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Biology 12

JANUARY 2003

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. .
(3)

Question 9:
9. .
(3)

Question 2:
2. .
(4)

Question 10:
10. .
(5)

Question 3:
3. .
(3)

Question 11:
11. .
(3)

Question 4:
4. .
(3)

Question 12:
12. .
(4)

Question 5:
5. .
(2)

Question 13:
13. .
(2)

Question 6:
6. .
(3)

Question 14:
14. .
(6)

Question 7:
7. .
(2)

Question 8:
8. .
(7)

BIOLOGY 12

JANUARY 2003

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

	Value	Suggested Time
1. This examination consists of two parts:		
PART A: 50 multiple-choice questions	50	45
PART B: 14 written-response questions	50	75
	Total:	
	100 marks	120 minutes

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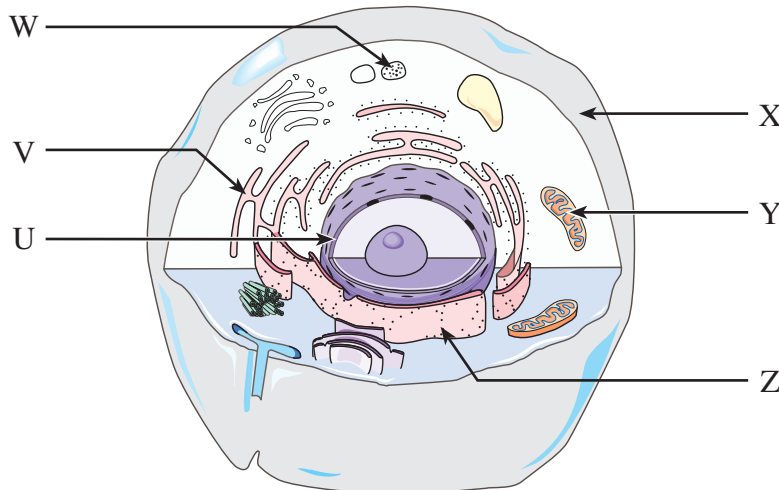
PART A: MULTIPLE CHOICE

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 questions 1 and 2.

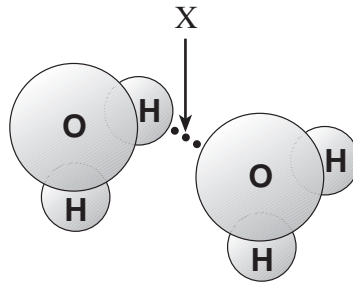


1. Which labelled organelle produces most of the ATP in the cell?
 - A. V
 - B. W
 - C. Y
 - D. Z

2. Which labelled organelle has a bilayer of phospholipids and pores through which mRNA passes?
 - A. U
 - B. V
 - C. X
 - D. Y

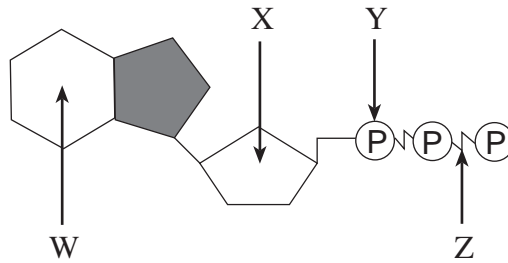
3. What could be produced by a cell with a large amount of smooth endoplasmic reticulum?
- A. enzymes
 - B. antibodies
 - C. hemoglobin
 - D. testosterone

Use the following diagram to answer question 4.



4. What type of bond is represented by X?
- A. ionic
 - B. peptide
 - C. covalent
 - D. hydrogen
-
5. Gastric juice contains a high concentration of which of the following?
- A. H^+
 - B. bile
 - C. OH^-
 - D. $NaHCO_3$
6. Which of the following are lipids?
- A. ATP
 - B. DNA
 - C. steroids
 - D. glycogen

Use the following diagram to answer question 7.



7. Which labelled part of the molecule is associated with energy storage?

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

8. What is found in RNA but **not** in DNA?

- A. uracil
- B. thymine
- C. deoxyribose
- D. sugar-phosphate backbone

9. During what process are polypeptides assembled at the ribosomes?

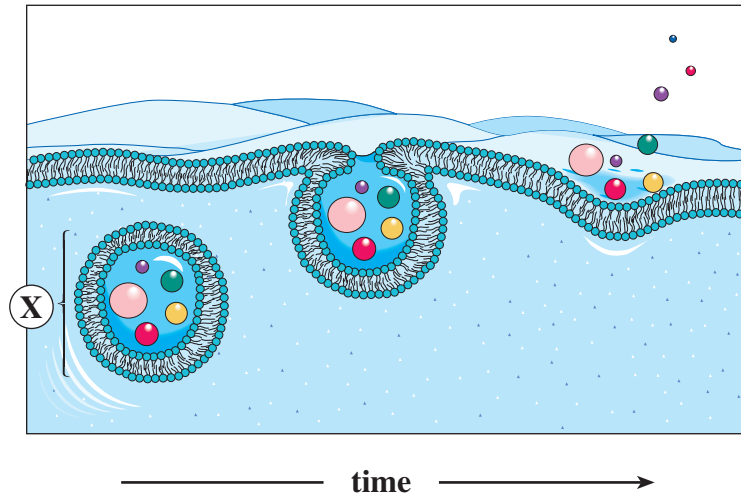
- A. hydrolysis
- B. translation
- C. replication
- D. transcription

10. What does metastasis refer to?

- A. mutation leading to a cancer-causing gene
- B. differentiated cells becoming undifferentiated
- C. the formation of new blood vessels in a tumour
- D. the spread of cancerous cells throughout the body

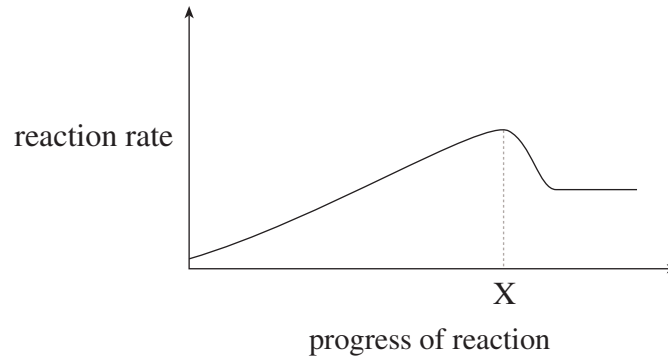
11. What process occurs during the development of cancer which allows a growing tumour to eliminate carbon dioxide and metabolic wastes?
- A. anaplasia
 - B. metastasis
 - C. carcinogenesis
 - D. vascularization
12. A substance that causes the expression of cancer-causing genes is acting as
- A. an initiator.
 - B. a promoter.
 - C. an oncogene.
 - D. a proto-oncogene.
13. What process does **not** require the use of ATP?
- A. exocytosis
 - B. pinocytosis
 - C. active transport
 - D. facilitated transport
14. Which of the following is an example of pinocytosis?
- A. Transport vesicles are formed at the Golgi bodies.
 - B. Small particles move because of osmotic pressure.
 - C. Large molecules are engulfed and brought into the cell.
 - D. A white blood cell forms a vacuole around a bacterium.
15. What will happen to an animal cell when it is placed into a concentrated salt solution?
- A. It will excrete salt.
 - B. Its volume will decrease.
 - C. It will absorb more water.
 - D. Its volume will remain the same.

Use the following diagram to answer question 16.



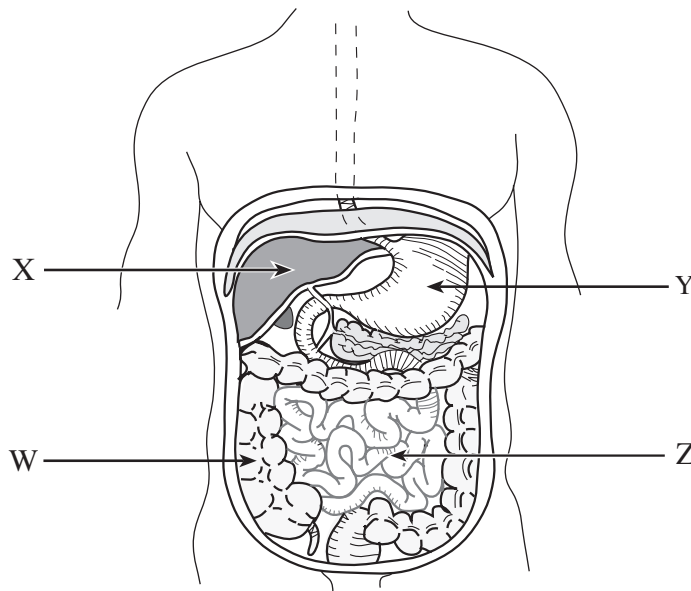
16. What could the structure labelled X contain?
- A. bacteria
 - B. glycogen
 - C. white blood cells
 - D. protein molecules
-
17. Increased secretion by the thyroid gland results in which of the following?
- A. increased use of oxygen
 - B. decreased body temperature
 - C. increased synthesis of glycogen
 - D. decreased carbon dioxide production
18. What could be added to an enzyme-catalyzed reaction to decrease its rate?
- A. enzymes
 - B. substrate
 - C. lead ions
 - D. coenzymes

Use the following graph to answer question 19.



19. What would cause the change in the rate of the enzyme-catalyzed reaction at **X**?
- A. an increase in enzyme concentration
 - B. an increase in the temperature to 37°C
 - C. a decrease in the substrate concentration
 - D. a decrease in the competitive inhibitor concentration

Use the following diagram to answer question 20.

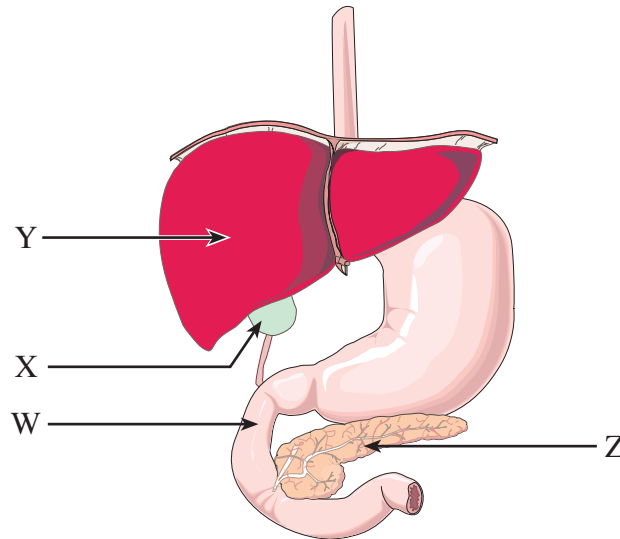


20. The absorption of water is the **main** function of which labelled structure?
- A. W
 - B. X
 - C. Y
 - D. Z

21. Which of the following is **not** a component of pancreatic juice?

- A. lipase
- B. amylase
- C. hydrochloric acid
- D. sodium bicarbonate

Use the following diagram to answer question 22.



22. Which labelled structure produces a substance which aids in the physical digestion of food?

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

23. What part of the digestive tract has the greatest surface area?

- A. the stomach
- B. the esophagus
- C. the large intestine
- D. the small intestine

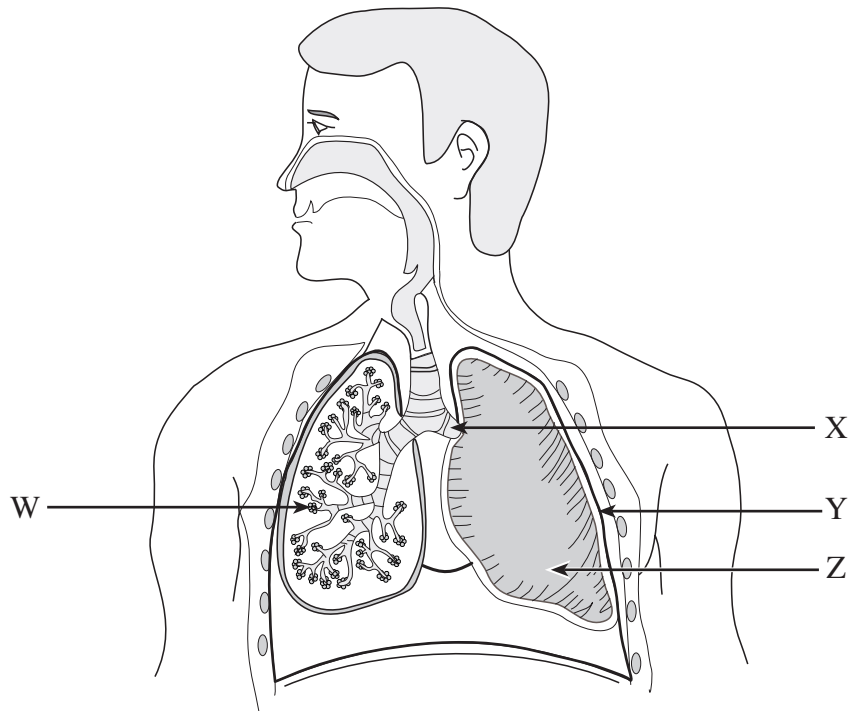
24. Which of the following combinations will produce the most product in the presence of water?

- A. amylase and fat at pH 7.4
- B. lipase and starch at pH 8.0
- C. trypsin and protein at pH 8.0
- D. nuclease and nucleic acid at pH 3.0

OVER

29. What is produced by white blood cells that inactivates bacteria or viruses?
- A. antigens
 - B. platelets
 - C. antibodies
 - D. hemoglobin
30. The chordae tendineae of the heart help to prevent the backflow of blood from the
- A. atria into the ventricles.
 - B. ventricles into the atria.
 - C. ventricles into the aorta and pulmonary trunk.
 - D. aorta and pulmonary trunk into the ventricles.
31. What valve opens when the heart chamber producing the highest blood pressure contracts?
- A. the aortic semi-lunar valve
 - B. the pulmonary semi-lunar valve
 - C. the left atrioventricular valve
 - D. the right atrioventricular valve
32. What vessel carries blood away from the right ventricle?
- A. the aorta
 - B. the vena cava
 - C. the pulmonary vein
 - D. the pulmonary trunk
33. During exhalation, what structure does air pass through immediately after leaving the bronchioles?
- A. the alveoli
 - B. the bronchi
 - C. the trachea
 - D. the pharynx

Use the following diagram to answer question 34.



34. Which labelled structure maintains negative pressure in the thoracic cavity?

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

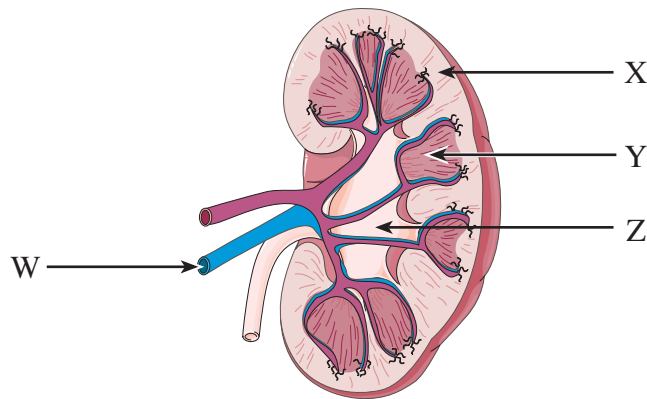
35. What is a function of mucus in the respiratory tract?

- A. to trap dust and debris
- B. to activate carbonic anhydrase
- C. to decrease the pH in the lungs
- D. to increase the pressure in the lungs

36. Which of the following events occurs during inhalation?
- A. The rib muscles relax.
 - B. The diaphragm flattens.
 - C. The thoracic volume decreases.
 - D. The rib cage moves down and in.
37. What occurs at the alveoli and pulmonary capillaries?
- A. internal respiration
 - B. external respiration
 - C. the binding of hydrogen to hemoglobin
 - D. the release of oxygen from hemoglobin
38. Which of the following substances formed during internal respiration counteracts a decrease in blood pH?
- A. oxyhemoglobin
 - B. carbonic anhydrase
 - C. reduced hemoglobin
 - D. carbaminohemoglobin
39. Which of the following conditions favours the release of oxygen from hemoglobin at the tissues?
- A. increased levels of carbon dioxide and increased pH
 - B. decreased pH and increased levels of carbaminohemoglobin
 - C. increased levels of hydrogen ions and increased temperature
 - D. decreased levels of carbon dioxide and decreased temperature
40. What is a function of the parasympathetic nervous system?
- A. It causes the pupils to dilate.
 - B. It increases the breathing rate.
 - C. It increases blood flow to the digestive system.
 - D. It is responsible for the “fight or flight” reactions.

41. What structure in the brain regulates the heartbeat and contains reflex centres for swallowing?
- A. the thalamus
 - B. the cerebellum
 - C. the corpus callosum
 - D. the medulla oblongata

Use the following diagram to answer question 42.



42. Which of the labelled arrows points to the renal cortex?

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

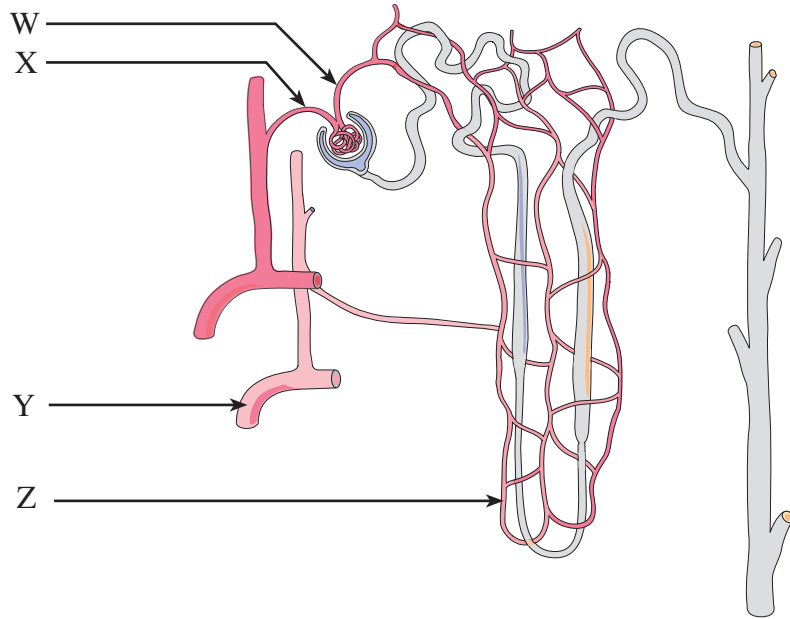
43. Where does selective reabsorption occur?

- A. in a collecting duct
- B. in the renal medulla
- C. in a Bowman's capsule
- D. in a proximal convoluted tubule

44. The function of which of the following is **most** dependent upon adequate blood pressure?

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

Use the following diagram to answer question 45.



45. Which labelled structure is the efferent arteriole?

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

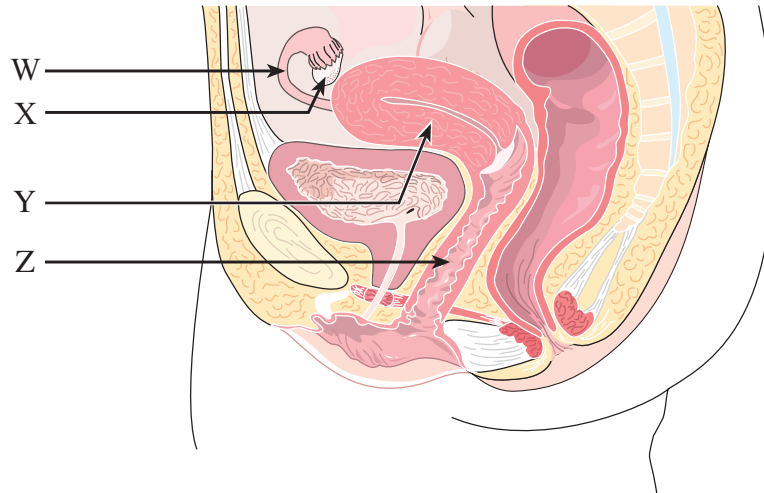
46. In what structure is the corpus luteum found?

- A. the uterus
- B. the ovary
- C. the clitoris
- D. the oviduct

47. What would be an effect of high estrogen concentrations in the female?

- A. The placenta would begin to develop.
- B. The follicle would increase the release of its secretions.
- C. The corpus luteum would reduce the release of progesterone.
- D. The anterior pituitary would reduce the release of follicle-stimulating hormone.

Use the following diagram to answer questions 48, 49 and 50.



48. What is represented by the structure labelled **W**?
- A. the ovary
 - B. the uterus
 - C. the vagina
 - D. the oviduct
49. Which labelled structure secretes hormones that cause the changes that occur in the female body during puberty?
- A. W
 - B. X
 - C. Y
 - D. Z
50. What will occur at **X** as a result of a reduction in the secretion of GnRH (gonadotropin-releasing hormone)?
- A. The follicle will not mature.
 - B. The secretion of estrogen will increase.
 - C. The secretion of progesterone will increase.
 - D. The corpus luteum will secrete human chorionic gonadotropin.

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

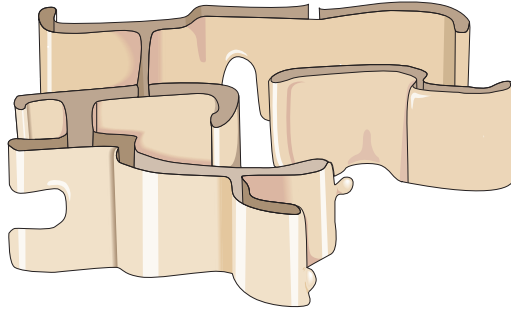
PART B: WRITTEN RESPONSE

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. You may not need all of the space provided to answer each question.

Use the following diagram to answer question 1.



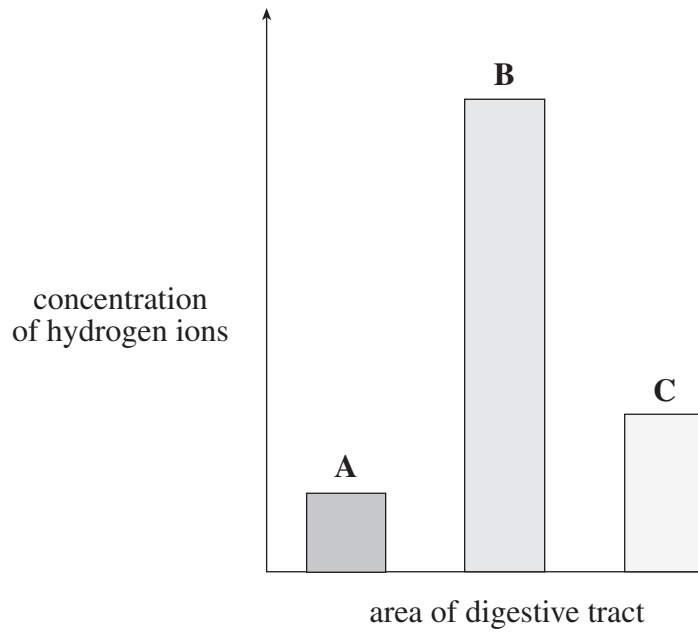
1. a) Name an organ whose cells contain large amounts of the organelle shown in the diagram. **(1 mark)**

- b) Describe **two** functions of the organelle. **(2 marks)**

i) _____

ii) _____

2. In an experiment investigating conditions in the digestive tract, the concentration of hydrogen ions was measured in three areas, **A**, **B** and **C**. The following graph shows the results.



Identify areas **A** and **B** and explain how the conditions there contribute to proper digestion.
(4 marks: 1 mark each for name; 1 mark each for explanation)

area **A**:

name: _____

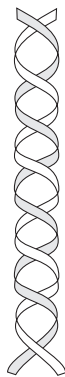
explanation: _____

area **B**:

name: _____

explanation: _____

Use the following diagram to answer question 3.



3. List **three** structural components of the unit molecule that form the polymer shown.

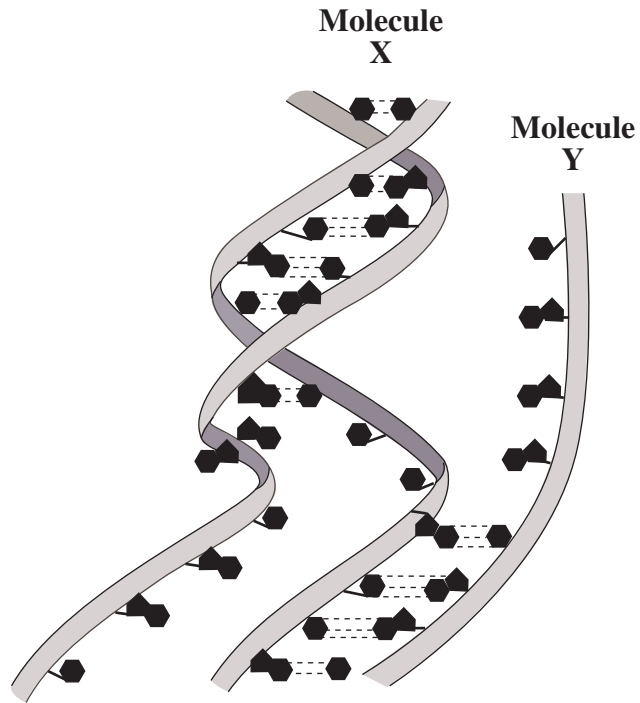
(3 marks)

i) _____

ii) _____

iii) _____

Use the following diagram to answer question 4.



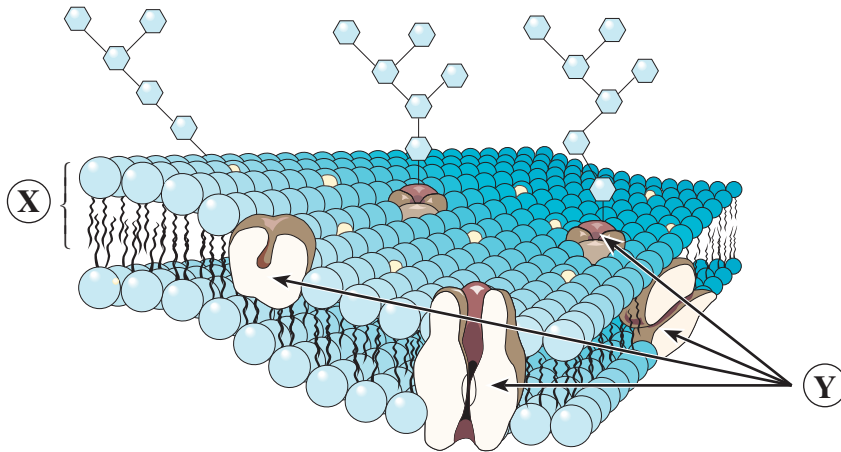
4. Describe **three** ways in which molecule **X** differs from molecule **Y**. **(3 marks)**

i) _____

ii) _____

iii) _____

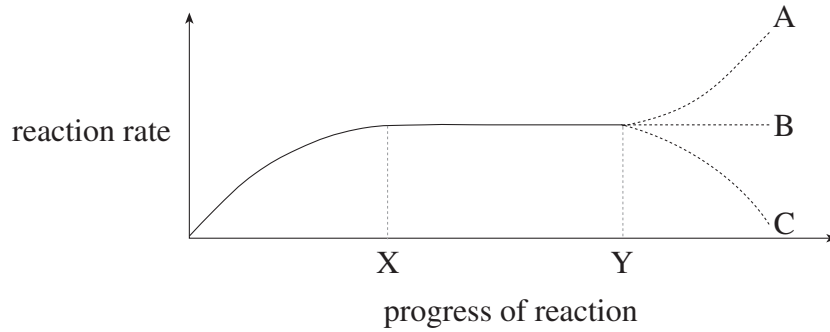
Use the following diagram to answer question 5.



5. a) Identify molecule **X**. (1 mark)

b) Give **one** function of the molecules labelled **Y**. (1 mark)

Use the following graph to answer question 6.



6. The graph shows the change in the rate of an enzyme-catalyzed reaction over time.

a) Explain why the rate became constant at time **X**. **(1 mark)**

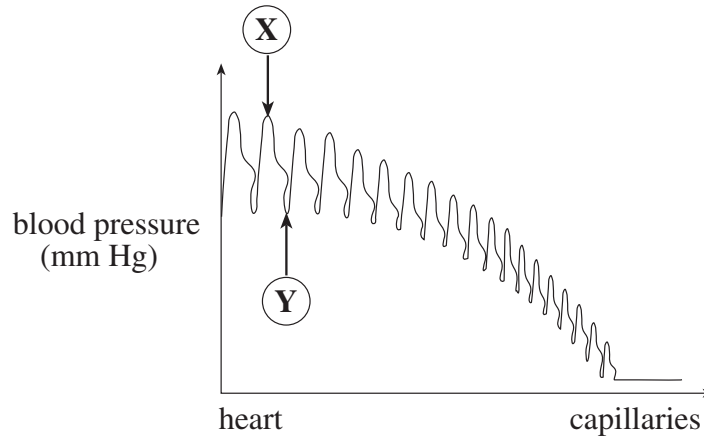
b) Which labelled line correctly illustrates what would occur if more enzyme was added at time **Y**. Explain your answer. **(2 marks)**

7. Name the organ that produces an enzyme which chemically digests fats and identify the enzyme it produces. **(2 marks)**

organ: _____

enzyme: _____

Use the following graph to answer question 8.



8. a) Name and explain what is occurring in the heart to cause the conditions shown on the graph at point **X** and point **Y**. **(4 marks)**

point **X**: _____

explanation: _____

point **Y**: _____

explanation: _____

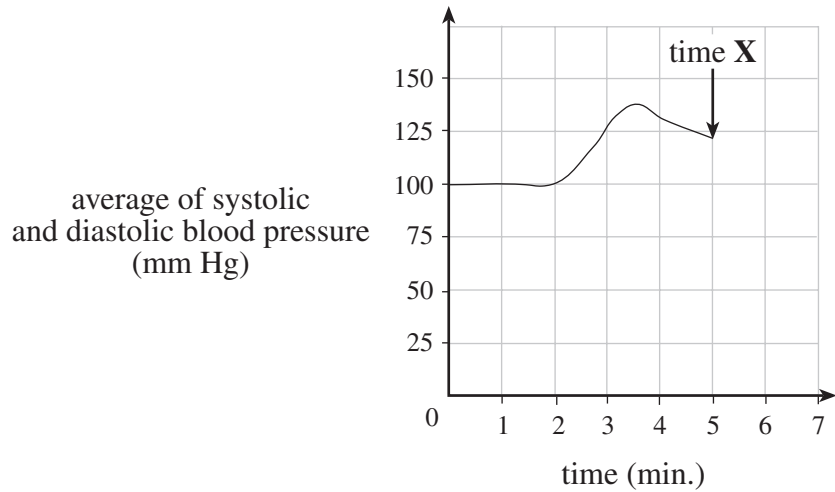
- b) Explain why blood pressure decreases as blood flows from the arteries to the capillaries. **(1 mark)**

- c) Why is it important that blood flows very slowly in the capillaries? **(1 mark)**

- d) Explain why blood velocity increases slightly as it moves from the capillaries to the veins. **(1 mark)**

OVER

Use the following graph to answer question 9.



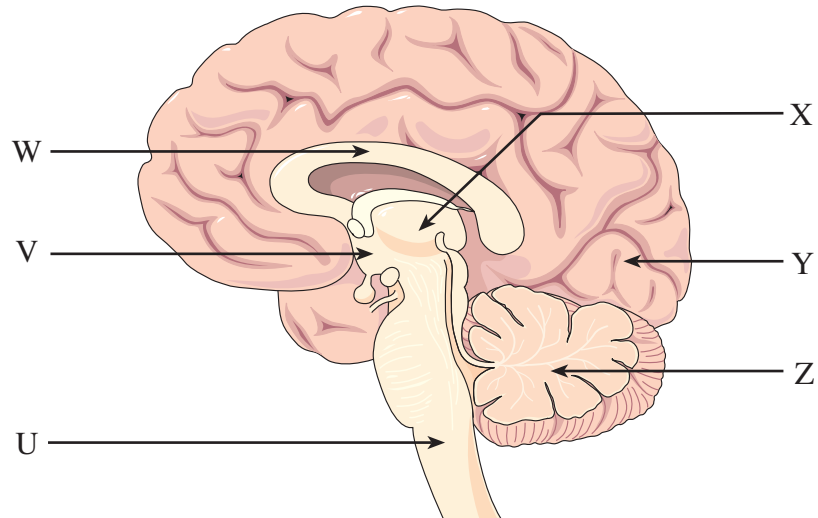
9. a) Describe the mechanisms at work in the body which led to the changes that occurred between minute two and minute three. **(2 marks)**

i) _____

ii) _____

b) If acetylcholine was administered at time X, describe the effect on the body. **(1 mark)**

Use the following diagram to answer question 11.



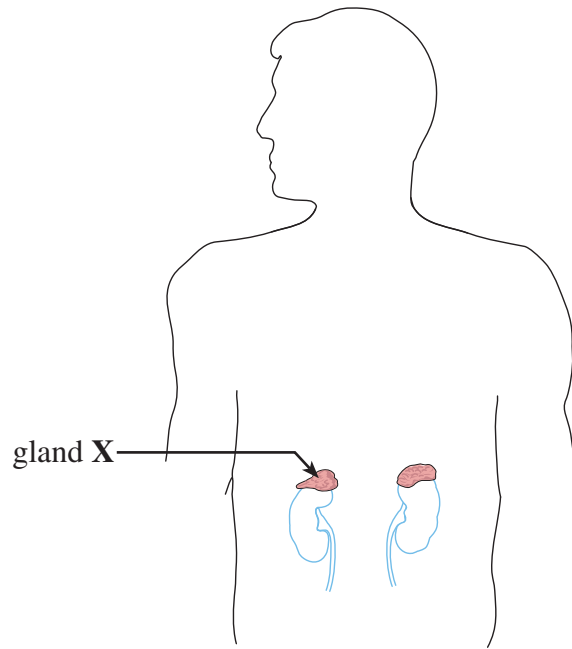
11. Write the letter indicating the part of the brain with the following functions.
(3 marks: 1 mark each)

Function	Letter
the neuroendocrine control centre	_____
ensures that skeletal muscle moves in a smooth and coordinated manner	_____
allows nerve impulses to pass between cerebral hemispheres	_____

12. List the structures, in the correct order, through which a glucose molecule passes as it travels through the tubule from the renal artery to the renal vein.

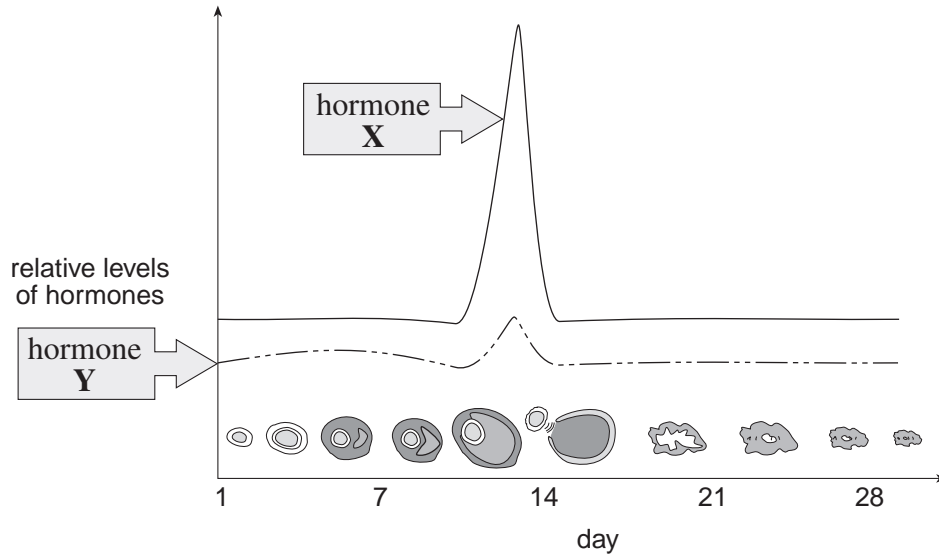
(4 marks: 3 marks for structures; 1 mark for correct order)

Use the following diagram to answer question 13.



13. How does gland X function to regulate sodium ion concentration in the blood? (2 marks)

Use the following diagram to answer question 14.



14. a) Identify each of the following. (2 marks: 1 mark each)

hormone X: _____

hormone Y: _____

b) Describe the effect of hormone X on the female reproductive system during days 15 to 28 of a 28-day cycle. (2 marks)

c) What would occur during days 1 to 13 of the ovarian cycle if follicle-stimulating hormone (FSH) was not secreted? (2 marks)

END OF EXAMINATION

