

NOVEMBER 1997

## PROVINCIAL EXAMINATION

MINISTRY OF EDUCATION, SKILLS AND TRAINING

# 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 <b>two</b> parts:		
PART A: 50 multiple-choice questions	50	45
PART B: 9 written-response questions	50	75
	<b>Total: 100 marks</b>	<b>120 minutes</b>
2. Electronic devices, including dictionaries and pagers, are <b>not</b> permitted in the examination room.		
3. The time allotted for this examination is <b>two hours</b> .		

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## PART A: MULTIPLE CHOICE

Value: 50 marks

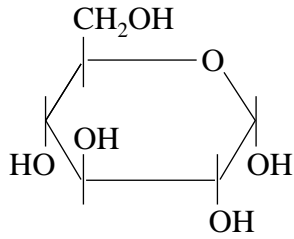
Suggested Time: 45 minutes

**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.

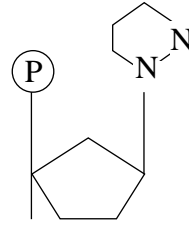
1. Amylase is synthesized at the
  - A. nucleus.
  - B. ribosome.
  - C. lysosome.
  - D. mitochondrion.
  
2. A role of water in cells of the human body is to
  - A. emulsify fats.
  - B. act as a solvent.
  - C. act as an enzyme.
  - D. denature proteins.
  
3. Which of the following is composed of nucleotides?
  - A. Fat.
  - B. RNA.
  - C. Starch.
  - D. Protein.
  
4. Which of the following is a polymer?
  - A. ATP.
  - B. Glucose.
  - C. Glycerol.
  - D. Cellulose.

5. Which of the following would be produced in a reaction catalyzed by enzymes known as nucleases?

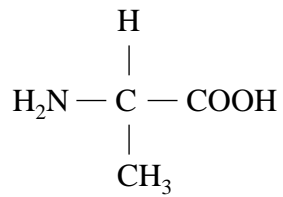
A.



B.



C.



D.  $\text{CH}_3 - (\text{CH}_2)_{14} - \text{COOH}$

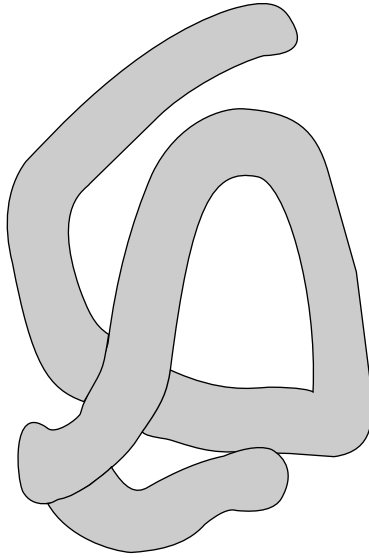
6. The breakdown of a disaccharide may produce

- A. glucose.
- B. glycerol.
- C. fatty acids.
- D. amino acids.

7. In the human body, steroid molecules can act as

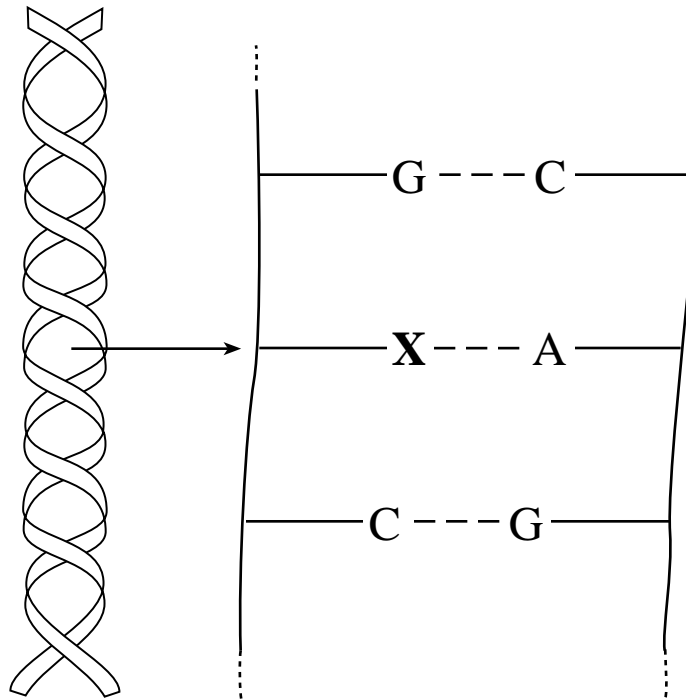
- A. buffers.
- B. vacuoles.
- C. hormones.
- D. coenzymes.

Use the following diagram to answer question 8.



8. The diagram above represents which level of protein structure?
- A. Tertiary.
  - B. Primary.
  - C. Secondary.
  - D. Quaternary.

Use the following diagram to answer question 9.



9. In the portion of the molecule shown above, which base should be in position **X**?

- A. Uracil.
  - B. Adenine.
  - C. Guanine.
  - D. Thymine.
- 

10. Under experimental conditions, cells grown in a medium containing thymine would incorporate thymine into their DNA. If cells grown for a number of generations in a medium containing radioactive thymine were removed from this medium and allowed to replicate once using thymine that was not radioactive, what percent of these cells would now be radioactive?

- A. 0%
- B. 25%
- C. 50%
- D. 100%

11. DNA replication involves the breaking of bonds between

- A. bases.
- B. sugars and bases.
- C. phosphates and bases.
- D. sugars and phosphates.



12. When a foreign gene is incorporated into an organism's nucleic acid, the resulting molecule is called
- A. ATP.
  - B. recombinant DNA.
  - C. transfer RNA (tRNA).
  - D. messenger RNA (mRNA).

**Use the following information to answer question 13.**

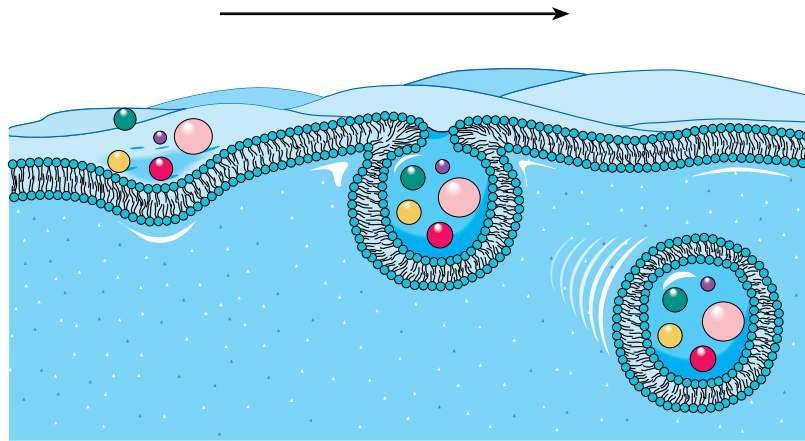
- 1. Uracil bonds with adenine.
- 2. Complementary bonding between codon and anticodon.
- 3. DNA unzips.
- 4. mRNA joins with ribosome.

13. The correct order of the above during protein synthesis is
- A. 1, 2, 4, 3
  - B. 1, 3, 2, 4
  - C. 3, 1, 4, 2
  - D. 3, 2, 1, 4
- 

14. If the code for an amino acid is AGC on the DNA molecule, the anticodon on the tRNA would be
- A. AGC
  - B. TGC
  - C. UCG
  - D. UGC

15. If the triplet code on a DNA molecule changes from ACT to AGC, the result is called
- A. mutation.
  - B. metastasis.
  - C. translation.
  - D. transcription.

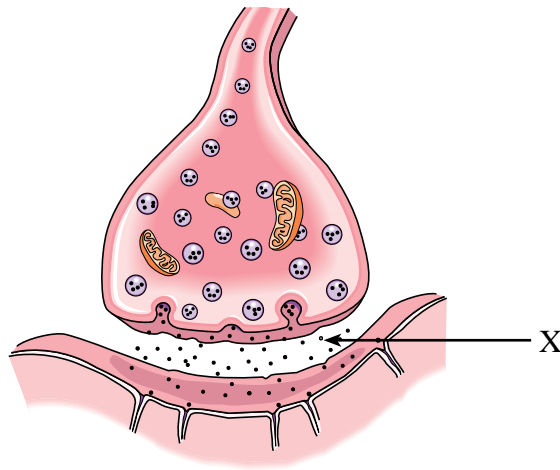
Use the following diagram to answer question 16.



16. Which of the following processes is represented above?
- A. Osmosis.
  - B. Diffusion.
  - C. Hydrolysis.
  - D. Endocytosis.
- 
17. When put in a hypotonic environment, an animal cell will
- A. swell.
  - B. shrink.
  - C. secrete enzymes.
  - D. remain unchanged.
18. The area of an enzyme into which a substrate fits is called the
- A. catalyst.
  - B. product.
  - C. active site.
  - D. activated complex.
19. The role of an enzyme in a chemical reaction is to
- A. emulsify fats.
  - B. prevent denaturation.
  - C. speed up the reaction.
  - D. buffer any acids or bases.

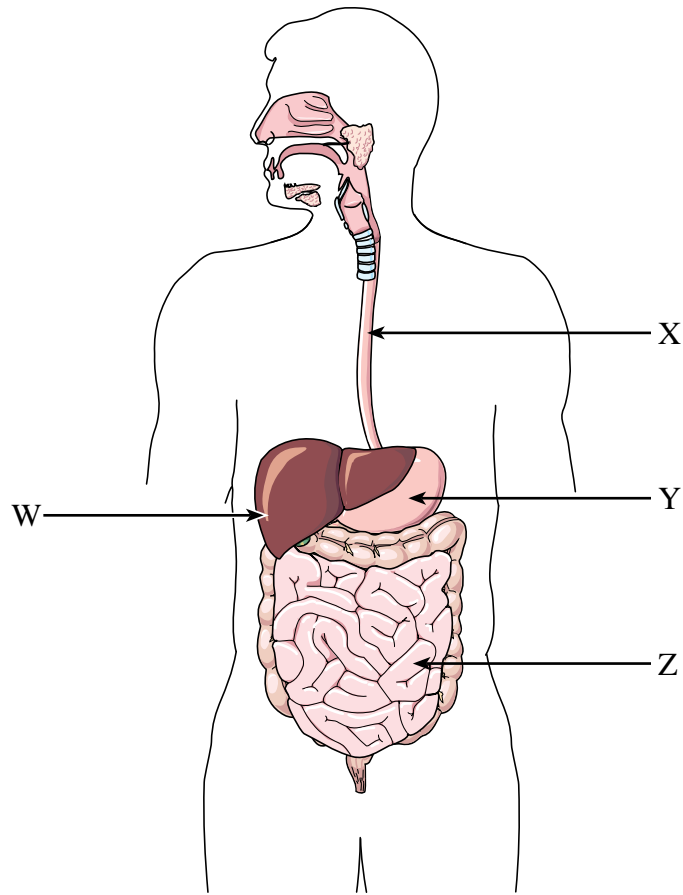
20. Which of the following would inhibit trypsin's ability to form an enzyme-substrate complex?
- A. pH of 3.
  - B. Temperature of 37° C.
  - C. Increased bile production.
  - D. Decreased numbers of villi.
21. The factor being tested in an experiment is the
- A. data.
  - B. variable.
  - C. conclusion.
  - D. observation.

Use the following diagram to answer question 22.

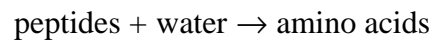


22. How does the molecule indicated by **X** move across the space above?
- A. Osmosis.
  - B. Diffusion.
  - C. Active transport.
  - D. Facilitated transport.
- 
23. A function of the small intestine is to
- A. secrete bile.
  - B. filter wastes.
  - C. make vitamins.
  - D. absorb nutrients.

Use the following diagram to answer question 24.

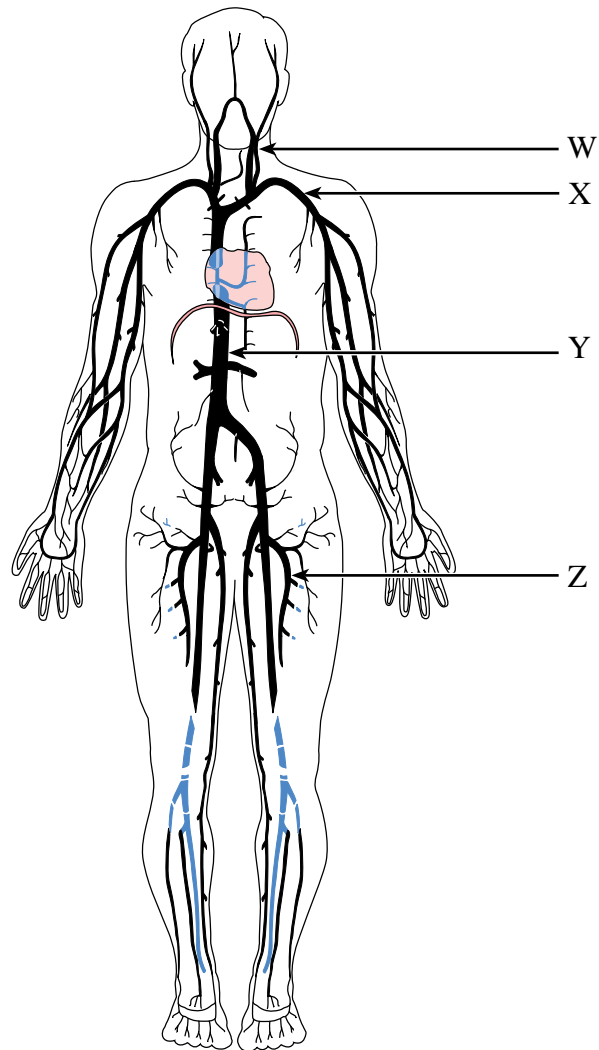


24. In which structure indicated would the following reaction occur?



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

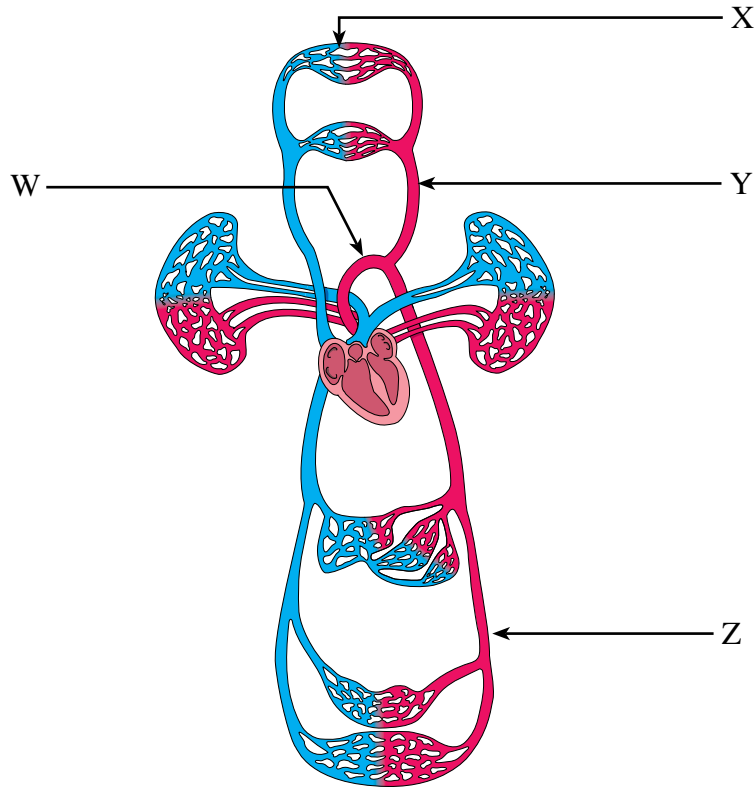
Use the following diagram to answer question 25.



25. Which of the blood vessels indicated in the diagram above is the subclavian vein?

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

Use the following diagram to answer question 26.



26. The blood pressure in the vessels in the diagram above would be highest at

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

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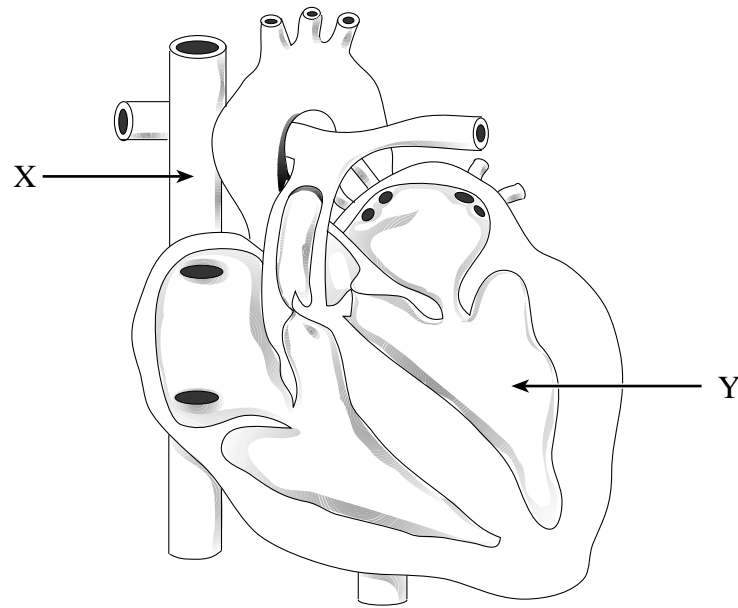
27. Which of the following is **not** found in the lymphatic system?

- A. Veins.
- B. Nodes.
- C. Arteries.
- D. Capillaries.

28. Red blood cells originate in the

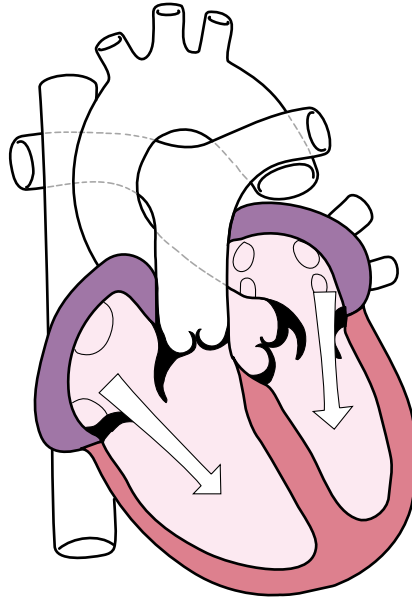
- A. liver.
- B. lymph nodes.
- C. bone marrow.
- D. capillary beds.

Use the following diagram to answer question 29.



29. The structures labelled **X** and **Y** in the diagram above are the
- A. aorta and the left ventricle.
  - B. pulmonary trunk and the right ventricle.
  - C. anterior vena cava and the left ventricle.
  - D. anterior vena cava and the right ventricle.

Use the following diagram to answer question 30.



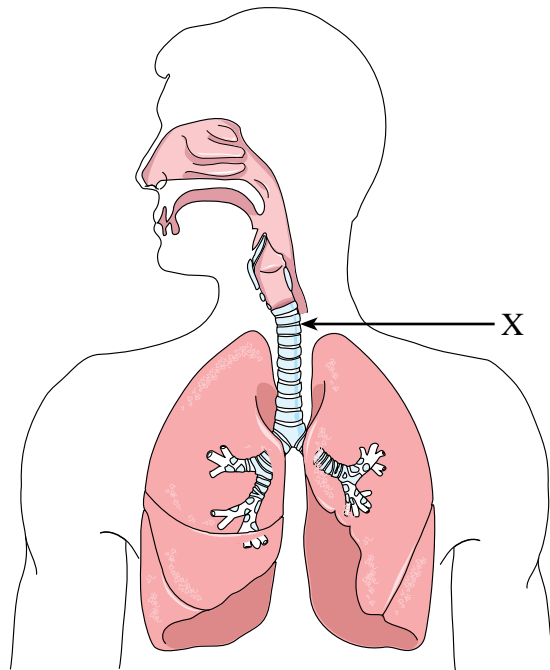
30. The diagram represents what happens in the heart as a result of
- A. systole of the atria.
  - B. systole of the ventricles.
  - C. the opening of the semi-lunar valves.
  - D. the sino-atrial (SA) node not functioning.

Use the following information to answer question 31.

- 1. Systole of the ventricles.
  - 2. Opening of the atrio-ventricular valves.
  - 3. Electrical impulse sent from the SA node.
  - 4. Atria fill with blood.
31. The order in which the events above occur during one heartbeat (the cardiac cycle) is
- A. 2, 1, 3, 4
  - B. 2, 3, 4, 1
  - C. 4, 1, 3, 2
  - D. 4, 3, 2, 1



Use the following diagram to answer question 32.



32. The structure labelled **X** is held open by

- A. cartilage.
  - B. vocal cords.
  - C. a lipoprotein layer.
  - D. a pleural membrane.
- 

33. Which of the following is the site of external respiration?

- A. Alveoli.
- B. Bronchioles.
- C. Mitochondria.
- D. Muscle tissue.

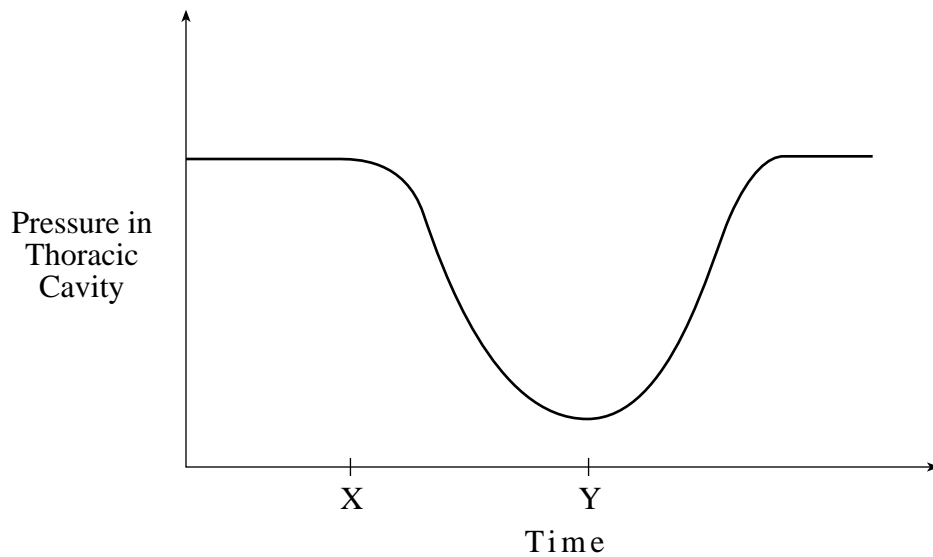
Use the following information to answer question 34.

1. Alveoli
2. Bronchi
3. Trachea
4. Bronchioles

34. What is the order in which air passes through these structures during inhalation?

- A. 2, 1, 3, 4
- B. 2, 4, 1, 3
- C. 3, 2, 4, 1
- D. 3, 4, 2, 1

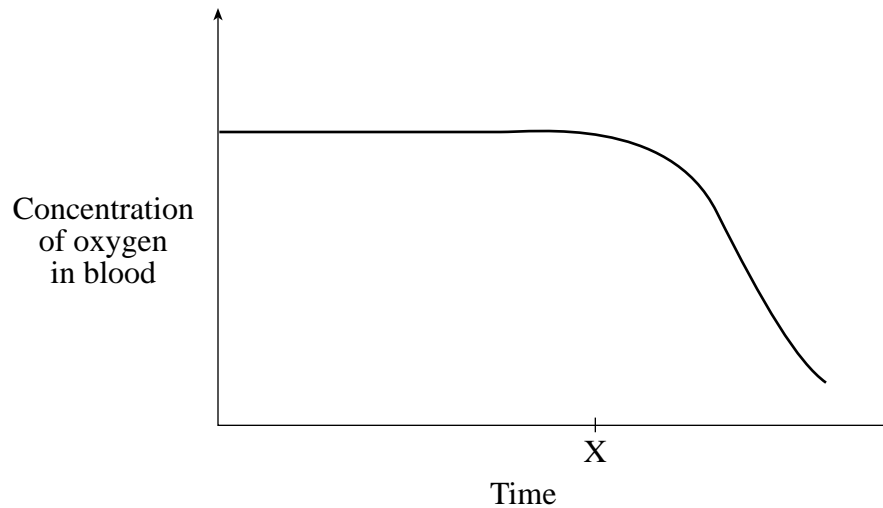
Use the following graph to answer question 35.



35. The graph shows changes in air pressure in the thoracic cavity during breathing. Which of the following occurs between times X and Y?

- A. Rib muscles relax and diaphragm relaxes.
- B. Rib muscles relax and diaphragm contracts.
- C. Rib muscles contract and diaphragm relaxes.
- D. Rib muscles contract and diaphragm contracts.

Use the following graph to answer question 36.



36. An experiment was carried out to determine factors affecting human blood's ability to carry oxygen. The results are shown in the graph above. Which of the following may have caused the change at time **X**?
- A. Water was removed from the plasma.
  - B. More platelets were added to the blood.
  - C. Stimulation of the medulla oblongata increased breathing rate.
  - D. A competitive inhibitor of hemoglobin was added to the blood.
- 

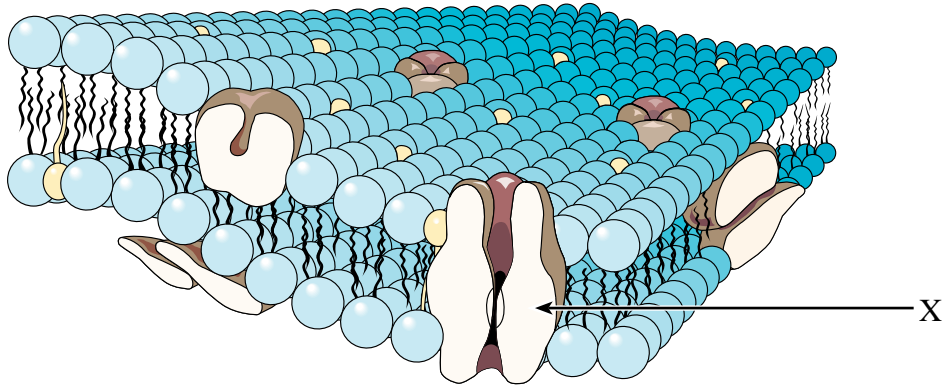
37. Which of the following is **not** carried by hemoglobin?

- A. Oxygen.
- B. Sodium ions.
- C. Hydrogen ions.
- D. Carbon dioxide.

38. Which of the following is responsible for transmitting impulses to the central nervous system (CNS)?

- A. Effectors.
- B. Interneurons.
- C. Motor neurons.
- D. Sensory neurons.

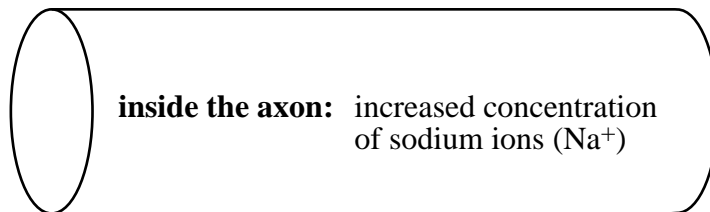
Use the following diagram to answer question 39.



39. The diagram shows part of a dendrite. A role of structure **X** is to
- A. secrete the myelin sheath.
  - B. identify the cell to phagocytes.
  - C. move sodium across the membrane.
  - D. release calcium at the synaptic ending.
- 

40. The diagram below represents a section of an axon.

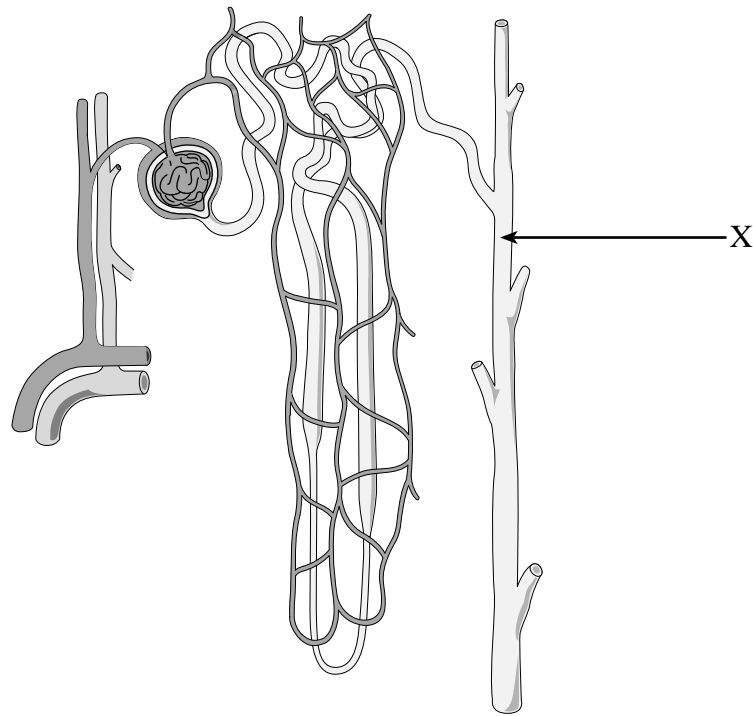
**outside the axon:** increased concentration of potassium ions ( $K^+$ )



Given the conditions above, what will occur next?

- A. Repolarization.
  - B. Depolarization.
  - C. Recovery period.
  - D. Synaptic transmission.
41. Which of the following neurons would be found in the autonomic nervous system?
- A. Sensory neurons in the skin.
  - B. Sensory neurons in the spinal cord.
  - C. Motor neurons ending in the intestines.
  - D. Motor neurons ending in skeletal muscle.

Use the following diagram to answer question 42.



42. The structure labelled **X** is the
- A. renal vein.
  - B. glomerulus.
  - C. collecting duct.
  - D. peritubular capillary network.
- 
43. Where is most of the glucose in the nephron reabsorbed?
- A. Loop of Henle.
  - B. Collecting duct.
  - C. Distal convoluted tubule.
  - D. Proximal convoluted tubule.
44. Which of the following would increase as ADH levels rise?
- A. Blood volume.
  - B. Glucose levels in the plasma.
  - C. Amount of urine in the bladder.
  - D. Urea concentration in the plasma.

45. Which of the following is the source of aldosterone?
- A. Pancreas.
  - B. Thyroid gland.
  - C. Adrenal gland.
  - D. Anterior pituitary.
46. Testosterone is produced in the
- A. epididymis.
  - B. interstitial cells.
  - C. seminal vesicles.
  - D. seminiferous tubules.
47. Which of the following would be affected by removal of the prostate gland?
- A. Urine formation.
  - B. Motility of sperm.
  - C. Sperm maturation.
  - D. Follicle development.
48. Which of the following hormones is controlled by positive feedback?
- A. Oxytocin.
  - B. Testosterone.
  - C. Progesterone.
  - D. Follicle-stimulating hormone (FSH).

**Use the following information to answer question 49.**

1. Urethra
2. Epididymis
3. Vagina
4. Oviduct
5. Ductus vas deferens

49. Which of the following would be the correct path of a sperm on its way to fertilize an egg?

- A. 1, 2, 3, 5, 4
  - B. 1, 3, 4, 5, 2
  - C. 2, 1, 3, 4, 5
  - D. 2, 5, 1, 3, 4
- 

50. Which part of a mature sperm contains mitochondria?

- A. Tail.
- B. Head.
- C. Midpiece.
- D. Acrosome.

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

**OVER**

**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 **one** function of each of the following. **(4 marks: 1 mark each)**

i) Vesicles:

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ii) Smooth endoplasmic reticulum:

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iii) Nuclear envelope:

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iv) Mitochondria:

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3. a) Explain why a cell membrane is described as *selectively permeable*. **(1 mark)**

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b) Describe how the structure of the cell membrane permits molecules to enter the cell by the following processes. **(3 marks: 1 mark each)**

i) Osmosis:

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ii) Facilitated Transport:

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iii) Pinocytosis:

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4. In paragraph form, describe the chemical breakdown of starch to a monosaccharide in the human body. **(7 marks)**

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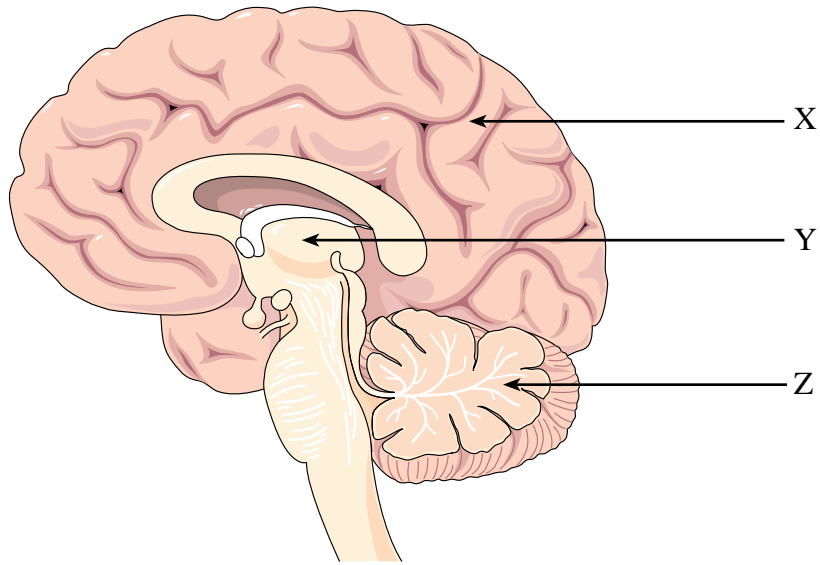
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5. Identify each part of the brain indicated in the diagram below and give **one** function of each.  
(6 marks: 1 mark each for name and 1 mark each for function)



Part X: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Part Y: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Part Z: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

6. State **four** ways in which the liver is important to the human body.

**(4 marks)**

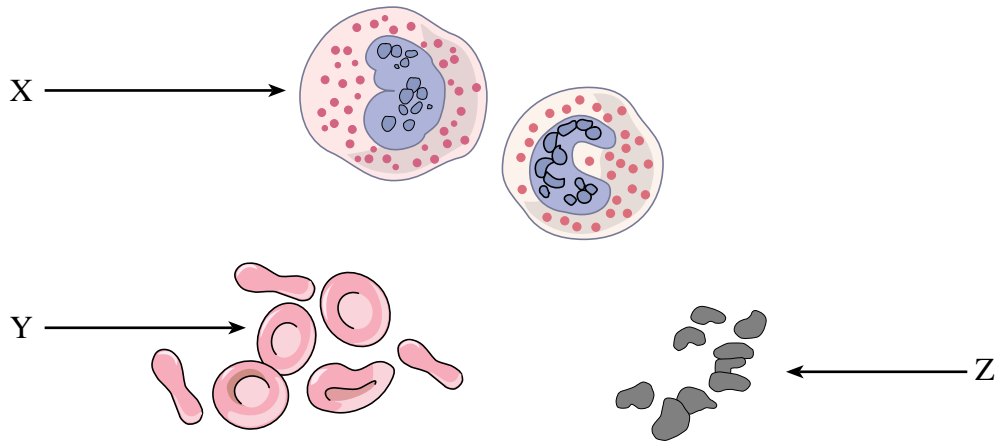
i) \_\_\_\_\_  
\_\_\_\_\_

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

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

iv) \_\_\_\_\_  
\_\_\_\_\_

7. Identify each blood component indicated in the diagram below and give **one** function of each.  
**(6 marks: 1 mark each for name and 1 mark each for function)**



Component X: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Component Y: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Component Z: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

8. State **one** function of each of the following.

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

i) Glomerulus:

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ii) Aldosterone:

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iii) Ureter:

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iv) Distal convoluted tubule:

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v) Urinary bladder:

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vi) Peritubular capillary network:

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vii) Renal pelvis:

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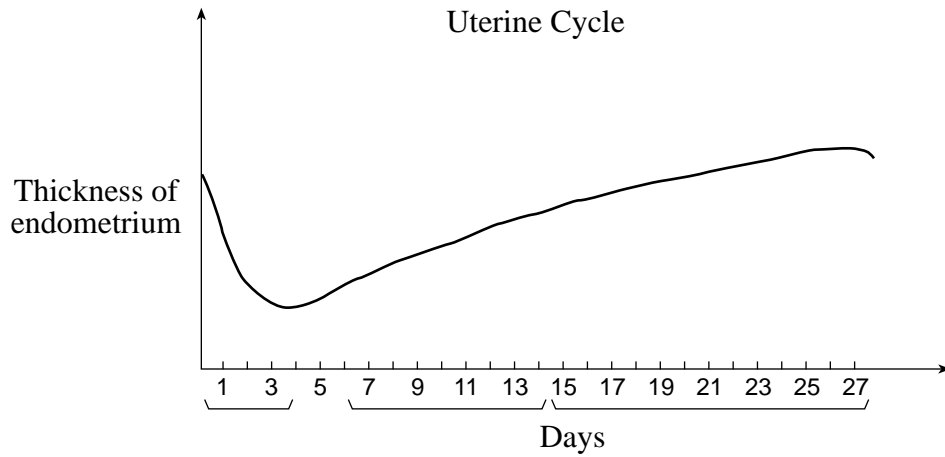
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viii) Afferent arteriole:

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Use the following graph to answer question 9.



9. Relate the development of the follicle to the observed changes in the thickness of the endometrium at: **(6 marks: 2 marks each)**

Days 1-3:

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Days 7-14:

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Days 15-27:

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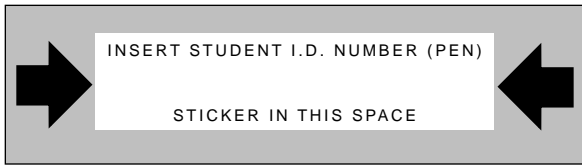
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**END OF EXAMINATION**







# **BIOLOGY 12**

**November 1997**

Course Code = BI

FOR OFFICE USE ONLY

# BIOLOGY 12

November 1997

Course Code = BI

Score for  
Question 1:

1. \_\_\_\_\_  
(4)

Score for  
Question 8:

8. \_\_\_\_\_  
(8)

Score for  
Question 2:

2. \_\_\_\_\_  
(5)

Score for  
Question 9:

9. \_\_\_\_\_  
(6)

Score for  
Question 3:

3. \_\_\_\_\_  
(4)

Score for  
Question 4:

4. \_\_\_\_\_  
(7)

Score for  
Question 5:

5. \_\_\_\_\_  
(6)

Score for  
Question 6:

6. \_\_\_\_\_  
(4)

Score for  
Question 7:

7. \_\_\_\_\_  
(6)

