INSERT STUDENT I.D. NUMBER (PEN)

STICKER IN THIS SPACE

JUNE 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: 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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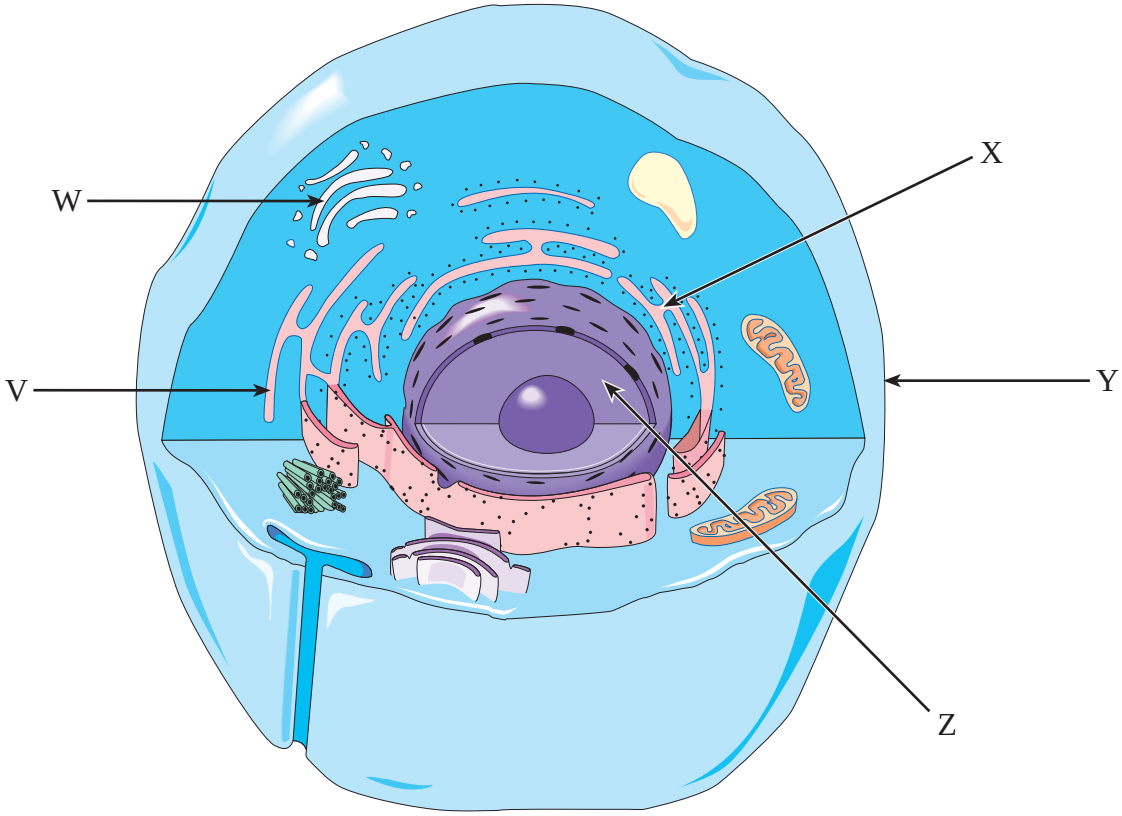
PART A: MULTIPLE CHOICE

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.

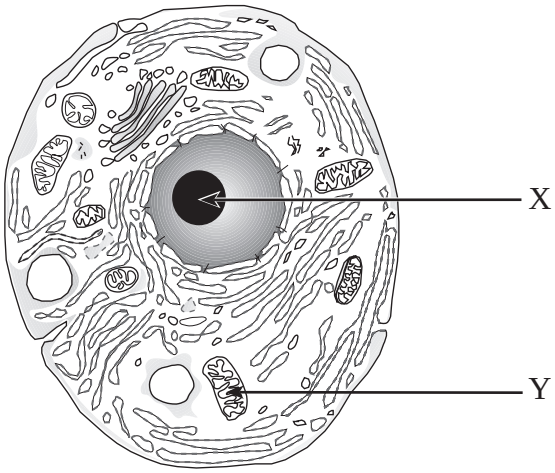


1. The cell produces, stores, packages and exports a steroid hormone. What is the correct order of structures involved in this process?

   A. Z, X, W
   B. V, W, X
   C. X, W, Y
   D. V, W, Y

OVER

Use the following diagram to answer questions 2 and 3.



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

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

3. The process that occurs in the structure labelled **Y** is

   A. cell division.
   B. active transport.
   C. protein synthesis.
   D. cellular respiration.

---

4. Which of the following is necessary for hydrogen bonding?

   A. Peptide bonds.
   B. Hydrogen ions.
   C. Polar molecules.
   D. Equal sharing of electrons.

5. The maintenance of a constant pH of the blood is achieved by

   A. acids.
   B. bases.
   C. water.
   D. buffers.

6. The bonding of unit molecules to produce a polysaccharide is called

   A. hydrolysis.
   B. translation.
   C. cellular respiration.
   D. dehydration synthesis.

7. Recombinant DNA is defined as DNA produced from

   A. RNA and a protein.
   B. DNA and hemoglobin.
   C. viral DNA and glucose.
   D. DNA of two different organisms.

Use the following table to answer question 8.

Three-letter codons of messenger RNA, and the amino acids specified by the codons

AAU, AAC — Asparagine	CAU, CAC — Histidine	GAU, GAC — Asparatic acid	UAU, UAC — Tyrosine
AAA, AAG — Lysine	CAA, CAG — Glutamine	GAA, GAG — Glutamic acid	UAA, UAG — Stop
ACU, ACC, ACA, ACG — Threonine	CCU, CCC, CCA, CCG — Proline	GCU, GCC, GCA, GCG — Alanine	UCU, UCC, UCA, UCG — Serine
AGU, AGC — Serine AGA, AGG — Arginine	CGU, CGC, CGA, CGG — Arginine	GGU, GGC, GGA, GGG — Glycine	UGU, UGC — Cysteine UGA — Stop UGG — Tryptophan
AUU, AUC, AUA — Isoleucine AUG — Methionine	CUU, CUC, CUA, CUG — Leucine	GUU, GUC, GUA, GUG — Valine	UUU, UUC — Phenylalanine UUA, UUG — Leucine

8. Determine the sequence of amino acids produced by this DNA sequence: G G A G T T T T C

   A. Proline, Valine, Lysine.
   B. Glycine, Valine, Leucine.
   C. Proline, Glutamine, Lysine.
   D. Glycine, Glutamic acid, Leucine.

OVER

9. Movement of cancer cells to a new site where a secondary tumour begins is called

   A. anaplasia.
   B. metastasis.
   C. promotion.
   D. vascularization.

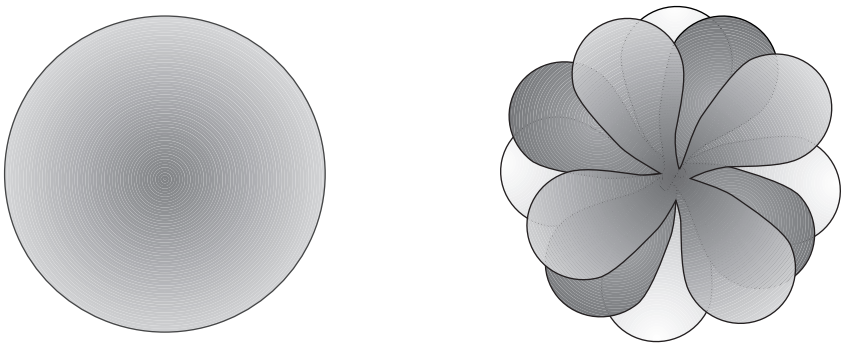
10. Which of the following is a characteristic of cancer cells?

   A. Differentiated.
   B. Contact inhibition.
   C. Poor blood supply.
   D. Disorganized growth.

11. One difference between proto-oncogenes and oncogenes is that oncogenes have the potential to

   A. infect viruses.
   B. inhibit cancer cells.
   C. produce more hormones.
   D. induce cancerous transformations.

Use the following diagram to answer question 12.

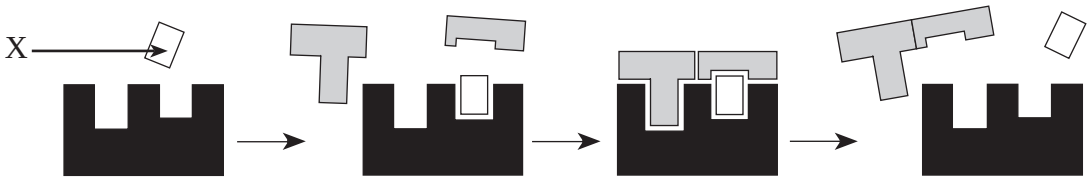


Cell X Cell Y

12. Simple diffusion of molecules would occur most rapidly in which of the cells above?

   A. Cell X, because it has a smaller volume.
   B. Cell X, because it synthesizes proteins at a faster rate.
   C. Cell Y, because it can move around more quickly.
   D. Cell Y, because it has a larger surface area.

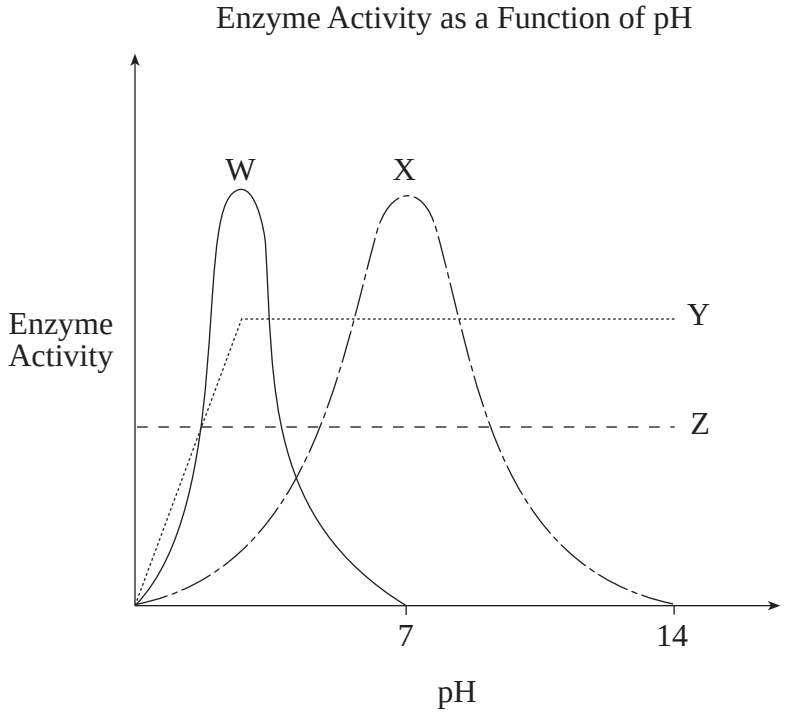
Use the following diagram to answer question 13.



13. The structure labelled **X** in the reaction above is

    A. a vitamin.
    B. the substrate.
    C. the active site.
    D. a competitive inhibitor.

Use the following graph to answer question 14.



14. Which line on the graph above represents the data from an experiment exploring the effect of pH on the activity of pepsin?

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

OVER

15. Peristalsis in the esophagus

A. moves food to the stomach.
B. opens the pyloric sphincter.
C. activates the salivary glands.
D. causes the secretion of pepsinogen.

16. Sodium bicarbonate ($NaHCO_3$) in pancreatic juice

A. emulsifies fats.
B. activates pepsin.
C. neutralizes acid chyme.
D. stimulates the release of insulin.

17. The liver plays vital roles in all of the following systems **except** the

A. nervous system.
B. digestive system.
C. excretory system.
D. circulatory system.

18. Vitamins and amino acids are produced in the large intestine by

A. feces.
B. bacteria.
C. the cells of the villi.
D. the reabsorption of water.

19. Blood vessels that allow diffusion of gases through their thin walls are the

A. arteries.
B. venules.
C. arterioles.
D. capillaries.

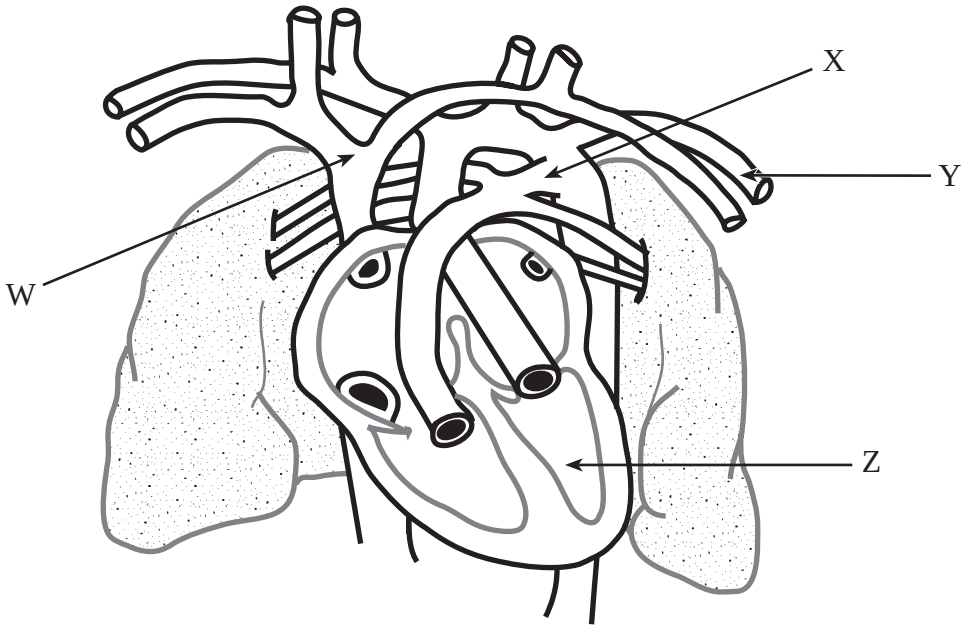
20. The blood vessel that carries blood from the lungs to the heart is the

A. coronary vein.
B. coronary artery.
C. pulmonary vein.
D. pulmonary artery.

21. Lymph enters the circulatory system at the

A. jugular vein.
B. umbilical vein.
C. subclavian vein.
D. pulmonary vein.

Use the following diagram to answer question 22.



22. Which arrow indicates a structure present in fetal, but not adult circulation?

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

---

23. All of the following are components of plasma **except**

A. salts.
B. water.
C. proteins.
D. platelets.

OVER

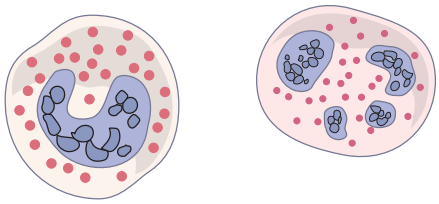
Use the following table to answer question 24.

VESSEL	RED BLOOD CELLS	VALVES
W	absent	absent
X	present	present
Y	absent	present
Z	present	absent

24. Which of the vessels above is a lymph vein?

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

Use the following diagram to answer question 25.



25. The blood cells shown in the diagram above function to

A. clot the blood.
B. fight infection.
C. buffer the blood.
D. transport oxygen.

26. A foreign substance that stimulates an immune response is a(n)

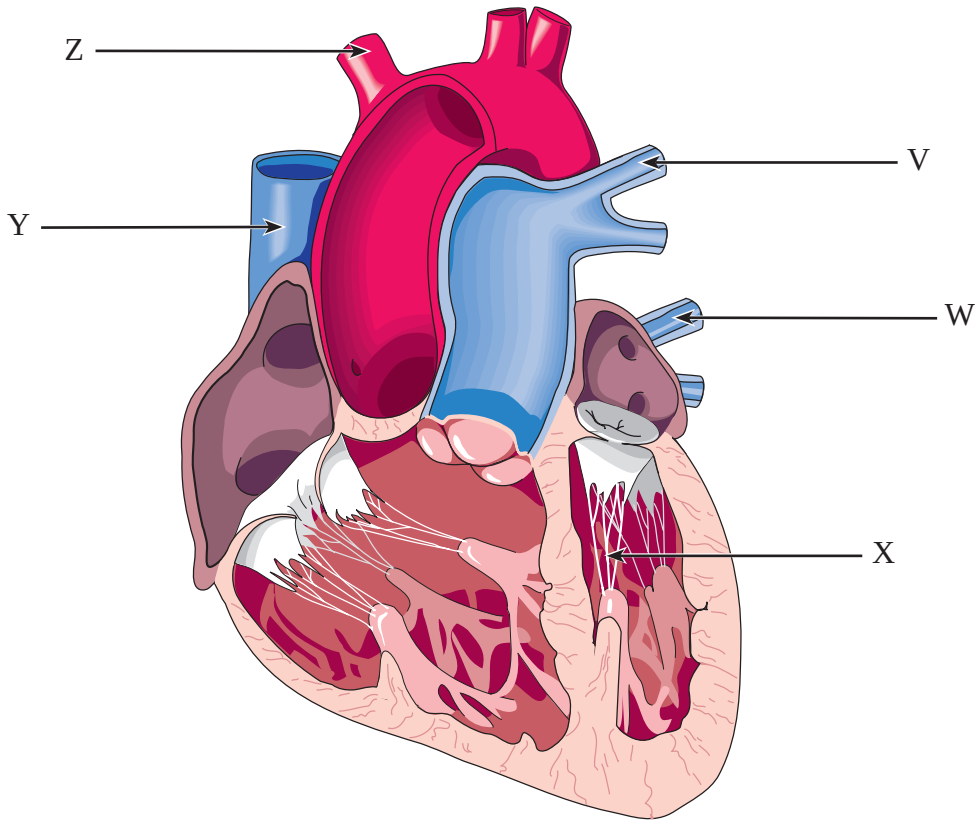
A. cancer.
B. antigen.
C. antibody.
D. promoter.

27. ~~When comparing the arteriole end of the capillary bed with the venule end, at the arteriole end more fluid~~ QUESTION DELETED

A. ~~enters the capillary due to blood pressure.~~
B. ~~leaves the capillary due to blood pressure.~~
C. ~~enters the capillary due to osmotic pressure.~~
D. ~~leaves the capillary due to osmotic pressure.~~

OVER

Use the following diagram to answer questions 28 and 29.



28. The function of the structure labelled **X** is to

    A. initiate heartbeat.
    B. channel blood to the ventricles.
    C. carry blood to the heart muscle.
    D. prevent the valves from inverting.

29. The anterior (superior) vena cava is labelled

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

30. The atrioventricular (AV) node stimulates the

A. aorta.
B. Purkinje fibers.
C. sinoatrial (SA) node.
D. atrioventricular valves.

31. Which of the following is normal resting systolic blood pressure for an adult?

A. 50 mm Hg
B. 80 mm Hg
C. 120 mm Hg
D. 180 mm Hg

32. The product of the reaction between Hb and O_2 is

A. bicarbonate.
B. hemoglobin.
C. oxyhemoglobin.
D. carbaminohemoglobin.

33. Carbaminohemoglobin is formed in the

A. large intestine by *E. Coli.*
B. alveolus when excess oxygen is present.
C. capillary for the transport of carbon dioxide.
D. nephron from the breakdown of amino acids.

OVER

Use the following table to answer question 34.

NEURON	TYPE OF NEURON	AMOUNT OF NEUROTRANSMITTER RELEASED
V	Inhibitory	100 units
W	Inhibitory	50 units
X	Excitatory	100 units
Y	Excitatory	75 units
Z	Excitatory	25 units

34. In order for a nerve impulse to be transmitted across the synapse, the amount of excitatory neurotransmitter must exceed that of inhibitory neurotransmitter by an amount called the "threshold." Which of the following combinations will result in the firing of a neuron whose threshold is 120 units?

    A. Y and Z
    B. V and W
    C. V, X and Y
    D. W, X and Y

---

35. A pesticide that destroys an enzyme found in the synaptic cleft may cause

    A. denaturation of the presynaptic contractile proteins.
    B. an increased rate of diffusion across the synaptic cleft.
    C. continued depolarization of the postsynaptic membrane.
    D. alteration of the receptors on the presynaptic membrane.

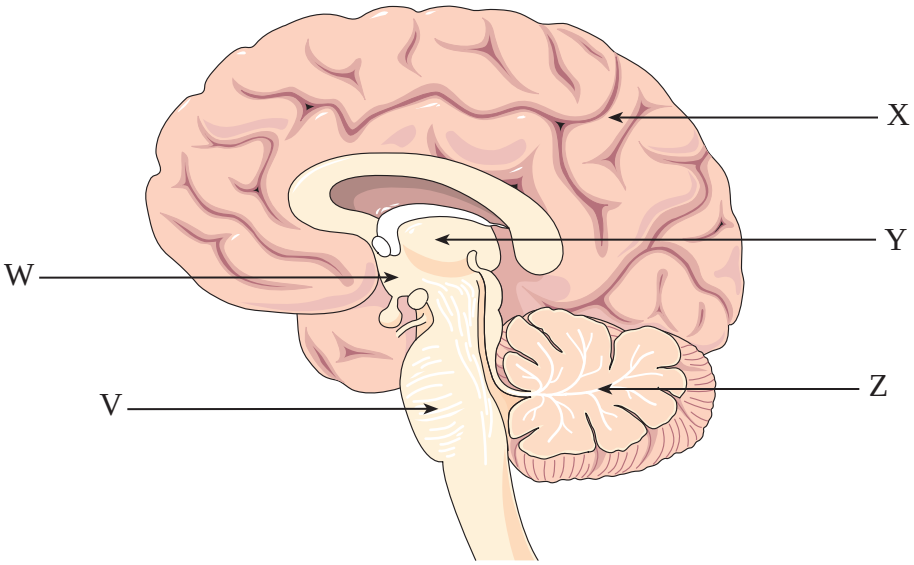
36. Which of the components of the nervous system has both autonomic and somatic divisions?

    A. Central.
    B. Peripheral.
    C. Sympathetic.
    D. Parasympathetic.

37. Which of the following is involved in the initiation of a “fight or flight” response?

A. Thyroid gland.
B. Prostate gland.
C. Adrenal cortex.
D. Adrenal medulla.

Use the following diagram to answer questions 38 and 39.



38. The function of the structure labelled **Y** is to

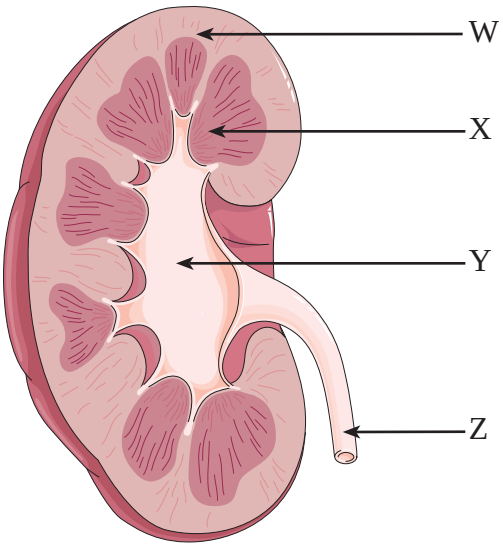
A. coordinate balance.
B. initiate a reflex arc.
C. regulate breathing rate.
D. sort incoming sensory impulses.

39. Which letter indicates the structure that integrates control of the endocrine glands by the nervous system?

A. V
B. W
C. X
D. Z

OVER

Use the following diagram to answer questions 40 and 41.



40. Which structure is the renal cortex?

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

41. The function of the structure labelled **Y** is to

A. collect urine.
B. protect the kidney.
C. adjust the pH of the blood.
D. supply blood to the kidney.

42. The tube that carries urine out of the bladder is the

A. ureter.
B. urethra.
C. distal tubule.
D. collecting duct.

43. As filtrate moves through the nephron it becomes increasingly hypertonic because of the

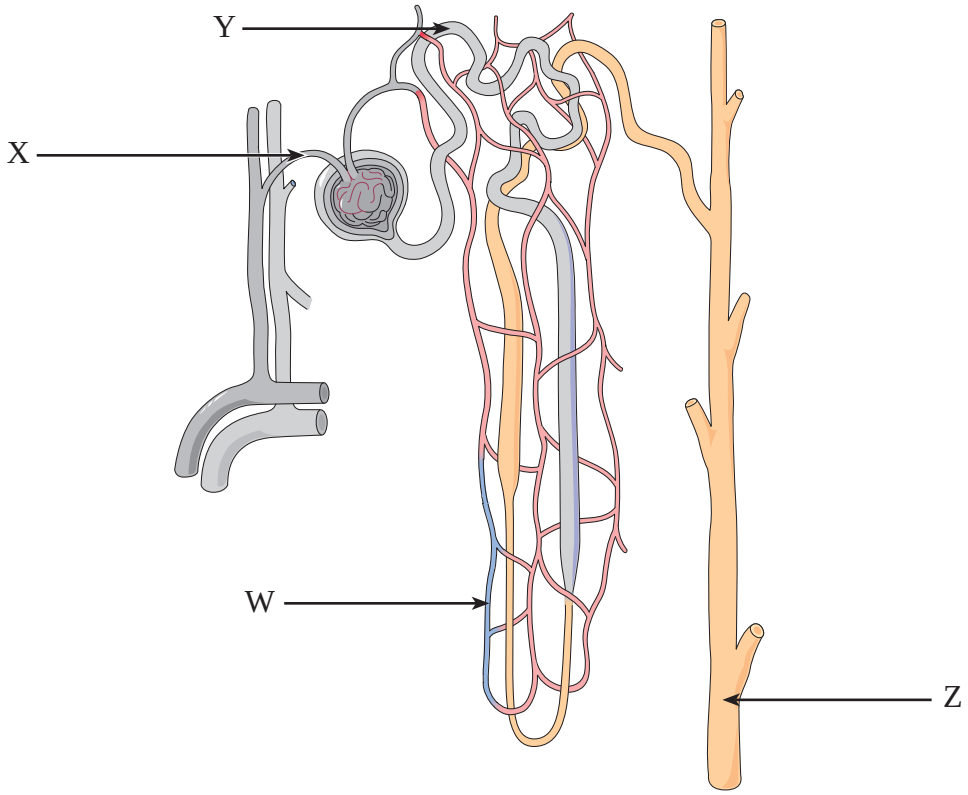
A. diffusion of glucose.
B. pressure filtration of the blood.
C. active transport of sodium ions.
D. reabsorption of bicarbonate ions.

44. Which of the following is **not** a characteristic of the glomerulus?

A. It is composed of capillaries.
B. It surrounds the Bowman's capsule.
C. Its blood pressure promotes filtration.
D. It is connected to arterioles at both ends.

OVER

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



45. A function of the structure labelled **X** is to

A. collect urine.
B. excrete sodium.
C. reabsorb glucose.
D. bring urea to the nephron.

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

A. glomerulus.
B. loop of Henle.
C. proximal tubule.
D. peritubular capillary network.

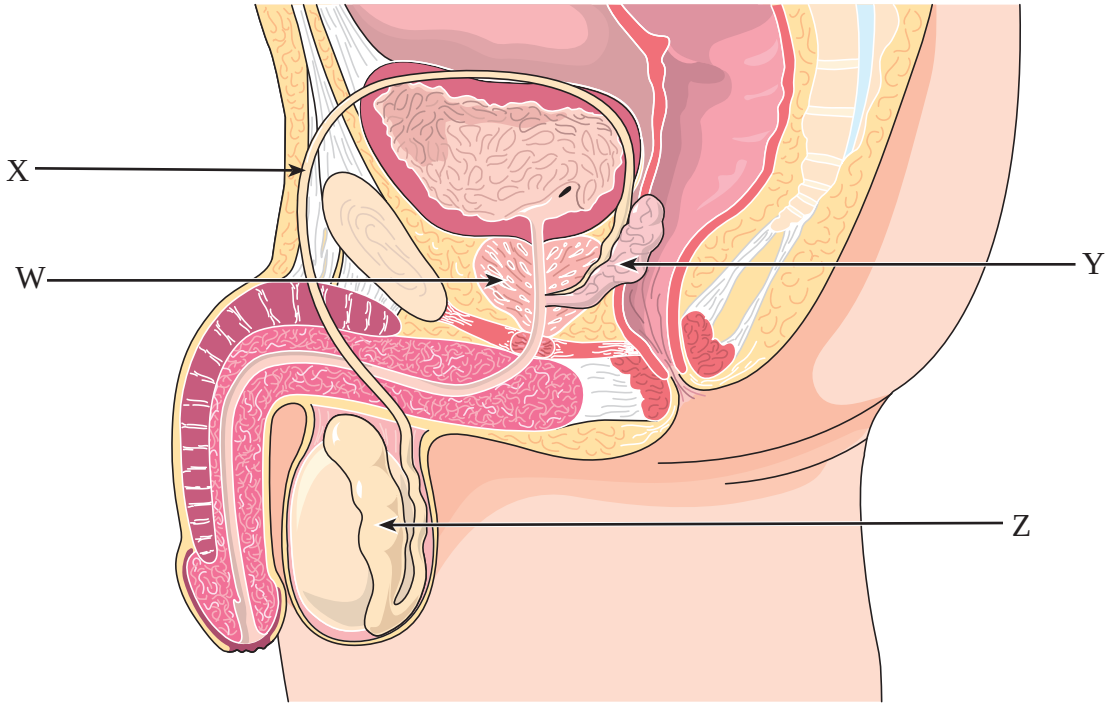
47. Which of the labelled structures in the diagram above responds to ADH (antidiuretic hormone)?

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

48. Aldosterone is secreted by the

A. testes.
B. nephron.
C. adrenal cortex.
D. posterior pituitary.

Use the following diagram to answer questions 49 and 50.



49. Which arrow points to the epididymis?

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

50. The function of the structure labelled **W** is to

A. store urine.
B. mature sperm.
C. secrete testosterone.
D. produce seminal fluid.

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. For each of the following molecules, give **one** function and describe a characteristic of the molecule that aids this function. **(6 marks: 2 marks each)**

a) ATP

Function: _____

_____

Characteristic: _____

_____

b) Water

Function: _____

_____

Characteristic: _____

_____

c) Phospholipid

Function: _____

_____

Characteristic: _____

_____

2. Complete the following table comparing DNA and RNA. **(3 marks: 1 mark each)**

	DNA	RNA
Bases	C, G, A, T	
Location in cell		nucleus and cytoplasm
Number of strands	2	

OVER

3. Give **one** role of each of the following in the process of translation. **(3 marks: 1 mark each)**

tRNA: _____

_____

Ribosome: _____

_____

mRNA: _____

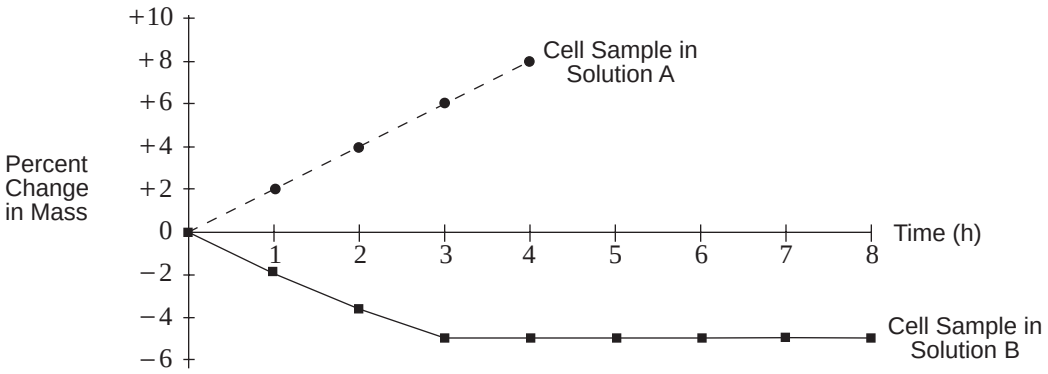
_____

4. a) Explain the “lock and key” model of enzymatic action. **(2 marks)**

b) Explain how denaturation stops enzymatic action. **(1 mark)**

OVER

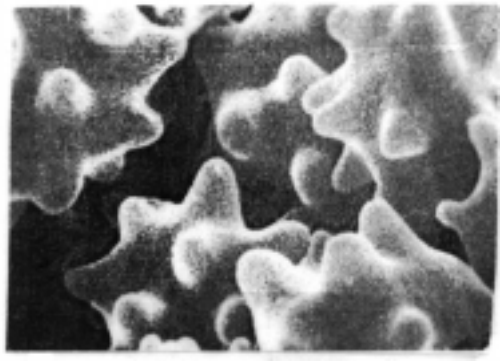
5. Two identical red blood cell samples were prepared for an experiment. The samples were placed in two different solutions and the percent change in mass was recorded and graphed over an eight hour period as shown below.



a) Account for the change in mass of the cells in **Solution A** during the first four hours. **(2 marks)**

b) What happened to the cells in **Solution A** after four hours? **(1 mark)**

Use the following diagram of red blood cells in solution to answer part c).



c) A sample of cells from **Solution B** (at five hours) was examined under the microscope. Explain why they appear as in the diagram above. **(2 marks)**

_____

_____

_____

_____

d) Give **one** reason for the results obtained from the cells placed in **Solution B** between three and eight hours. **(1 mark)**

_____

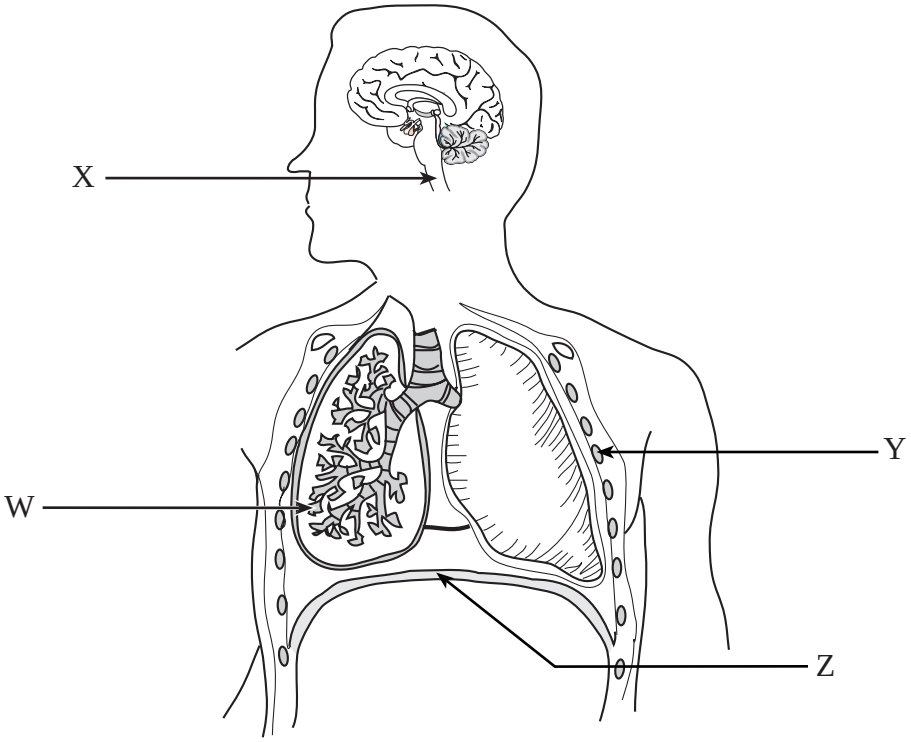
_____

OVER

6. Complete the table below by giving **one enzyme produced** by each of the following glands and by stating the **digestive product** of that enzyme. **(6 marks: 1 mark each)**

GLANDS	ENZYME PRODUCED	DIGESTIVE PRODUCT
Salivary glands		
Gastric glands		
Intestinal glands		

Use the following diagram to answer question 7.



7. a) Label structures **W, X, Y** and **Z** on the diagram. **(4 marks: 1 mark each)**

b) Describe the roles of structures **W, X** and **Z** in the process of inhalation. **(3 marks)**

c) Why are the pleural membranes important to the inhalation process? **(1 mark)**

OVER

8. Name each of the following neurons and for each give its role in a reflex arc. **(6 marks)**

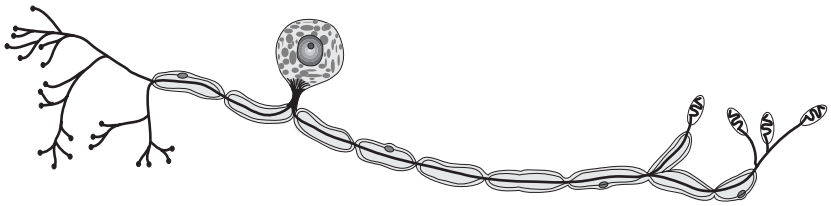
a)

Name: _____

Role: _____

_____

b)

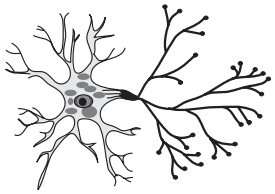


Name: _____

Role: _____

_____

c)



Name: _____

Role: _____

_____

9. a) Complete this summary table of the **ovarian cycle.** **(4 marks)**

	HORMONE WHICH INITIATES PHASE	HORMONE PRODUCED BY OVARY
Phase 1 Days 1 to 14		
Phase 2 Days 15 to 28		

b) i) What is the event that occurs on Day 14? **(1 mark)**

ii) What causes this event to occur? **(1 mark)**

c) What causes Phase 2 to end? **(1 mark)**

d) Describe the effects of implantation (pregnancy) on the ovarian cycle. **(2 marks)**

END OF EXAMINATION

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BIOLOGY 12

June 1998

Course Code = BI

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Score for Question 1:	Score for Question 8:
1. _____ (6)	8. _____ (6)

Score for Question 2:	Score for Question 9:
2. _____ (3)	9. _____ (9)

Score for Question 3:
3. _____ (3)

Score for Question 4:
4. _____ (3)

Score for Question 5:
5. _____ (6)

Score for Question 6:
6. _____ (6)

Score for Question 7:
7. _____ (8)