

JANUARY 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: 9 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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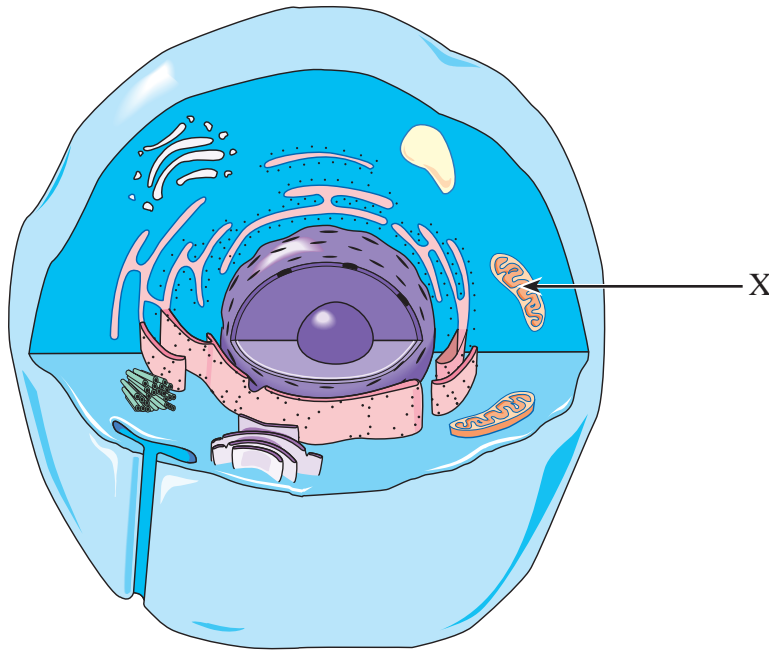
PART A: MULTIPLE CHOICE

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 organelle labelled **X** is a

- A. vacuole.
 - B. ribosome.
 - C. Golgi body.
 - D. mitochondrion.
-

2. Specialized vacuoles containing molecules that catalyze the hydrolysis of macromolecules are

- A. nucleoli.
- B. ribosomes.
- C. lysosomes.
- D. chromosomes.

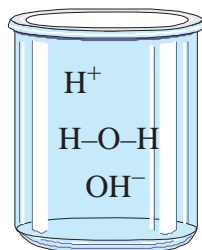
3. An organelle composed of membranous tubules that synthesize testosterone is the
- A. vacuole.
 - B. Golgi apparatus.
 - C. rough endoplasmic reticulum.
 - D. smooth endoplasmic reticulum.

Use the following information to answer question 4.

- 1. Vesicle fuses with a lysosome.
 - 2. Bacterium is taken into the macrophage.
 - 3. Digestion of the bacterium occurs.
 - 4. Vesicle is formed around the bacterium.
4. Which of the following is the correct sequence to describe what happens to a bacterium after a type of white blood cell called a macrophage encounters it?
- A. 1, 3, 2, 4
 - B. 1, 4, 2, 3
 - C. 2, 3, 4, 1
 - D. 2, 4, 1, 3
-

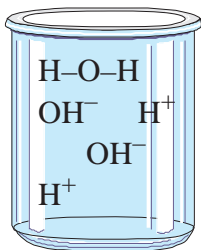
5. A substance that prevents large changes in the pH of a solution is
- A. DNA.
 - B. water.
 - C. a buffer.
 - D. an enzyme.

6. The solution in the beaker below has a pH of 7.

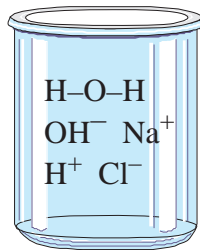


Which of the following diagrams correctly represents a solution with a pH less than 7?

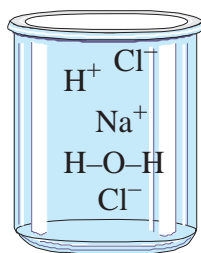
A.



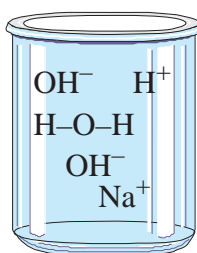
B.



C.



D.



7. Synthesis of protein involves the bonding of amino acids to

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

8. Nucleic acids are composed of

- A. glucose.
- B. enzymes.
- C. fatty acids.
- D. nucleotides.

9. Which of the following are components of a phospholipid?

- A. cholesterol, glycerol, fatty acids
- B. fatty acids, phosphate group, glycerol
- C. glycerol, amino acids, phosphate group
- D. phosphate group, cholesterol, monosaccharides

10. What is the ratio of hydrogen to oxygen molecules in a carbohydrate?

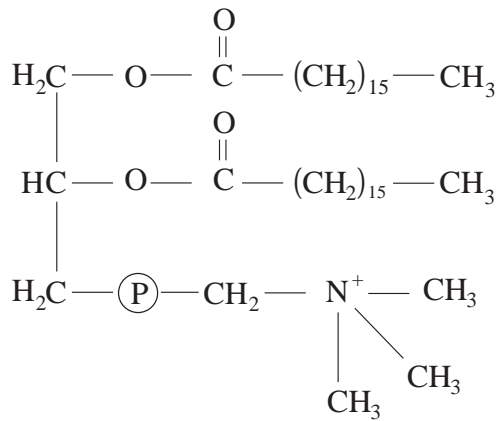
- A. 1:1
- B. 1:2
- C. 2:1
- D. 3:1

11. Which of the following is an amino (amine) group?

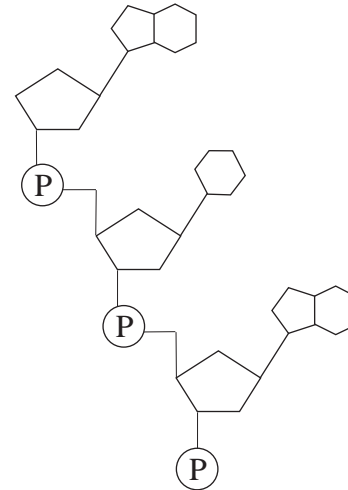
- A. NH_2
- B. OH^{-1}
- C. PO_4^{-3}
- D. COOH

12. Which of the following structures represents ATP?

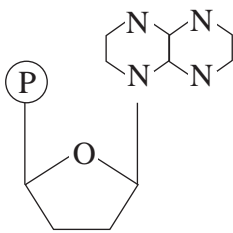
A.



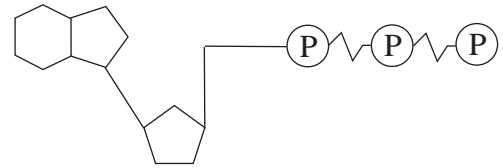
B.



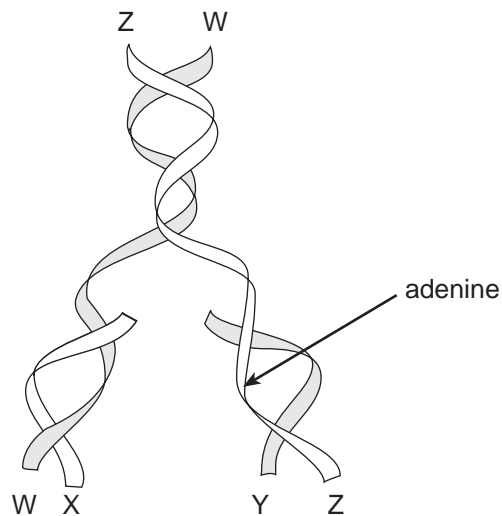
C.



D.



Use the following diagram to answer question 13.

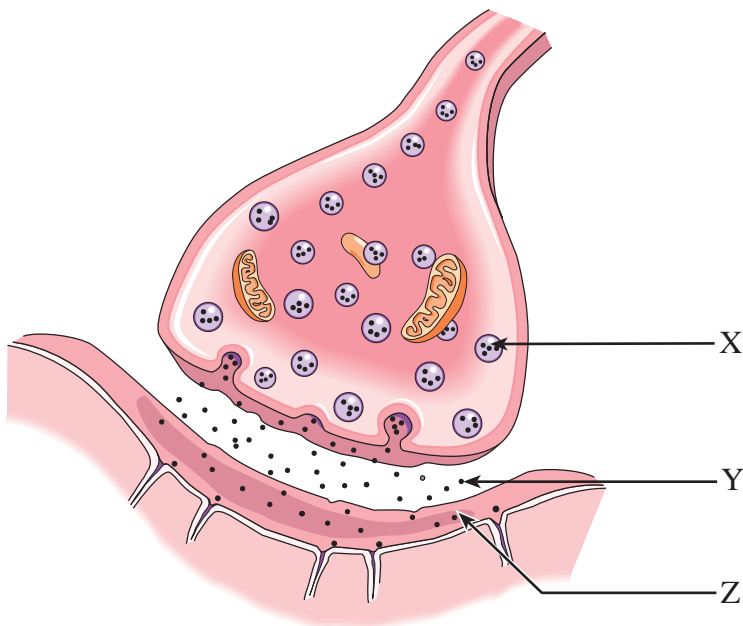


13. If adenine is located on **strand Z** as shown, then on **strand X** at the same location must be

- A. uracil.
- B. adenine.
- C. thymine.
- D. cytosine.

14. The fluid-mosaic membrane model describes the membrane as having a
- sheet of protein.
 - phospholipid bilayer.
 - sugar-phosphate backbone.
 - complementary base template.

Use the following diagram to answer question 15.

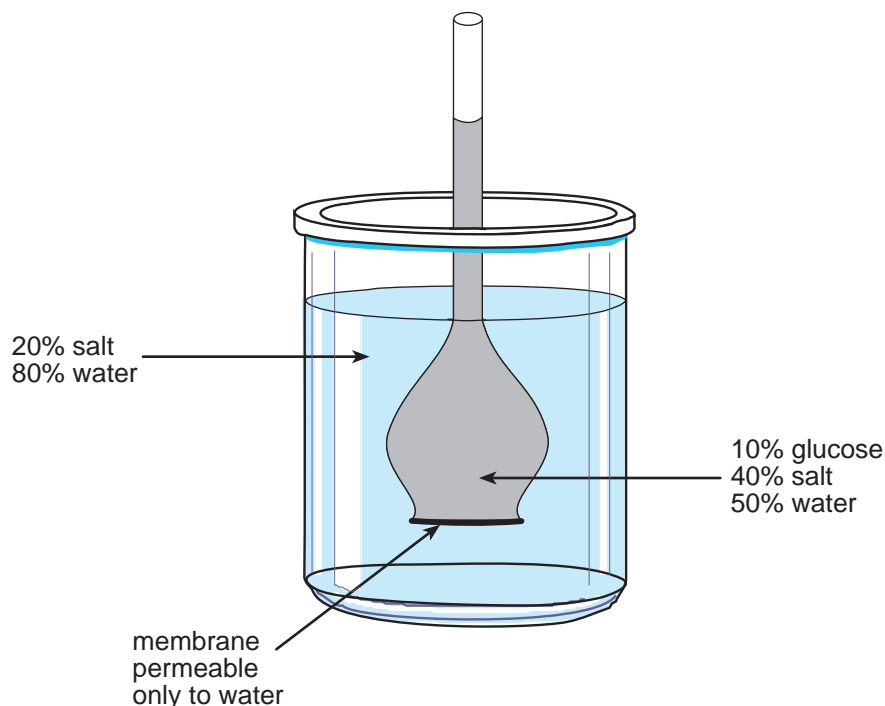


15. Which processes are involved in the movement of molecule **Y** from **point X** to **point Z**?
- exocytosis and diffusion
 - endocytosis and diffusion
 - exocytosis and facilitated transport
 - endocytosis and facilitated transport

16. Which of the following cells is the most efficient in terms of diffusion of wastes out of the cell?

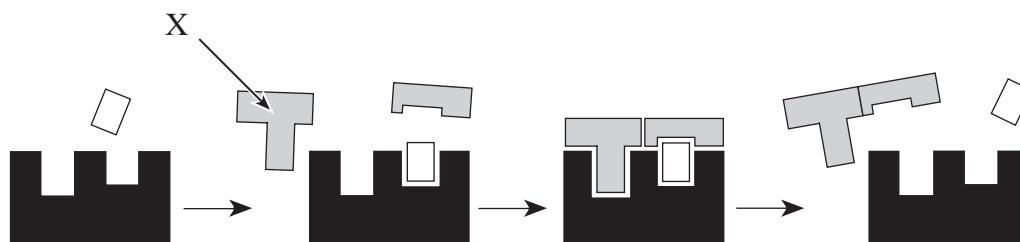
CELL	SURFACE AREA (μ^2)	VOLUME (μ^3)	
A.	A	2	3
B.	B	4	5
C.	C	6	5
D.	D	5	5

Use the following diagram to answer question 17.



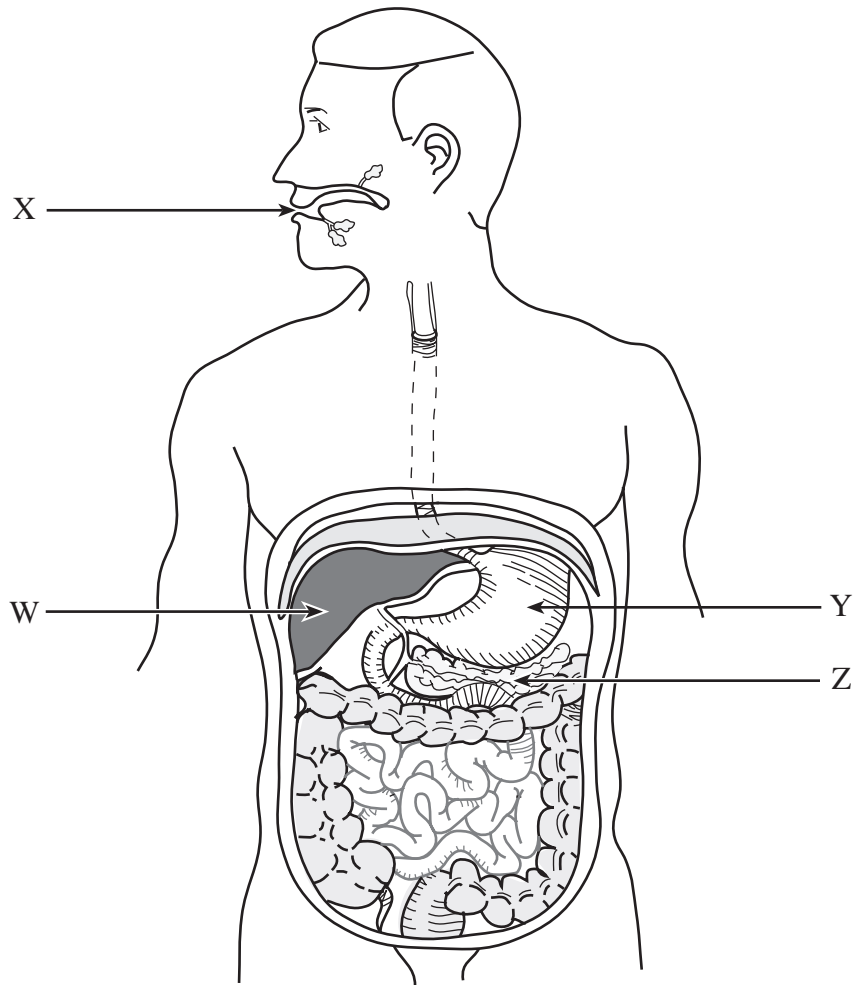
17. The diagram above shows a thistle tube suspended in a solution. The initial concentrations of the solutions inside and outside the thistle tube are indicated. What will happen to the concentration of the salt solution surrounding the thistle tube?
- A. It will decrease as salt moves into the thistle tube.
 - B. It will increase as salt moves out of the thistle tube.
 - C. It will increase as water moves into the thistle tube.
 - D. It will decrease as water and glucose move out of the thistle tube.

Use the following diagrams to answer question 18.



18. The structure labelled **X** is a(n)
- A. product.
 - B. enzyme.
 - C. complex.
 - D. substrate.

Use the following diagram to answer questions 19 and 20.



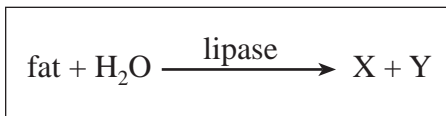
19. Which organ releases an enzyme that digests fats?

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

20. Which organ functions to kill bacteria, store food and digest protein?

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

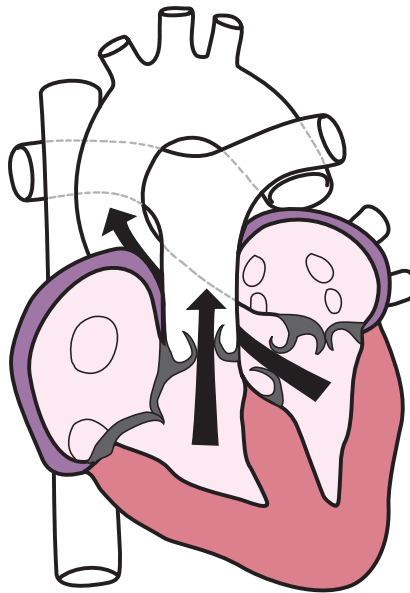
21. Which organ has a large surface area and has special adaptations for the absorption of fats?
- A. mouth
 - B. stomach
 - C. esophagus
 - D. small intestine
22. Which two enzymes break down the same substrate?
- A. trypsin and pepsin
 - B. pepsin and peptidase
 - C. lipase and salivary amylase
 - D. pancreatic amylase and maltase
23. In the following reaction, product **X** could be a(n)



- A. peptide.
 - B. fatty acid.
 - C. nucleotide.
 - D. amino acid.
24. Saliva contains an enzyme that partially digests
- A. fat.
 - B. starch.
 - C. protein.
 - D. nucleic acids.
25. A blood vessel that transports blood out of a capillary bed is a(n)
- A. vein.
 - B. artery.
 - C. venule.
 - D. arteriole.

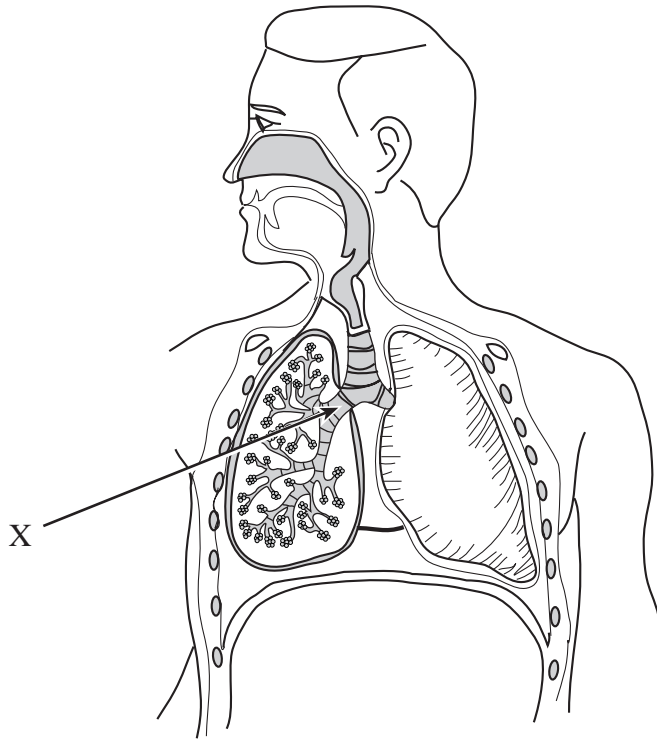
26. The path followed by blood on one circuit through the heart is
- ventricle, atrioventricular valve, semilunar valve, atrium.
 - atrium, atrioventricular valve, ventricle, semilunar valve.
 - atrium, ventricle, atrioventricular valve, semilunar valve.
 - atrium, semilunar valve, ventricle, atrioventricular valve.
27. A condition called tachycardia exists when a person's heartrate is abnormally high. Which of the following explains how tachycardia may arise?
- The Purkinje fibres are over-stimulating the pacemaker.
 - The sinoatrial (SA) node is receiving increased stimulation.
 - There is increased stimulation by the parasympathetic nervous system.
 - Impulses from the sinoatrial (SA) node are not reaching the atrioventricular (AV) node.

Use the following diagram to answer question 28.



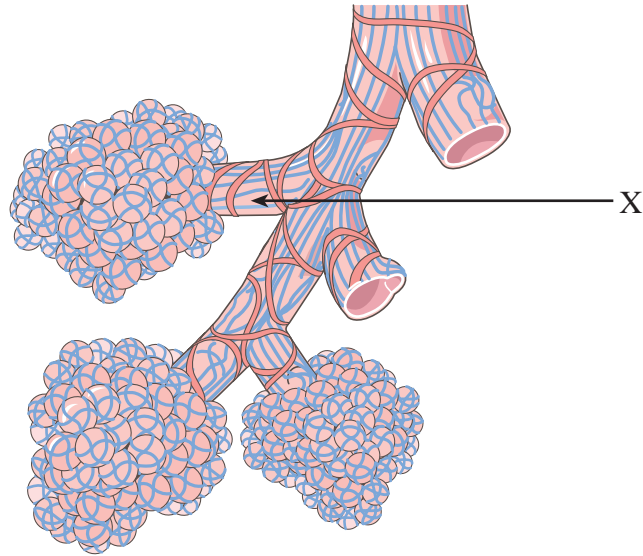
28. The heart shown above is in the process of
- atrial and ventricular systole.
 - atrial and ventricular diastole.
 - atrial systole and ventricular diastole.
 - atrial diastole and ventricular systole.

Use the following diagram to answer question 29.



29. A function of the structure labelled **X** is to
- A. produce sound.
 - B. exchange gases.
 - C. carry air into and out of the lung.
 - D. stimulate the breathing centre in the brain.

Use the following diagram to answer question 30.



30. The structure labelled **X** is a(n)

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

31. The diaphragm assists breathing by

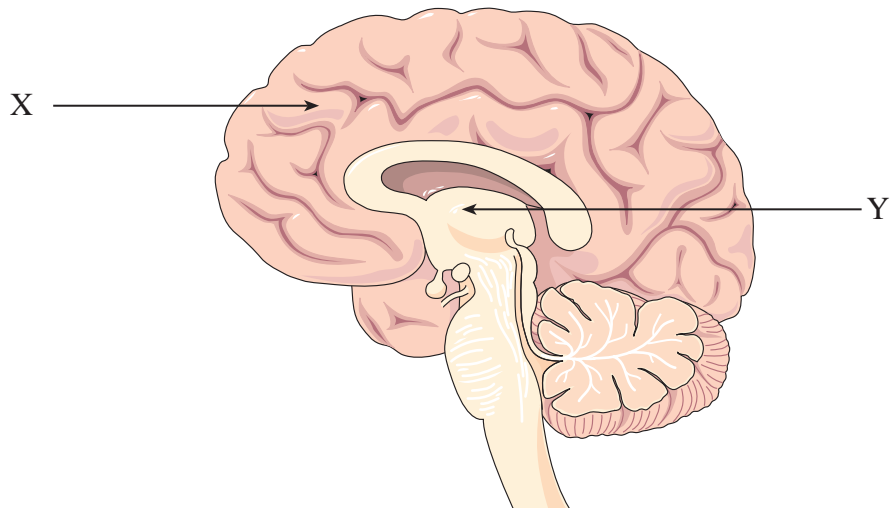
- A. moving the ribs up.
- B. stimulating the lungs to absorb oxygen.
- C. changing the volume of the thoracic cavity.
- D. allowing the lungs to move freely in the thoracic cavity.

32. Internal respiration is the exchange of

- A. glucose and hydrogen ions between the air and the blood.
- B. oxygen and carbon dioxide between the air and the blood.
- C. glucose and hydrogen ions between the blood and tissue fluid.
- D. oxygen and carbon dioxide between the blood and tissue fluid.

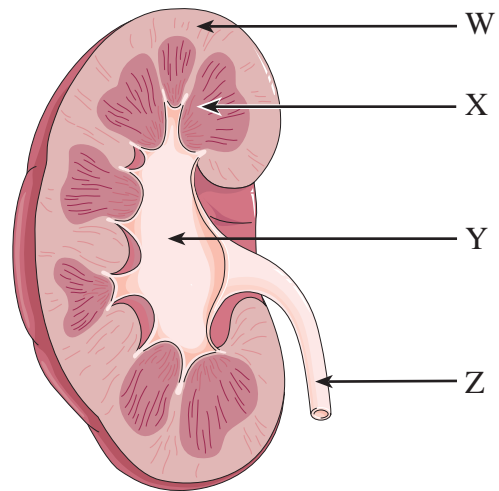
33. Which of the following would have the highest concentrations of both bicarbonate ions and reduced hemoglobin?
- A. an iliac vein
 - B. a carotid artery
 - C. a coronary artery
 - D. a pulmonary vein
34. Which of the following is correctly paired?
- A. sympathetic nervous system stimulation and acetylcholine
 - B. sympathetic nervous system stimulation and a relaxed state
 - C. parasympathetic nervous system stimulation and noradrenalin
 - D. parasympathetic nervous system stimulation and a relaxed state
35. The source gland for adrenalin is the
- A. pancreas.
 - B. adrenal cortex.
 - C. adrenal medulla.
 - D. posterior pituitary.

Use the following diagram to answer questions 36 and 37.



36. The structure labelled **X** is the
- A. cerebrum.
 - B. cerebellum.
 - C. hypothalamus.
 - D. corpus callosum
37. A function of the structure labelled **Y** is to
- A. sort and relay sensory stimuli.
 - B. initiate the “fight or flight” response.
 - C. integrate muscle position and balance.
 - D. channel information between the two hemispheres.

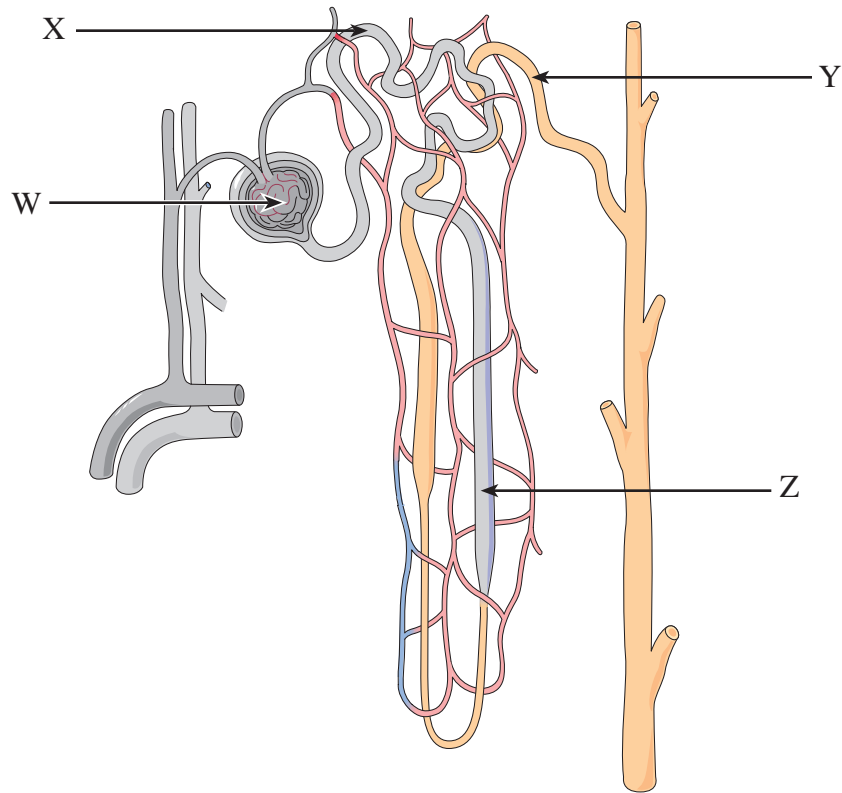
Use the following diagram to answer question 38.



38. Which of the labelled structures is the renal cortex?

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

Use the following diagram to answer questions 39 and 40.



39. The process that occurs at **W** is

- A. tubular excretion.
- B. pressure filtration.
- C. reabsorption of water.
- D. selective reabsorption.

40. The permeability of which structure is altered by secretions from the adrenal cortex?

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

41. In a healthy person, the following substances enter the kidneys via the renal arteries in the amounts shown:

UREA (grams/day)	GLUCOSE (grams/day)	WATER (litres/day)
54	180	180

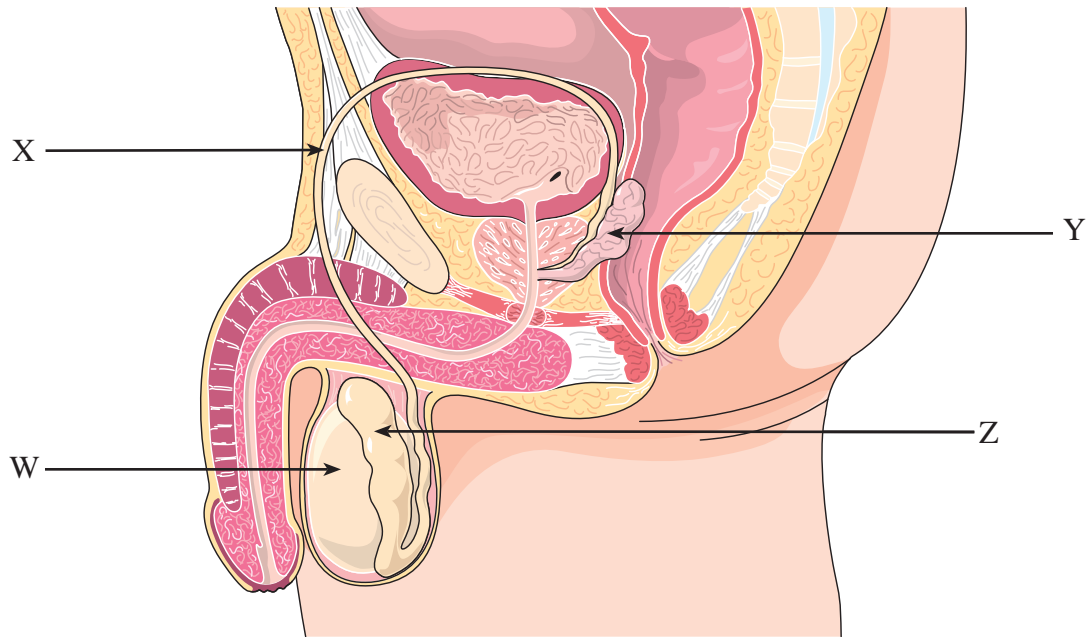
Which of the following describes the amounts of each substance leaving the kidneys in the renal veins? ~~DELETED~~

	UREA (grams/day)	GLUCOSE (grams/day)	WATER (litres/day)
A.	10	100	170
B.	24	180	178
C.	54	178	177
D.	70	180	180

42. Antidiuretic hormone (ADH) is released by the

- A. kidneys.
- B. pancreas.
- C. anterior pituitary.
- D. posterior pituitary.

Use the following diagram to answer question 43.



43. Which of the labelled structures is the epididymis?

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

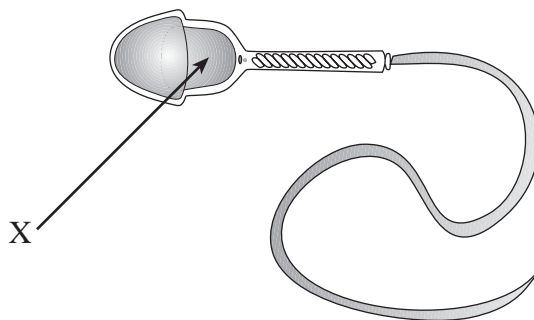
44. Testosterone is produced in the

- A. epididymis.
- B. prostate gland.
- C. interstitial cells.
- D. seminiferous tubules.

45. Which of the following is **not** a function of seminal fluid?

- A. provides a suitable pH
- B. supplies an energy source
- C. causes the uterus to contract
- D. constricts the urethra during ejaculation

Use the following diagram to answer question 46.



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

- A. tail.
 - B. head.
 - C. acrosome.
 - D. mid-piece.
-

47. When testosterone levels in a man's bloodstream decrease,

- A. the hypothalamus shuts down.
- B. more progesterone is secreted.
- C. luteinizing hormone (LH) secretion is increased.
- D. follicle-stimulating hormone (FSH) secretion is blocked.

48. Which of the following describes the hormonal levels on day **one** of a 28-day uterine cycle?

	ESTROGEN	PROGESTERONE
A.	low	high
B.	high	high
C.	low	low
D.	high	low

49. Most birth-control pills work by preventing egg maturation. These pills contain which of the following hormones?

- A. estrogen
- B. testosterone
- C. luteinizing hormone (LH)
- D. follicle-stimulating hormone (FSH)

50. Menstruation is the discharge of

- A. a follicle.
- B. the uterine lining.
- C. the corpus luteum.
- D. the cells lining the vagina.

**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. Describe the structure of DNA. (You may use a labelled diagram to answer this question.)
(4 marks)

4. In an experiment designed to test the effects of environmental conditions on the ability of enzymes to digest food, the following steps are carried out:

- Four test tubes are labelled A, B, C and D.
- All tubes contain distilled water and a small amount of egg white (protein).
- Individual tubes have additional contents as shown in the table below.
- All tubes are to be incubated at 37°C for one hour.

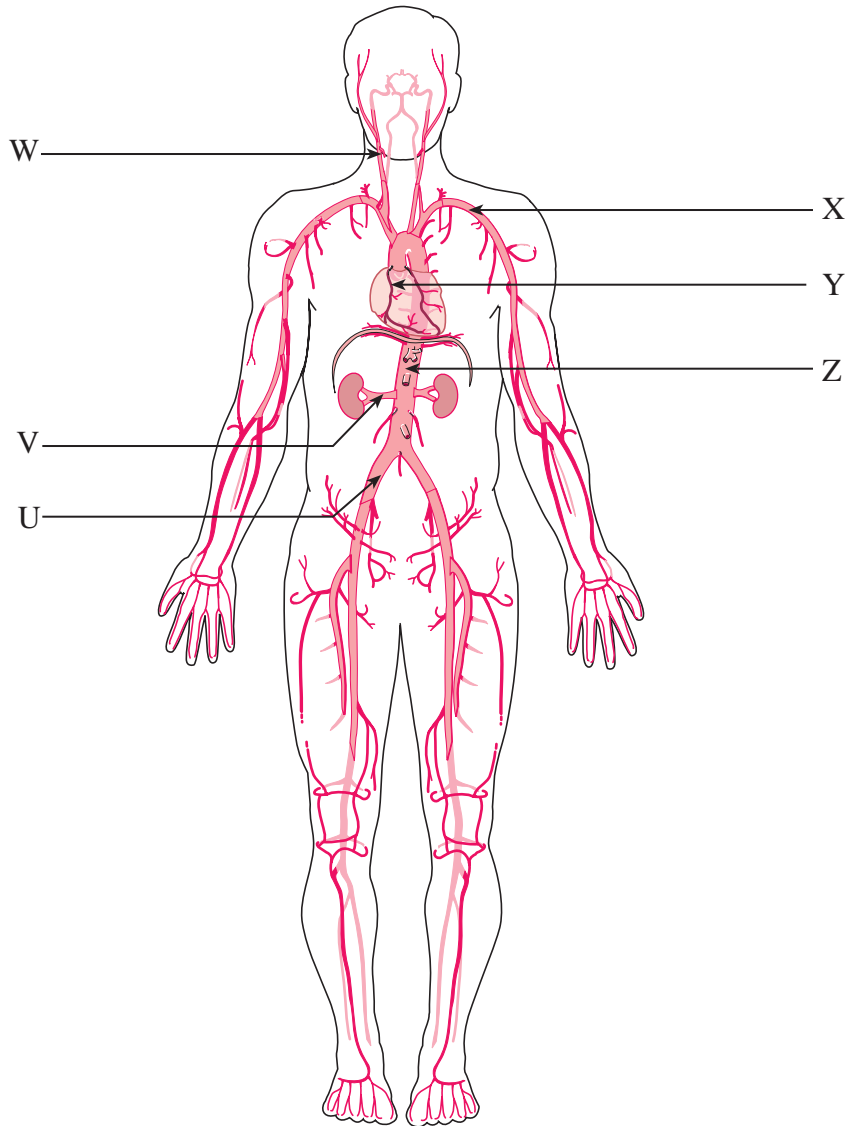
For each tube, explain what will happen and why.

(8 marks: 1 mark each for result; 1 mark each for explanation)

TUBE	INITIAL CONTENTS	ADDITIONAL CONTENTS	RESULT AND EXPLANATION
A	distilled water + egg white	none	
B	distilled water + egg white	pepsin	
C	distilled water + egg white	pepsin + hydrochloric acid (at pH 3)	
D	distilled water + egg white	hydrochloric acid (at pH 3)	

OVER

Use the following diagram to answer question 5a).



5. a) For each blood vessel listed in the table below, write the letter from the diagram which indicates the vessel's location. **(2 marks: $\frac{1}{2}$ mark each)**

BLOOD VESSEL	LETTER FROM DIAGRAM
Iliac artery	
Aorta	
Carotid artery	
Subclavian artery	

- b) In the table below, contrast the structure and/or function of the hepatic vein versus the hepatic portal vein. **(4 marks)**

	HEPATIC VEIN	HEPATIC PORTAL VEIN
CONTRAST 1		
CONTRAST 2		

- c) Name **two** structures present in fetal but **not** in adult circulatory systems and describe the function of each. **(4 marks: 1 mark each for name; 1 mark each for function)**

Name: _____

Function: _____

Name: _____

Function: _____

6. Describe how the upper respiratory tract is specialized to keep the lungs free of debris. **(3 marks)**

8. Give **two** functions of each of the following urinary system structures.

(6 marks)

Kidney:

i) _____

ii) _____

Collecting duct:

i) _____

ii) _____

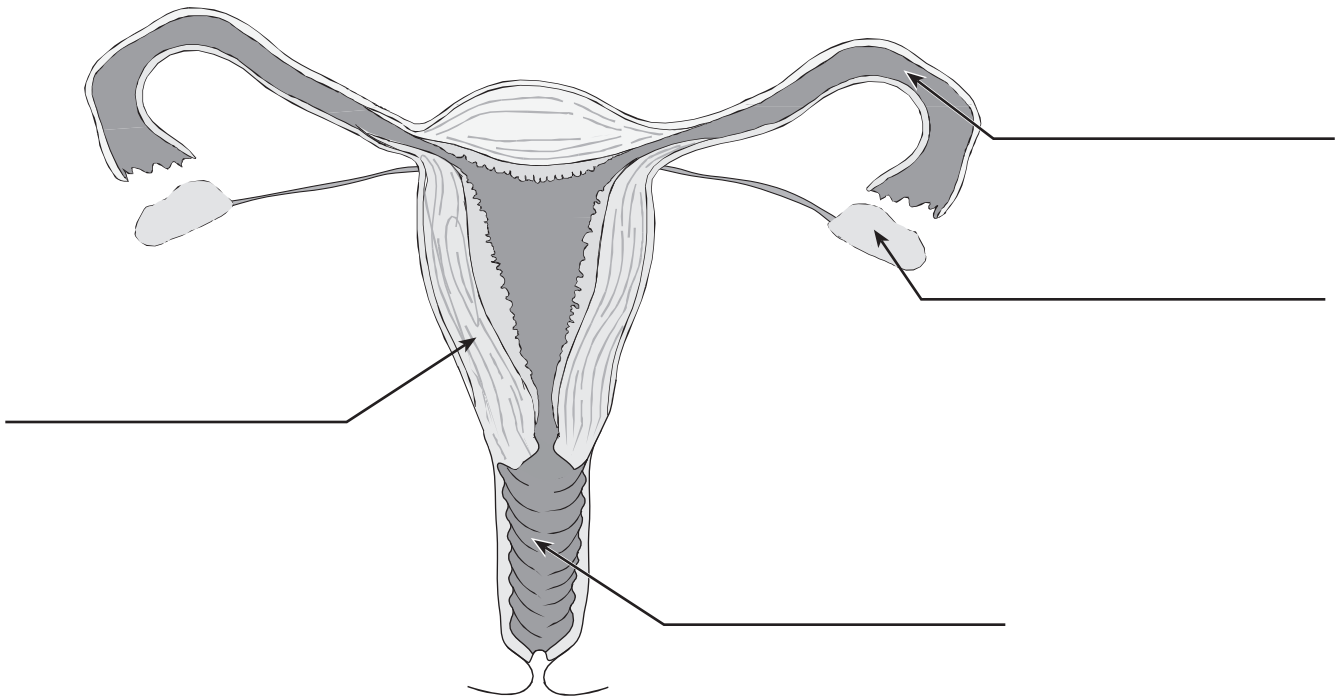
Proximal tubule:

i) _____

ii) _____

9. Label the following diagram in the blanks provided.

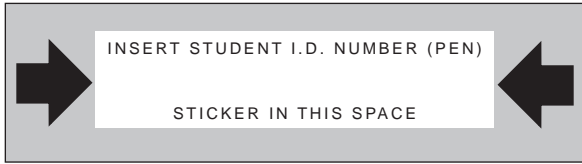
(4 marks)



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Score for
Question 1:

1. $\frac{\quad}{(4)}$

Score for
Question 8:

8. $\frac{\quad}{(6)}$

Score for
Question 2:

2. $\frac{\quad}{(3)}$

Score for
Question 9:

9. $\frac{\quad}{(4)}$

Score for
Question 3:

3. $\frac{\quad}{(4)}$

Score for
Question 4:

4. $\frac{\quad}{(8)}$

Score for
Question 5:

5. $\frac{\quad}{(10)}$

Score for
Question 6:

6. $\frac{\quad}{(3)}$

Score for
Question 7:

7. $\frac{\quad}{(8)}$

