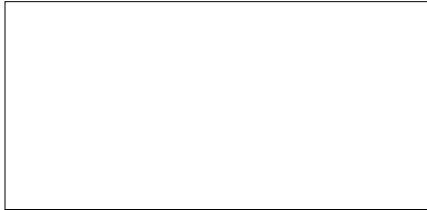


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Biology 12

AUGUST 2005

Course Code = BI



Biology 12

AUGUST 2005

Course Code = BI

**BRITISH
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Student Instructions

1. Place the stickers with your Personal Education Number (PEN) in the allotted spaces above. **Under no circumstance is your name or identification, other than your Personal Education 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. 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

.
5. 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

AUGUST 2005

Course Code = BI

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Question 7 0 1 2 3 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	(.5) NR <input type="checkbox"/> <input type="checkbox"/>



GENERAL INSTRUCTIONS

1. Electronic devices, including dictionaries and pagers, are **not** permitted in the examination room.
2. 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.
3. For each of the written-response questions, write your answer in **ink** unless otherwise instructed in the space provided in this booklet.
4. 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.
5. This examination is designed to be completed in **two hours**. *Students may, however, take up to 30 minutes of additional time to finish.*

BIOLOGY 12 PROVINCIAL EXAMINATION

	Value	Suggested Time
1. This examination consists of two parts:		
PART A: 67 multiple-choice questions	67 marks	80 minutes
PART B: 7 written-response questions	23 marks	40 minutes
Total:	90 marks	120 minutes

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PART A: MULTIPLE CHOICE

Value: 67 marks

Suggested Time: 80 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 on the Response Form that has the letter corresponding to your answer.

1. What organelle has saccules that produce vesicles?
 - A. a Golgi body
 - B. the nucleolus
 - C. a mitochondrion
 - D. the rough endoplasmic reticulum

2. Which of the following breaks down old blood cells?
 - A. a lysosome
 - B. the nucleolus
 - C. a chromosome
 - D. the smooth endoplasmic reticulum

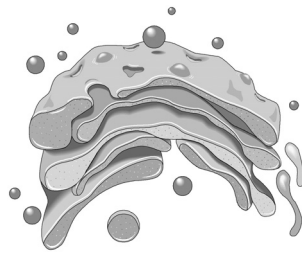
3. Organelle **X** produces proteins. These proteins move through organelle **Y** toward organelle **Z** where they are packaged. What are **X**, **Y** and **Z**?

	Organelle X	Organelle Y	Organelle Z
A.	ribosome	mitochondrion	lysosome
B.	ribosome	rough endoplasmic reticulum	Golgi body
C.	nucleolus	cell membrane	Golgi body
D.	chromosome	nucleus	smooth endoplasmic reticulum

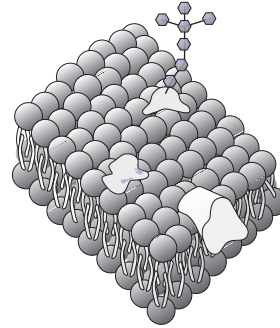
4. What organelle produces steroid hormones?
- A. a lysosome
 - B. a chloroplast
 - C. the nucleolus
 - D. the smooth endoplasmic reticulum

Use the following diagrams to answer question 5.

Structure X



Structure Y



5. Which of the following is produced by structure X and becomes a part of structure Y?
- A. ATP
 - B. vesicles
 - C. cellulose
 - D. lysosomes
-

6. What type of molecule is adenosine triphosphate (ATP)?
- A. a fat
 - B. a steroid
 - C. a protein
 - D. a nucleotide

Use the following list to answer question 7.

- | |
|--|
| <p>Molecules</p> <ul style="list-style-type: none">• water• glucose• phospholipid |
|--|

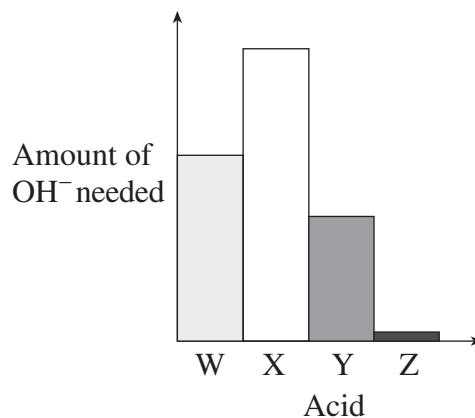
~~7. How many of the molecules above are polar?~~

- ~~A. 0~~
 - ~~B. 1~~
 - ~~C. 2~~
 - ~~D. 3~~
-

8. Which molecular property allows water to act as a solvent?

- A. the lack of ionic bonds within the molecule
- B. the ability to donate electrons between its atoms
- C. the unequal sharing of electrons between its atoms
- D. the presence of covalent bonds within the molecule

9. Equal quantities of four different acids were placed in separate test tubes. OH^- was added until the pH in each test tube was 3.0. The graph shows the amount of OH^- added to each test tube.



Which of the four acids had the highest initial pH?

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

10. Which of the following molecules is a monomer of lipids?

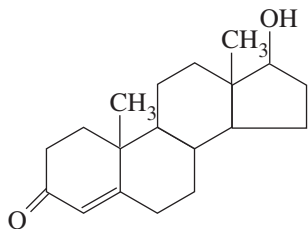
- A. glycerol
- B. glycogen
- C. amino acid
- D. cholesterol

11. Which of the following is a formula for a carbohydrate?

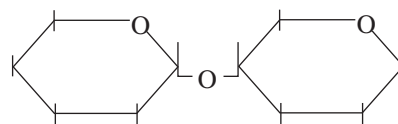
- A. $C_2H_6O_2$
- B. $C_3H_3O_6$
- C. $C_3H_8O_3$
- D. $C_5H_{10}O_5$

12. Which of the following molecules functions as a hormone?

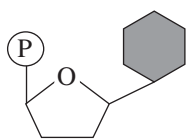
A.



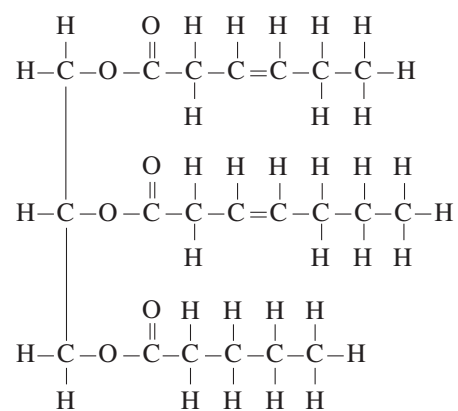
B.



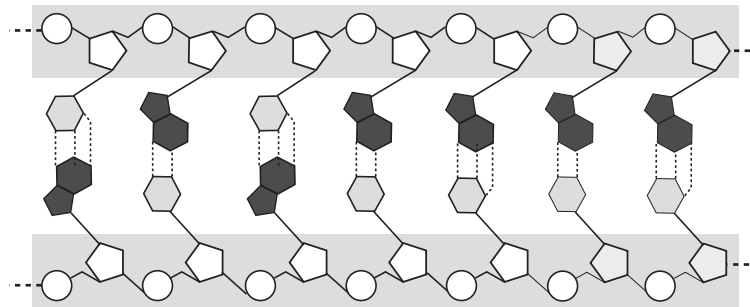
C.



D.



Use the following diagram to answer question 13.



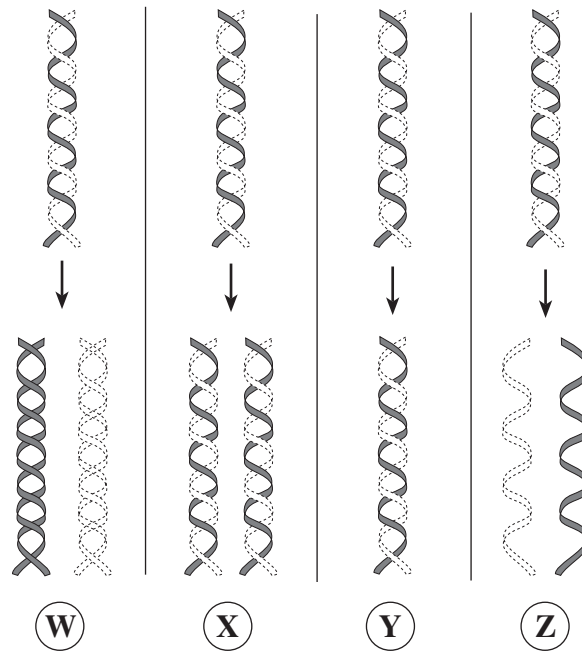
13. Which of the following is **not** found in this molecule?

- A. uracil
 - B. nitrogen
 - C. phosphate
 - D. deoxyribose
-

14. Which of the following is the second step of replication?

- A. the formation of two new DNA molecules
- B. complementary base pairing of nitrogenous bases
- C. the breaking of hydrogen bonds between nitrogenous bases
- D. the joining of bonds between the sugar and phosphate backbone

Use the following diagram to answer questions 15 and 16.



15. Which of the above illustrates the result of replication?

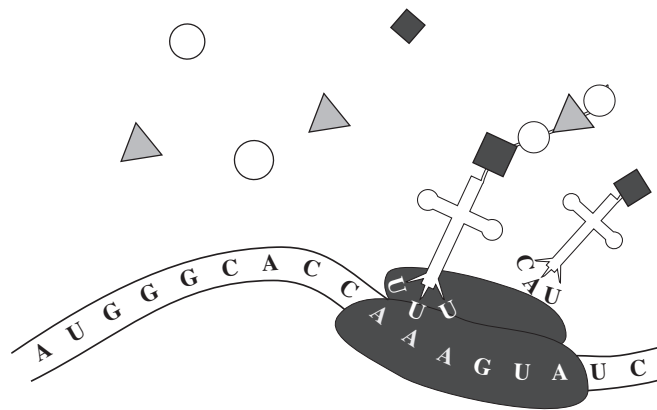
- A. W
- B. X
- C. Y
- D. Z

16. Where does this process take place?

- A. the nucleus
- B. the ribosome
- C. the nucleolus
- D. the Golgi body

17. Which of the following is a step in transcription?
- A. Ribosomes move along mRNA.
 - B. Amino acids are joined by peptide bonds.
 - C. Adenine in DNA bonds to thymine in mRNA.
 - D. Hydrogen bonds are broken to expose a section of the DNA helix.

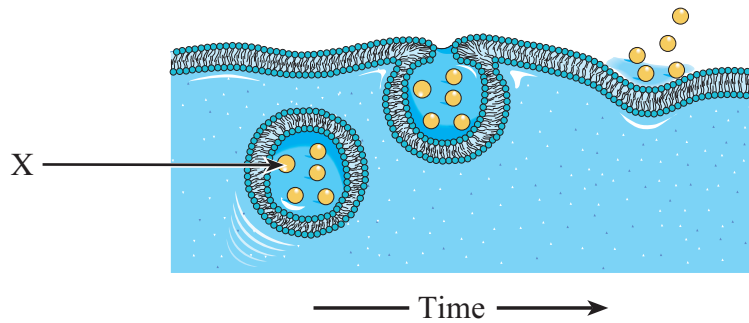
Use the following diagram to answer questions 18 and 19.



18. The process shown includes which of the following steps?
- A. denaturing of tRNA
 - B. codon-anticodon base pairing
 - C. joining of adjacent nucleotides
 - D. formation of hydrogen bonds between amino acids
19. Where in the cell does this process take place?
- A. the nucleus
 - B. the nucleolus
 - C. the Golgi bodies
 - D. the rough endoplasmic reticulum
-
20. Ultraviolet light, which can alter DNA, is an example of which of the following?
- A. a mutagen
 - B. polymerase
 - C. an anticodon
 - D. recombinant DNA

21. Which property of a neutral fat allows it to diffuse through the cell membrane?
- A. the size of the molecule
 - B. the non-polar characteristic of the molecule
 - C. the presence of glycoproteins in the cell membrane
 - D. the presence of protein carriers in the cell membrane

Use the following diagram to answer question 22.



22. Molecule **X** could be which of the following?

- A. water
 - B. glucose
 - C. acetylcholine
 - D. potassium ions
-

23. Cholesterol molecules are synthesized in liver cells and packaged as LDLs (low-density lipoproteins). The LDLs are released into the blood. Which of the following is the process by which LDLs re-enter body cells from the blood?

- A. osmosis
- B. exocytosis
- C. endocytosis
- D. facilitated diffusion

Use the following experiment to answer questions 24 and 25.

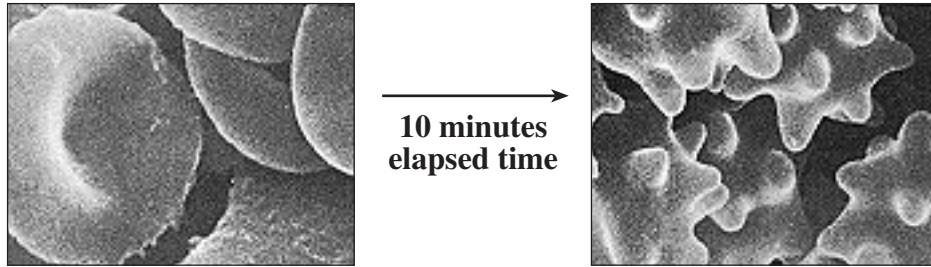
Experiment

A student designs an experiment to determine the effect of sucrose concentration on the mass of potato cells. The following procedure is carried out:

- 6 equal-sized cubes are cut from the same potato.
- The initial mass of each of the cubes is measured.
- 6 test tubes are filled with different solutions (distilled water, 1%, 2%, 3%, 4% and 5% sucrose solutions)
- A single cube of potato is added to each test tube.
- After one hour the cubes are removed, blotted dry with a paper towel, and the mass of each cube is recorded.

24. One of the solutions was found to be isotonic to the cytoplasm of the potato cells. Why was there no change in the mass of the potato cube in this isotonic solution?
- A. There is an equal movement of water into and out of the cells.
 - B. The water and sucrose do not move across the cell membrane.
 - C. There is an equal movement of sucrose into and out of the cells.
 - D. There is an equal movement of water and sucrose into and out of the cells.
25. What is the dependent variable in the experiment?
- A. the size of the potato cubes
 - B. the mass of the potato cubes
 - C. the concentration of the solution
 - D. the time the cubes remain in the test tubes

Use the following diagram to answer question 26.



26. Red blood cells are added to a salt solution in a beaker. Which of the following explains the changes that occurred to the red blood cells after 10 minutes?

- A. The red blood cells were placed in an isotonic solution.
 - B. The red blood cells were placed in a hypotonic solution.
 - C. The red blood cells were placed in a hypertonic solution.
 - D. The red blood cells were hypertonic to the solution in the beaker.
-

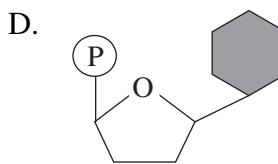
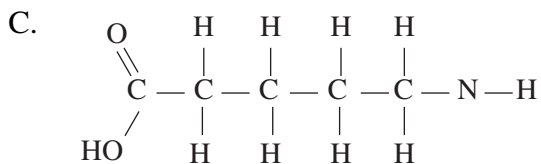
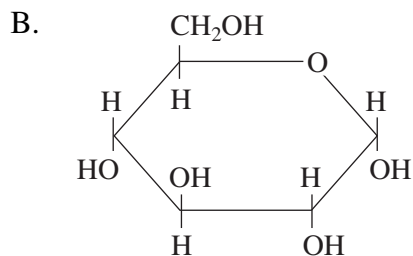
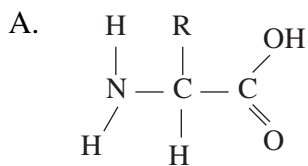
27. Which of the following increases the rate of diffusion in cells?

- A. increased surface area to volume ratio
- B. decreased folding of the cell membrane
- C. a decrease in the concentration gradient
- D. an increase in temperature from 40°C to 90°C

28. Which of the following attaches to a protein to catalyze a metabolic reaction?

- A. an enzyme
- B. a coenzyme
- C. a heavy metal
- D. a competitive inhibitor

29. A chemical reaction occurs slowly at 37°C. When molecule **X** is added, the reaction speeds up. Which of the following is a monomer of molecule **X**?



30. Which of the following decreases the rate of an enzyme-catalyzed reaction in the body?

- A. adding more enzyme
- B. adding more substrate
- C. maintaining optimum pH
- D. changing the temperature from 37°C to 10°C

31. Which pair of structures produces amylase?

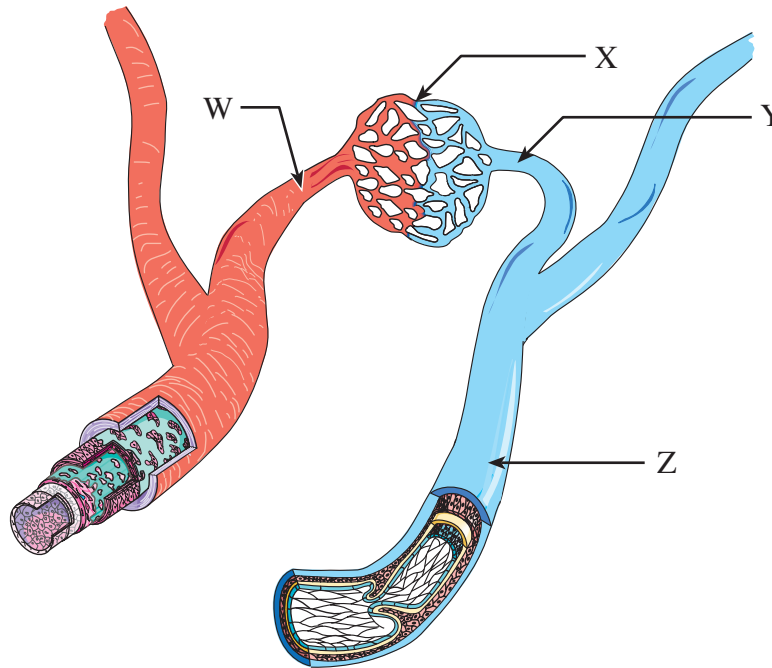
- A. the liver and the duodenum
- B. the liver and the salivary glands
- C. the pancreas and the small intestine
- D. the salivary glands and the pancreas

32. Which pair of structures produces enzymes that digest protein?

- A. the colon and the pancreas
- B. the stomach and the pancreas
- C. the small intestine and the liver
- D. the stomach and the large intestine

33. Which of the following may be found in a person's stomach after they have eaten a meal?
- A. water, salts, maltase and bile
 - B. starch, glycerol, amylase and trypsin
 - C. protein, pepsin, hydrochloric acid and maltose
 - D. hydrochloric acid, peptides, bicarbonate ions and nuclease
34. Which of the following results from decreased secretions from the gall bladder?
- A. increased gastric secretions
 - B. increased peristalsis in the digestive tract
 - C. decreased absorption of water in the small intestine
 - D. decreased production of glycerol in the small intestine
35. What substances are absorbed by the lacteals?
- A. fats
 - B. peptides
 - C. nucleotides
 - D. carbohydrates
36. How are veins and lymph vessels similar?
- A. both contain valves
 - B. both return blood to the heart
 - C. both have large amounts of elastic tissue
 - D. both carry blood with a low oxygen concentration
37. Where is blood velocity the slowest?
- A. in a vein
 - B. in a venule
 - C. in an artery
 - D. in a capillary

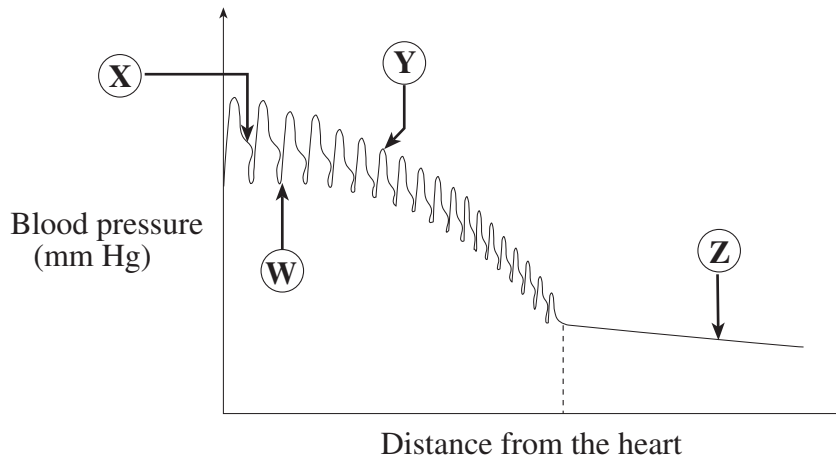
Use the following diagram to answer questions 38, 39 and 40.



38. Which blood vessel can constrict to cause an increase in blood pressure?
- A. W
 - B. X
 - C. Y
 - D. Z
39. Which vessel is a venule?
- A. W
 - B. X
 - C. Y
 - D. Z
40. Which vessel contains blood with the highest concentration of bicarbonate ions and has the lowest pressure?
- A. W
 - B. X
 - C. Y
 - D. Z

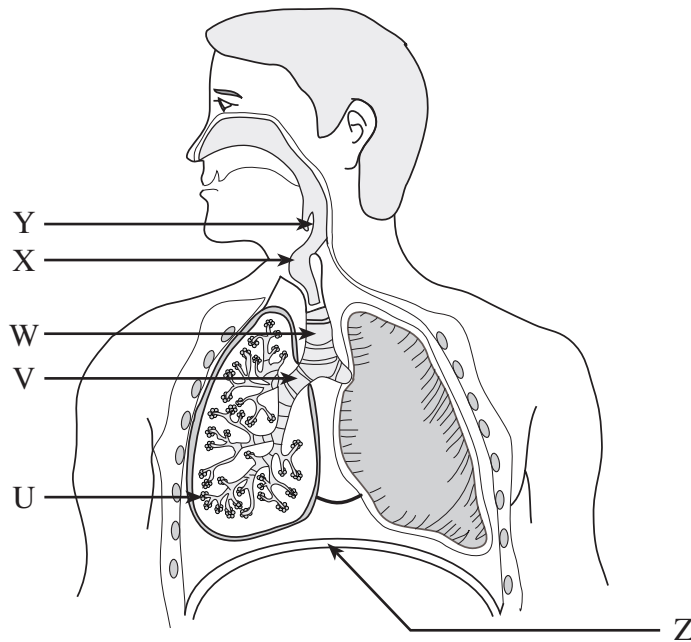
41. Where does lymph enter the circulatory system?
- at the hepatic vein
 - at the jugular veins
 - at the coronary veins
 - at the subclavian veins
42. Blood enters the iliac artery from which of the following vessels?
- the aorta
 - the renal artery
 - the carotid artery
 - the coronary artery

Use the following graph to answer questions 43 and 44.



43. Which letter indicates the point at which the ventricles are in systole?
- W
 - X
 - Y
 - Z
44. Which of the following occurs at W?
- The semilunar valves are open.
 - The ventricles are filling with blood.
 - The atrioventricular valves are closed.
 - The Purkinje fibres stimulate the atria to contract.

Use the following diagram to answer questions 45, 46 and 47.



45. In which area do voice sounds originate?

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

46. What is the structure labelled W?

- A. the larynx
- B. the alveoli
- C. the trachea
- D. the bronchi

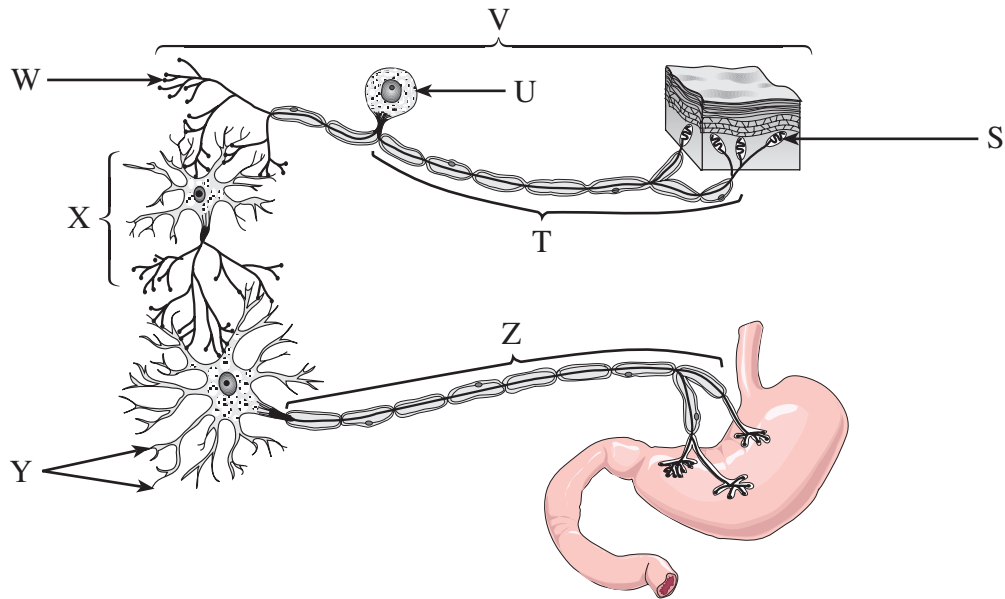
47. What structure prevents food from entering the respiratory system?

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

48. ~~What occurs as the pH of the blood in muscle capillaries decreases?~~

- ~~A. Concentration of oxyhemoglobin increases.~~
- ~~B. Activity in the medulla oblongata decreases.~~
- ~~C. Concentration of reduced hemoglobin decreases.~~
- ~~D. Concentration of oxygen in the blood plasma increases.~~

Use the following diagram to answer questions 49, 50 and 51.



49. Which letter indicates the interneuron?

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

50. Which letter indicates the dendrite of the structure which carries impulses from a pain receptor?

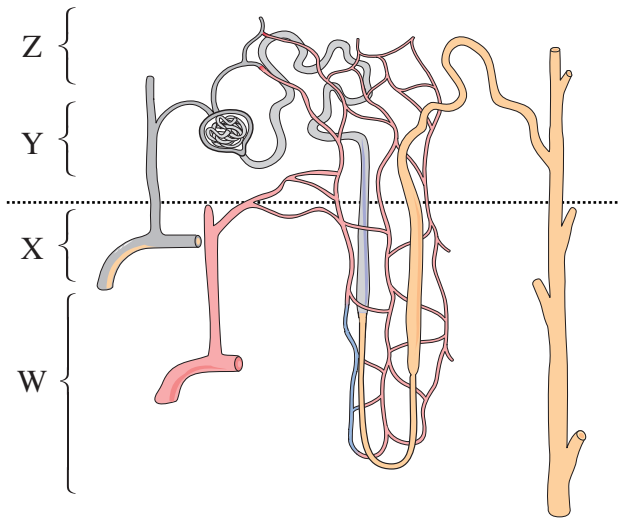
- A. S
- B. T
- C. U
- D. W

51. Which structure carries impulses away from the central nervous system?

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

52. What part of the brain controls the release of hormones from the pituitary gland?
- A. the thalamus
 - B. the cerebrum
 - C. the hypothalamus
 - D. the corpus callosum
53. Which of the following would require the greatest activity in the cerebellum?
- A. recalling a memory
 - B. smelling freshly baked bread
 - C. adding numbers in your head
 - D. performing a gymnastics routine
54. What part of the brain receives sensory information and sends it to the appropriate areas of the cerebrum?
- A. the thalamus
 - B. the cerebellum
 - C. the hypothalamus
 - D. the corpus callosum
55. To what part of the kidney is the ureter attached?
- A. the nephron
 - B. the renal pelvis
 - C. the renal cortex
 - D. the renal medulla

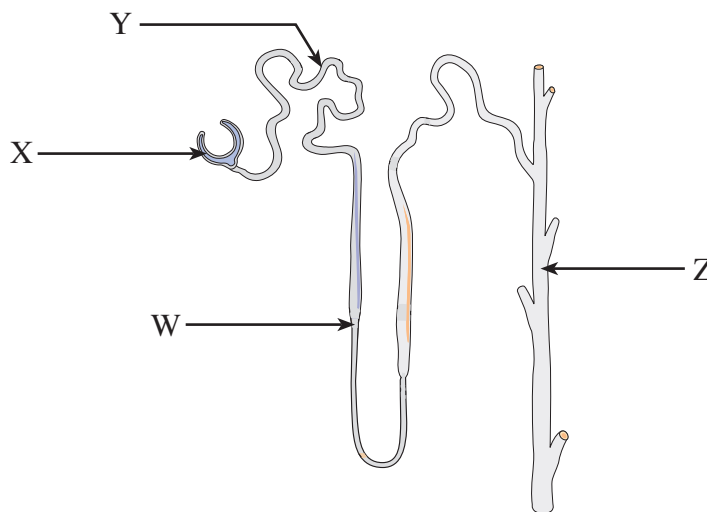
Use the following diagram to answer question 56.



56. What area of the kidney has the highest concentration of sodium ions and urea?

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

Use the following diagram to answer question 57.



57. How many of the labelled structures allow water reabsorption?

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

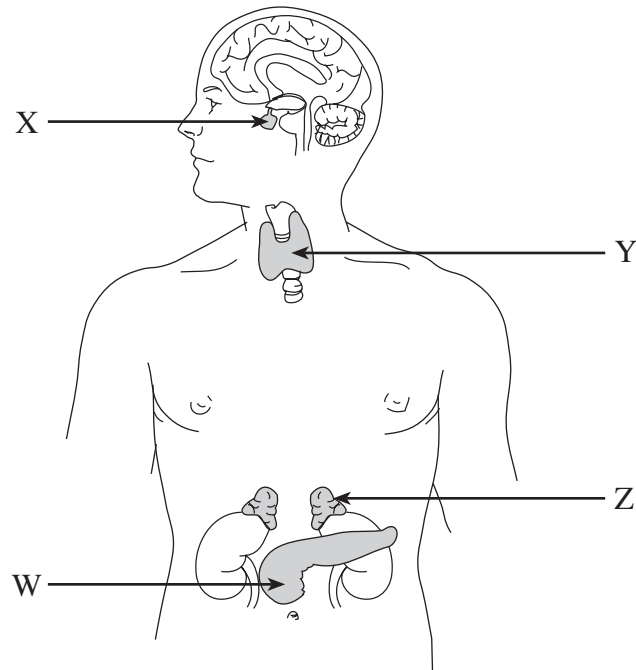
58. In what part of the nephron does glucose move from the filtrate to the surrounding blood vessels?
- A. the loop of Henle
 - B. the Bowman's capsule
 - C. the distal convoluted tubule
 - D. the proximal convoluted tubule

Use the following list to answer question 59.

- | | |
|---|---|
| <ul style="list-style-type: none">• ions• water• lipids | <ul style="list-style-type: none">• protein• blood cells• amino acids |
|---|---|

59. How many of the above items pass from the bloodstream into Bowman's capsule?
- A. 2
 - B. 3
 - C. 4
 - D. 5

Use the following diagram to answer question 60.



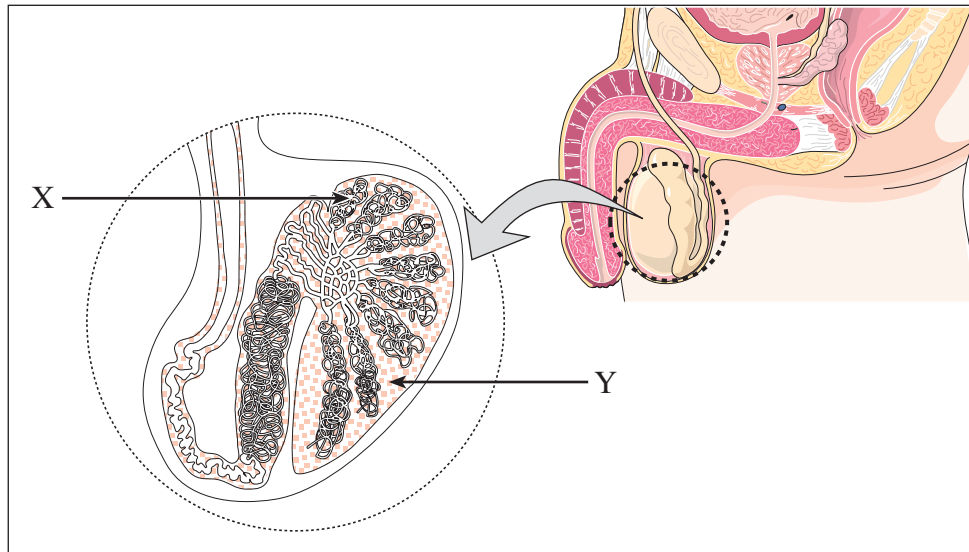
60. Which gland releases a hormone that causes the reabsorption of sodium ions?

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

61. Where do sperm become motile?

- A. the epididymis
- B. the vas deferens
- C. the prostate gland
- D. the seminal vesicles

Use the following diagram to answer questions 62 and 63.



62. Which of the following is a function of the substance produced at **Y**?

- A. to fertilize the egg
- B. to neutralize the acidity of the vagina
- C. to provide nourishment for the sperm
- D. to increase muscular development at puberty

63. Where do the cells stored in **X** move to next?

- A. the urethra
 - B. the epididymis
 - C. the vas deferens
 - D. the seminal vesicles
-

64. Which of the following is a function of seminal fluid?

- A. to provide nutrition for the egg
- B. to cause contraction of the uterus
- C. to act as an acid to buffer the vagina
- D. to develop secondary sexual characteristics

65. Which of the following hormones acts on the testes?
- A. ADH
 - B. GnRH
 - C. luteinizing hormone
 - D. human chorionic gonadotropin
66. Which of the following is a consequence of increased secretions of progesterone?
- A. the release of the ova
 - B. the maturation of the follicle
 - C. a decrease in luteinizing hormone
 - D. an increase in follicle-stimulating hormone
67. Which of the following occurs during days 15–28 of the ovarian cycle?
- A. The follicle undergoes maturation.
 - B. A luteinizing hormone surge occurs.
 - C. Progesterone is secreted by the corpus luteum.
 - D. Secretion of follicle-stimulating hormone begins.

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

PART B: WRITTEN RESPONSE

Value: 23 marks

Suggested Time: 40 minutes

- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination unless otherwise instructed.
 2. Write your answers in the space below the questions.
 3. You may not need all of the space provided to answer each question.

1. A person is diagnosed with hypothyroidism, a condition in which an insufficient amount of thyroxin is present in the bloodstream. Explain how the breathing rate is affected by the decreased secretion of thyroxin. **(2 marks)**

4. Explain **three** ways in which the alveoli are well suited to their function. **(3 marks)**

5. Describe the upswing and downswing of an action potential with respect to membrane polarity and movement of ions. **(4 marks: 2 marks each)**

upswing:

downswing:

6. Explain how the conditions in the renal medulla result in the production of urine which is hypertonic to blood. **(3 marks)**

7. Describe the events which initiate and control the secretion of oxytocin. **(3 marks)**

END OF EXAMINATION

