

Biology 12

June 2004 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.	D	K	1	1	A1	35.	B	H	1	3	K4
2.	D	H	1	1, 3	A1; C8; P1	36.	D	K	1	3	L6
3.	A	K	1	1	B3	37.	D	K	1	3	L4
4.	C	U	1	1	C1, 2	38.	C	H	1	3	L7
5.	D	H	1	1	C3, 4, 1	39.	C	U	1	3	M2; N1
6.	D	U	1	1	C2, 8	40.	D	U	1	3	M3
7.	B	U	1	1	C3, 5	41.	B	H	1	3	M3
8.	D	U	1	1	C2, 1, 10	42.	C	U	1	3	M3
9.	B	U	1	1	D3, 4	43.	B	U	1	3	M3
10.	B	K	1	2	E1	44.	B	U	1	3	M4
11.	B	H	1	2, 1	E1; A1, 3	45.	A	U	1	3	M5, 6
12.	B	K	1	2	E1	46.	B	K	1	3	M8
13.	C	U	1	2	E1, 2	47.	D	K	1	3	M8, 2
14.	C	H	1	2	E1, 4	48.	D	H	1	3	N2
15.	D	K	1	2	G1	49.	B	K	1	3	N4
16.	C	U	1	2, 1	G1; C11	50.	B	K	1	3	O1
17.	A	K	1	2	G3, 5, 12	51.	A	K	1	3	O1, 2
18.	B	H	1	2	G6	52.	A	U	1	3	O1, 2, 3
19.	C	U	1	2	G8	53.	D	U	1	3	O2, 1, 3
20.	C	K	1	2	H3	54.	A	K	1	3	O2
21.	D	K	1	2	H5	55.	C	H	1	3	O2
22.	C	K	1	3	I1	56.	C	U	1	3	O1, 2
23.	C	U	1	3	I1	57.	D	H	1	3	O5, 4
24.	C	U	1	3	I2, 1, 4	58.	A	U	1	3	O4, 5
25.	C	U	1	3	I1, 2, 4	59.	B	U	1	3	P1
26.	D	U	1	3	I2, 4	60.	A	U	1	3	P1
27.	D	K	1	3	I3	61.	A	H	1	3, 1	P4; C12
28.	A	H	1	3	I6, 7	62.	A	H	1	3	P6
29.	B	H	1	3	J1, 2	63.	D	K	1	3	P7
30.	D	H	1	3	J1	64.	C	U	1	3	P10
31.	D	K	1	3	J4	65.	A	U	1	3	P10, 9
32.	A	U	1	3	J8	66.	B	U	1	3	P11
33.	D	U	1	3	K1	67.	D	K	1	3	P12
34.	C	U	1	3	K1						

Multiple Choice = 67 marks

Part B: Written Response

Q	B	C	S	CO	PLO
1.	1	U	3	1, 2	A1, 2; G5
2.	2	U	2	1	D2
3.	3	U	4	2	H1, 6
4.	4	U	4	3	I2, 4
5.	5	U	6	3	J5
6.	6	U	4	3	L5, 4

Written Response = 23 marks

Multiple Choice = 67 (67 questions)
Written Response = 23 (6 questions)
EXAMINATION TOTAL = 90 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: 23 marks

Suggested Time: 40 minutes

1. Describe **three** cellular processes which make use of vesicles.

(3 marks)

- Autolysis / enzymes from lysosomes break down worn-out cell parts or entire cells.
- Intracellular digestion.
- Viruses are packaged in vesicles.
- Neurotransmitters are packaged in vesicles.
- Cell products produced at the rough endoplasmic reticulum are packaged into vesicles at the smooth endoplasmic reticulum.
- Vesicles carrying cell products fuse with the Golgi bodies releasing their contents for storage and modification.
- Vesicles pinch off from the Golgi bodies and transport material to the cell membrane.
- The cell membrane folds inwards forming vesicles during the process of pinocytosis.
- In exocytosis, vesicles allow cell materials (e.g., wastes, hormones) to be exported from the cell.
- In phagocytosis, entire cells or cell fragments are brought into large vesicles.
- Lysosomes pinch off from the Golgi bodies and are used in intracellular digestion.
- Storage of macromolecules such as glycogen in liver cells and starch in plants cells.

any three for
1 mark each

2. Describe **two** ways in which enzymes are used during DNA replication.

(2 marks)

- **An enzyme causes adjacent nucleotides to join / reforms the backbone.**
- **An enzyme causes the hydrogen bonds to break between the complementary bases / unzips the DNA molecule.**
- **An enzyme ensures the correct base sequence in the new DNA strand.**
- **An enzyme joins complementary bases / allows complementary base pairing to occur.**
- **An enzyme unwinds / uncoils DNA.**
- **An enzyme proofreads or edits DNA.**

} **any two for
1 mark each**

3. Two digestive enzymes produced by two different glands act on the same substrate. Both enzymes function optimally at a pH of 7.1 to 8.4 and a temperature of 37°C.

a) Describe the similarity of the enzymes' structures and explain why this affects their ability to act on the same substrate.

(2 marks)

- The tertiary structure is the same. } either one for
- The active sites will both be the same shape. } 1 mark
- The substrate can lock into either active site due to similar shapes. } either one for
- The substrate and enzyme are complementary. } 1 mark

b) What would happen to the rate of the reaction above if the pH was changed to 3.0? Explain your answer.

(2 marks)

- The reaction would stop / slow down. (1 mark)
- AND
- The enzyme would be denatured.
 - The substrate would no longer be able to fit into the active site.
 - The bonds between the R-groups would be disrupted.
 - The shape of the enzyme is changed.
- } any one for
1 mark

4. Describe **two** digestive reactions which occur as a result of pancreatic secretions. **(4 marks)**

- **Proteins are converted to peptides (1 mark) due to the action of trypsin (1 mark).**
- **Starch is converted to maltose (1 mark) due to the action of amylase (1 mark).**
- **Fats are converted to fatty acids and glycerol (1 mark) due to the action of lipase (1 mark).**
- **Nucleic acids are converted to nucleotides (1 mark) due to the action of nucleases (1 mark).**
- **Sodium bicarbonate neutralizes acidic pH to become more suitable for enzyme action in the duodenum. (1 mark)**
- **Water is added for the hydrolytic reactions which occur in the duodenum. (1 mark)**

5. Describe the location of each of the following fetal structures and explain their function in fetal circulation. **(6 marks: 2 marks each)**

oval opening:

- **located between the right and left atria (1 mark)**

AND

- **allows blood to bypass the non-functioning lungs**
 - **allows oxygenated blood in the right atrium to enter the systemic system**
- } **either one for 1 mark**

venous duct:

- **located in the liver**
 - **connected to the vena cava**
 - **connected to the umbilical vein**
 - **located between the umbilical vein and the posterior vena cava in the liver**
 - **allows oxygenated blood returning from placenta to enter the systemic circulatory system**
 - **allows blood to bypass the liver**
- } **any one for 1 mark**
- } **either one for 1 mark**

umbilical arteries:

- **connected to the placenta**
 - **located in the umbilical cord**
 - **located between the aorta and the placenta**
 - **carry wastes to the placenta**
 - **carry deoxygenated blood to be oxygenated**
 - **join the fetal circulatory system with the placenta**
- } **any one for 1 mark**
- } **any one for 1 mark**

6. Describe the events that lead to inhalation after stimulation by the respiratory centre. **(4 marks)**

- **rib muscles (intercostals) contract / ribs move up and out**
- **diaphragm contracts / flattens**
- **this increases the thoracic volume**
- **negative pressure is created**
- **air pulled into negative pressure (or into larger unoccupied volume)**

**any four for
1 mark each**

END OF KEY