Biology 12

August 1999 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	CO	PLO	Q	K	C	CO	PLO
1.	B	U	1	A1	26.	A	U	3	J1
2.	B	K	1	A1	27.	A	K	3	J2
3.	C	H	1	A1, 3; C8; G1	28.	C	U	3	J2
4.	D	U	1	A1, 3	29.	C	K	3	J2
5.	D	K	1	B3	30.	A	H	3	J2; K5
6.	B	H	1	C1, 2	31.	D	U	3	J5
7.	C	K	1	C2, 3, 4	32.	D	U	3	J8
8.	C	U	1	C7	33.	B	H	3	J9
9.	D	H	1	D1	34.	C	U	3	J9
10.	C	K	2	E1	35.	B	H	3	J12
11.	D	H	2	E4	36.	B	U	3	K2
12.	D	H	2	E2, 4	37.	C	K	3	L1
13.	D	K	2	F1	38.	D	K	3	L4, 5
14.	A	U	2	F3, 5	39.	C	H	3	L6
15.	A	H	2	F4	40.	B	U	3	L7
16.	A	U	2	G1	41.	A	H	3	L8
17.	A	H	2	G4	42.	B	K	3	M1
18.	C	U	2	G5	43.	B	H	3	M1, 6, 8
19.	C	U	2	H1	44.	C	H	3	M5, 6
20.	C	H	2	H6; I2, 4	45.	D	K	3	N2
21.	A	U	3	I1	46.	B	U	3	O2
22.	D	U	3	I1, 2	47.	B	U	3	O4
23.	C	U	3	I1, 2	48.	A	U	3	P1
24.	A	U	3	I5	49.	D	U	3	P4
25.	A	U	3	I7	50.	B	U	3	P7

Multiple Choice = 50 marks

Part B: Written Response

Q	B	C	S	CO	PLO
1.	1	U	4	1	C2, 6
2.	2	U	3	1	D5
3.	3	U	4	2	G3
4.	4	H	5	2	H3, 6; I1, 2, 4
5.	5	K	6	3	I1, 2
6.	6	U	3	3	J1; K1
7.	7	U	3	3	L8
8.	8	U	8	3	M1, 3
9.	9	K	8	3	O2
10.	10	U	6	3	P1, 2

Written Response = 50 marks

Multiple Choice = 50 (50 questions)
Written Response = 50 (10 questions)
EXAMINATION TOTAL = 100 marks

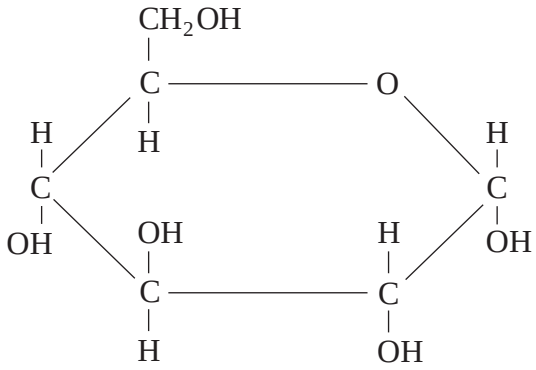
LEGEND:
Q = Question Number **B** = Score Box Number **S** = Score
K = Keyed Response **C** = Cognitive Level **CO** = Curriculum Organizer
PLO = Prescribed Learning Outcome

PART B: WRITTEN RESPONSE

Value: 50 marks **Suggested Time: 75 minutes**

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.

Use the following diagram to answer question 1.



1. a) Identify the molecule above. **(1 mark)**

- **glucose (1 mark)**

b) What is the **general** term given to polymers formed from this molecule? **(1 mark)**

- **polysaccharides (1 mark)**

c) List **two** biological functions of these polymers. **(2 marks)**

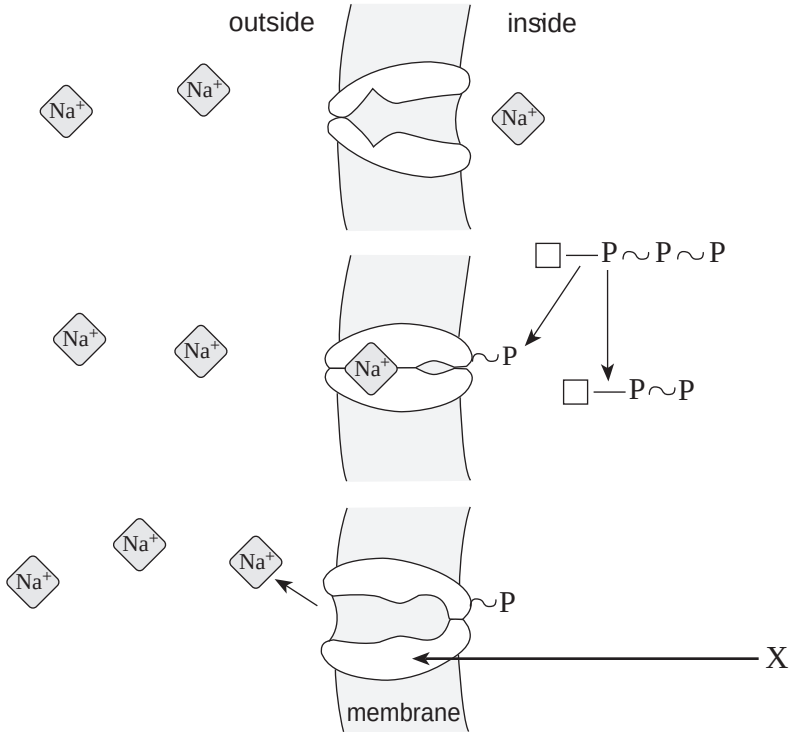
- **To store energy in animals as glycogen. (1 mark)**
- **To provide strength and support to plant cell walls. (1 mark)**

2. Using the table below, list **three** differences between RNA and DNA.
(3 marks: 1 mark for each contrasting pair)

RNA	DNA
single strand	**double strand**
contains uracil	**contains thymine**
ribose sugar	**deoxyribose sugar**

1 mark for each contrasting pair

Use the following diagram to answer question 3.



3. a) Identify the process shown in the diagram above. **(1 mark)**

- **active transport (1 mark)**

b) Give **one** example in which this process is used in the body. **(1 mark)**

- **Nerve impulse transmission.**
- **Reabsorption and tubular excretion.**
- **Absorption of nutrients in the small intestine.**
- **Active transport of sodium ions into the medulla of the kidney.**

any one for 1 mark

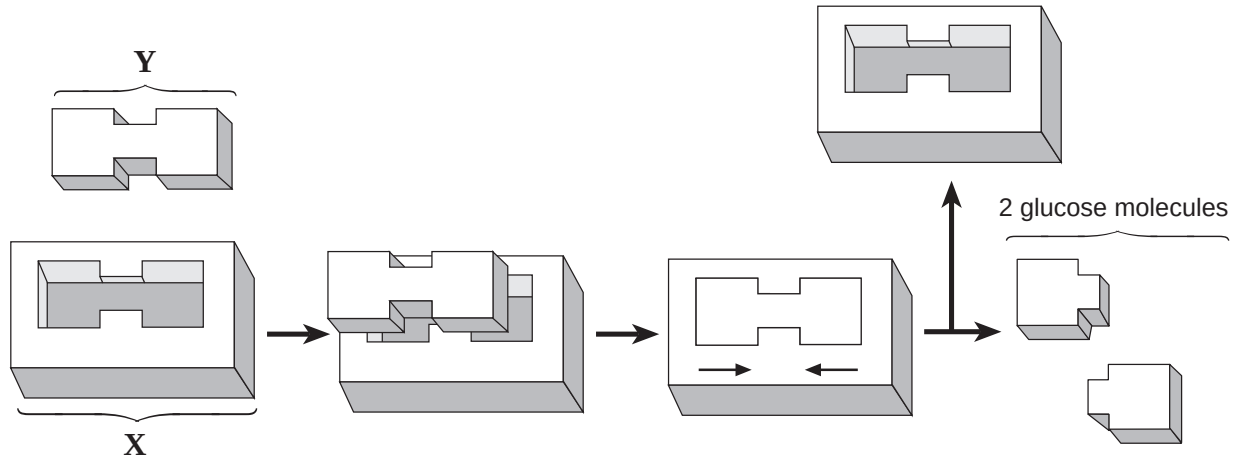
c) Describe the function of the molecule represented by □—P∼P∼P : **(1 mark)**

- **Provides energy for the process. (1 mark)**

d) What is the function of molecule **X**? **(1 mark)**

- **Transports (or carries) sodium ions. (1 mark)**

Use the following diagrams to answer question 4.



4. a) The diagrams illustrate a reaction that occurs in the small intestine. Give the specific name for each of the following.

Molecule **X**: **(1 mark)**

- **maltase (1 mark)**

Molecule **Y**: **(1 mark)**

- **maltose (1 mark)**

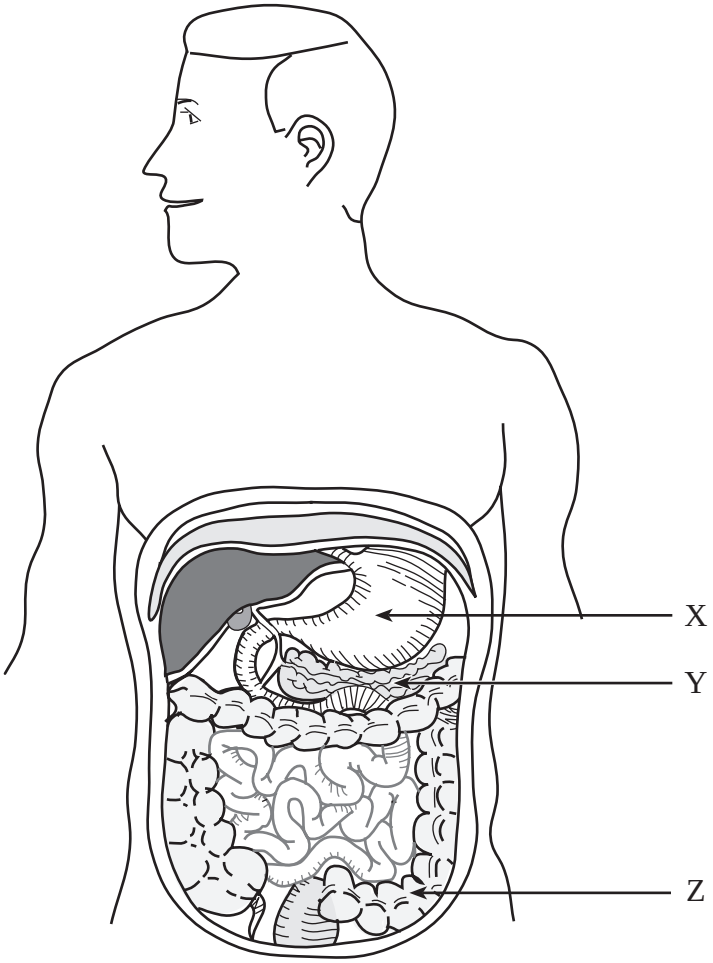
b) In a laboratory experiment, substance **Y** was added in increasing amounts until it eventually had no effect on the rate of the reaction. Explain why. **(1 mark)**

- **The active sites of the enzymes were occupied. (1 mark)**

c) A solution containing lead ions was added to the reaction. How will the addition of this solution affect the reaction? Explain why. **(2 marks)**

- **The rate of the reaction will decrease (1 mark) because the enzyme has been denatured (1 mark).**

Use the following diagram to answer question 5.



5. a) State **two** functions of structure **Z**. **(2 marks)**

- **Absorption of water.**
- **Compacting/storage of feces.**
- **Synthesis of vitamin K (by bacteria).**

any two for 1 mark each

b) For each of the following structures, list **one** enzyme it secretes and the substrate that the enzyme acts upon. **(4 marks: 1 mark each for enzyme; 1 mark each for substrate)**

Structure **X**:

Enzyme: **pepsin (1 mark)**
Substrate: **protein (1 mark)**

Structure **Y**:

Enzyme: **trypsin(ogen) (1 mark)**
Substrate: **protein (1 mark)**

OR

Enzyme: **lipase (1 mark)**
Substrate: • **fat** } **either one for**
• **lipid** } **1 mark**

OR

Enzyme: **amylase (1 mark)**
Substrate: **starch (1 mark)**

6. Describe how the structure of each of the following aids in its function. **(3 marks)**

Artery:

- **is thick-walled with elastic tissue to be able to withstand the forces of blood pressure.**
- **is equipped with smooth muscle so that blood pressure may be controlled.**

either one for 1 mark

Semi-lunar valve:

- **has cusps (flaps) which open in one direction only in order to prevent back flow. (1 mark)**

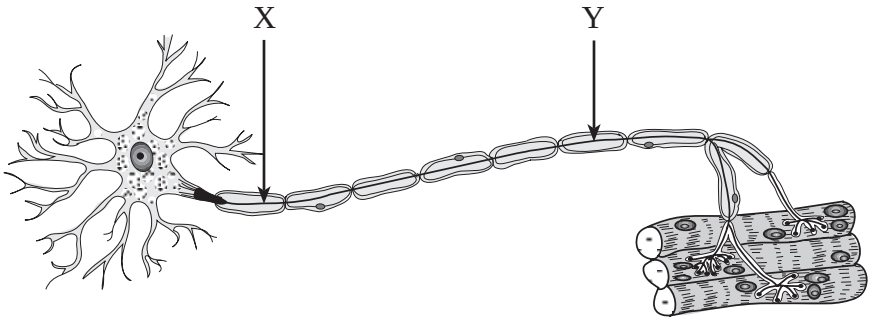
Capillary:

- **is thin-walled in order to facilitate the exchange of materials. (1 mark)**

7. Identify **three** substances transported by hemoglobin in the blood and give the name of each form of hemoglobin. **(3 marks: $\frac{1}{2}$ mark each)**

SUBSTANCE TRANSPORTED	FORM OF HEMOGLOBIN
oxygen	**oxyhemoglobin**
hydrogen ions	**reduced hemoglobin**
carbon dioxide	**carbaminohemoglobin**

Use the following diagram to answer question 8.



8. Describe, in correct order, the events that occur during the transmission of a nerve impulse from point **X** to point **Y**. **(8 marks)**

- **Initially, there is a greater concentration of sodium ions outside the neuron and a greater concentration of potassium ions inside the neuron.**
- **Initially, the interior of the neuron has a relatively negative charge.**

  OR
- **The resting potential is approximately – 65 mV.**
- **Sodium ion gates open.**
- **Sodium ions diffuse into the neuron.**
- **This causes depolarization.**

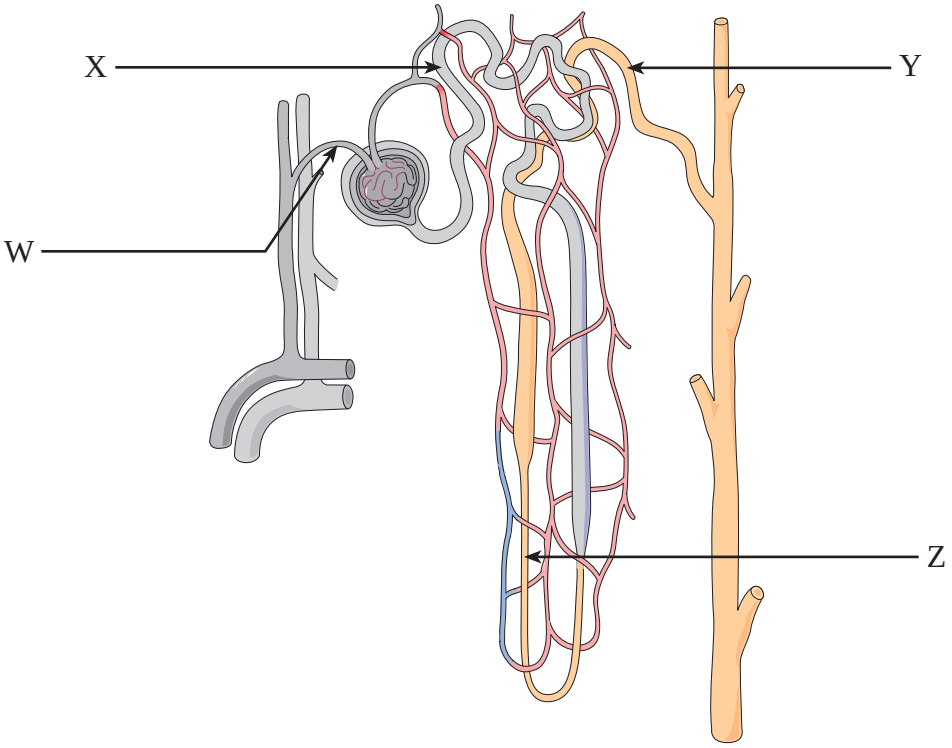
  OR
- **A reversal of the voltage occurs across the membrane.**
- **Potassium ion gates open.**
- **Potassium ions exit the neuron.**
- **This causes repolarization.**
- **The sodium-potassium pump re-establishes the original ion distribution.**
- **Depolarization of one site on the neuron causes depolarization of the area adjacent to it.**

  OR
- **An action potential may be generated.**

any seven for 1 mark each

(1 mark for correct order)

Use the following diagram to answer question 9.



9. Identify the following structures and give a **different** function of each structure.
(8 marks: 1 mark each for name; 1 mark each for function)

Structure **W**:

Name: **afferent arteriole (1 mark)**
Function: • **Brings blood to the glomerulus. (1 mark)**

Structure **X**:

Name: **proximal tubule (1 mark)**
Function: • **Reabsorbs water.**
• **Selectively reabsorbs nutrients such as glucose and amino acids.**

} **either one for 1 mark**

Structure **Y**:

Name: **distal convoluted tubule (1 mark)**

Function:
- **Reabsorbs water.** *(Note to markers: only accept if students have not used "reabsorbs water" for structure X.)*
- **Regulates blood pH.**
- **Carries out selective reabsorption of K^+, H^+, NaCl and HCO_3^-.**

any one for 1 mark

Structure **Z**:

Name: **loop of Henle (1 mark)**

Function:
- **Osmoregulation.**
- **Maintains salt and water balance.**

either one for 1 mark

10. a) Give **two** functions of each of the following hormones.

Estrogen: **(2 marks)**

- **Causes eggs to mature.**
- **Causes breasts to develop.**
- **Causes endometrium to thicken.**
- **Causes the pelvic girdle to enlarge.**
- **Causes growth of uterus and vagina.**
- **Causes the onset of the menstrual cycle.**
- **Causes growth of pubic and underarm hair.**

any two for 1 mark each

LH (luteinizing hormone): **(2 marks)**

- **A surge of LH causes ovulation in females.**
- **Promotes testosterone production in males.**
- **Leads to luteal phase in females (ovarian cycle).**
- **Causes development of the corpus luteum in females.**

any two for 1 mark each

b) Describe **two** hormonal changes that occur in the mother as a result of implantation. **(2 marks)**

- **Embryonic membrane produces HCG (human chorionic gonadotropic) hormone.**
- **HCG maintains corpus luteum in the secretory phase; therefore, it continues to secrete progesterone.**
- **Placenta continues HCG production.**
- **Negative feedback results in decreased FSH (follicle-stimulating hormone) and LH production.**
- **Placenta secretes estrogen and progesterone and the corpus luteum degenerates by the end of the first trimester.**

any two for 1 mark each

END OF KEY