

AUGUST 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: 12 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

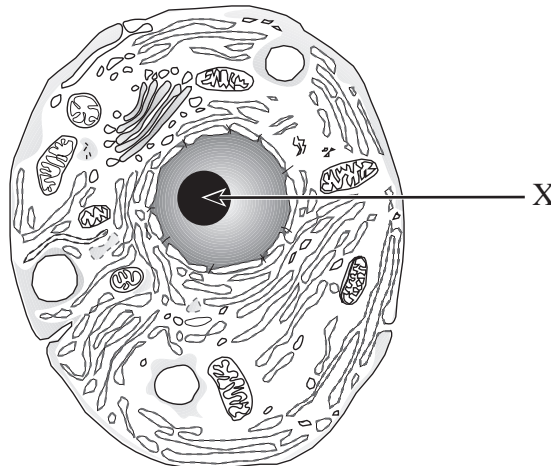
Value: 50 marks

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. The site of testosterone production in the cytoplasm of an interstitial cell is the
 - A. lysosome.
 - B. mitochondrion.
 - C. rough endoplasmic reticulum.
 - D. smooth endoplasmic reticulum.

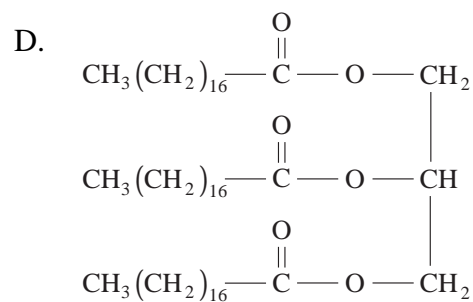
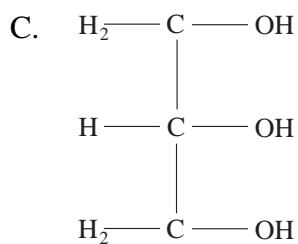
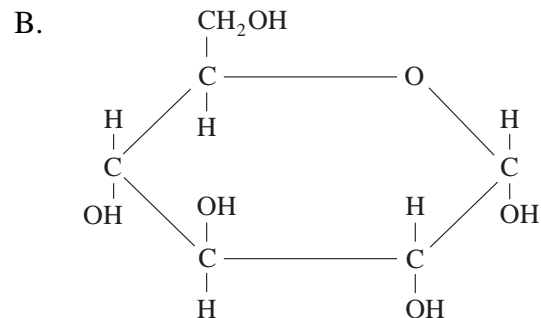
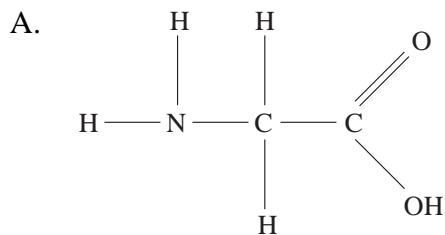
Use the following diagram to answer question 2.



2. The function of the structure labelled **X** is to synthesize
 - A. DNA.
 - B. rRNA.
 - C. proteins.
 - D. carbohydrates.

3. For digestion to occur in a vacuole, the vacuole must first fuse with a
- nucleus.
 - ribosome.
 - lysosome.
 - Golgi body.
4. A water molecule joins with an adjacent water molecule by forming a(n)
- ionic bond.
 - peptide bond.
 - covalent bond.
 - hydrogen bond.
5. Blood has a pH that is slightly basic. A sample of blood containing a buffer is treated with a weak acid. Which pH value would result?
- 1.57
 - 6.78
 - 7.38
 - 13.21

6. Which of the following is a product of the complete hydrolysis of cellulose?



7. The linear sequence of amino acids found in an enzyme is called its
- A. tertiary structure.
 - B. primary structure.
 - C. secondary structure.
 - D. quaternary structure.
8. If the nucleotide sequence of an anticodon was AUC, then the DNA triplet would be
- A. ATC.
 - B. TAG.
 - C. AUC.
 - D. UAG.
9. Increased blood flow to a cancerous tumour is called
- A. anaplasia.
 - B. metastasis.
 - C. malignancy.
 - D. vascularization.

Use the following information to answer question 10.

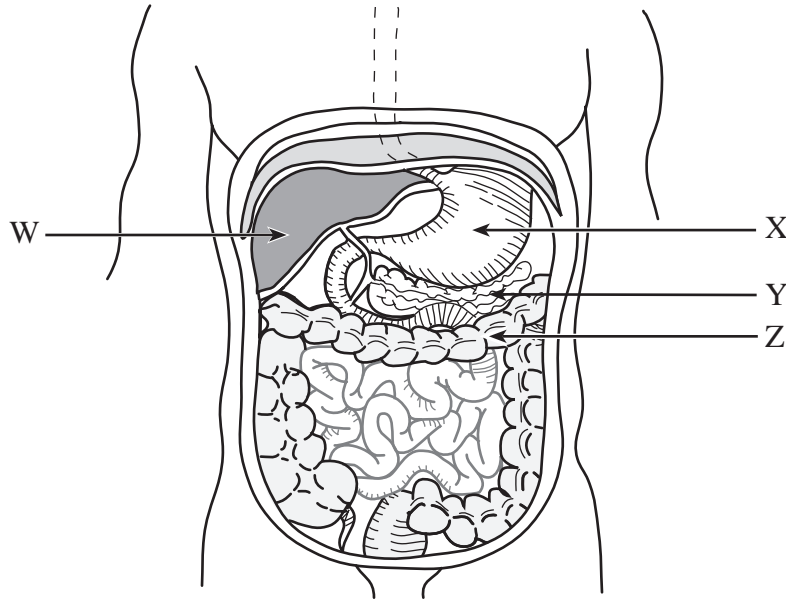
- 1. promotion
- 2. metastasis
- 3. vascularization
- 4. anaplasia

10. Which of the following is the correct sequence to describe the order of development of a cancerous tumor?
- A. 1, 4, 3, 2
 - B. 2, 1, 3, 4
 - C. 3, 2, 1, 4
 - D. 3, 4, 1, 2
-
11. A cancer-causing gene is called a(n)
- A. initiator.
 - B. promoter.
 - C. oncogene.
 - D. proto-oncogene.

12. The most abundant molecules in the cell membrane are
- A. steroids.
 - B. proteins.
 - C. phospholipids.
 - D. carbohydrates.
13. Which of the following processes moves molecules using cellular energy?
- A. Osmosis.
 - B. Diffusion.
 - C. Pinocytosis.
 - D. Facilitated transport.
14. The cytoplasmic concentration of solute in a cell is 0.05%. This cell is placed in a solution that causes the cell to swell and burst. The solute concentration of this solution is
- A. 0.005%
 - B. 0.05%
 - C. 0.5%
 - D. 5.0%
15. An enzyme speeds up a chemical reaction by
- A. regulating pH.
 - B. acting as a buffer.
 - C. preventing denaturation.
 - D. lowering the energy of activation.
16. High concentrations of thyroxin in the blood will cause metabolic reactions in a cell to
- A. speed up.
 - B. slow down.
 - C. stop occurring.
 - D. remain unchanged.

17. Which of the following would prevent maltase from forming an enzyme-substrate complex?
- A. pH of 8.5
 - B. a competitive inhibitor
 - C. increased production of bile
 - D. an increase in substrate concentration
18. Why would drugs like penicillin destroy bacteria but have no effect on human cells?
- A. Human enzymes would be denatured by penicillin.
 - B. Bacterial cells would use penicillin as a coenzyme.
 - C. Penicillin would fit the active site of bacterial enzymes.
 - D. Enzymes in human cells would use penicillin to produce excess energy.
19. Two glands that are responsible for secreting protein-digesting enzymes are
- A. salivary and gastric.
 - B. gastric and pancreas.
 - C. thyroid and pancreas.
 - D. intestinal and thyroid.
20. Bile causes the emulsification of
- A. lipids.
 - B. proteins.
 - C. nucleic acids.
 - D. carbohydrates.
21. Blood proteins are made in the
- A. liver.
 - B. kidney.
 - C. stomach.
 - D. pancreas.

Use the following diagram to answer question 22.



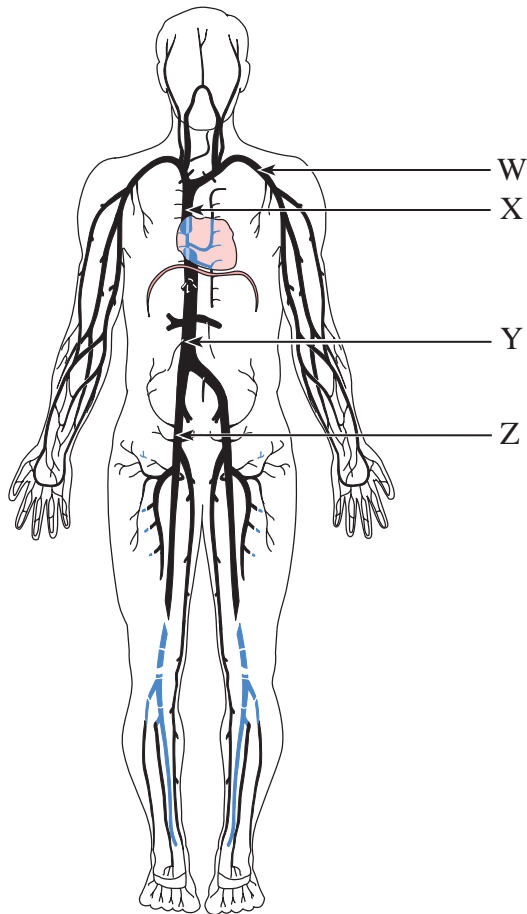
22. Organisms producing vitamins, growth factors and essential amino acids that are beneficial to the body are found in
- A. W
 - B. X
 - C. Y
 - D. Z

Use the following table to answer question 23.

VESSEL	BICARBONATE ION (HCO_3^-) CONCENTRATION	UREA CONCENTRATION
W	high	low
X	high	high
Y	low	low
Z	low	high

23. The relative concentrations of bicarbonate ions (HCO_3^-) and urea were analyzed in blood samples taken from a healthy person. Which vessel is the hepatic vein?
- A. W
 - B. X
 - C. Y
 - D. Z

Use the following diagram to answer question 24.



24. Lymph fluid is returned to the circulatory system in the vessel labelled

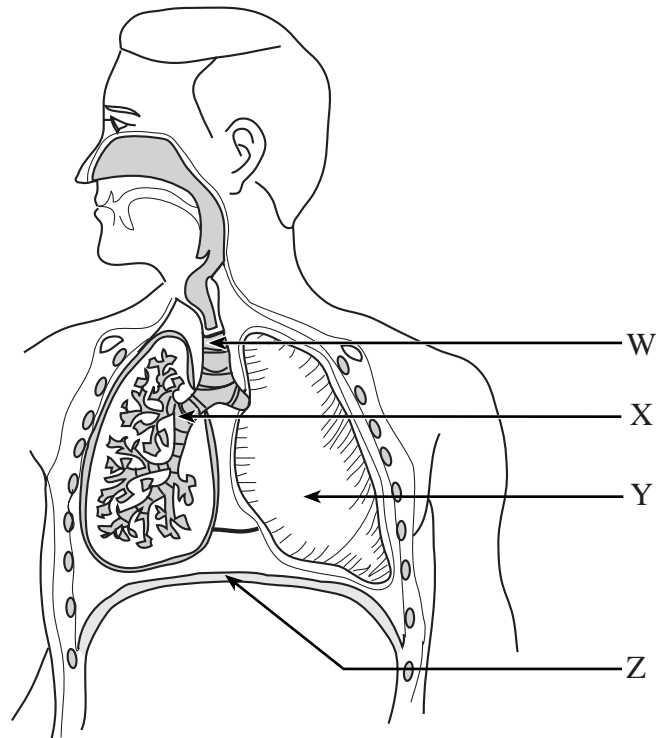
- A. W
 - B. X
 - C. Y
 - D. Z
-

25. Plasma is composed **mostly** of

- A. salt.
- B. water.
- C. protein.
- D. hormones.

26. The presence of bacteria in the blood will cause the body to produce
- A. mucus.
 - B. antigens.
 - C. antibodies.
 - D. hydrochloric acid.
27. The osmotic return of fluid from the tissues to the blood occurs at the
- A. arterioles.
 - B. lymph veins.
 - C. capillary bed.
 - D. subclavian vein.
28. The vein carrying the highest concentration of oxygen is the
- A. iliac.
 - B. renal.
 - C. hepatic.
 - D. pulmonary.
29. The most muscular chamber of the heart is the
- A. left atrium.
 - B. right atrium.
 - C. left ventricle.
 - D. right ventricle.
30. A nerve impulse passes through the following structures when the heart contracts. The correct sequence is
- A. AV node, Purkinje fibres, SA node.
 - B. SA node, Purkinje fibres, AV node.
 - C. Purkinje fibres, SA node, AV node.
 - D. SA node, AV node, Purkinje fibres.

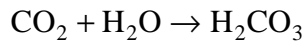
Use the following diagram to answer question 31.



31. The structure that increases thoracic volume when it contracts is
- A. W
 - B. X
 - C. Y
 - D. Z
-

32. Alveoli would **not** be characterized as
- A. muscular.
 - B. thin-walled.
 - C. vascularized.
 - D. secreting a lipoprotein.

33. Consider the following reaction:



An enzyme found in red blood cells that catalyzes this reaction is

- A. nuclease.
- B. peptidase.
- C. dehydrogenase.
- D. carbonic anhydrase.

34. As the blood becomes more acidic in muscle tissues, hemoglobin will carry less

- A. oxygen.
- B. hydrogen ion.
- C. carbon dioxide.
- D. bicarbonate ion.

35. The formation of carbaminohemoglobin occurs in the

- A. veins.
- B. arteries.
- C. arterioles.
- D. capillaries.

36. What type of neuron transmits an impulse to the central nervous system?

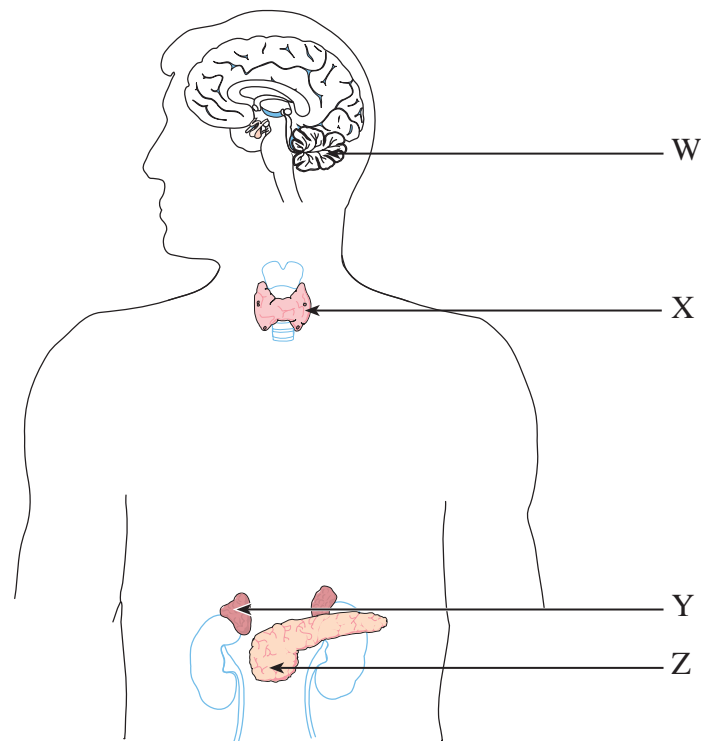
- A. Motor.
- B. Sensory.
- C. Efferent.
- D. Interneuron.

37. Resting potential in a neuron is maintained by

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

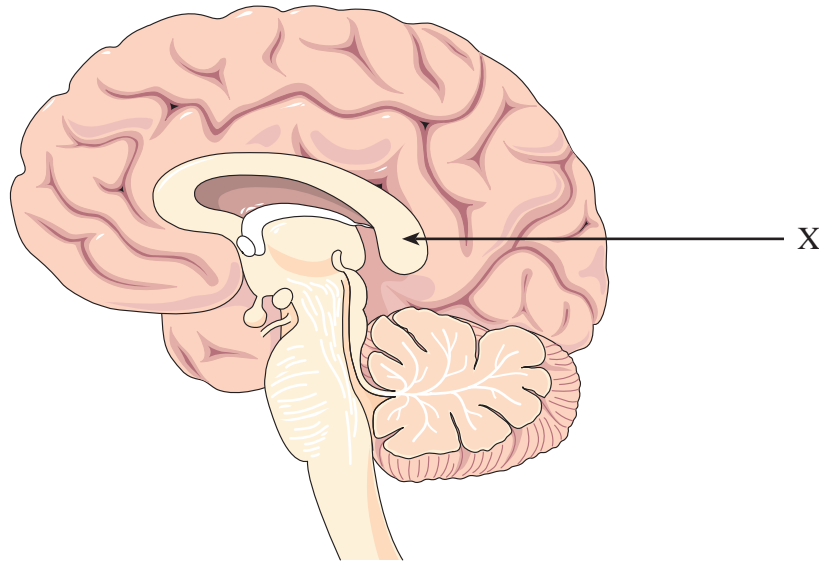
38. The speed of a nerve impulse along a sensory neuron depends on the
- A. dendrites.
 - B. cell bodies.
 - C. myelin sheath.
 - D. sensory receptors.
39. In order for a nerve impulse to pass from one neuron to the next, which of the following ions must be present at the pre-synaptic ending?
- A. Calcium (Ca^{2+}).
 - B. Chloride (Cl^-).
 - C. Phosphate (PO_4^{3-}).
 - D. Magnesium (Mg^{2+}).

Use the following diagram to answer question 40.



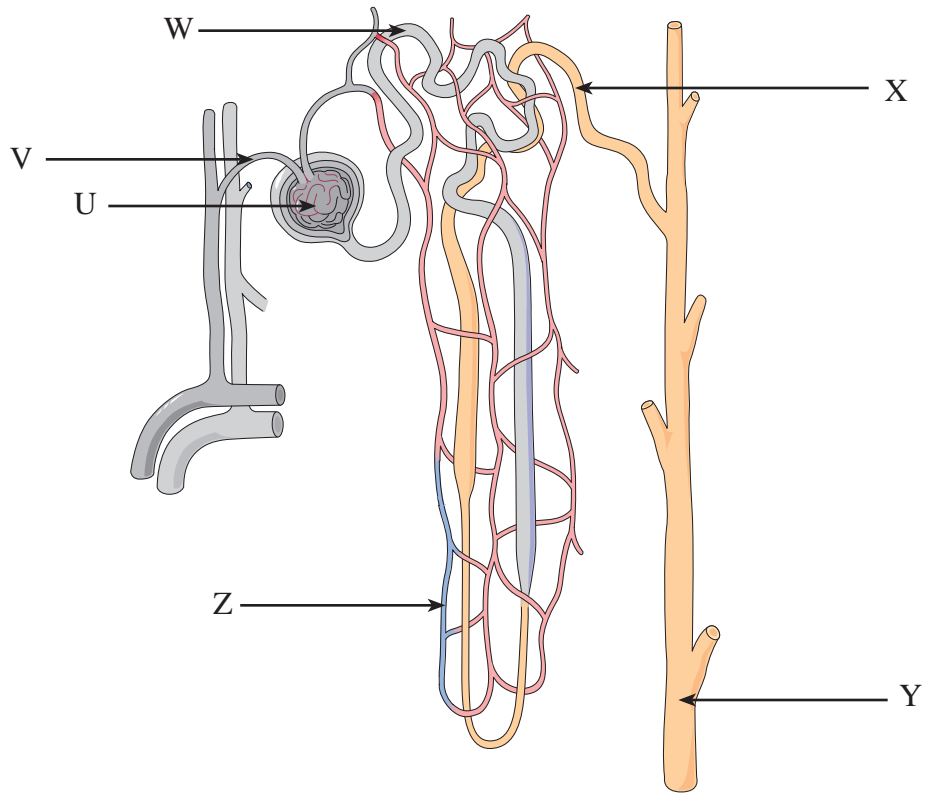
40. Dilation of the pupils is initiated by secretions from
- A. W
 - B. X
 - C. Y
 - D. Z

Use the following diagram to answer question 41.



41. The function of structure **X** is to
- A. control the breathing and heart rate.
 - B. secrete hormones that control organs of the body.
 - C. channel nerve impulses to the appropriate part of the brain.
 - D. exchange information between right and left cerebral hemispheres.
-
42. In a healthy person, Bowman's capsules are found in the renal
- A. vein.
 - B. pelvis.
 - C. cortex.
 - D. medulla.
43. The composition of the filtrate in the Bowman's capsule is determined by
- A. pH.
 - B. enzymes.
 - C. temperature.
 - D. molecular size.

Use the following diagram to answer questions 44 and 45.



44. In a healthy person, the sequence of structures through which most glucose molecules pass is

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

45. Secretions from the posterior pituitary affect which structure labelled above?

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

46. Spermatogenesis occurs in the

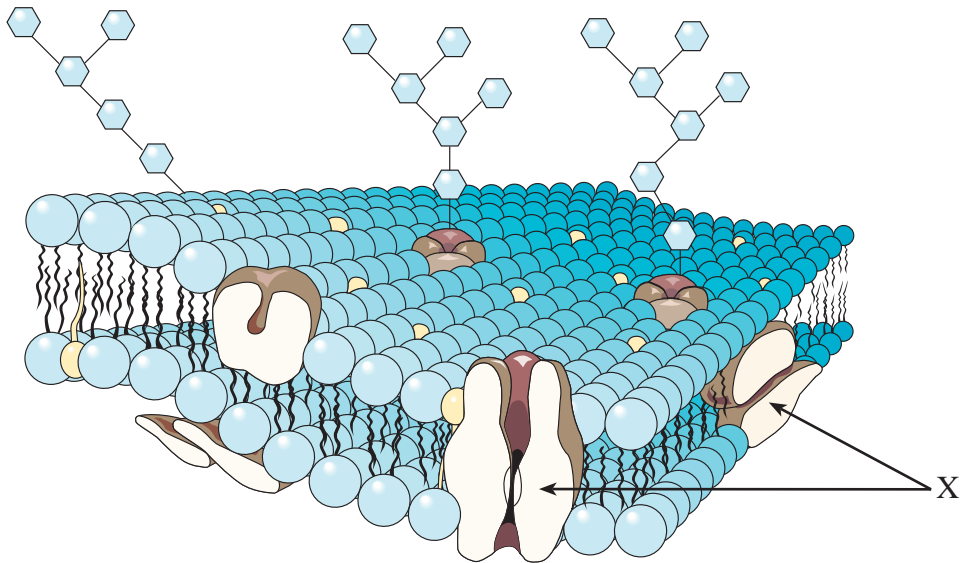
- A. epididymis.
- B. interstitial cells.
- C. seminiferous tubules.
- D. ductus (vas) deferens.

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47. The sperm penetrates the egg by means of enzymes that are found in the
- A. tail.
 - B. head.
 - C. acrosome.
 - D. mid-piece.
48. Testosterone levels in males are regulated by
- A. aldosterone.
 - B. progesterone.
 - C. luteinizing hormone.
 - D. follicle stimulating hormone.
49. Fertilization of the egg almost always occurs in the
- A. uterus.
 - B. cervix.
 - C. ovaries.
 - D. oviducts.
50. The hormone produced as a result of implantation is called
- A. testosterone.
 - B. luteinizing hormone (LH).
 - C. follicle stimulating hormone (FSH).
 - D. human chorionic gonadotropic hormone (HCG).

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

Use the following diagram to answer question 2.



2. a) Identify the molecules labelled **X**.

(1 mark)

b) Name **two** processes by which these molecules function in order to move materials.

(2 marks)

i) _____

ii) _____

3. List **three** ways in which mRNA is different from DNA.

(3 marks)

i) _____

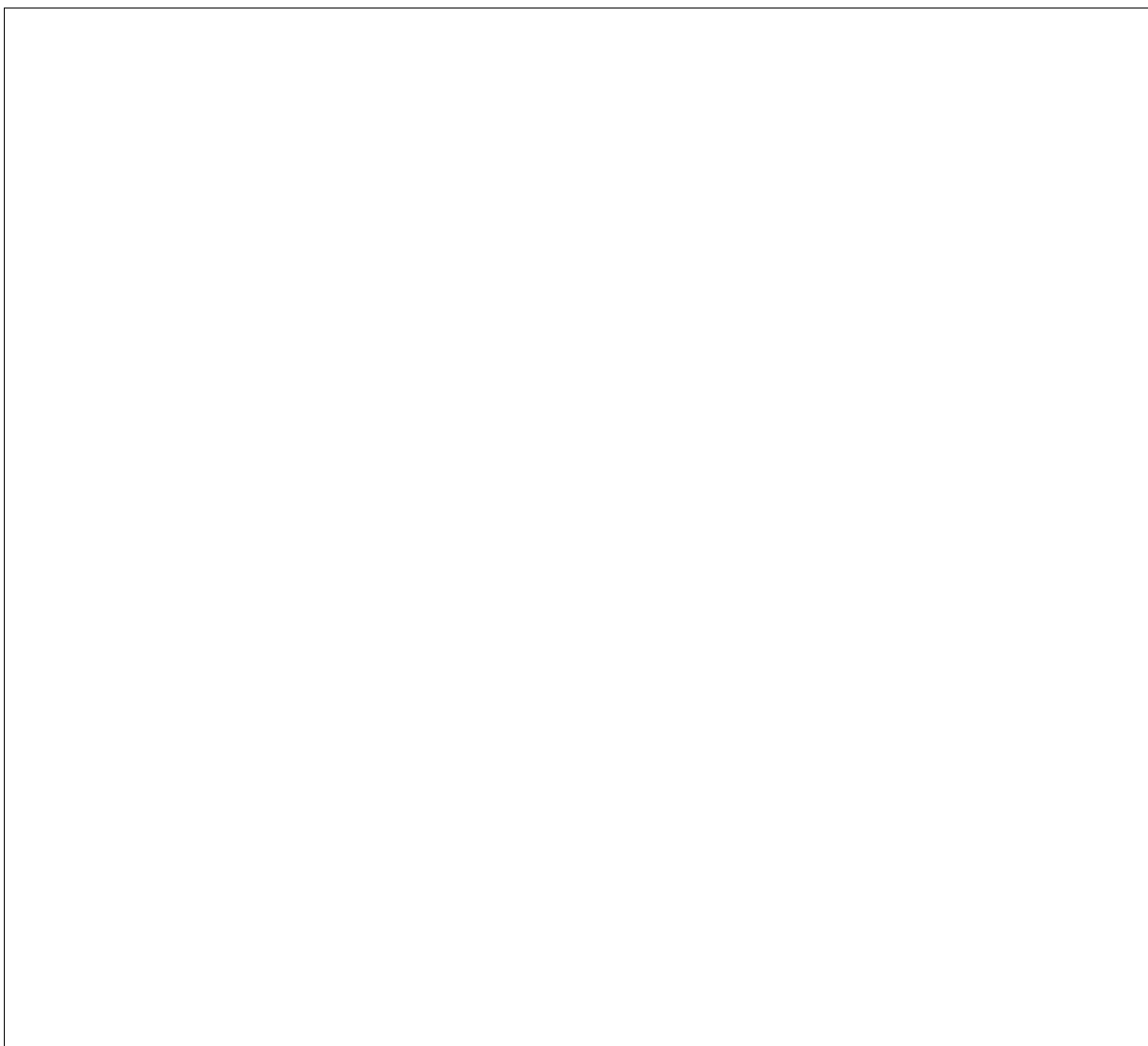
ii) _____

iii) _____

4. a) Give **one** example of an environmental mutagen. **(1 mark)**

b) Explain how a mutagen could change the mRNA produced in a cell. **(2 marks)**

5. Draw a labelled diagram to illustrate the “lock and key” model of enzymatic action. **(4 marks)**



6. a) Name the **three** glands that secrete enzymes that digest carbohydrates. **(3 marks)**

i) _____

ii) _____

iii) _____

b) Name the structure in the small intestine that absorbs the products of carbohydrate digestion. **(1 mark)**

c) Where does the body store the excess products of carbohydrate digestion? **(1 mark)**

7. The maintenance of optimum pH is essential to living systems. Give **three** different locations in the body where pH is regulated and explain how it is maintained.
(6 marks: 1 mark each for locations; 1 mark each for explanations)

Location: _____

Explanation: _____

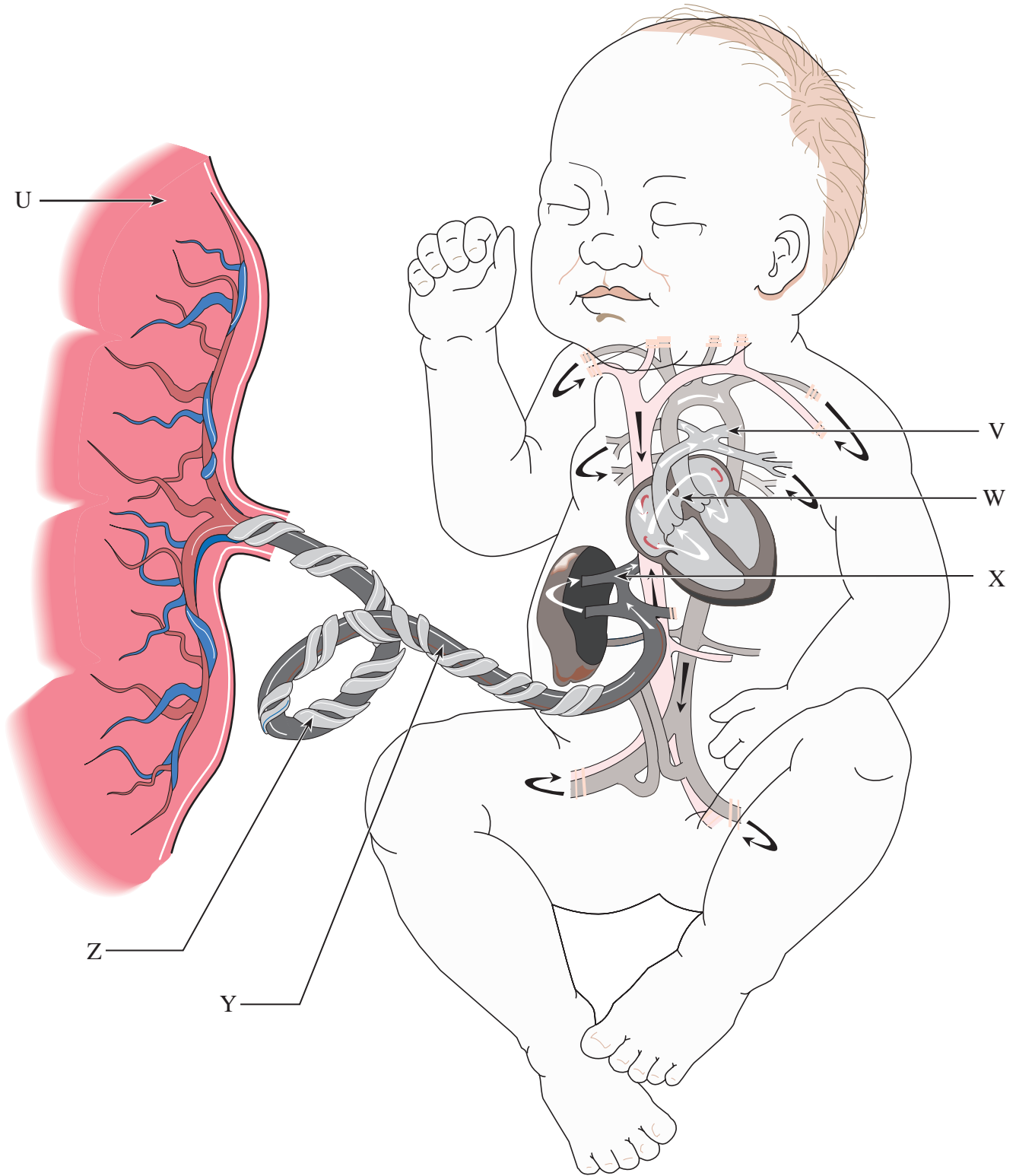
Location: _____

Explanation: _____

Location: _____

Explanation: _____

8. Name any **three** fetal structures indicated by the letters. Give **one** function for each structure that you name. (6 marks: 1 mark each for names; 1 mark each for functions)



Letter: _____ Name: _____

Function: _____

Letter: _____ Name: _____

Function: _____

Letter: _____ Name: _____

Function: _____

10. Describe **two** ways in which a drug could block transmission of an impulse at the synapse.

(2 marks)

i) _____

ii) _____

11. Describe the process by which each of the following affects the composition of filtrate in the nephron. **(4 marks: 2 marks each)**

Proximal Tubule:

Loop of Henle:

12. a) Give **two** functions for each of the following structures. **(4 marks: 2 marks each)**

Testes:

i) _____

ii) _____

Ovaries:

i) _____

ii) _____

b) Name the hormone that is involved in a positive feedback loop and explain **one** of its functions. **(2 marks)**

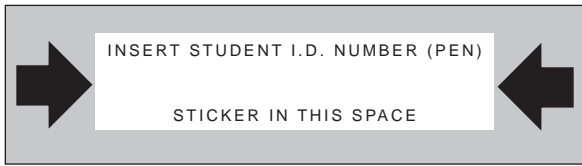
Name: _____

Function: _____

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Score for
Question 1:

1. _____
(4)

Score for
Question 8:

8. _____
(6)

Score for
Question 2:

2. _____
(3)

Score for
Question 9:

9. _____
(4)

Score for
Question 3:

3. _____
(3)

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10. _____
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4. _____
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Score for
Question 11:

11. _____
(4)

Score for
Question 5:

5. _____
(4)

Score for
Question 12:

12. _____
(6)

Score for
Question 6:

6. _____
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Score for
Question 7:

7. _____
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