

NOVEMBER 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: 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. 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.		
4. This examination is designed to be completed in two hours . <i>Students may, however, take up to 30 minutes of additional time to finish.</i>		

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PART A: MULTIPLE CHOICE

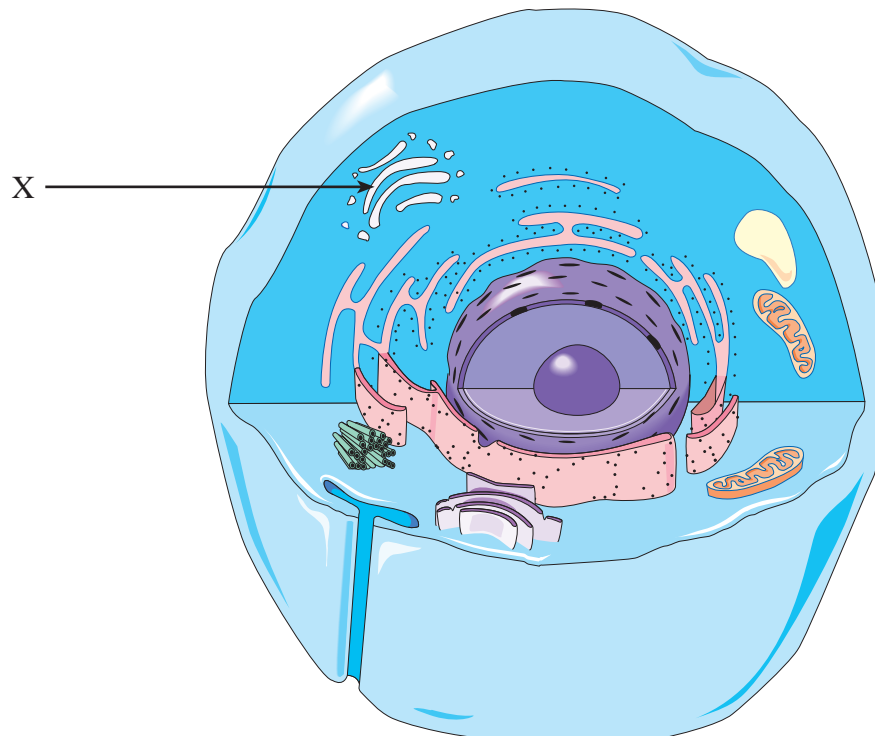
Value: 50 marks

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.

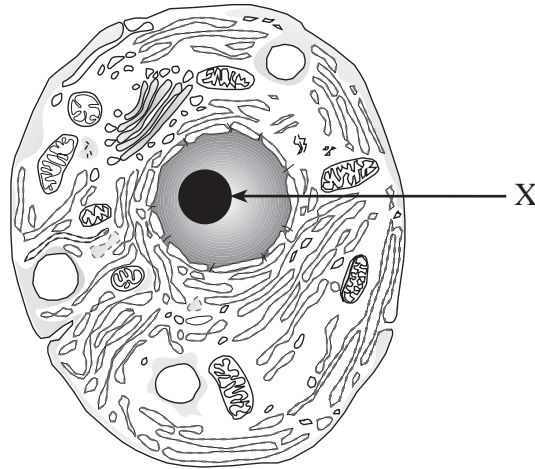
1. Which organelle contains enzymes that digest old cells?
 - A. nucleus
 - B. ribosome
 - C. lysosome
 - D. Golgi body

Use the following diagram to answer question 2.



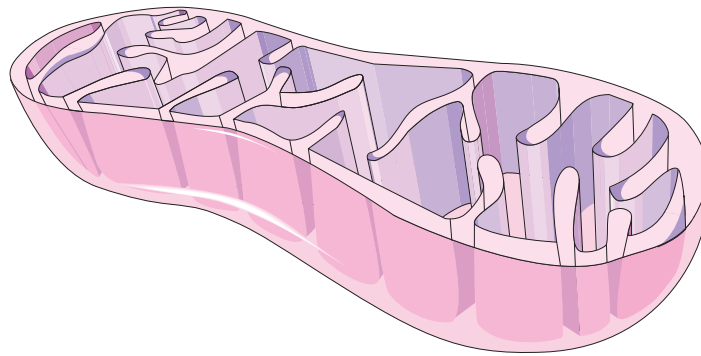
2. The organelle labelled X
 - A. makes ATP.
 - B. synthesizes proteins.
 - C. packages and modifies proteins.
 - D. controls what enters and leaves the cell.

Use the following diagram to answer question 3.



3. The structure labelled **X** is the
- A. nucleolus.
 - B. mitochondria.
 - C. cell membrane.
 - D. rough endoplasmic reticulum.

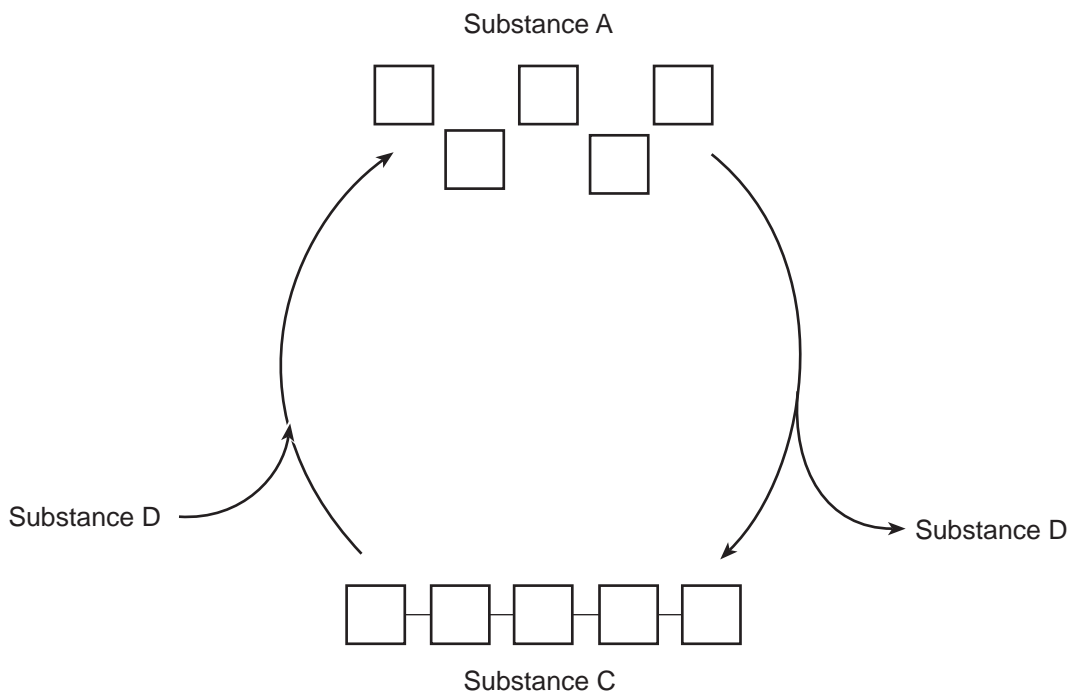
Use the following diagram to answer question 4.



4. Products of this organelle are needed for which of the following?
- A. capillary-tissue fluid exchange
 - B. diffusion of oxygen into the lung capillaries
 - C. re-establishment of the resting potential in a neuron
 - D. movement of water into a cell across a semi-permeable membrane

5. Which organelles are found in greater amounts in a cell that produces enzymes for the digestion of starches?
- Golgi bodies and nuclei
 - lysosomes and smooth endoplasmic reticulum
 - Golgi bodies and rough endoplasmic reticulum
 - smooth endoplasmic reticulum and mitochondria
6. A glucose molecule contains
- six carbon atoms.
 - two high-energy phosphates.
 - three fatty acids and glycerol.
 - a long chain of carbohydrate rings.

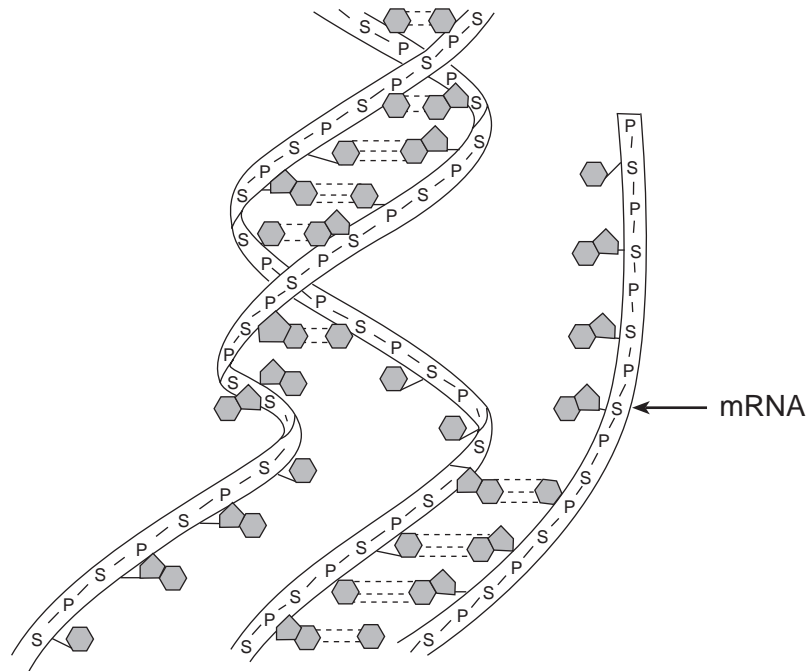
Use the following diagram to answer question 7.



7. The diagram above represents a series of reactions which occur in the body. If **substance D** was unavailable, which of the following would result?
- DNA could not be replicated.
 - Proteins would not be produced.
 - Carbohydrates could not be hydrolyzed.
 - Fatty acids and glycerol would not join together to produce fats.

8. A characteristic of unsaturated fats is that they
- denature as they cool.
 - are made up of glucose and fructose.
 - are made up of amino acids and glycerol.
 - have double bonds in their carbon chains.
9. The level of protein structure represented by the alpha-helix shape is
- primary.
 - secondary.
 - tertiary.
 - quaternary.

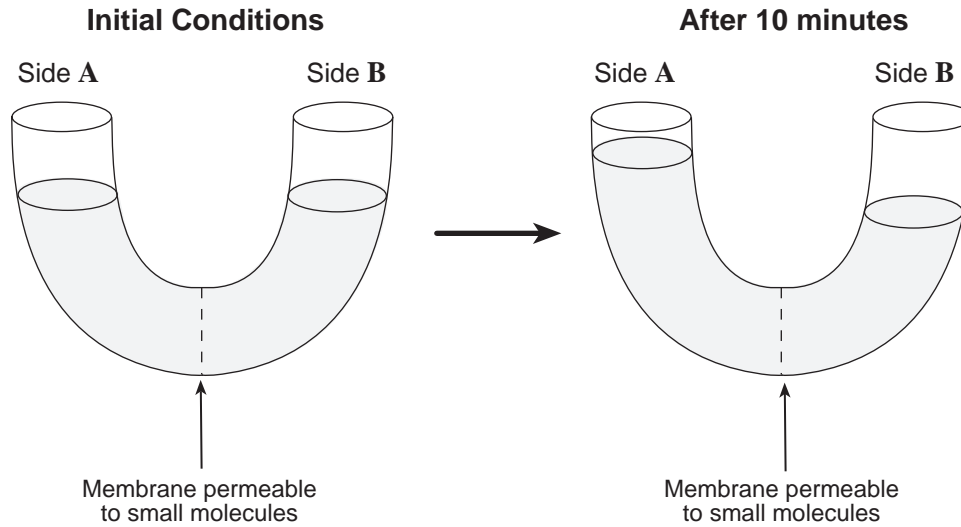
Use the following diagram to answer question 10.



10. Which process is shown above?
- translation
 - elongation
 - replication
 - transcription

11. A change in the sequence of bases in a strand of DNA that occurs as a result of exposure to x-rays is an example of
- A. mutation.
 - B. denaturation.
 - C. transcription.
 - D. protein synthesis.
12. A proto-oncogene is described as DNA that
- A. causes cancer.
 - B. causes the vascularization of a tumour.
 - C. can be mutated into cancer-causing DNA.
 - D. directly causes uncontrolled cellular growth.
13. Carrier molecules that bring materials into cells are
- A. lipids.
 - B. proteins.
 - C. glycogen.
 - D. phospholipids.
14. Which of the following moves material against a concentration gradient?
- A. osmosis
 - B. diffusion
 - C. active transport
 - D. facilitated transport
15. The secretion of noradrenalin into the synaptic cleft occurs by which of the following processes?
- A. exocytosis
 - B. pinocytosis
 - C. endocytosis
 - D. active transport

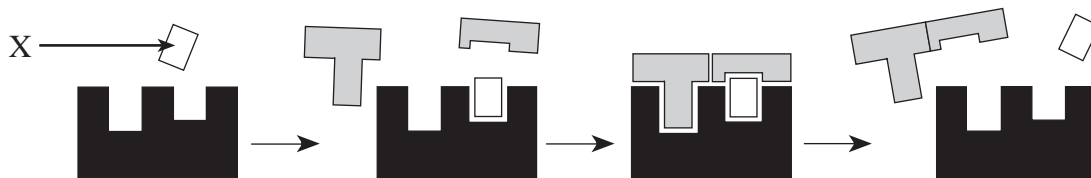
Use the following diagrams to answer question 16.



16. Which of the following conditions would cause the change in the fluid levels as shown after 10 minutes?

	SOLUTION IN SIDE A	SOLUTION IN SIDE B
A.	distilled water	5% salt
B.	2% glucose	5% glucose
C.	5% protein	2% protein
D.	2% salt	2% salt

Use the following diagrams to answer question 17.

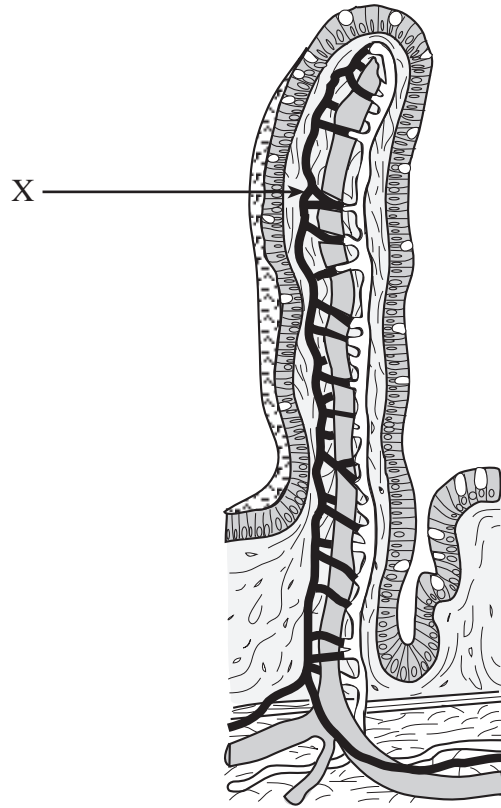


17. The diagram above represents an enzyme-catalyzed reaction. The substance labelled X is most likely a

- A. steroid.
- B. protein.
- C. vitamin.
- D. calcium ion (Ca^{2+}).

18. A function of enzymes is to
- A. emulsify fats.
 - B. carry information to nerves.
 - C. catalyze chemical reactions.
 - D. maintain constant blood pH.
19. What would occur if sodium bicarbonate ions were removed from pancreatic juice?
- A. Decreased amounts of bile would be released.
 - B. Increased H₂O absorption would occur in the colon.
 - C. The cells lining the small intestine would be damaged.
 - D. Digestion of nutrients in the small intestine would increase.
20. Which of the following describes peristalsis?
- A. the physical breakdown of fats
 - B. production of vitamins by *E. coli*
 - C. release of enzymes by the pancreas
 - D. muscle contractions of the digestive tract
21. Trypsin functions **best** in which of the following conditions?
- A. basic
 - B. acidic
 - C. neutral
 - D. low pH

Use the following diagram to answer question 22.



22. The absorption of materials at structure **X** is temporarily impaired. What would occur during the time that structure **X** is **not** functioning properly?

- A. Absorption of fats would stop.
 - B. The amount of glycogen produced in the liver would decrease.
 - C. The pancreas would release more enzymes and bicarbonate ions.
 - D. Pepsinogen would be secreted by the stomach in greater amounts.
-

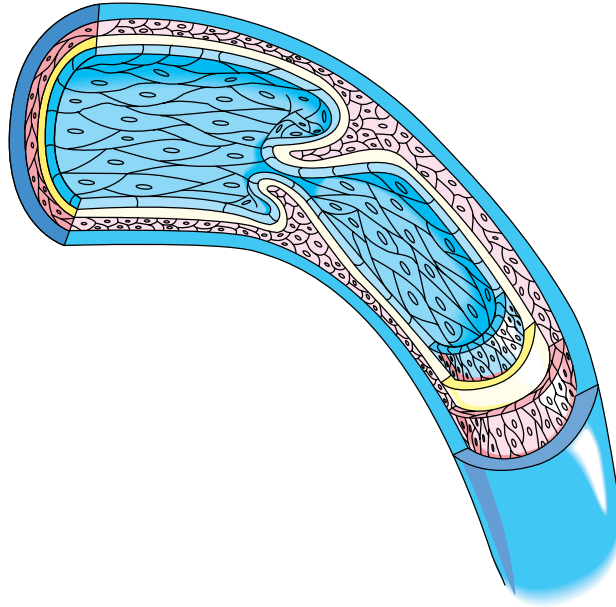
23. Which type of blood vessel has thick walls in order to withstand high pressure?

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

24. The blood vessels that carry blood to and from the head are the

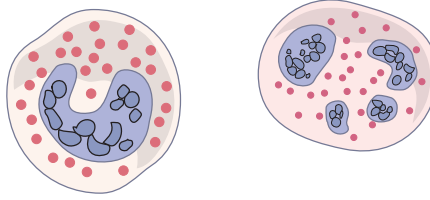
- A. iliac arteries and veins.
- B. subclavian arteries and veins.
- C. carotid arteries and jugular veins.
- D. anterior (superior) and posterior (inferior) vena cavae.

Use the following diagram to answer question 25.



25. The structure above would carry
- A. deoxygenated blood from the legs to the heart.
 - B. deoxygenated blood from the heart to the lungs.
 - C. oxygenated blood toward and away from the glomerulus.
 - D. deoxygenated blood from the left atrium to the left ventricle.
-
26. Which of the following would occur as a result of the oval opening in the heart remaining open after birth?
- A. Blood pressure in the lungs would increase.
 - B. Impulses from the sinoatrial (SA) node would stop.
 - C. Blood in the right atrium would mix with blood in the left atrium.
 - D. A greater amount of blood would flow into the pulmonary system.
27. Which of the following is a function of red blood cells?
- A. clot blood
 - B. carry oxygen
 - C. fight infection
 - D. regulate osmotic pressure

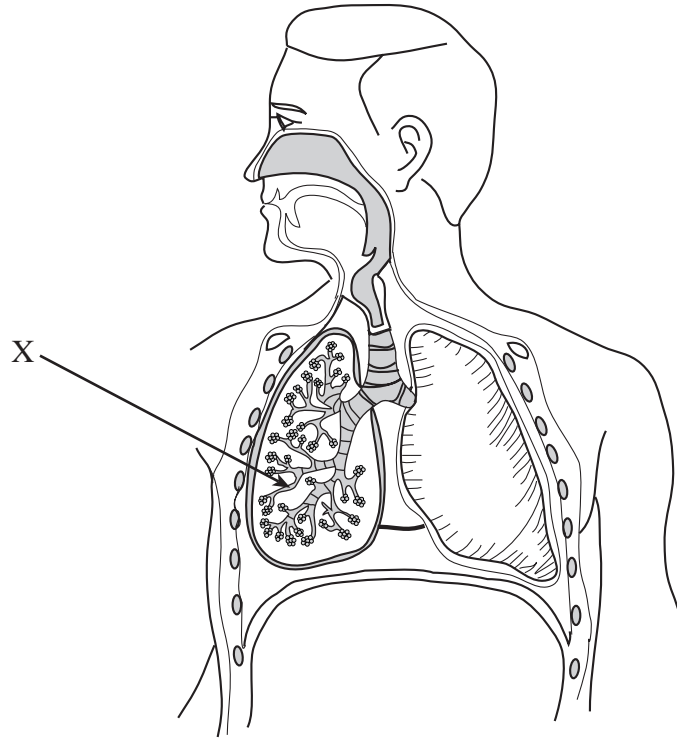
Use the following diagrams to answer question 28.



28. Which of the following would result if the cells above were functioning properly?
- A. Blood clotting would occur.
 - B. Less oxygen would be carried in the blood.
 - C. Disease-causing bacteria could be engulfed.
 - D. Fluids would remain in the tissues, causing swelling.
-

29. Which chamber of the heart pumps oxygenated blood into the aorta?
- A. left atrium
 - B. right atrium
 - C. left ventricle
 - D. right ventricle

Use the following diagram to answer question 30.



30. The structure labelled **X** is a

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

31. Where does oxygen diffuse into the blood?

- A. alveoli
- B. trachea
- C. bronchioles
- D. pleural membranes

32. An increase in the rate of contractions of the diaphragm and rib muscles would indicate

- A. decreased hydrogen ion concentration.
- B. decreased reduced hemoglobin in the blood.
- C. increased concentration of bicarbonate ion in the blood.
- D. increased concentration of oxyhemoglobin in the blood.

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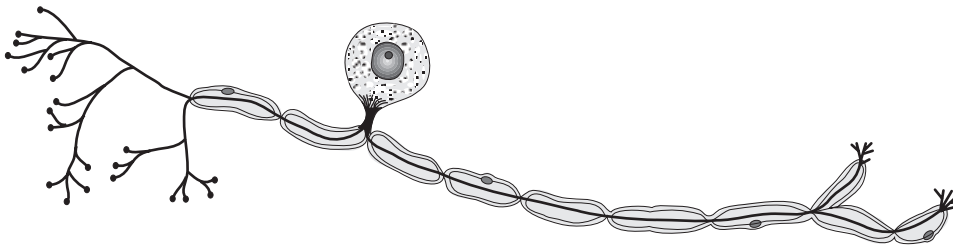
33. Blood entering the systemic circulation carries high concentrations of
- A. oxyhemoglobin.
 - B. bicarbonate ions.
 - C. reduced hemoglobin.
 - D. carbaminohemoglobin.

Use the following diagram to answer question 34.



34. The structure labelled **X** is the
- A. axon.
 - B. dendrite.
 - C. cell body.
 - D. myelin sheath.

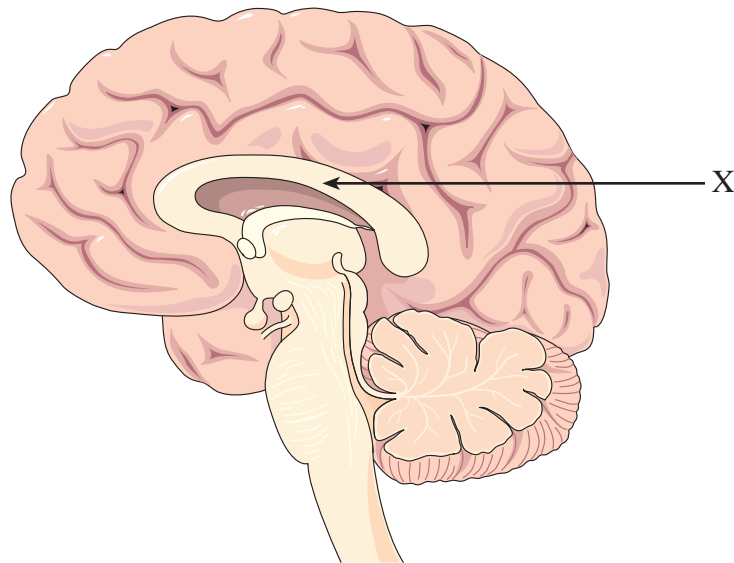
Use the following diagram to answer question 35.



35. The structure above carries impulses
- A. from a receptor.
 - B. to a muscle or a gland.
 - C. away from the central nervous system.
 - D. solely within the central nervous system.

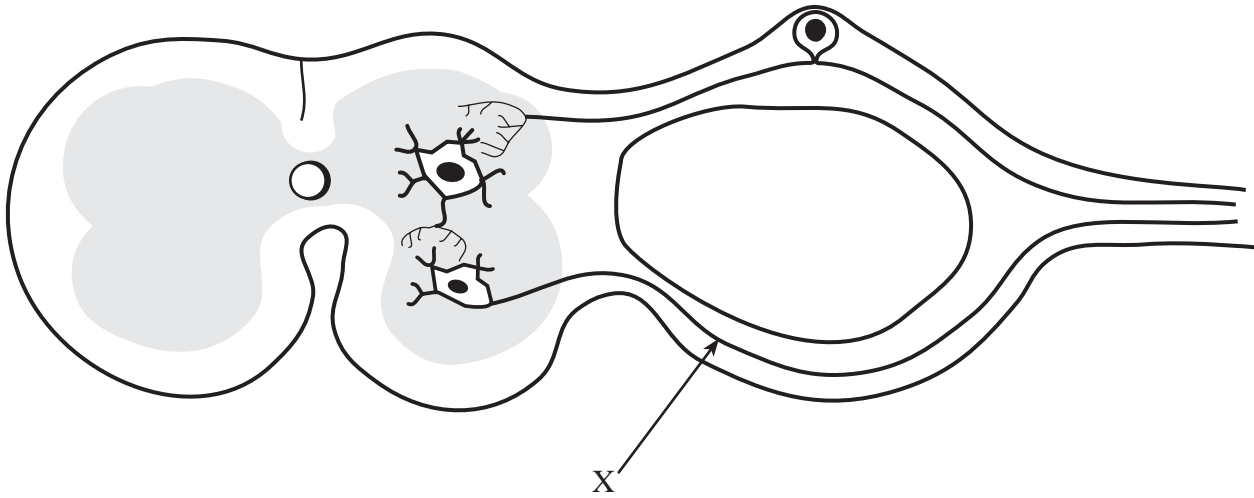
36. Which of the following is a characteristic of a resting potential?
- A. secretion of calcium ions
 - B. neurotransmitters move into the axon
 - C. depolarization of the post-synaptic membrane
 - D. a net negative charge on the inside of the axon

Use the following diagram to answer question 37.



37. The structure labelled **X** is the
- A. cerebrum.
 - B. cerebellum.
 - C. hypothalamus.
 - D. corpus callosum.

Use the following diagram to answer question 38.



38. If a neuron is severed at point **X**,

- A. sensory impulses still reach the brain.
- B. increased amounts of neurotransmitters are secreted.
- C. a message is sent to the sensory receptors, inhibiting them.
- D. another interneuron moves into place to complete the reflex arc.

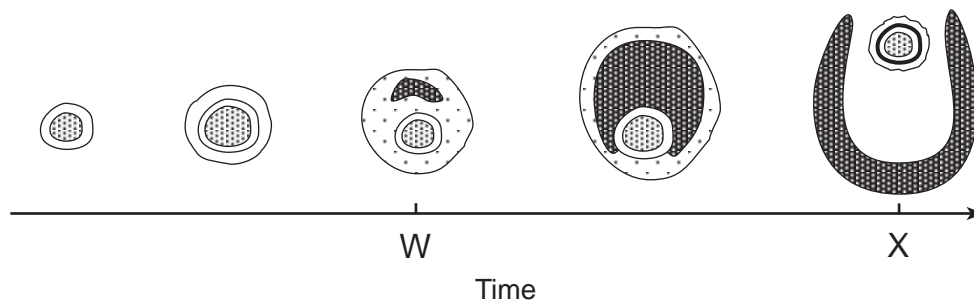
Use the following diagram to answer question 39.



40. Which of the following is controlled by the somatic nervous system?
- A. rate of heartbeat
 - B. contraction of skeletal muscles
 - C. increased blood flow to muscle tissue
 - D. movement of food through the intestines
41. The part of the brain responsible for muscle coordination is the
- A. cerebellum.
 - B. hypothalamus.
 - C. corpus callosum.
 - D. medulla oblongata.
42. Which structure carries urine from the bladder to the outside of the body?
- A. ureter
 - B. urethra
 - C. renal pelvis
 - D. collecting duct
43. Which substance is found in the glomerulus, Bowman's capsule and efferent arteriole but is **not** normally found in the collecting duct?
- A. urea
 - B. glucose
 - C. penicillin
 - D. sodium ions
44. Blood is brought to the glomerulus by the
- A. renal vein.
 - B. afferent arteriole.
 - C. efferent arteriole.
 - D. peritubular capillaries.
45. The source of antidiuretic hormone (ADH) is the
- A. thyroid.
 - B. adrenal cortex.
 - C. anterior pituitary.
 - D. posterior pituitary.

46. Storage and maturation of sperm occurs in the
- epididymis.
 - corpus luteum.
 - seminal vesicle.
 - Cowper's gland.
47. When sperm is ejaculated, it comes into contact with or passes near each of the following structures. Which sequence correctly describes the passage of sperm out of the body?
- seminiferous tubules → prostate → vas deferens → urethra
 - seminiferous tubules → vas deferens → urethra → prostate
 - seminiferous tubules → vas deferens → prostate → urethra
 - prostate → seminiferous tubules → vas deferens → urethra

Use the following diagram to answer questions 48 and 49.



48. The diagram above represents the stages of a developing follicle. What other event takes place during the time period from **W** to **X**?
- The endometrium breaks down.
 - The uterine lining rebuilds and thickens.
 - The anterior pituitary secretes decreasing amounts of luteinizing hormone (LH).
 - The hypothalamus shuts off the production of follicle-stimulating hormone (FSH).
49. The event shown at time **X** occurs as a result of
- the release of large amounts of LH and FSH.
 - the secretion of oxytocin while breast feeding.
 - the secretion of human chorionic gonadotropin (HCG).
 - a steady decline in FSH, LH, estrogen and progesterone.

50. The presence of human chorionic gonadotropin (HCG) in a woman's urine indicates that she
- A. is pregnant.
 - B. has just ovulated.
 - C. is about to menstruate.
 - D. has decreased estrogen levels.

**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.

1. State a **different** function for each of the following in the human body.
(3 marks: 1 mark each)

Monosaccharides:

Amino acids:

Glycogen:

2. Describe the process of DNA replication.

(3 marks)

Use the following chart to answer question 3.

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 }

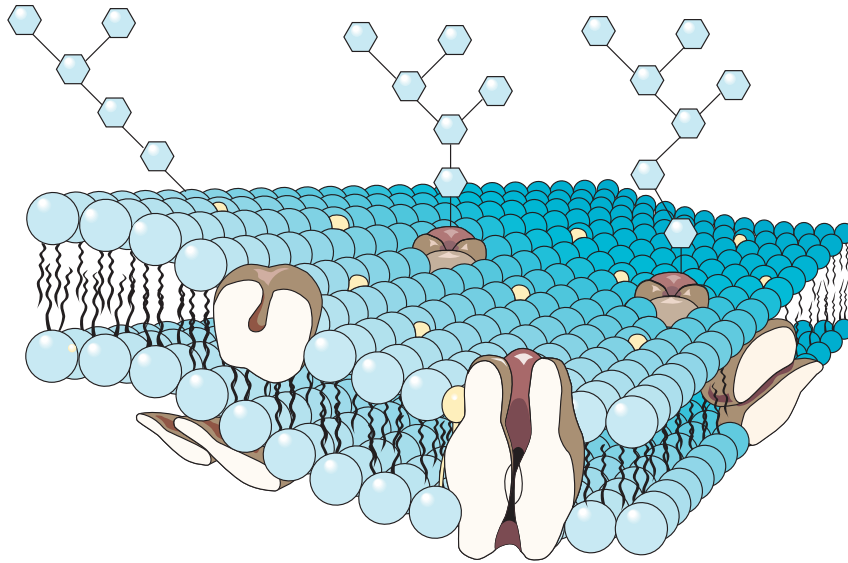
3. a) Determine the DNA base sequence that codes for the amino acid tryptophan. **(1 mark)**

- b) Determine the anticodon for tryptophan. **(1 mark)**

4. Describe how increased vascularization aids in the development of cancer.

(2 marks)

Use the following diagram to answer question 5.



5. Give **three** functions of the structure above.

(3 marks)

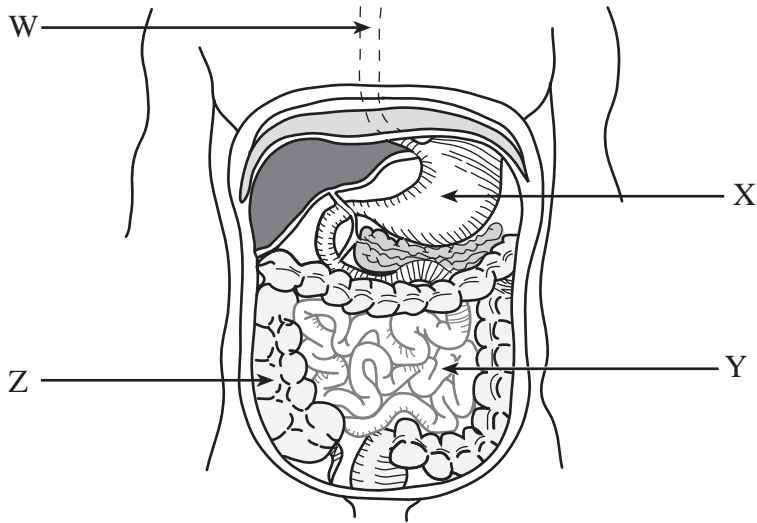
i) _____

ii) _____

iii) _____

6. The addition of heavy metals, boiling water or acid all have the same effect on the rate of an enzyme-catalyzed reaction. Describe the effect that these additions have on the enzyme and the reaction rate. **(4 marks)**

Use the following diagram to answer question 7.



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

Part **W**:

Name: _____

Function: _____

Part **X**:

Name: _____

Function: _____

Part **Y**:

Name: _____

Function: _____

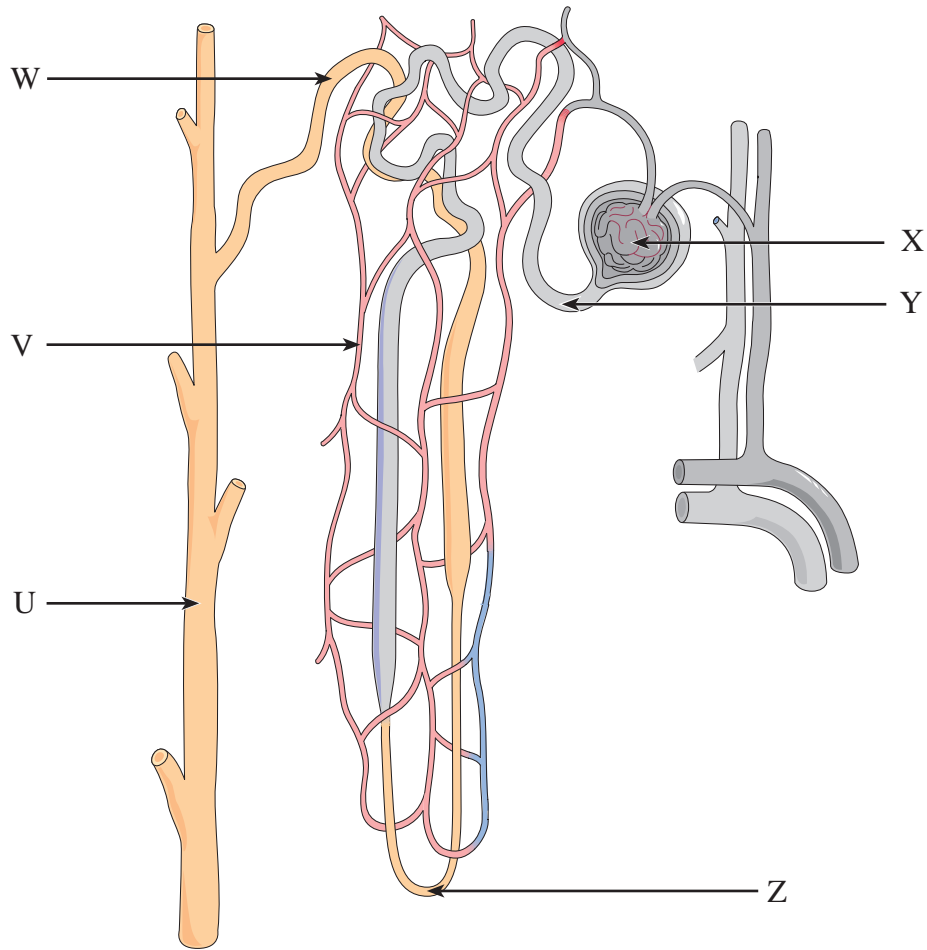
Part **Z**:

Name: _____

Function: _____

9. Describe how the characteristics of the lungs assist in the function of gas exchange. **(4 marks)**

Use the following diagram to answer question 11.



11. State a **different** function of each of the labelled structures. (6 marks: 1 mark each)

Part U:

Part V:

Part W:

Part X:

Part Y:

Part Z:

12. a) Give **one** function of each of the following in a **male**. **(3 marks: 1 mark each)**

Luteinizing hormone (LH):

Follicle-stimulating hormone (FSH):

Testosterone:

b) i) Name **two** structures that contribute to the production of seminal fluid. **(2 marks)**

i) _____

ii) _____

ii) Give **two** functions of seminal fluid. **(2 marks)**

i) _____

ii) _____

END OF EXAMINATION

Question 1:

1. .
(3)

Question 7:

7. .
(6)

Question 2:

2. .
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Question 8:

8. .
(5)

Question 3:

3. .
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Question 9:

9. .
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Question 4:

4. .
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Question 10:

10. .
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Question 5:

5. .
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Question 11:

11. .
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Question 6:

6. .
(4)

Question 12:

12. .
(7)

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batch and sequence number

BIOLOGY 12
November 1999

Course Code = BI

Use this space if I.D. sticker is **not** available.

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