

Biology 12
 August 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	26.	C	U	3	J11
2.	B	U	1	A1	27.	C	U	3	J12
3.	C	U	1	A2	28.	D	K	3	K1
4.	D	K	1	B1	29.	C	K	3	K1
5.	C	H	1	B3	30.	D	U	3	K2
6.	B	H	1	C5, 1	31.	D	U	3	L1
7.	B	U	1	C10	32.	A	U	3	L3
8.	A	H	2	E1	33.	D	U	3	L7
9.	D	K	2	F1	34.	A	H	3	L7
10.	A	U	2	F1	35.	D	U	3	L8
11.	C	K	2	F3	36.	B	U	3	M2
12.	C	K	3	G1	37.	D	U	3	M3
13.	C	U	2	G3, 5	38.	C	K	3	M4
14.	A	H	2	G6	39.	A	U	3	M5, 6
15.	D	U	2	H1	40.	C	H	3	N3
16.	A	U	2	H2	41.	D	U	3	N4
17.	B	U	2	H6	42.	C	U	3	O1, 2
18.	C	H	2	H6	43.	D	H	3	O2
19.	B	U	3	I2	44.	B	H	3	O2, 3
20.	A	K	3	I6	45.	C	H	3	O4, 5
21.	A	K	3	I7	46.	C	K	3	P1
22.	D	U	3	I10	47.	C	K	3	P4
23.	B	H	3	J2; L7, 8	48.	C	U	3	P6
24.	A	U	3	J2	49.	D	K	3	P7
25.	B	K	3	J7	50.	D	K	3	P12

Multiple Choice = 50 marks

Part B: Written Response

Q	B	C	S	CO	PLO
1.	1	U	4	1	A1, 2
2.	2	U	3	1, 2	C11, G1, 3
3.	3	K	3	1	D5
4.	4	U	3	2	E3, 4
5.	5	U	4	2	H3
6.	6	U	5	3	I2, 7, 9
7.	7	H	6	3	I2, L8, O1
8.	8	U	6	3	J5
9.	9	U	4	3	M5, 6
10.	10	H	2	3	M5, 6, 7
11.	11	U	4	3	O2, 5
12.	12	K	6	3	P1, 7, 11

Written Response = 50 marks

Multiple Choice = 50 (50 questions)

Written Response = 50 (12 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

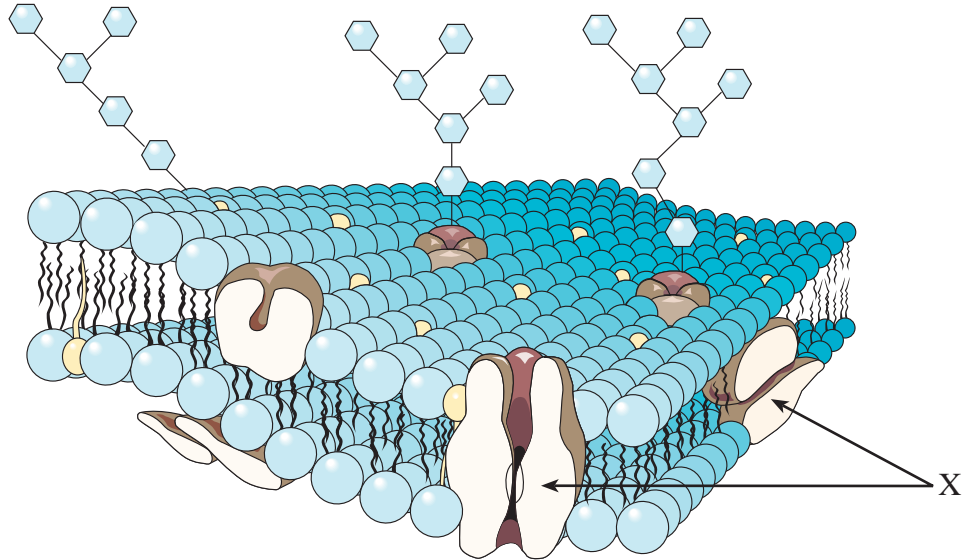
- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination.
 2. Write your answers in the space below the questions.
 3. Organization and planning space has been incorporated into the space allowed for answering each question.
 4. You may not need all of the space provided to answer each question.

1. Explain the functional relationship between rough endoplasmic reticulum, Golgi bodies, chromosomes and vesicles. **(4 marks)**

- **Chromosomes contain the DNA code for proteins.**
- **Ribosomes or rough endoplasmic reticulum are sites of protein production.**
- **Endoplasmic reticulum temporarily stores proteins coded by the DNA of the chromosome.**
- **Vesicles transport proteins to Golgi bodies.**
- **Golgi bodies receive proteins from vesicles and repackage these proteins into new vesicles.**
- **The proteins in these new vesicles are either exported or used within the cell as a lysosome.**

**any four for
1 mark each**

Use the following diagram to answer question 2.



2. a) Identify the molecules labelled **X**.

(1 mark)

• **Protein.** (1 mark)

b) Name **two** processes by which these molecules function in order to move materials.

(2 marks)

- **Diffusion.**
 - **Active transport.**
 - **Facilitated transport.**
- } any two for
1 mark each

3. List **three** ways in which mRNA is different from DNA.

(3 marks)

mRNA

- **Uracil.**
- **Shorter.**
- **Ribose sugar.**
- **Single stranded.**
- **More abundant.**
- **Moves out of the nucleus (into the cytoplasm).**

} **any three for
1 mark each**

4. a) Give **one** example of an environmental mutagen.

(1 mark)

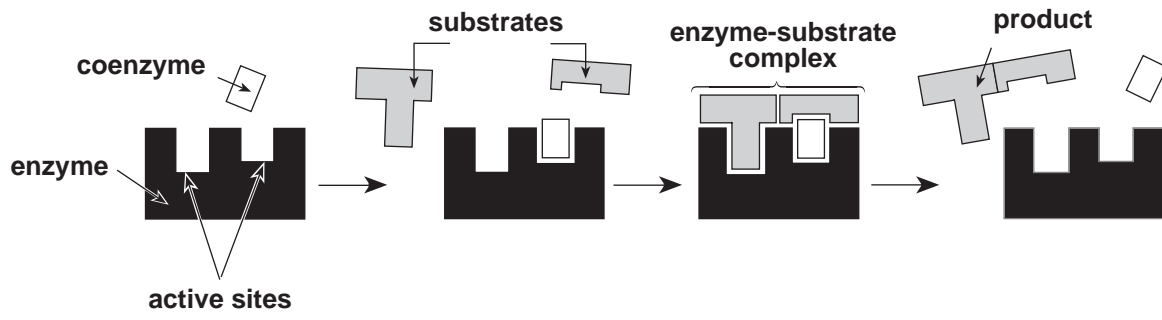
- **Viruses.**
 - **Radiation.**
 - **Chemicals.**
- } **any one for
1 mark**

b) Explain how a mutagen could change the mRNA produced in a cell.

(2 marks)

- **The DNA is altered by addition, deletion or substitution of nucleotides. (1 mark)**
- **A different sequence will be transcribed resulting in altered codons. (1 mark)**

5. Draw a labelled diagram to illustrate the “lock and key” model of enzymatic action. (4 marks)



6. a) Name the **three** glands that secrete enzymes that digest carbohydrates.

(3 marks)

- **Pancreas. (1 mark)**
- **Salivary glands. (1 mark)**
- **Intestinal glands. (1 mark)**

b) Name the structure in the small intestine that absorbs the products of carbohydrate digestion.

(1 mark)

- **Villus. (1 mark)**

c) Where does the body store the excess products of carbohydrate digestion?

(1 mark)

- **Fat.**
 - **Liver.**
 - **Muscle.**
- } **any one for
1 mark**

7. The maintenance of optimum pH is essential to living systems. Give **three** different locations in the body where pH is regulated and explain how it is maintained.
(6 marks: 1 mark each for locations; 1 mark each for explanations)

The student could indicate 3 of the following:

Location: • **duodenum** } **either one for**
 • **digestive system** } **1 mark**

Explanation:

• **Secretion of sodium bicarbonate occurs to neutralize acid chyme thus maintain optimum pH. (1 mark)**

Location: • **capillaries** } **either one for**
 • **respiratory system** } **1 mark**

Explanation:

• **Hemoglobin acts as a buffer by absorbing H^+ ions in order to maintain optimum blood pH. (1 mark)**

Location: • **kidney** } **either one for**
 • **nephron** } **1 mark**

Explanation:

• **If blood is too acidic, hydrogen ions are excreted and bicarbonate ions are reabsorbed.**

• **If blood is too alkaline, fewer hydrogen ions are excreted and fewer sodium and bicarbonate ions are reabsorbed.**

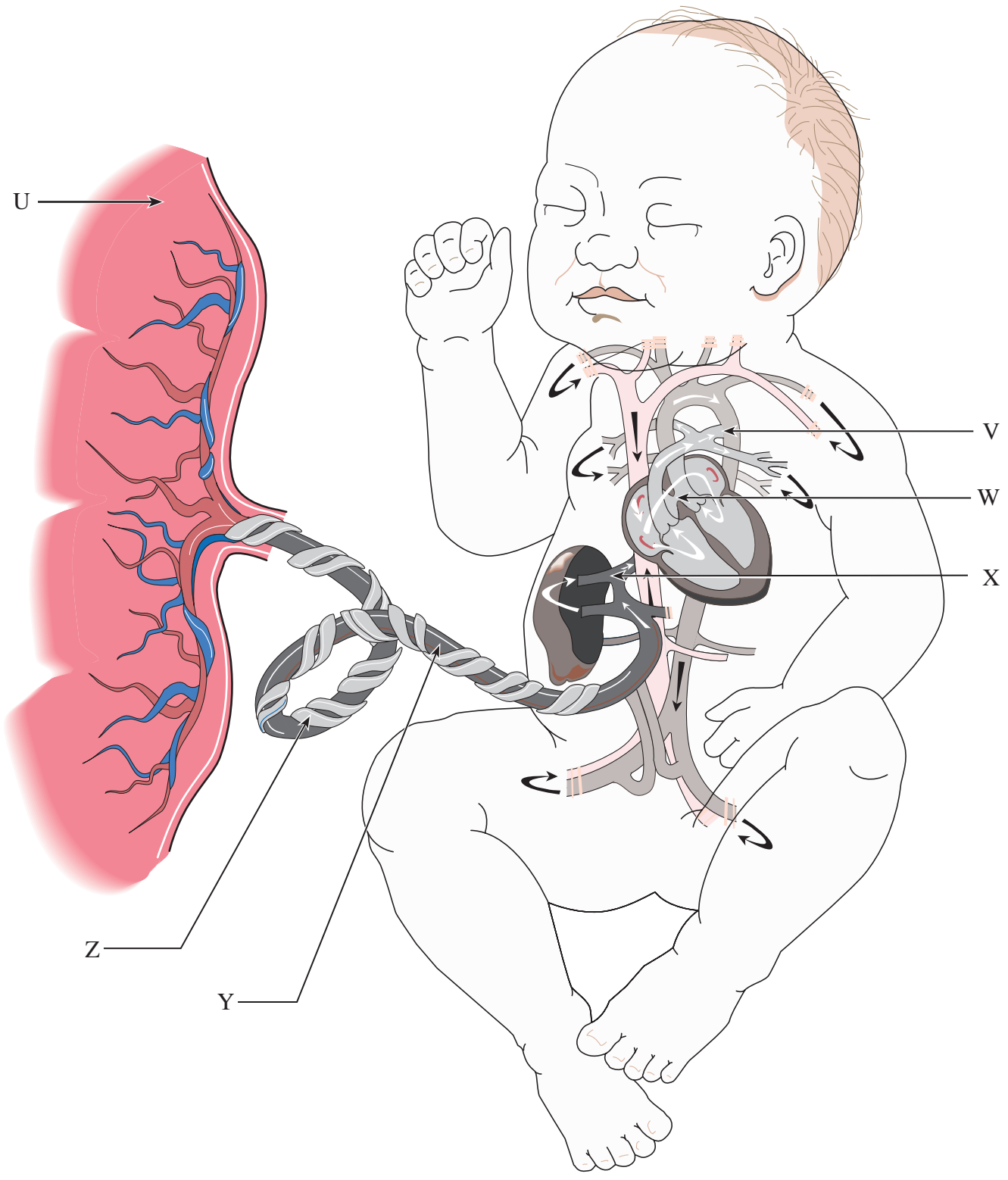
} **either one for 1 mark**

Location: • **stomach (1 mark)**

Explanation:

• **Secretion of HCl produces an acidic environment in order to maintain optimum pH. (1 mark)**

8. Name any **three** fetal structures indicated by the letters. Give **one** function for each structure that you name. (6 marks: 1 mark each for names; 1 mark each for functions)



The student could indicate 3 of the following:

Letter: U

Name: **placenta**

Function: **Exchanges wastes for nutrients with the mother's blood.**

Letter: V

Name: **arterial duct**

Function: **Diverts blood from the lungs.**

Letter: W

Name: **oval opening**

Function: **Diverts blood from the lungs.**

Letter: X

Name: **venous duct**

Function: **Joins the umbilical vein to the vena cava.**

Letter: Y

Name: **umbilical vein**

Function: **Carries blood from the placenta (brings nutrients).**

Letter: Z

Name: **umbilical artery**

Function: **Carries blood to the placenta (takes wastes).**

9. Explain how a nerve impulse travels from one neuron to another.

(4 marks)

- **Diffusion of Ca^{2+} ions into presynaptic ending.**
- **Contractile proteins pull synaptic vesicles to presynaptic membrane.**
- **Neurotransmitter is released from synaptic vesicles (exocytosis).**
- **Neurotransmitter diffuses across synaptic cleft.**
- **Neurotransmitter binds to receptor sites on post synaptic membrane causing it to depolarize.**
- **Neurotransmitter is destroyed by an enzyme.**

**any four for
1 mark each**

10. Describe **two** ways in which a drug could block transmission of an impulse at the synapse.

(2 marks)

- **Could inhibit release of neurotransmitter.**
- **Could destroy neurotransmitter in the synaptic cleft.**
- **Could occupy receptor sites on post-synaptic membrane (acts as a competitive inhibitor).**
- **Could block uptake of Ca^{2+} ions by the presynaptic membrane.**
- **Could interfere with formation of neurotransmitter or vesicles.**

**any two for
1 mark each**

11. Describe the process by which each of the following affects the composition of filtrate in the nephron. **(4 marks: 2 marks each)**

Proximal Tubule:

- **Selective reabsorption.**
- **Glucose is actively transported into the blood.**
- **Fatty acids and glycerol are actively transported into the blood.**
- **Water is reabsorbed passively by osmosis.**
- **Na⁺ ions are actively transported into the blood.**
- **Cl⁻ ions are passively reabsorbed by the blood.**

} any two for
1 mark each

Loop of Henle:

- **Counter-current exchange.**
- **Na⁺ ions are transported out of the ascending limbs by active transport (Cl⁻ follows passively).**
- **There is increasing salt concentration in the medulla.**
- **The tissue surrounding the descending limbs is saltier and H₂O is drawn out of the nephron.**

} any two for
1 mark each

12. a) Give **two** functions for each of the following structures.

(4 marks: 2 marks each)

Testes:

- **Produce sperm. (1 mark)**
- **Produce testosterone. (1 mark)**

Ovaries:

- **Release egg(s).**
 - **Mature egg(s).**
 - **Secrete estrogen.**
 - **Secrete progesterone.**
- } **any two for
1 mark each**

b) Name the hormone that is involved in a positive feedback loop and explain **one** of its functions.

(2 marks)

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

Function:

- **Causes expression of milk by mammary glands.**
- **Causes the smooth muscles of the uterus to contract and these contractions increase the release of more oxytocin from the posterior pituitary.**

} **either one for
1 mark**

END OF KEY