Biology 12

August 2005 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.	A	K	1	1	A1	35.	A	U	1	3	I9
2.	A	U	1	1	A1	36.	A	K	1	3	J8
3.	B	H	1	1	A2	37.	D	K	1	3	J1
4.	D	U	1	1	A1	38.	A	U	1	3	J1
5.	B	H	1	1	A2	39.	C	K	1	3	J1
6.	D	K	1	1	C2	40.	D	H	1	3	J1
~~7.~~	~~C~~	~~U~~	~~1~~	~~1~~	~~B1~~	41.	D	U	1	3	J2
8.	C	U	1	1	B1	42.	A	U	1	3	J6
9.	D	H	1	1	B3	43.	C	H	1	3	K6
10.	A	K	1	1	C2	44.	B	H	1	3	K6
11.	D	U	1	1	C3	45.	C	K	1	3	L1
12.	A	U	1	1	C8	46.	C	K	1	3	L1
13.	A	U	1	1	D1	47.	C	U	1	3	L1
14.	B	U	1	1	D2	~~48.~~	~~D~~	~~H~~	~~1~~	~~3~~	~~L8~~
15.	B	H	1	1	D2	49.	B	K	1	3	M2
16.	A	K	1	1	D2	50.	B	U	1	3	M2
17.	D	U	1	2	E1	51.	D	U	1	3	M8
18.	B	H	1	2	E1	52.	C	K	1	3	N4
19.	D	U	1	2	E1	53.	D	U	1	3	N4
20.	A	K	1	2	E3	54.	A	U	1	3	N4
21.	B	U	1	2	G1	55.	B	K	1	3	O1
22.	C	U	1	2	G5	56.	A	U	1	3	O1
23.	C	H	1	2	G5	57.	C	H	1	3	O2
24.	A	U	1	2	G6	58.	D	K	1	3	O2
25.	B	U	1	2	H7	59.	B	H	1	3	O2
26.	C	U	1	2	G6	60.	D	U	1	3	O5
27.	A	U	1	2	G7	61.	A	K	1	3	P1
28.	B	U	1	2	H1	62.	D	H	1	3	P5
29.	A	H	1	2	H1	63.	B	U	1	3	P2
30.	D	K	1	2	H6	64.	B	K	1	3	P3
31.	D	K	1	3	I1	65.	C	K	1	3	P6
32.	B	K	1	3	I1	66.	C	H	1	3	P10
33.	C	H	1	3	I1	67.	C	U	1	3	P10
34.	D	H	1	3	I6						

Part B: Written Response

Q	C	S	CO	PLO
1.	U	2	2	H2
2.	U	4	2, 3	H6; I4, 2
3.	U	4	3	J4
4.	U	3	3	L3
5.	U	4	3	M3
6.	U	3	3	O1, 2, 5
7.	U	3	3	P11

Written Response = 23 marks

Multiple Choice	=	67 (67 questions)
Written Response	=	23 (7 questions)
EXAMINATION TOTAL	**=**	**90 marks**

LEGEND:

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

PART B: WRITTEN RESPONSE

Value: 23 marks **Suggested Time: 40 minutes**

1. A person is diagnosed with hypothyroidism, a condition in which an insufficient amount of thyroxin is present in the bloodstream. Explain how the breathing rate is affected by the decreased secretion of thyroxin. **(2 marks)**

- **Without sufficient thyroxin, insufficient metabolism will occur in body cells. (1 mark)**

AND

- **Less carbon dioxide is produced.**
- **Breathing rate is decreased since carbon dioxide concentration triggers the medulla oblongata.**
- **Cell respiration requires oxygen, so less oxygen is required by cells.**

any one for 1 mark

2. Using **two** examples, explain why correct pH is important for the efficient functioning of digestive enzymes. **(4 marks)**

- **Correct pH is required so the enzyme does not denature (1 mark) allowing it to join to its substrate molecule (1 mark).**

AND

Examples:

- **Pepsin requires an acidic pH of 1–2 to catalyze the breakdown of protein into peptides. (1 mark)**
- **Any enzyme correctly matched to its correct pH. (1 mark)**

3. How does the chemical composition of the blood in the aorta differ from that of the blood in the pulmonary trunk? **(4 marks)**

- **The blood in the aorta contains higher concentrations of oxyhemoglobin.**
- **The blood in the aorta contains lower concentrations of bicarbonate ions.**
- **The blood in the aorta contains lower concentrations of reduced hemoglobin.**
- **The blood in the aorta contains lower concentrations of carbaminohemoglobin.**
- **The blood in the aorta contains lower concentrations of dissolved carbon dioxide.**
- **The blood in the aorta is slightly more basic.**

any four for 1 mark each

Note to markers:
1 mark only for each valid difference.

4. Explain **three** ways in which the alveoli are well suited to their function. **(3 marks)**

- **There are many alveoli to increase surface area.**
- **Lipoproteins prevent the alveoli from collapsing.**
- **Alveoli are one cell layer thick to increase the rate of diffusion.**
- **Alveoli are highly vascularized to facilitate external respiration.**

any three for 1 mark each

5. Describe the upswing and downswing of an action potential with respect to membrane polarity and movement of ions. **(4 marks: 2 marks each)**

upswing:

- **Sodium gates open allowing sodium ions to diffuse into the axoplasm. (1 mark)**
- **Depolarization results in a change in the polarity across the membrane from –65 mV to +40 mV. (1 mark)**

downswing:

- **Potassium gates open allowing potassium ions to diffuse from the inside to the outside of the axoplasm. (1 mark)**
- **Repolarization results in a change in the polarity across the membrane from +40 mV to –65 mV. (1 mark)**

6. Explain how the conditions in the renal medulla result in the production of urine which is hypertonic to blood. **(3 marks)**

- **The renal medulla contains a high concentration of Na^+, Cl^- and urea making it hypertonic to the filtrate.**
- **When the filtrate passes through the renal medulla, water moves from the filtrate into the renal medulla where the peritubular network absorbs it.**
- **The filtrate, having lost water, is now hypertonic to body fluids.**
- **ADH causes water reabsorption from the collecting duct making urine more hypertonic.**

any three for 1 mark each

7. Describe the events which initiate and control the secretion of oxytocin. **(3 marks)**

- **When the fetus reaches the cervix, oxytocin is released. (1 mark)**

AND

- **Oxytocin is produced in the hypothalamus.**
- **Oxytocin is stored and released from the posterior pituitary gland.**
- **Oxytocin causes an increase in uterine contractions.**
- **This results in an increase in the release of oxytocin (positive feedback loop).**

any two for 1 mark each

END OF KEY