

NOVEMBER 1998

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

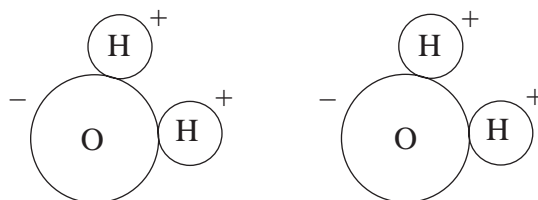
INSTRUCTIONS: For each question, select the **best** answer and record your choice on the Response Form provided. Using an HB pencil, completely fill in the circle that has the letter corresponding to your answer.

Use the following diagram to answer question 1.



1. The process that occurs in the structure shown above is
 - A. photosynthesis.
 - B. protein synthesis.
 - C. cellular respiration.
 - D. inter-cellular digestion.

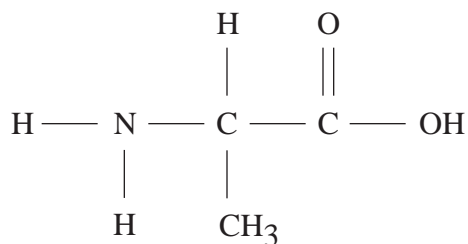
Use the following diagram to answer question 2.



2. The chemical bond that will form between the molecules in the diagram above is a(n)
 - A. ionic bond.
 - B. peptide bond.
 - C. covalent bond.
 - D. hydrogen bond.

3. Substances that increase the concentration of hydrogen ions in a solution are
- acids.
 - bases.
 - enzymes.
 - polar molecules.

Use the following diagram to answer question 4.



4. This molecule is part of a
- fat.
 - protein.
 - nucleic acid.
 - carbohydrate.
-

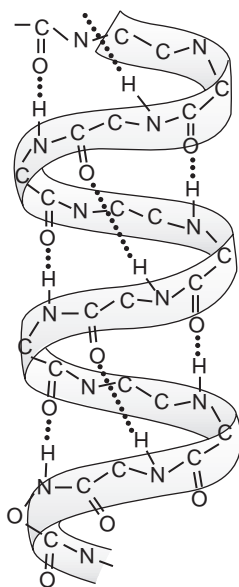
5. Which of the following molecules is a carbohydrate?

- $\text{C}_3\text{H}_7\text{O}_2\text{N}$
- $\text{C}_6\text{H}_{12}\text{O}_6$
- $\text{C}_{13}\text{H}_{26}\text{O}_2$
- $\text{C}_{20}\text{H}_{40}\text{O}_2$

6. Which of the following is made up of a long chain of glucose molecules?

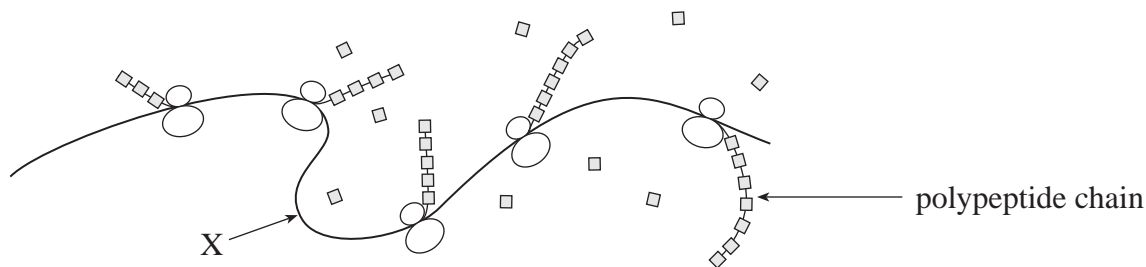
- DNA.
- Starch.
- Pepsin.
- Phospholipid.

Use the following diagram to answer question 7.



7. This diagram indicates which level(s) of structure?
- A. Only primary.
 - B. Primary and secondary.
 - C. Primary, secondary and tertiary.
 - D. Primary, secondary, tertiary and quaternary.

Use the following diagram to answer question 8.



8. The molecule represented by the line labelled **X** is
- A. DNA.
 - B. tRNA.
 - C. rRNA.
 - D. mRNA.

OVER

9. A section of DNA has the following sequence of nitrogenous bases:

C G A T T A C A G

Which of the following sequences would be produced as a result of transcription?

- A. C G T U U T C T G
- B. G C T A A T G T C
- C. C G A U U A C A G
- D. G C U A A U G U C

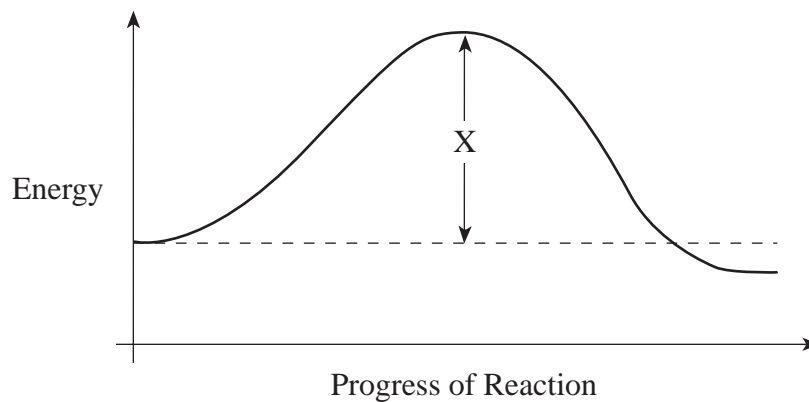
10. For a substance to be classified as a mutagen, it must cause

- A. a change in DNA.
- B. enzymes to denature.
- C. hydrolysis of proteins.
- D. mRNA to be produced.

11. Frog eggs placed in an isotonic solution will

- A. burst.
- B. shrink.
- C. remain the same.
- D. increase in volume.

Use the following graph to answer question 12.

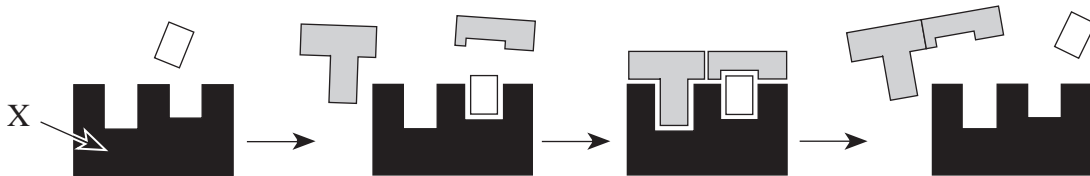


12. The arrow labelled **X** in the graph above indicates the

- A. net energy gain.
- B. activation energy.
- C. temperature of the products.
- D. temperature of the reactants.

13. Which of the following is a function of the hormone thyroxin?
- A. It decreases blood volume.
 - B. It increases metabolic rate.
 - C. It slows the release of insulin.
 - D. It increases blood sodium levels.

Use the following diagram to answer question 14.

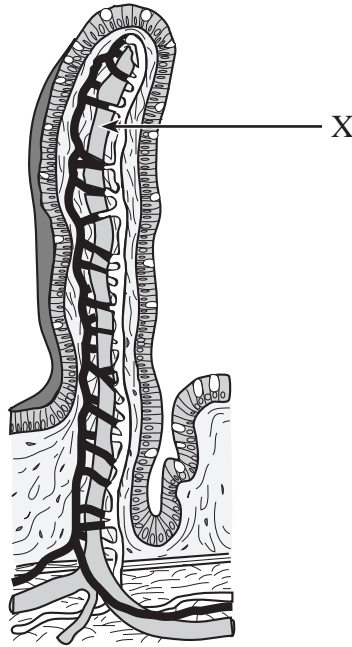


14. The structure labelled X in the diagram is a(n)
- A. enzyme.
 - B. substrate.
 - C. coenzyme.
 - D. enzyme-substrate complex.
-
15. Compounds that are needed for enzymes to function properly are
- A. buffers.
 - B. steroids.
 - C. vitamins.
 - D. heavy metals.

16. When salivary amylase enters the stomach, it becomes
- A. basic.
 - B. buffered.
 - C. activated.
 - D. denatured.
17. Which of the following would increase the rate of a metabolic reaction in the mouth?
- A. Adding lead ions.
 - B. Increasing the pH to 12.
 - C. Decreasing the temperature to 0°C.
 - D. Increasing the enzyme concentration.

18. The absorption of water from the digestive tract occurs mainly in the
- A. colon.
 - B. kidneys.
 - C. stomach.
 - D. duodenum.
19. The function of the cardiac sphincter is to prevent backflow of acid chyme from the
- A. esophagus to the mouth.
 - B. stomach to the esophagus.
 - C. duodenum to the stomach.
 - D. colon to the small intestine.
20. Which of the following correctly matches a digestive enzyme with its source?
- A. Pepsin / pancreas.
 - B. Bile / gall bladder.
 - C. Trypsin / stomach.
 - D. Amylase / pancreas.
21. Secretions from the salivary glands catalyze which of the following reactions?
- A. $\text{protein} + \text{H}_2\text{O} \rightarrow \text{peptides}$
 - B. $\text{peptides} + \text{H}_2\text{O} \rightarrow \text{amino acids}$
 - C. $\text{carbohydrates} + \text{H}_2\text{O} \rightarrow \text{maltose}$
 - D. $\text{fats} + \text{H}_2\text{O} \rightarrow \text{fatty acids and glycerol}$
22. The emulsification of fat is carried out by
- A. bile.
 - B. lipase.
 - C. pepsin.
 - D. bicarbonate ions.

Use the following diagram to answer question 23.



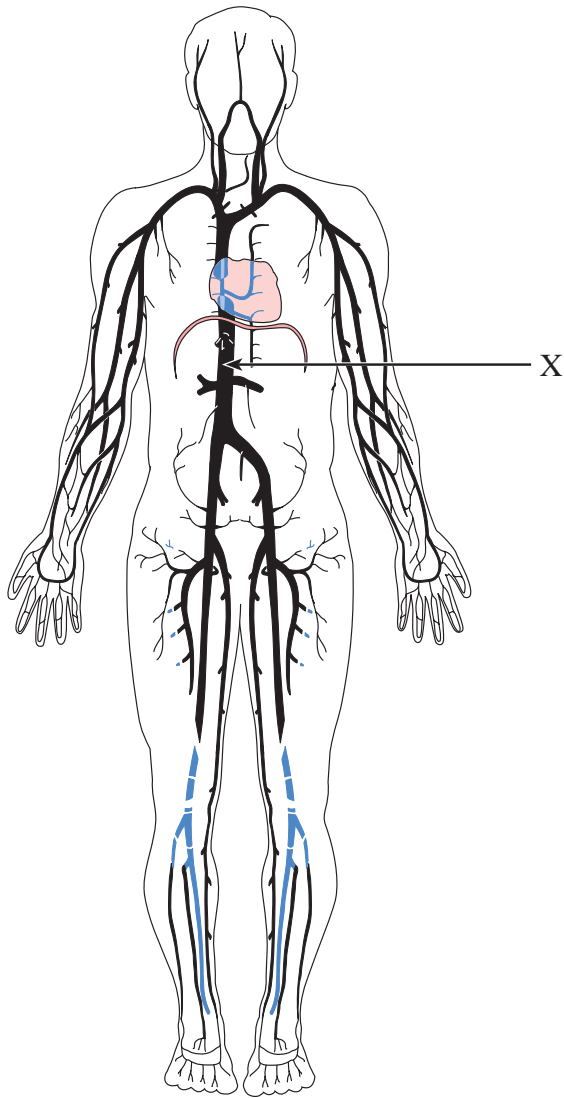
23. Which of the following substances is absorbed into the structure labelled X ?

- A. Fat.
 - B. Urea.
 - C. Glucose.
 - D. Amino acids.
-

24. Populations of *E. coli* are found in the

- A. liver.
- B. colon.
- C. pancreas.
- D. gall bladder.

Use the following diagram to answer question 25.



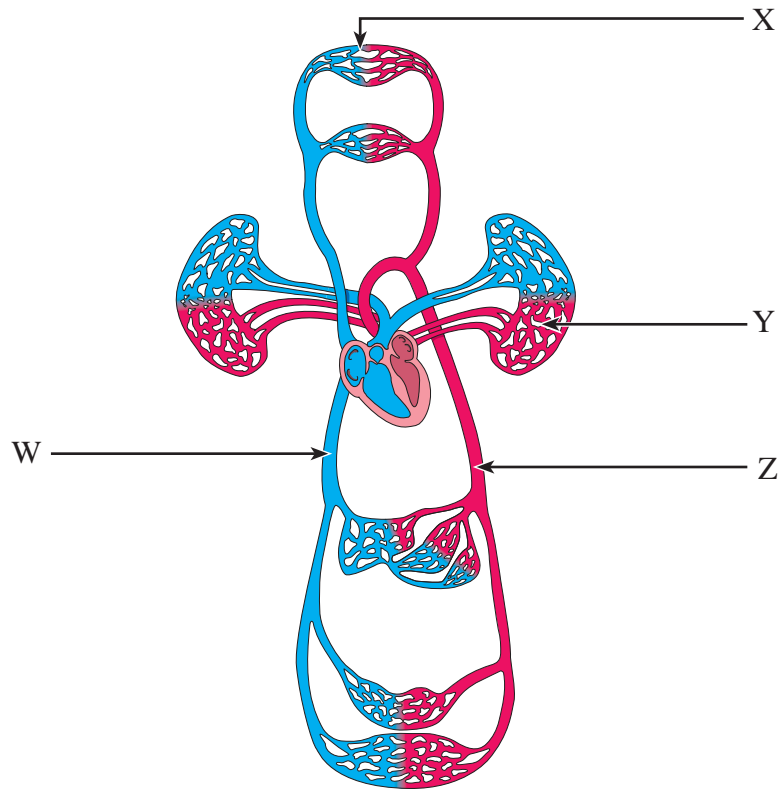
25. The structure labelled **X** is the

- A. iliac artery.
- B. hepatic vein.
- C. carotid artery.
- D. posterior vena cava.

26. Which of the following organs has a portal system associated with it?

- A. Skin.
- B. Lung.
- C. Liver.
- D. Heart.

Use the following diagram to answer question 27.



27. In the diagram above, the blood pressure is highest at

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

28. Which of the following is a characteristic of pulmonary circulation?

- A. Blood leaves the heart via the aorta.
- B. Blood in the arteries is deoxygenated.
- C. Blood in the veins is travelling to the lungs.
- D. Blood in capillaries absorbs high levels of carbon dioxide.

OVER

Use the following diagram to answer question 29.



29. Which of the following blood vessels is represented by the diagram?

- A. Lymph vessel.
 - B. Carotid artery.
 - C. Hepatic portal vein.
 - D. Peritubular capillary.
-

30. Blood leaves the right ventricle via the

- A. aorta.
- B. pulmonary trunk.
- C. coronary arteries.
- D. anterior vena cava.

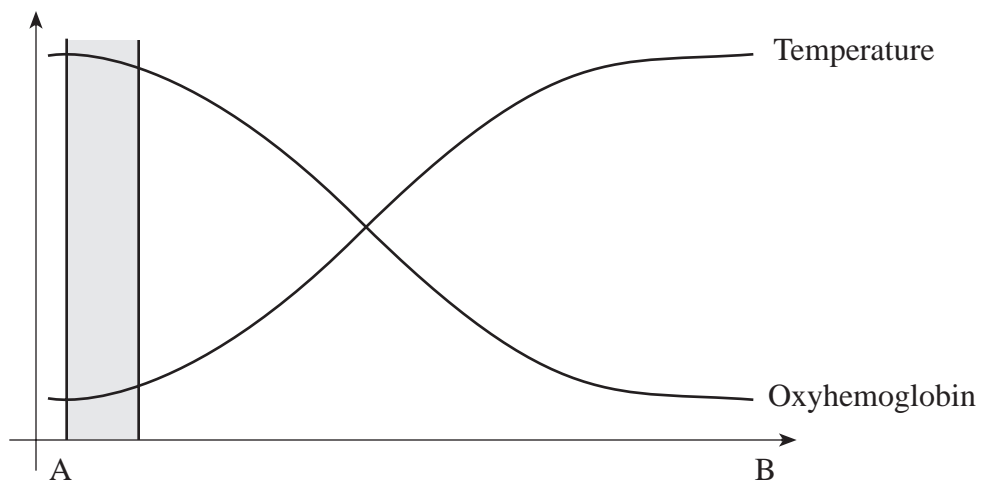
31. Hypertension would be indicated by a blood pressure reading of

- A. 100 / 80
- B. 120 / 50
- C. 120 / 80
- D. 150 / 110

32. The destruction of the cilia lining the respiratory tract would result in

- A. decreased breathing rate.
- B. decreased mucus production.
- C. increased debris in the airways.
- D. increased temperature in the lungs.

Use the following graph to answer question 33.



33. The graph above shows the temperature and level of oxyhemoglobin in the blood as it moves from point **A** to point **B** in the body. The shaded area on the graph would represent the

- A. trachea.
- B. body tissues.
- C. pulmonary arteries.
- D. alveolar capillaries.

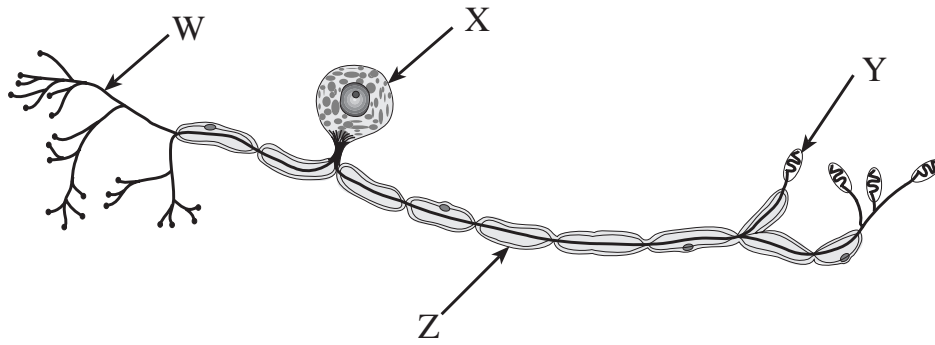
34. The type of neuron that can **only** be found in the central nervous system (CNS) is a(n)

- A. interneuron.
- B. motor neuron.
- C. mixed neuron.
- D. sensory neuron.

35. During which stage of a nerve impulse does the opening of the sodium gates play an important role?

- A. Recovery.
- B. Repolarization.
- C. Depolarization.
- D. Resting potential.

Use the following diagram to answer question 36.



36. Which letter indicates a structure that speeds the transmission of nerve impulses?

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

37. Nerve impulses are not continuously generated at a synapse because

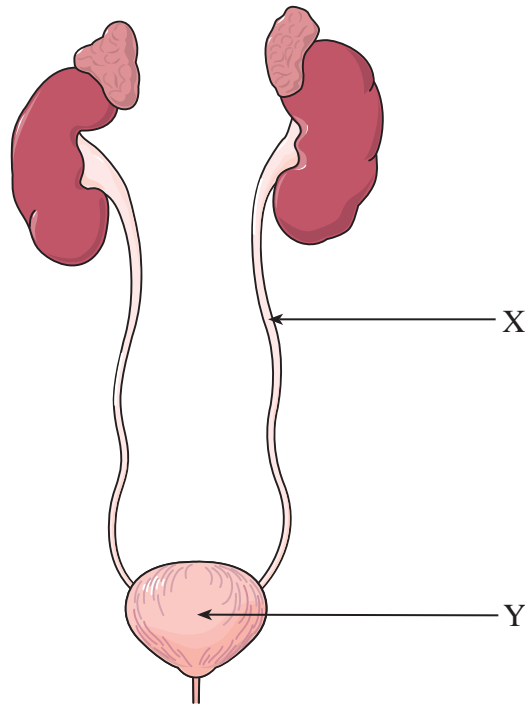
- A. there are insufficient calcium ions.
- B. the presynaptic membrane is depolarized.
- C. the synaptic membranes become impermeable.
- D. neurotransmitters are broken down by enzymes.

Use the following diagram to answer question 38.



38. The structure labelled **X** represents a(n)
- A. effector.
 - B. receptor.
 - C. interneuron.
 - D. sensory neuron.
-
39. Which of the following would result from stimulation by the sympathetic nervous system?
- A. Hypotension.
 - B. Constricted pupils.
 - C. Decreased digestive rate.
 - D. Reduced blood flow to skeletal muscles.
40. What part of the brain is malfunctioning if nerve impulses are unable to travel from the right to the left hemisphere?
- A. Cerebrum.
 - B. Cerebellum.
 - C. Hypothalamus.
 - D. Corpus callosum.

Use the following diagram to answer questions 41 and 42.



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

- A. ureter.
- B. urethra.
- C. bladder.
- D. collecting duct.

42. The function of the structure labelled **Y** is to

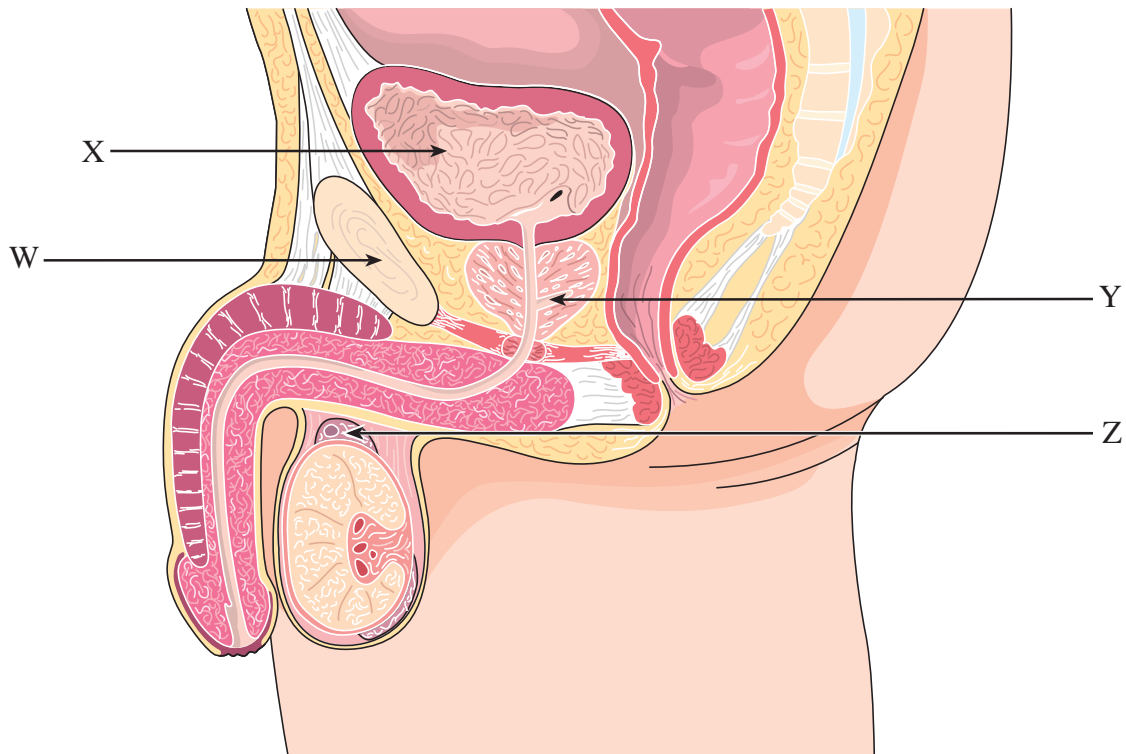
- A. store urine.
 - B. filter blood.
 - C. produce urine.
 - D. maintain blood volume.
-

43. Which of the following structures requires a hypertonic environment to function?

- A. Glomerulus.
- B. Loop of Henle.
- C. Afferent arteriole.
- D. Bowman's capsule.

44. When comparing the blood concentrations of urea and glucose in the hepatic portal vein to those in the renal vein, one finds that in the hepatic portal vein
- urea is lower and glucose is lower.
 - urea is lower and glucose is higher.
 - urea is higher and glucose is lower.
 - urea is higher and glucose is higher.
45. Decreasing the concentration of sodium ions in the blood will result in
- increased ADH secretion and increased aldosterone secretion.
 - increased ADH secretion and decreased aldosterone secretion.
 - decreased ADH secretion and increased aldosterone secretion.
 - decreased ADH secretion and decreased aldosterone secretion.

Use the following diagram to answer question 46.



46. Which letter indicates the prostate gland?
- W
 - X
 - Y
 - Z

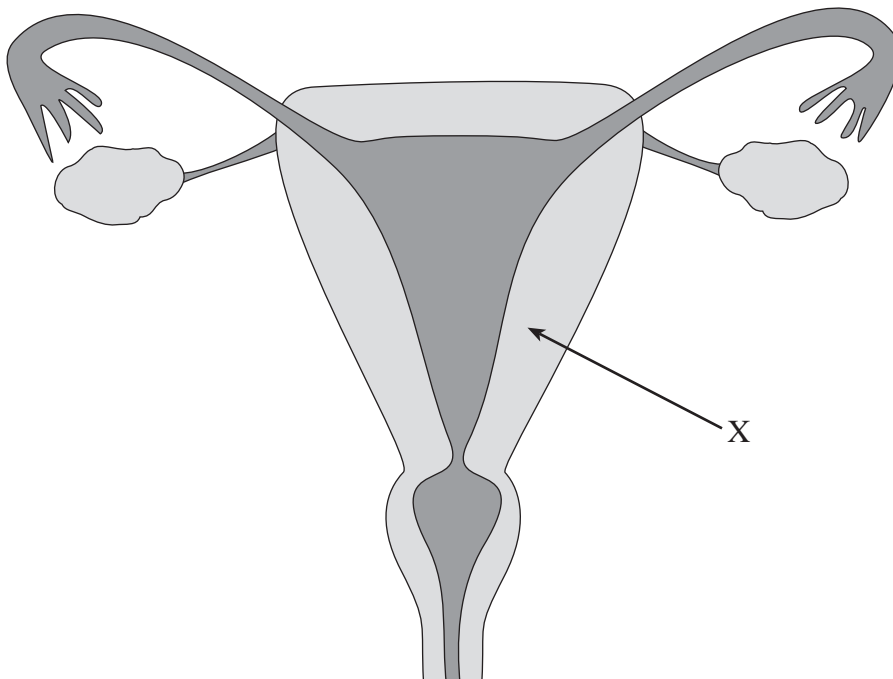
47. A function of the interstitial cells of the testes is the

- A. storage of semen.
- B. maturation of sperm cells.
- C. production of testosterone.
- D. production of seminal fluid.

48. The production of testosterone is regulated by

- A. oxytocin.
- B. progesterone.
- C. luteinizing hormone (LH).
- D. follicle-stimulating hormone (FSH).

Use the following diagram to answer question 49.



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

- A. uterus.
- B. cervix.
- C. vagina.
- D. urethra.

50. Which of the following statements is correct regarding the sequence of events during the ovarian and uterine cycles?
- A. Ovulation occurs when progesterone levels decrease.
 - B. The endometrium is shed as estrogen levels increase.
 - C. As the corpus luteum degenerates, progesterone levels decrease.
 - D. When implantation occurs, HCG (human chorionic gonadotropic) hormone levels decrease.

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

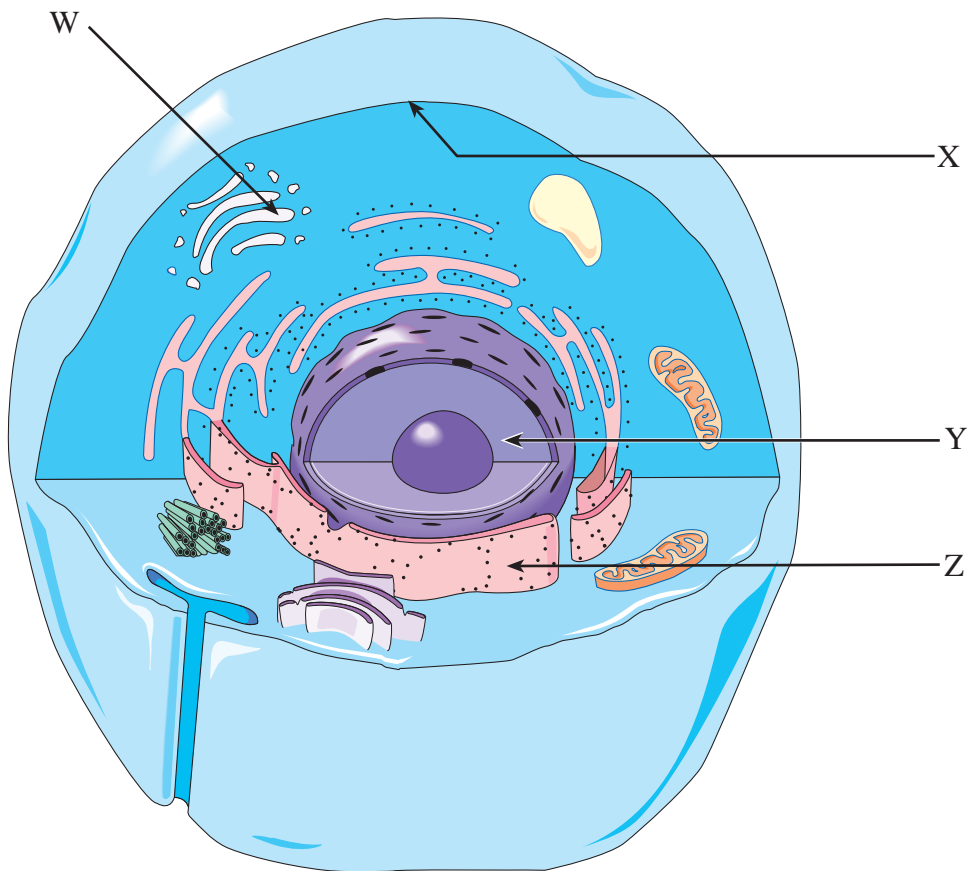
PART B: WRITTEN RESPONSE

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. Identify each part of the cell indicated and give **one** role for each structure in the secretion and/or synthesis of a protein. **(6 marks: $\frac{1}{2}$ mark for each name; 1 mark for each function)**

Part **W**:

Name: _____

Role: _____

Part **X**:

Name: _____

Role: _____

Part **Y**:

Name: _____

Role: _____

Part **Z**:

Name: _____

Role: _____

OVER

2. Demonstrate your understanding of the structure of DNA by describing the following features of the DNA molecule. You may use drawings in your answers.

a) Describe the **shape** of the DNA molecule. **(1 mark)**

b) Describe the **structure** of the strands (backbone) of DNA. **(1 mark)**

c) **Describe** complementary base pairing. **(1 mark)**

d) **Describe** the bonding that occurs between bases. **(1 mark)**

3. Give **three** ways in which cancer cells differ from normal cells.

(3 marks)

i) _____

ii) _____

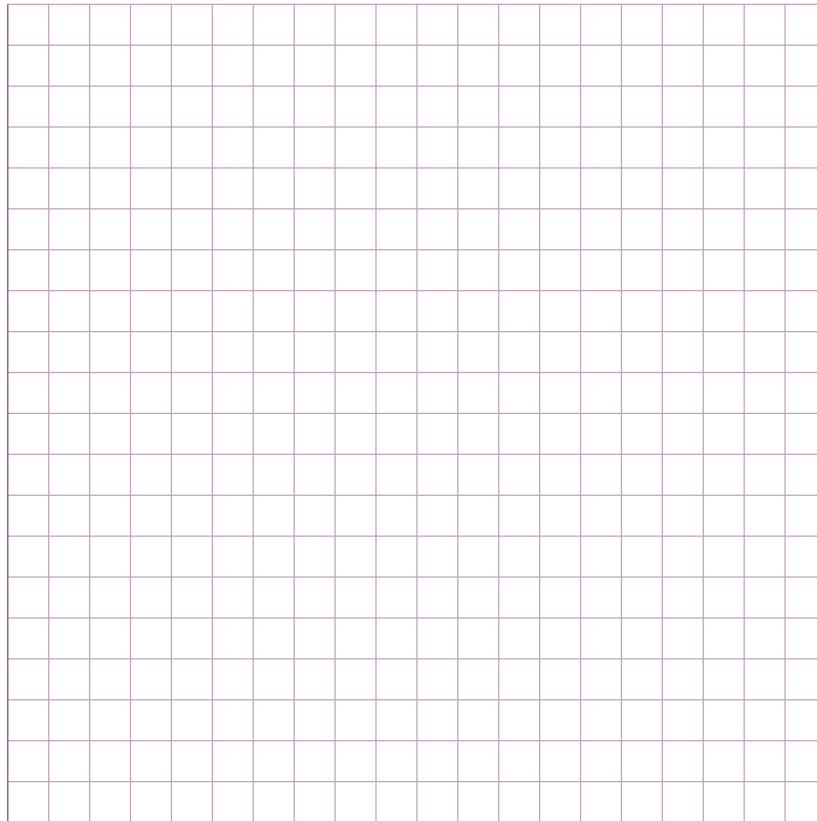
iii) _____

4. An experiment was designed to determine the correct salinity of water (percentage of salt in water) required to successfully clone certain cells using tissue culture. Three cell samples were placed in three different salt solutions and their change in mass was recorded in the data table shown below.

SALT IN WATER (%)	CHANGE IN MASS OF CELLS (%)
0.5	+0.82
1.0	+0.40
1.5	-0.15

- a) Use the grid provided to graph the data above. Label the x -axis as salt in water (%).

(2 marks)



- b) If the cells must be cultured in a solution that does not cause them to shrink or swell, estimate the percentage of salt in water that would be best for culturing the cells. **(1 mark)**

- c) Why do the cells in the 1.5% salt solution lose mass? **(1 mark)**

- d) Name the process and explain how each of the following nutrients, when added to any of the solutions, would enter the cells in the culture. **(2 marks)**

Glucose:

Name of Process: _____

Explanation: _____

Oxygen:

Name of Process: _____

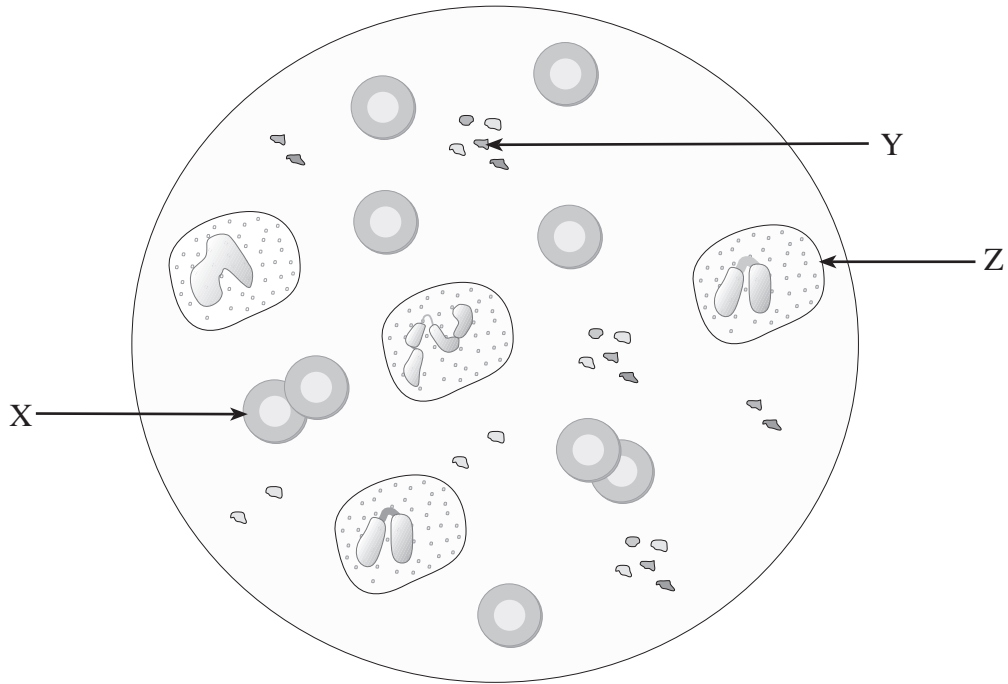
Explanation: _____

5. Complete the following table for the digestive system.

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

SOURCE OF ENZYME	ENZYME	SUBSTRATE
Stomach		
	Lipase	
	Trypsin	
		Maltose

Use the following blood-smear diagram to answer question 6.



6. Name structures **X**, **Y** and **Z** and provide a function of each.
(6 marks: 1 mark for each name; 1 mark for each function)

Structure **X**:

Name: _____

Function: _____

Structure **Y**:

Name: _____

Function: _____

Structure **Z**:

Name: _____

Function: _____

7. a) Explain how each of the following structures functions in the process of inhalation. **(2 marks)**

Diaphragm: _____

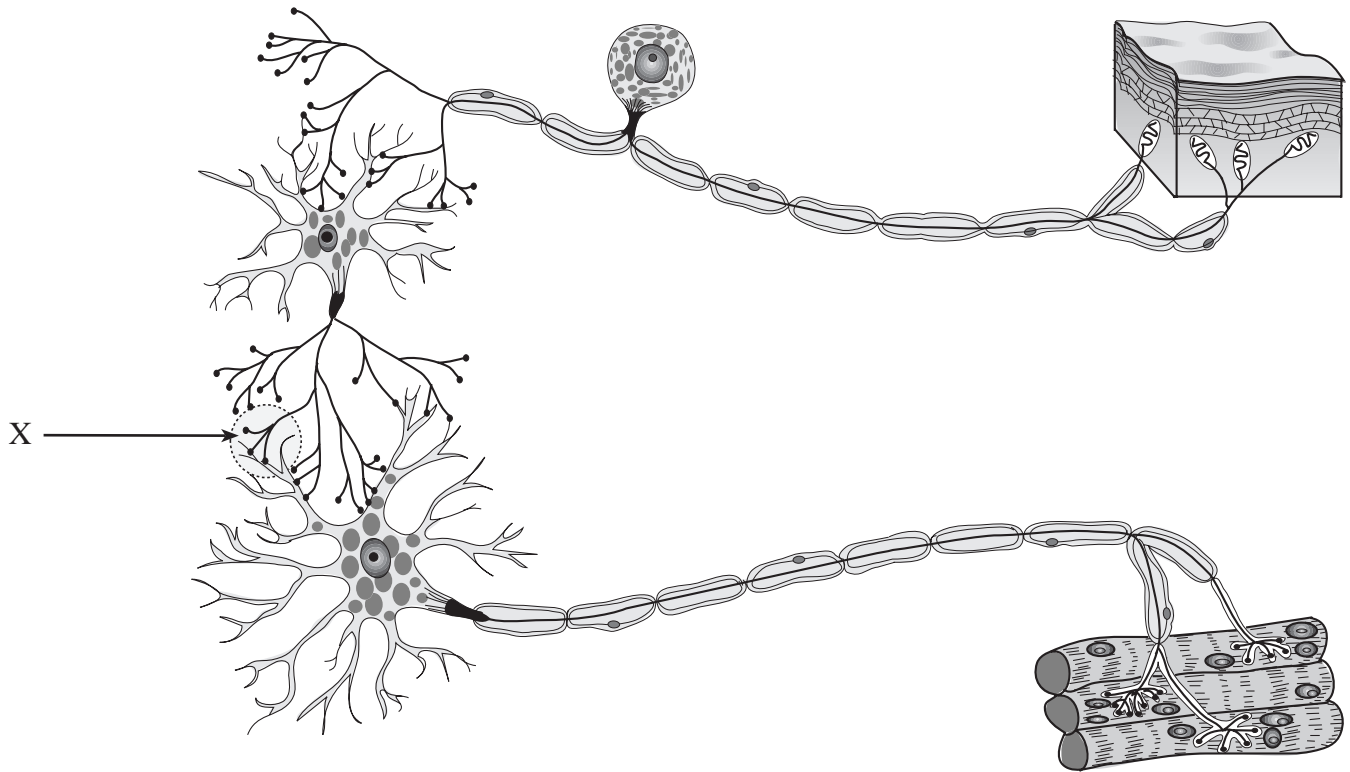
Ribs: _____

b) What role does each of the following have in breathing? **(2 marks)**

Medulla oblongata: _____

Pleural membranes: _____

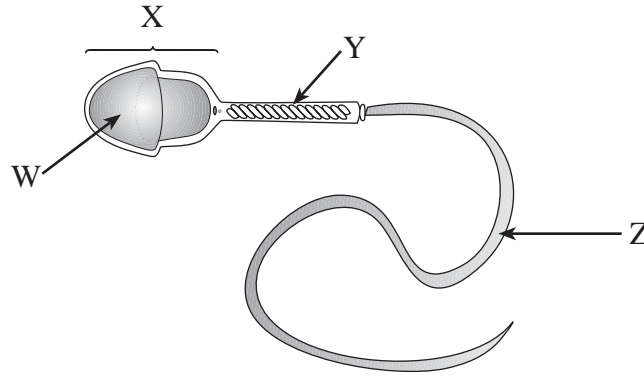
Use the following diagram to answer question 8.



8. Describe the process which occurs at the circled area labelled **X** when a nerve impulse travels through this area. **(6 marks)**

9. Demonstrate your understanding of negative feedback by describing how the kidneys and the hypothalamus work together to regulate blood volume. **(5 marks)**

Use the following diagram to answer question 10.



10. Identify the labelled structures in the diagram above and give **one** function of each.
(6 marks: $\frac{1}{2}$ mark for each name; 1 mark for each function)

Structure **W**:

Name: _____

Function: _____

Structure **X**:

Name: _____

Function: _____

Structure **Y**:

Name: _____

Function: _____

Structure **Z**:

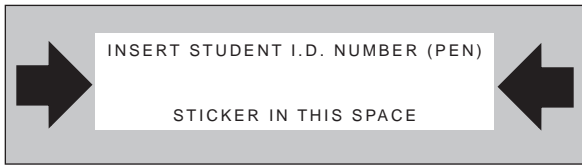
Name: _____

Function: _____

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November 1998

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BIOLOGY 12

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Score for
Question 1:

1. _____
(6)

Score for
Question 8:

8. _____
(6)

Score for
Question 2:

2. _____
(4)

Score for
Question 9:

9. _____
(5)

Score for
Question 3:

3. _____
(3)

Score for
Question 10:

10. _____
(6)

Score for
Question 4:

4. _____
(6)

Score for
Question 5:

5. _____
(4)

Score for
Question 6:

6. _____
(6)

Score for
Question 7:

7. _____
(4)

