

**AUGUST 1995 BIOLOGY 12 PROVINCIAL EXAMINATION  
ANSWER KEY / SCORING GUIDE**

**TOPICS**

CORE:		1.	Methods and Principles
		2.	Cells
		3.	Humans VII, VIII, IX
		4.	Humans X, XI, XII
OPTIONS: (Choose <b>two</b> of six)	}	5.	Section I: Immunology
		6.	Section II: Skeletal System and Muscles
		7.	Section III: Reproduction and Embryology
		8.	Section IV: Genetic Disorders and Engineering
		9.	Section V: Cancer
		10.	Section VI: Sensory Receptors

**PART A: MULTIPLE-CHOICE**

Q	C	T	K	S	CGR	Q	C	T	K	S	CGR
1.	U	2	A	1	III C 2	27.	U	3	C	1	IX C 3
2.	K	2	C	1	III C 8	28.	K	3	C	1	IX A 2
3.	U	2	B	1	III C 1	29.	K	3	C	1	IX F 6
4.	K	2	C	1	III D 1	30.	H	3	B	1	IX B 2
5.	U	2	A	1	III D 5	31.	U	3	A	1	IX C 1
6.	U	2	B	1	III C 3	32.	U	4	C	1	XD 1
7.	H	2	A	1	VD 3	33.	H	4	C	1	XD 3
8.	U	2	B	1	IV B 1, 2	34.	U	4	D	1	XE 1
9.	K	2	C	1	III C 3, 4	35.	H	4	B	1	XB 3
10.	U	2	B	1	VB 2, 5	36.	U	4	D	1	XI A 1
11.	H	2	A	1	VA 3	37.	K	4	A	1	XI A 1
12.	U	2	C	1	VA 5	38.	K	4	B	1	XI G 1
13.	H	2	B	1	VB 5	39.	K	4	A	1	XI H 1
14.	U	2	B	1	III E 2	40.	U	4	C	1	XI H 1
15.	K	2	A	1	III E 2	41.	K	4	D	1	XI H 1
16.	K	2	A	1	IV B 1	42.	H	4	C	1	XI I 2,3
17.	U	2	B	1	VI C 2	43.	K	4	C	1	XII C 1
18.	U	3	A	1	VIII A 7	44.	U	4	A	1	XII C 1
19.	U	3	A	1	VIII A 8	45.	U	4	C	1	XII C 1
20.	U	3	D	1	IX F 4	46.	H	4	D	1	XII A 10
21.	U	3	B	1	VIII A 2	47.	K	4	D	1	XII C 1
22.	U	3	C	1	VIII A 10	48.	K	4	C	1	XII A 3
23.	H	3	B	1	IX F 5	49.	H	4	D	1	XII C 1
24.	U	3	D	1	IX A 2	50.	U	4	D	1	XII B 3, C 1
25.	K	3	B	1	IX F 4	51.	K	4	A	1	XII C 1
26.	K	3	A	1	IX B 1	52.	H	4	A	1	XII C 1

**PART B: WRITTEN-RESPONSE**

<b>Q</b>	<b>B</b>	<b>C</b>	<b>T</b>	<b>S</b>	<b>CGR</b>
1.	1	U/H	2	5	V A 2
2.	2	K	2	3	VI E 1
3.	3	U	2	3	IV B 1
4.	4	K	3	4	VII 1
5.	5	U	3	4	VIII A 2,4,8,9
6.	6	U	4	5	XC 1
7.	7	U	4	4	XII A 3

**Core written–response total = 28 marks**

**PART C: OPTIONS —Score only 2 out of 6 boxes (sections) from box 8 to box 13.**

	<b>Q</b>	<b>B</b>	<b>C</b>	<b>T</b>	<b>S</b>	<b>CGR</b>
Section I	1–3	8	K/U	5	10	Option I
Section II	1–3	9	K/U	6	10	Option II
Section III	1–3	10	K/U	7	10	Option III
Section IV	1–3	11	K/U	8	10	Option IV
Section V	1–3	12	K/U	9	10	Option V
Section VI	1–3	13	K/U	10	10	Option VI

**Option Section written–response total = 20 (2 x 10)**

Multiple–choice = 52 (52 questions)

Written–response = 48 (7 questions and 2 option sections)

**Total = 100 marks**

**LEGEND:**

**Q** = Question

**C** = Cognitive level

**T** = Topic

**K** = Keyed response

**S** = Score

**CGR** = Curriculum Guide Reference

**B** = Score box number

**PART B: WRITTEN-RESPONSE**

**Value: 28 marks**

**Suggested Time: 50 minutes**

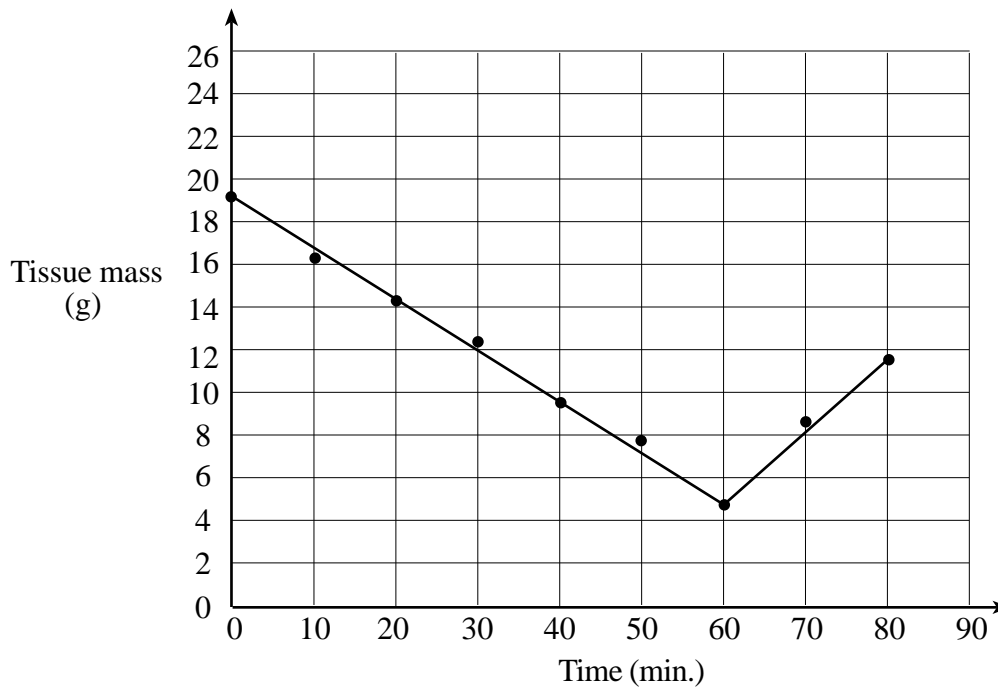
- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination.
  2. Write your answers in the space below the questions.
  3. Organization and planning space has been incorporated into the space allowed for answering each question.
  4. You may not need all of the space provided to answer each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

1. Plant tissue was placed in starch a solution. The following data were gathered over an 80 minute period.

Time (min.)	0	10	20	30	40	50	60	70	80
Tissue mass (g)	20	17	15	13	10	8	5	9	12

a) Plot the data on the graph provided.

**(1 mark)**



b) Explain the process occurring in the plant tissue between 0 and 60 minutes.

**(2 marks)**

**Name a process:** Osmosis occurs.

$\frac{1}{2}$  mark

**Explanation:** The water left the cells because the environment was hypertonic.

$1\frac{1}{2}$  mark

- c) Name the substance that was added to the solution at 60 minutes and explain how this substance caused the change illustrated on the graph. **(2 marks)**

**Substance: Water 1 mark**

**Explanation: Adding water made the environment hypotonic to the plant tissue which caused water to enter the tissue. 1 mark**

2. Explain how the following environmental factors would increase the rate of photosynthesis.

a) Increased light intensity:

**(1 mark)**

- **causes more electrons to become excited for cyclic and non-cyclic photophosphorylation**

b) Warmer temperatures:

**(1 mark)**

- **cause the enzyme rate of activity to increase**
  - **may cause denaturation if too hot**
- } **any one for 1 mark**

c) Increased carbon dioxide (CO<sub>2</sub>) concentration:

**(1 mark)**

- **the rate of CO<sub>2</sub> conversion to PGAL in the Calvin cycle**
  - **more PGA is formed**
  - **more CO<sub>2</sub> fixation**
- } **any one for 1 mark**

3. Name a cellular process for which each of the following organelles is **primarily** responsible.  
(3 marks: 1 mark each)

a) Chloroplasts:

- **photosynthesis**

b) Mitochondria:

- **aerobic cellular respiration**
  - **aerobic respiration**
- } any one for  
1 mark

c) Lysosomes:

- **intracellular digestion**
  - **autodigestion / autolysis**
- } any one for  
1 mark

4. Name the **four** major tissue types of the human body, and give **one** specific location of each.  
(4 marks:  $\frac{1}{2}$  mark for name and  $\frac{1}{2}$  mark for example)

**Tissue Type 1:** • epithelial tissue

**Location:** • lining of lungs

**Tissue Type 2:** • connective tissue

**Location:** • tendons, bones, blood

**Tissue Type 3:** • muscular tissue

**Location:** • smooth muscle  
• digestive tracts

**Location:** • cardiac muscle  
• heart

**Location:** • skeletal muscle  
• give location or name specific muscle

**Tissue Type 4:** • nervous tissue

**Location:** • brain  
• spinal cord

5. Give **one** role for each of the following in the digestive system. **(4 marks: 1 mark each)**

a) Pyloric sphincter:

- **It holds food in the stomach as digestion progresses.**
- **Controls the amount of chyme entering the duodenum.**
- **It prevents back flow of chyme into the stomach.**

b) Villi:

- **They increase the surface area of the small intestine for the absorption of nutrients.**
- **They absorb any unit molecules, monosaccharides, amino acids, etc.**

c) Peristalsis:

- **Peristalsis is the rhythmic contraction that moves food down the digestive tract.**

d) *E. coli*:

- **The bacteria breakdown some previously undigested material in the large intestine.**
- **These bacteria also produce vitamins, amino acids, and other growth factors.**



6. The reflex arc consists of five distinct components. List each one and give **one** function for each component. (5 marks:  $\frac{1}{2}$  mark for component and  $\frac{1}{2}$  mark for function)

**Component 1:** • receptor or sensory receptor

**Function:** • receives stimuli  
• produces nerve impulse (initial)

**Component 2:** • sensory neuron

**Function:** • takes nerve impulse to interneuron / association neuron

**Component 3:** • interneuron / association neuron

**Function:** • relays impulse to motor neurons

**Component 4:** • motor neurons

**Function:** • takes nerve impulse to effector or muscle or gland

**Component 5:** • effector or muscle or gland

**Function:** • muscle or gland that responds to impulse

7. State specifically where each of the following endocrine glands is located. You may use a diagram to support your answer. **(4 marks: 1 mark each)**

a) Pituitary gland:

- **In the base of the brain.**
- **Attached to hypothalamus.**

b) Thyroid gland:

- **In the neck surrounding the larynx. (Adams apple, voice box)**

c) Pancreas:

- **Below the stomach, stretching across from one side to the other.**
- **Abdomen ( $\frac{1}{2}$  mark)**

d) Testis:

- **They are suspended in the scrotal sac in the groin area.**

## PART C: OPTIONAL AREAS

Value: 20 marks

Suggested Time: 30 minutes

### INSTRUCTIONS:

1. Choose **two** sections from the optional areas in this part of the examination.
2. Answer **all** of the questions in each section that you choose.
3. If you answer questions in more than two sections, only the **first two** sections will be marked.
4. You may not need all of the space provided to answer each question.

OPTION I: IMMUNOLOGY

OPTION II: SKELETAL SYSTEM AND MUSCLES

OPTION III: REPRODUCTION AND EMBRYOLOGY

OPTION IV: GENETIC DISORDERS AND ENGINEERING

OPTION V: CANCER

OPTION VI: SENSORY RECEPTORS

**OPTION I: IMMUNOLOGY**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
passive immunity	
secondary immune response	a) results from first contact with antigen <u>primary immune response</u>
interferon	b) prevents virus from entering surrounding cells <u>interferon</u>
histamine	c) matures in the thymus gland <u>T cell</u>
T cell	d) produces antibodies <u>B cell</u>
B cell	e) constricts air passageways <u>histamine</u>
primary immune response	f) results from a booster shot <u>secondary immune response</u>
neutrophil	

2. Define *autoimmune disease* and give **one** example. **(2 marks)**

**Definition:**      **Antibodies acting against the body's own tissue.**

**Example:**      **Multiple sclerosis, rheumatoid arthritis, etc.**

3. a) List **two** places other than the blood where macrophages can be found. **(1 mark)**

- **lymph**       $\frac{1}{2}$  mark
- **tissue fluid**       $\frac{1}{2}$  mark

b) List **two** things that macrophages engulf. **(1 mark)**

- **bacteria/viruses**       $\frac{1}{2}$  mark
- **dead tissue/debris**       $\frac{1}{2}$  mark

**OPTION II: SKELETAL SYSTEM AND MUSCLES**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
cartilage	
tendon	a) a contractile unit of actin and myosin <u>sarcomere</u>
ligament	b) a freely moving joint <u>synovial</u>
sarcomere	c) cell membrane in muscles <u>sarcolemma</u>
creatine phosphate	d) source of energy for muscle cells <u>creatine phosphate</u>
sarcolemma	e) attaches muscle to bone <u>tendons</u>
skeletal muscle	f) found in ears and tip of the nose <u>cartilage</u>
synovial	

2. a) List **two** characteristics of smooth muscle. **(1 mark: ½ mark each)**

- **lacks striations**
  - **spindle shaped cells**
  - **involuntary**
- } any two for  
½ mark each

b) State a place in the human body where smooth muscle is located. **(1 mark)**

- **line digestive tract, uterus, diaphragm, etc.** } any one for 1 mark

3. Define *Haversian canals* and state their function. **(2 marks)**

- **They are hollow canals located in compact bone, or bone.** **1 mark**
- **They house nerve fibres and blood vessels.** **1 mark**

**OPTION III: REPRODUCTION AND EMBRYOLOGY**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. (6 marks)

COLUMN A	COLUMN B
acrosome	
corpus luteum	a) stimulates secretions from the corpus luteum <u>luteinizing hormone</u>
luteinizing hormone	b) causes the endometrium to thicken <u>estrogen</u>
estrogen	c) an organ of copulation <u>vagina</u>
vagina	d) contains enzymes necessary to penetrate egg <u>acrosome</u>
urethra	e) area for maturation of sperm <u>epididymis</u>
epididymis	f) secretes testosterone <u>interstitial cell</u>
interstitial cell	

2. Name **four** different methods of birth control. (2 marks:  $\frac{1}{2}$  mark each)

- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li>• vasectomy</li> <li>• tubal ligation</li> <li>• pill</li> <li>• IUD</li> <li>• diaphragm</li> <li>• condoms</li> <li>• coitus interruptus</li> </ul> | <ul style="list-style-type: none"> <li>• abstinence</li> <li>• sponge</li> <li>• rhythm</li> <li>• abortion</li> <li>• douche</li> <li>• morning after pill (RU #486)</li> </ul> | } | <p>any four for<br/><math>\frac{1}{2}</math> mark each</p> |
|--|--|---|--|

3. List **two** differences that distinguish fetal development from embryonic development. (2 marks: 1 mark each)

- Sex organs are not distinguished in the embryo.
- Heart beat is not loud enough to be heard in the embryo.
- First two months involve embryonic development; and the last seven involve fetal development.
- Embryonic development in humans is the same as that of many mammals, whereas fetal development is distinguishable as human.
- Morphogenesis occurs in the embryo.

### OPTION IV: GENETIC DISORDERS AND ENGINEERING

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
conjugation	
transformation	a) used to produce new plant varieties <span style="float: right;"><u>protoplast</u></span>
transduction	b) cloned gene fragment <span style="float: right;"><u>DNA probe</u></span>
amniocentesis	c) extrachromosomal DNA in bacteria <span style="float: right;"><u>plasmid</u></span>
trisomy XYY	d) one bacterium donates DNA <b>directly</b> to another bacterium <span style="float: right;"><u>conjugation</u></span>
DNA probe	e) when bacteria pick up DNA released from dead cells <span style="float: right;"><u>transformation</u></span>
plasmid	f) DNA carried to a new cell by a virus <span style="float: right;"><u>transduction</u></span>
protoplast	

2. Name **two** processes which occur during the **interphase** stage of the cell cycle. **(2 marks: 1 mark each)**

- **DNA replication**
- **centrioles duplicate**
- **cellular metabolism (protein synthesis)**

3. Give **one** example of a biological safeguard and **one** example of a physical safeguard used by scientists when they carry out genetic engineering experiments. **(2 marks: 1 mark each)**

- Biological:**
- vaccination
  - type of viral or bacteria host that is used
- Physical:**
- a negative pressure laboratory
  - protective clothing (suits, goggles, etc.)

**OPTION V: CANCER**

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
vascularization	
lymph	a) disorganized growth of cells <span style="float: right;"><u>anaplasia / carcinoma</u></span>
oncogene	b) body fluid containing leukocytes <span style="float: right;"><u>lymph</u></span>
interleukin	c) an immune system booster <span style="float: right;"><u>interleukin</u></span>
anaplasia	d) cancer of connective tissue <span style="float: right;"><u>sarcomas</u></span>
metastasis	e) DNA that makes cell cancerous <span style="float: right;"><u>oncogene</u></span>
carcinoma	f) causes secondary tumours to form <span style="float: right;"><u>metastasis</u></span>
sarcoma	

2. Give **four** characteristics that distinguish cancer cells from normal cells. **(2 marks:  $\frac{1}{2}$  mark each)**

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• <b>tend to be mobile</b></li> <li>• <b>loss of contact inhibition</b></li> <li>• <b>continue to divide</b></li> <li>• <b>non differentiated</b></li> <li>• <b>altered cell membrane</b></li> <li>• <b>less cell-to-cell communication</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>microfilaments altered</b></li> <li>• <b>grow in multiple layers</b></li> <li>• <b>multi-nucleated</b></li> <li>• <b>abnormal number of chromosomes</b></li> <li>• <b>abnormal amount of cytoplasm</b></li> <li>• <b>abnormal mitosis</b></li> </ul> | } <b>any four for <math>\frac{1}{2}</math> mark each</b> |
|---|--|--|

3. a) What is the role of a promoter substance? **(1 mark)**

- **It speeds the development of cancer.**

b) Give **one** example of a promoter substance. **(1 mark)**

- **cigarette smoke**
- **asbestos fibres**
- **UV light**
- **radiation**



### OPTION VI: SENSORY RECEPTORS

1. Select a term from column **A** that matches its description given in column **B**. Write the term in the blank beside each description. Each term may be used **only** once, and not all the terms will be used. **(6 marks)**

COLUMN A	COLUMN B
sour receptors	
mechanoreceptors	a) most are located at the back of the tongue <u><b>bitter receptors</b></u>
proprioceptors	b) found on the retina <u><b>photoreceptors</b></u>
photoceptors	c) many are found in the nasal cavity <u><b>olfactory receptors</b></u>
thermoreceptors	d) sensitive to the flow of heat <u><b>thermoreceptors</b></u>
olfactory receptors	e) most are located at the front of the tongue <u><b>salt receptors</b></u>
bitter receptors	f) many are found in the inner ear <u><b>mechanoreceptors</b></u>
salt receptors	

2. Explain why some people may not be able to see in colour but are able to see in black and white. **(2 marks)**

- **Cones of all types are missing.**
- **Only rods are present on retina.**
- **Deficiency of cone cells.**

3. Give the location and explain the function of ossicles. **(2 marks: 1 mark each)**

- Location:** • **They are located in the middle ear.**
- Function:** • **They transfer and magnify vibrations of the eardrum to oval window.**

**END OF KEY**