

Biology 12
 June 1998 Provincial Examination
ANSWER KEY / SCORING GUIDE

CURRICULUM:

Organizers	Sub-Organizers
1. Cell Biology	A, B, C, D
2. Cell Processes and Application	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.	D	H	1	A1, 2, 3	26.	B	K	3	J11
2.	C	K	1	A1, 3	27.	D E L E T E D			
3.	D	U	1	A1, 3	28.	D	U	3	K1
4.	C	U	1	B1	29.	C	K	3	K1
5.	D	K	1	B3	30.	B	U	3	K2
6.	D	U	1	C1	31.	C	U	3	K5, 6
7.	D	K	1	D3	32.	C	U	3	L8
8.	C	H	2	E2	33.	C	U	3	L7, 8
9.	B	K	2	F1	34.	D	H	3	M3
10.	D	K	2	F1	35.	C	H	3	M7
11.	D	U	2	F3	36.	B	U	3	N1, 2
12.	D	H	2	G8	37.	D	U	3	N3
13.	A	H	2	H1, 4, 5	38.	D	U	3	N4
14.	A	H	2	H6; I2, 4	39.	B	U	3	N4, 5
15.	A	K	3	I3, 1	40.	A	K	3	O1
16.	C	K	3	I4	41.	A	U	3	O1
17.	A	H	3	I6, 7; J7; O3	42.	B	K	3	O1
18.	B	U	3	I10	43.	C	H	3	O2
19.	D	K	3	J1	44.	B	U	3	O2
20.	C	K	3	J2	45.	D	U	3	O2
21.	C	K	3	J2, 8	46.	D	K	3	O2
22.	B	U	3	J5	47.	D	U	3	O2, 5
23.	D	U	3	J7	48.	C	K	3	O4
24.	C	U	3	J8	49.	D	K	3	P1
25.	B	U	3	J9	50.	D	U	3	P1

Multiple Choice = 50 marks

Part B: Written Response

Q	B	C	S	CO	PLO
1.	1	H	6	1	B1, 2; C2, 8, 11
2.	2	U	3	1	A1; D5
3.	3	K	3	2	E1, 3
4.	4	U	3	2	H3, 6
5.	5	H	6	2	G6, 7
6.	6	K	6	3	I2, 4
7.	7	U	8	3	L1, 5, 6
8.	8	U	6	3	M2, 8
9.	9	U	9	3	P9, 10, 12

Written Response = 50 marks

Multiple Choice = 50 (50 questions)

Written Response = 50 (9 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.

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:

- **To act as the “energy currency.”**
 - **To act as an energy carrier in cells.**
- } **either one for 1 mark**

Characteristic:

- **It has high energy phosphate bonds. (1 mark)**

b) Water

Function:

- **To act as a solvent for polar molecules.**
 - **To maintain blood volume in the body.**
 - **To regulate temperature (large range between freezing and evaporation).**
- } **any one for 1 mark**

Characteristic:

- **It has a polar nature. (1 mark)**

c) Phospholipid

Function:

- **It forms membranes. (1 mark)**

Characteristic:

- **It has a polar nature.**
- **It has hydrophilic ends.**
- **It has hydrophobic ends.**
- **Its composition aids in movement of lipids across the membrane.**

} **any one for
1 mark**

2. Complete the following table comparing DNA and RNA.

(3 marks: 1 mark each)

	DNA	RNA
Bases	C, G, A, T	C, G, A, U
Location in cell	nucleus	nucleus and cytoplasm
Number of strands	2	1

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

tRNA:

- **Matches its anticodon to the mRNA codon.**
 - **Brings the correct amino acid to the ribosome.**
- } **either one for
1 mark**

Ribosome:

- **Site of production of polypeptide.**
 - **Site where codon and anticodon join.**
 - **Holds the mRNA for translation to occur.**
- } **any one for
1 mark**

mRNA:

- **Carries a copy of the code to the site of translation.**
 - **Contains codons which determine the sequence of amino acids.**
- } **either one for
1 mark**

4. a) Explain the “lock and key” model of enzymatic action.

(2 marks)

- **An enzyme has an active site [the lock] that specifically fits the substrate(s) [the key]. (1 mark)**
- **The enzyme and substrate(s) fit together forming a complex so that the substrate(s) react.**
- **The enzyme and substrate(s) fit together forming a complex so that the energy of activation is lowered.**

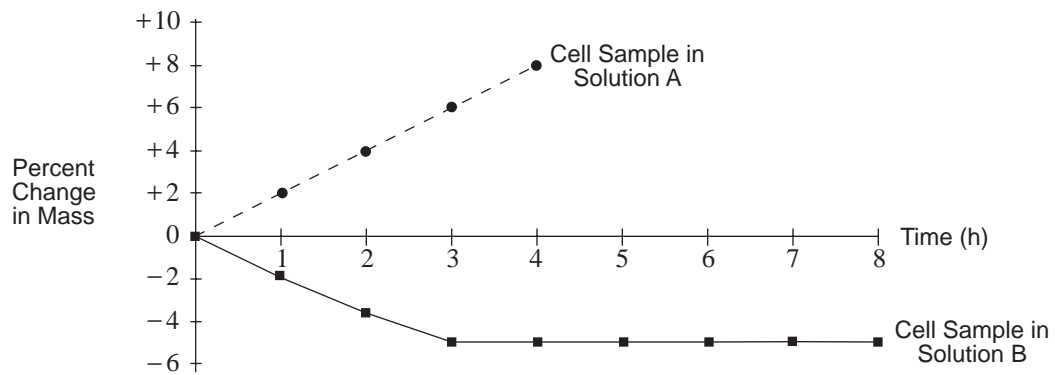
} either one for
1 mark

b) Explain how denaturation stops enzymatic action.

(1 mark)

- **Denaturation alters the shape of the active site. (1 mark)**

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)

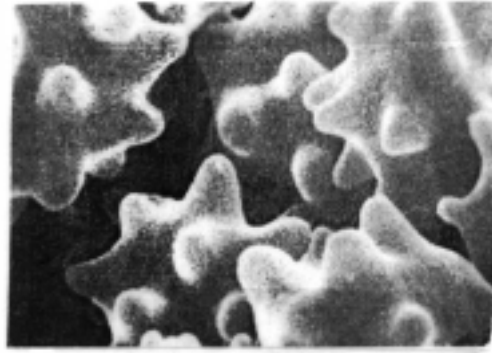
- **Solution A is hypotonic to the cells. (1 mark)**
- **Water entered the cells via osmosis. (1 mark)**

- b) What happened to the cells in **Solution A** after four hours?

(1 mark)

- **The cells burst. (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)**

- They are crenated.
 - Water left the cells via osmosis.
 - **Solution B** is hypertonic to the cells.
- } any two for
1 mark each

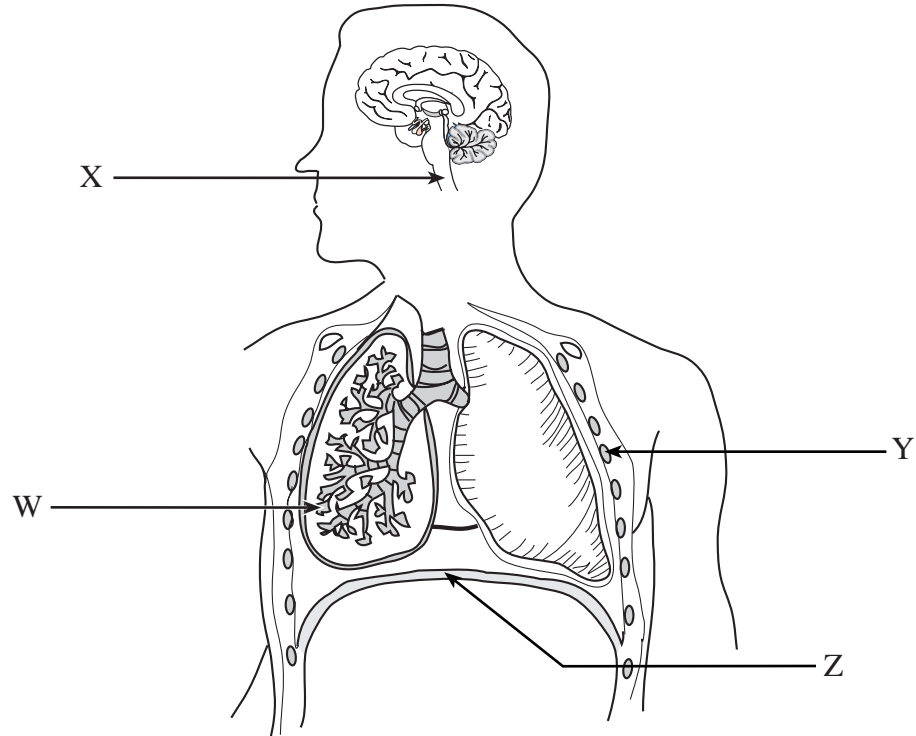
d) Give **one** reason for the results obtained from the cells placed in **Solution B** between three and eight hours. **(1 mark)**

- **Isotonicity was reached between the interior and exterior of the cells. (1 mark)**

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)**

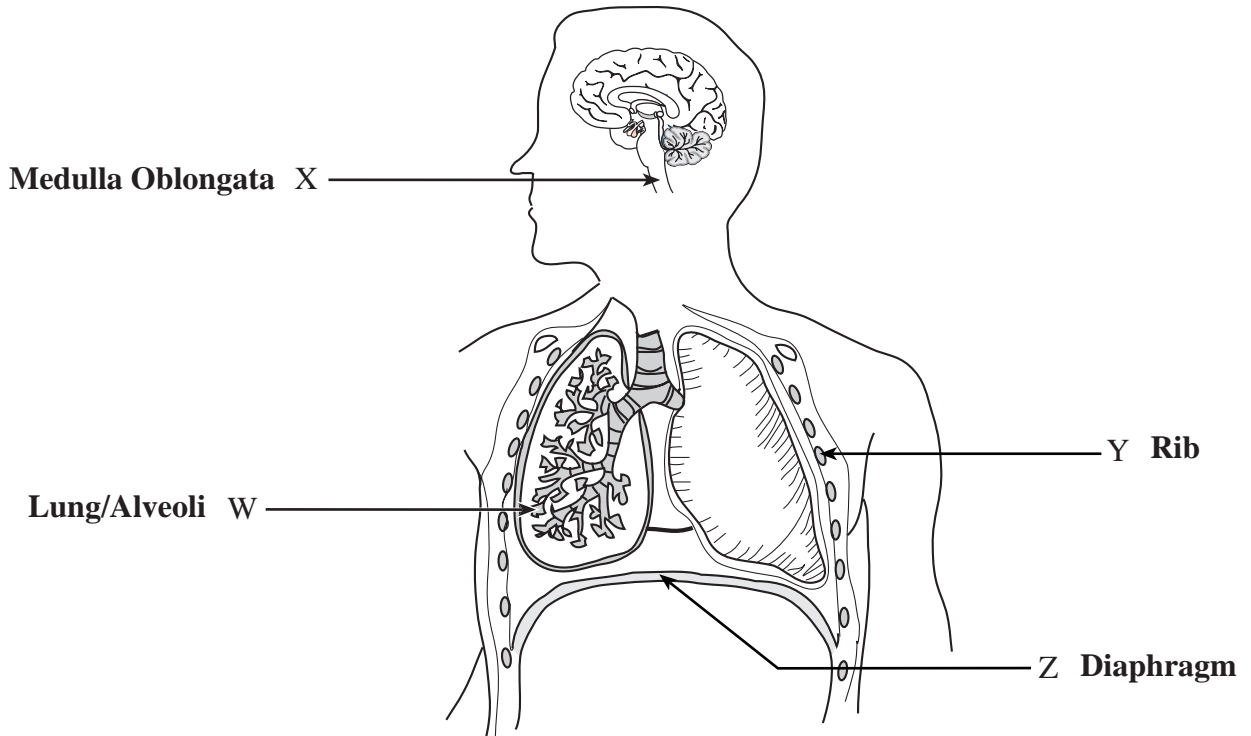
GLANDS	ENZYME PRODUCED	DIGESTIVE PRODUCT
Salivary glands	Salivary Amylase	Maltose
Gastric glands	Pepsin or Pepsinogen	Peptides or Polypeptides
Intestinal glands	Maltase or Nuclease or Peptidase	Glucose or Nucleotides or Amino Acids

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)

- **The medulla oblongata senses increased carbon dioxide concentrations in the blood and sends messages to the rib muscles and diaphragm. (1 mark)**
- **The diaphragm contracts and flattens, which increases the volume of the thoracic cavity. (1 mark)**
- **The resulting negative pressure sucks air into the lungs/alveoli and gas exchange between the capillaries and the lungs occurs. (1 mark)**

c) Why are the pleural membranes important to the inhalation process?

(1 mark)

- **They maintain an interpleural pressure that is less than atmospheric pressure thereby keeping the lungs open.**
- **They are lubricated and slide easily to reduce friction.**

} **either one for
1 mark**

8. Name each of the following neurons and for each give its role in a reflex arc.

(6 marks)

a)

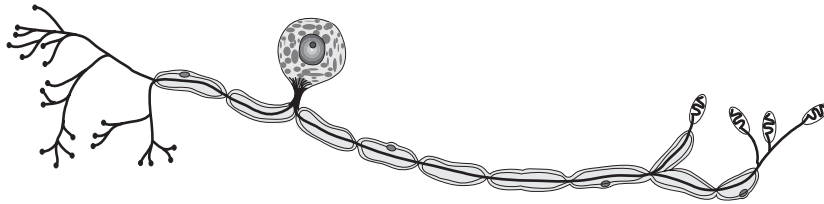


Name: **Motor Neuron.** (1 mark)

Role: • **Carries impulse from the interneuron to the effector.**
• **Carries impulse from the interneuron to the muscle.**
• **Carries impulse from the interneuron to the gland.**

} **any one for
1 mark**

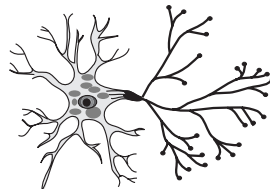
b)



Name: **Sensory Neuron.** (1 mark)

Role: **Carries impulse from the sensory receptors to the interneuron.** (1 mark)

c)



Name: **Interneuron.** (1 mark)

Role: • **Carries impulse from the sensory neuron to the motor neuron.**
• **Carries impulse within the spinal cord.**

} **either one for
1 mark**

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	Follicle Stimulating Hormone (FSH)	Estrogen
Phase 2 Days 15 to 28	Luteinizing Hormone (LH)	Progesterone

b) i) What is the event that occurs on Day 14?

(1 mark)

- **Ovulation occurs on Day 14. (1 mark)**

ii) What causes this event to occur?

(1 mark)

- **A surge of LH is thought to be responsible. (1 mark)**

c) What causes Phase 2 to end?

(1 mark)

- **Degeneration of the corpus luteum.**
- **All hormones are at their lowest levels.**
- **Negative feedback of LH stops its production.**

} any one for
1 mark

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

(2 marks)

- **Degeneration of the corpus luteum is prevented.**
- **More progesterone is produced.**
- **No new follicles mature.**

} any two for
1 mark each

END OF KEY