

Biology 12

January 2003 Provincial Examination

ANSWER KEY / SCORING GUIDE

CURRICULUM:

Organizers	Sub-Organizers
1. Cell Biology	A, B, C, D
2. Cell Processes and Applications	E, F, G, H
3. Human Biology	I, J, K, L, M, N, O, P

Part A: Multiple Choice

Q	K	C	S	CO	PLO	Q	K	C	S	CO	PLO
1.	C	U	1	1	A1, 3	26.	B	U	1	3	I2
2.	A	U	1	1, 2	A1, 2, 3; G1	27.	A	U	1	3	I9
3.	D	U	1	1	A2, 1	28.	C	U	1	3	J2, 4; K1; L8
4.	D	K	1	1	B1	29.	C	K	1	3	J11, 9
5.	A	H	1	1, 3	B3; I4	30.	B	U	1	3	K1
6.	C	K	1	1	C8	31.	A	U	1	3	K1, 4
7.	D	U	1	1	C12	32.	D	K	1	3	K1; J2
8.	A	K	1	1	D5	33.	B	U	1	3	L1, 4
9.	B	K	1	2	E1	34.	C	H	1	3	L1, 5
10.	D	K	1	2	F1	35.	A	K	1	3	L2
11.	D	U	1	2	F1	36.	B	K	1	3	L4
12.	B	K	1	2	F4	37.	B	U	1	3	L7
13.	D	K	1	2	G3, 5	38.	C	U	1	3	L8
14.	C	U	1	2	G5	39.	C	H	1	3	L8, 7
15.	B	U	1	2	G6	40.	C	U	1	3	N2
16.	D	U	1	2	G5	41.	D	K	1	3	N4
17.	A	H	1	2	H2	42.	B	K	1	3	O1
18.	C	U	1	2	H6	43.	D	U	1	3	O2
19.	C	H	1	2	H6; G7	44.	A	U	1	3	O2
20.	A	U	1	3	I1	45.	A	K	1	3	O2
21.	C	U	1	3	I2, 4	46.	B	K	1	3	P7
22.	C	U	1	3	I1, 6, 7	47.	D	H	1	3	P10
23.	D	K	1	3	I9	48.	D	K	1	3	P7
24.	C	H	1	3	I2	49.	B	U	1	3	P7
25.	D	H	1	3, 1	I2; C1, 2	50.	A	H	1	3	P9, 10

Multiple Choice = 50 marks

Part B: Written Response

Q	B	C	S	CO	PLO
1.	1	U	3	1, 3	A1, 3; I7; P1, 7
2.	2	U	4	1, 3	B3; I1, 4
3.	3	U	3	1	D1
4.	4	U	3	2, 1	E1; D5
5.	5	K	2	2	G1
6.	6	H	3	2	H6; G7
7.	7	K	2	3	I4
8.	8	U	7	3	J1; K6
9.	9	H	3	3	K4, 6; N2
10.	10	U	5	3	M6, 5, 7
11.	11	K	3	3	N4
12.	12	U	4	3	O2
13.	13	H	2	3	O4, 5
14.	14	U	6	3	P9, 10

Written Response = 50 marks

Multiple Choice = 50 (50 questions)

Written Response = 50 (14 questions)

EXAMINATION TOTAL = 100 marks

LEGEND:

Q = Question Number **B** = Score Box Number **S** = Score

K = Keyed Response **C** = Cognitive Level **CO** = Curriculum Organizer

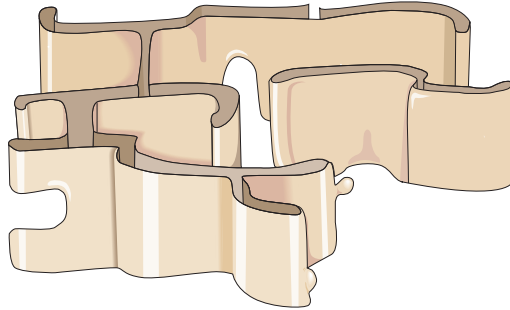
PLO = Prescribed Learning Outcome

PART B: WRITTEN RESPONSE

Value: 50 marks

Suggested Time: 75 minutes

Use the following diagram to answer question 1.



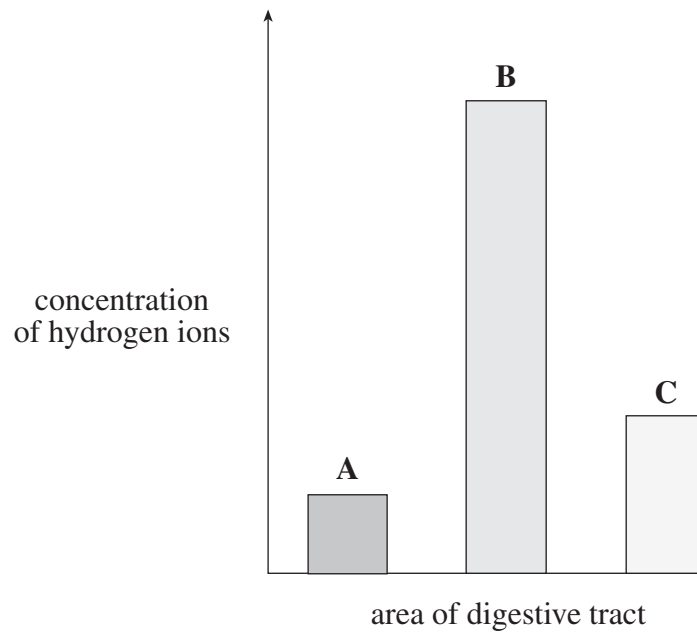
1. a) Name an organ whose cells contain large amounts of the organelle shown in the diagram. **(1 mark)**

- liver
 - testes
 - ovaries
 - adrenal gland
- } any one for
1 mark

- b) Describe **two** functions of the organelle. **(2 marks)**

- to produce lipids
 - to detoxify drugs
 - to form vesicles to transport molecules
 - to produce steroid hormones (or any specific example)
- } any two for
1 mark each

2. In an experiment investigating conditions in the digestive tract, the concentration of hydrogen ions was measured in three areas, **A**, **B** and **C**. The following graph shows the results.



Identify areas **A** and **B** and explain how the conditions there contribute to proper digestion.
(4 marks: 1 mark each for name; 1 mark each for explanation)

area **A**:

name:

- **duodenum**
 - **small intestine**
- } either one for
1 mark

explanation:

- **basic conditions optimum for enzymes to function (1 mark)**

area **B**:

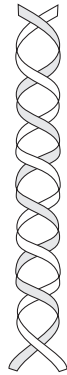
name:

- **stomach (1 mark)**

explanation:

- **acidic conditions needed for enzyme function (1 mark)**

Use the following diagram to answer question 3.

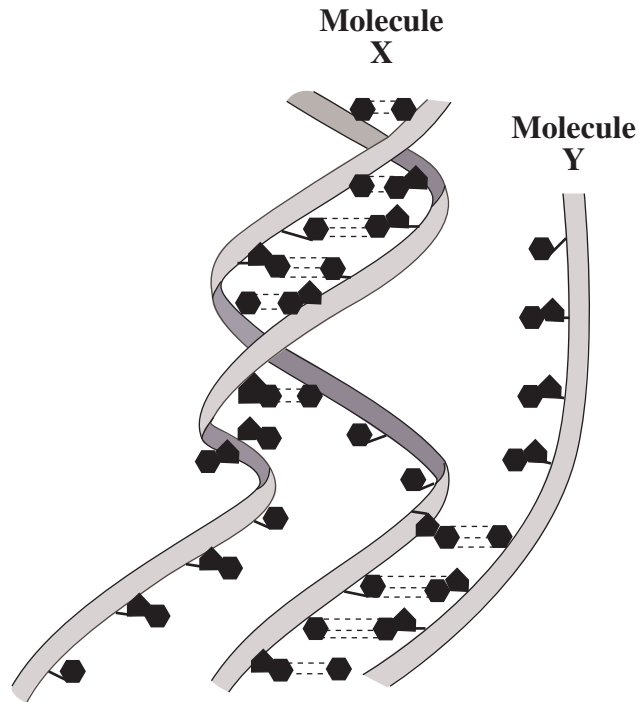


3. List **three** structural components of the unit molecule that form the polymer shown.

(3 marks)

- **phosphate group (1 mark)**
- **deoxyribose (1 mark)**
- **a base (adenine, cytosine, guanine and thymine) (1 mark)**

Use the following diagram to answer question 4.



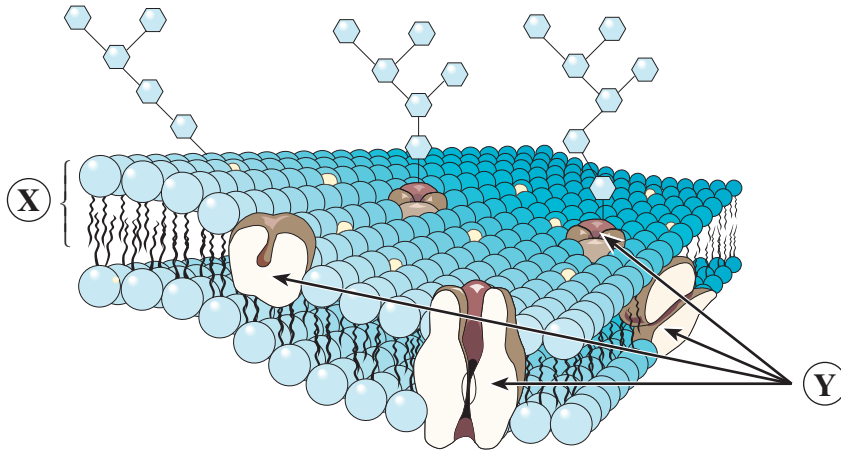
4. Describe **three** ways in which molecule **X** differs from molecule **Y**.

(3 marks)

- Molecule X contains deoxyribose whereas molecule Y contains ribose.
- Molecule X contains thymine whereas molecule Y contains uracil.
- Molecule X is double stranded and molecule Y is single stranded.
- Molecule X is found in the nucleus whereas molecule Y is found in the cytoplasm and in the nucleus.

} any three for
1 mark each

Use the following diagram to answer question 5.



5. a) Identify molecule X.

(1 mark)

- phospholipid (1 mark)

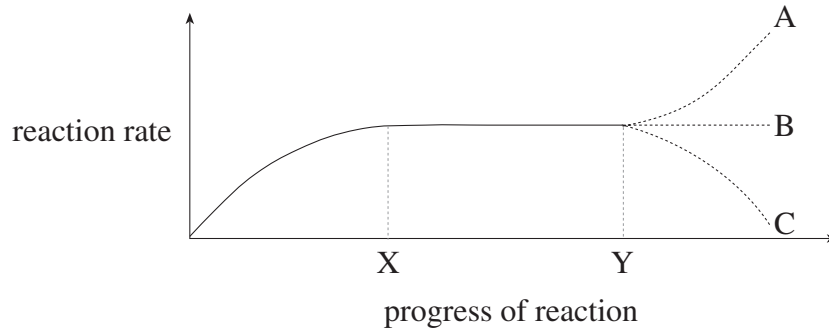
b) Give **one** function of the molecules labelled Y.

(1 mark)

- identifies the cell
- catalyzes a specific reaction
- shaped so specific molecules bind to it
- allows a specific ion or substance to enter or exit the cell
- carries material across the cell membrane during active transport / facilitated transport

} any one for
1 mark

Use the following graph to answer question 6.



6. The graph shows the change in the rate of an enzyme-catalyzed reaction over time.

a) Explain why the rate became constant at time **X**.

(1 mark)

• **All of the active sites were occupied. (1 mark)**

b) Which labelled line correctly illustrates what would occur if more enzyme was added at time **Y**. Explain your answer.

(2 marks)

• **line A (1 mark)**

• **More active sites are available to bind with substrates. (1 mark)**

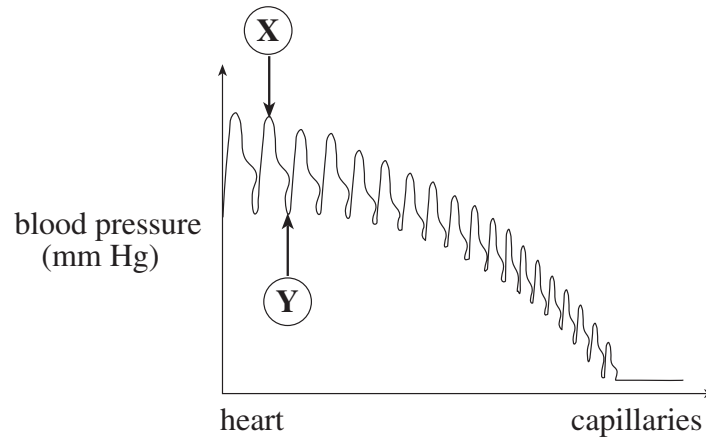
7. Name the organ that produces an enzyme which chemically digests fats and identify the enzyme it produces.

(2 marks)

organ: **pancreas (1 mark)**

enzyme: **lipase (1 mark)**

Use the following graph to answer question 8.



8. a) Name and explain what is occurring in the heart to cause the conditions shown on the graph at point X and point Y. **(4 marks)**

point X: **systole (1 mark)**

explanation: **The left ventricle contracts, causing blood to enter the aorta under high pressure. (1 mark)**

point Y: **diastole (1 mark)**

explanation: **The left ventricle relaxes, decreasing pressure in the aorta. (1 mark)**

- b) Explain why blood pressure decreases as blood flows from the arteries to the capillaries. **(1 mark)**

- **This decrease is due to the progressive increase in total cross-sectional area as blood nears the capillaries. (1 mark)**

c) Why is it important that blood flows very slowly in the capillaries?

(1 mark)

The slow speed of the blood in the capillaries is necessary to allow sufficient time for the exchange of substances between the blood in the capillaries and the surrounding tissues. (1 mark)

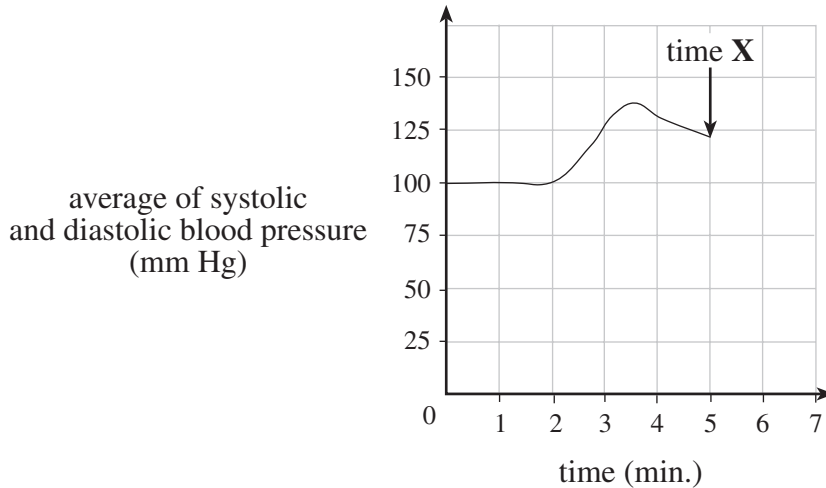
d) Explain why blood velocity increases slightly as it moves from the capillaries to the veins.

(1 mark)

- **Contraction of skeletal muscles helps to increase blood velocity.**
- **Blood velocity increases as it moves from the capillaries to the veins because of the progressive decrease in total cross-sectional area.**

} **either one for
1 mark**

Use the following graph to answer question 9.



9. a) Describe the mechanisms at work in the body which led to the changes that occurred between minute two and minute three. **(2 marks)**

- **The sympathetic nervous system (through the neurotransmitter epinephrine / noradrenalin) causes the “fight or flight” response which increases blood pressure.**
- **The hormone adrenaline causes the “fight or flight” response which increases blood pressure.**
- **Heart rate increases so more blood is forced into the same volume.**
- **Arteriole constriction so blood is forced into smaller volume within the body.**

**any two for
1 mark each**

- b) If acetylcholine was administered at time **X**, describe the effect on the body. **(1 mark)**

- **Arterioles will dilate.**
- **Heart rate will decrease.**
- **Breathing rate will slow.**
- **Average systolic and diastolic blood pressure will decrease.**

**any one for
1 mark**

10. a) Describe the events that occur between the time a nerve impulse reaches the end of an axon and the release of the neurotransmitters. **(3 marks)**

- **The nerve impulse at the end of the axon increases the permeability of the presynaptic membrane to calcium ions.**
- **Calcium ions enter the axon.**
- **Calcium ions cause the microfilaments attached to vesicles to contract.**
- **The vesicles with the neurotransmitters bind to the presynaptic membrane.**

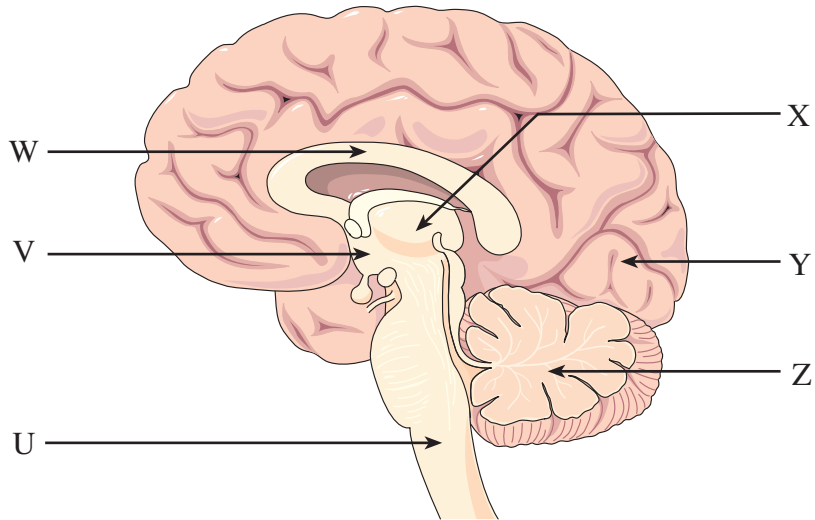
**any three for
1 mark each**

b) What happens to neurotransmitters after they are released into the synaptic cleft? **(2 marks)**

- **The neurotransmitters diffuse across the synaptic gap.**
- **The neurotransmitters bind to receptors at the postsynaptic membrane.**
- **The neurotransmitters are broken down by hydrolytic enzymes.**
- **After the neurotransmitters are broken down, their components are re-absorbed into the presynaptic membrane.**
- **The neurotransmitters are re-absorbed into the presynaptic membrane.**

**any two for
1 mark each**

Use the following diagram to answer question 11.



11. Write the letter indicating the part of the brain with the following functions.

(3 marks: 1 mark each)

Function	Letter
the neuroendocrine control centre	<u> V </u>
ensures that skeletal muscle moves in a smooth and coordinated manner	<u> Z </u>
allows nerve impulses to pass between cerebral hemispheres	<u> W </u>

12. List the structures, in the correct order, through which a glucose molecule passes as it travels through the tubule from the renal artery to the renal vein.

(4 marks: 3 marks for structures; 1 mark for correct order)

• afferent arteriole



• glomerulus



• Bowman's capsule



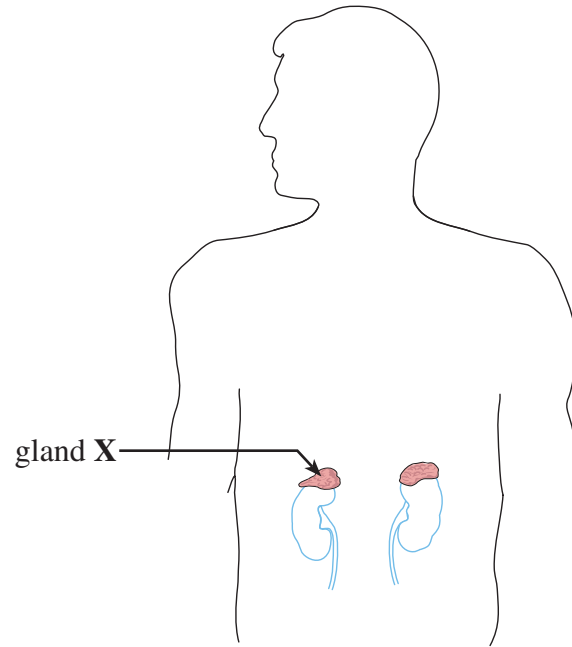
• proximal convoluted tubule



• peritubular capillaries

} any three for
1 mark each + 1 mark for correct order

Use the following diagram to answer question 13.



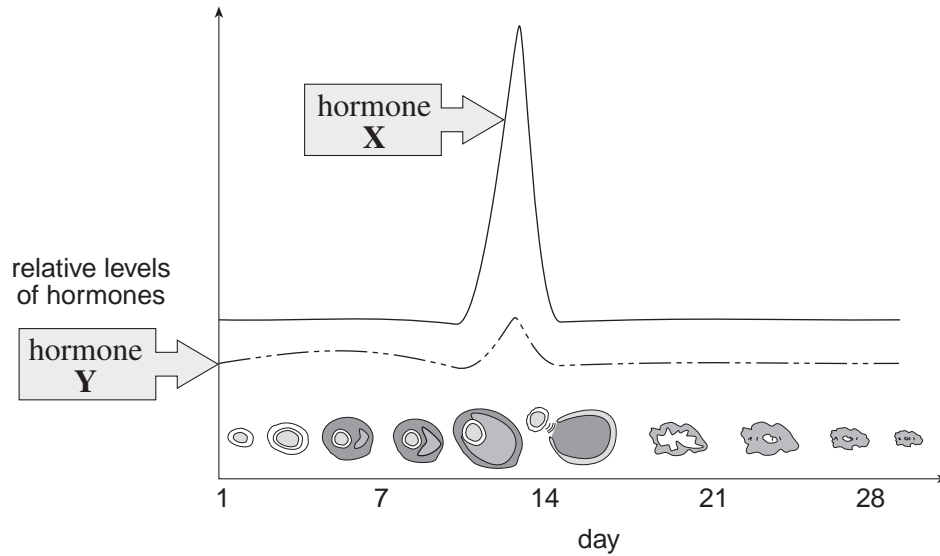
13. How does gland X function to regulate sodium ion concentration in the blood?

(2 marks)

- increases aldosterone secretion
- increases sodium ion re-absorption
- sodium ion concentration in blood increases
- increases blood volume (water re-absorption)

} any two for
1 mark each

Use the following diagram to answer question 14.



14. a) Identify each of the following.

(2 marks: 1 mark each)

hormone X:

- **luteinizing hormone (LH) (1 mark)**

hormone Y:

- **follicle-stimulating hormone (FSH) (1 mark)**

b) Describe the effect of hormone X on the female reproductive system during days 15 to 28 of a 28-day cycle.

(2 marks)

- **It causes the corpus luteum to secrete progesterone. (1 mark)**
- **Progesterone causes the endometrium to become thickened and secretory. (1 mark)**

c) What would occur during days 1 to 13 of the ovarian cycle if follicle-stimulating hormone (FSH) was not secreted?

(2 marks)

- **The follicle would not mature.**
- **The follicle would not produce estrogen.**
- **Consequently the uterine lining would not increase in thickness.**

} **any two for
1 mark each**

END OF KEY