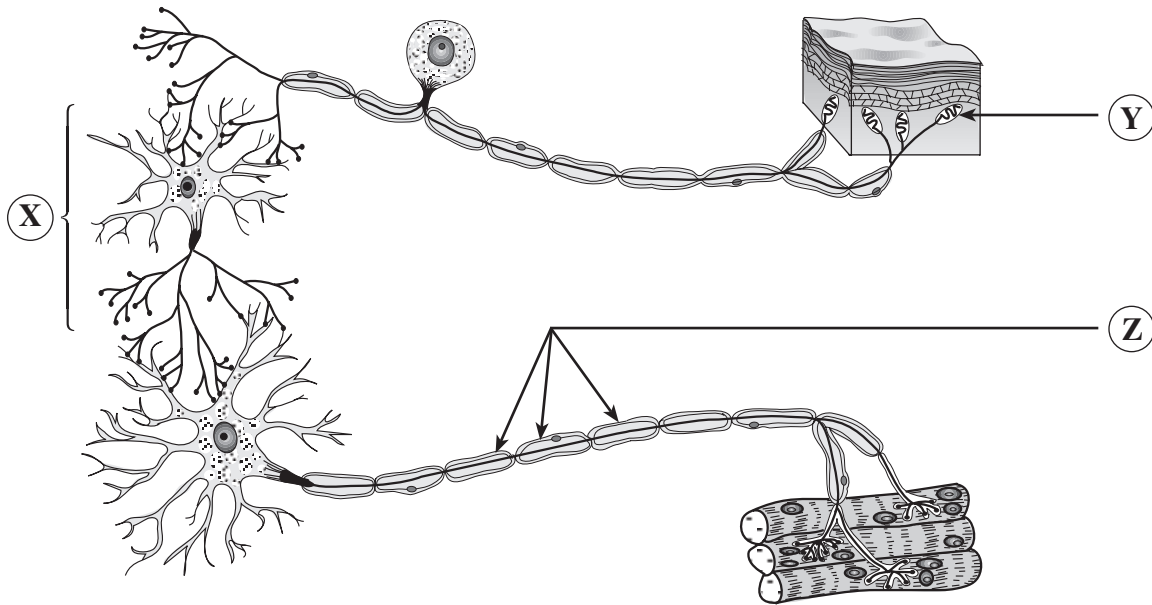
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Use the following diagram to answer question 9.



9. Give **one** function of each of the following structures. (3 marks: 1 mark each)

Structure **X**:

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Structure **Y**:

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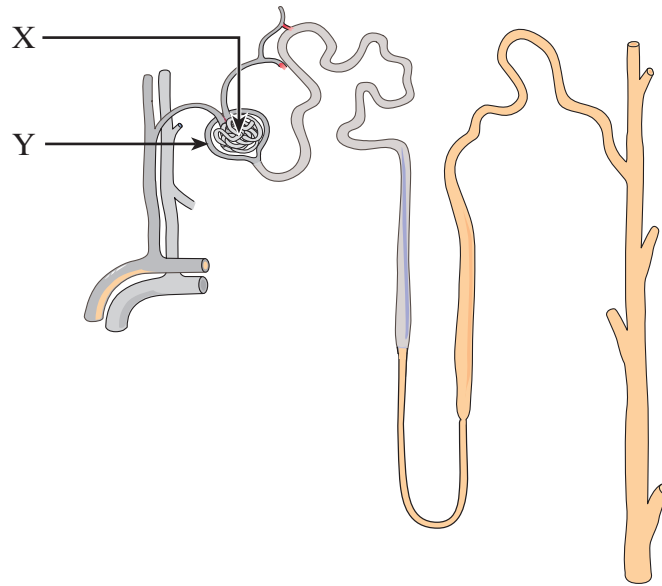
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Structure **Z**:

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Use the following diagram to answer question 10.



10. a) Identify structure X.

(1 mark)

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b) Describe the process that occurs between X and Y.

(2 marks)

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c) Identify **two** components of blood that cannot move into the filtrate under normal conditions.

(2 marks)

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

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

11. a) Give **three** characteristics of semen and describe how each of these characteristics facilitates the function of semen. **(3 marks)**

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

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

iii) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b) What would result if luteinizing hormone (LH) was **not** secreted in the male? **(2 marks)**

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

**END OF EXAMINATION**