

JUNE 1996

PROVINCIAL EXAMINATION

MINISTRY OF EDUCATION, SKILLS AND TRAINING

BIOLOGY 12

GENERAL INSTRUCTIONS

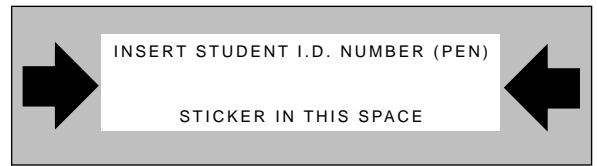
1. Insert the stickers with your Student I.D. Number (PEN) in the allotted spaces above.
Under no circumstance is your name or identification, other than your Student I.D. Number, to appear on this paper.
2. Take the separate Answer Sheet and follow the directions on its front page.
3. Be sure you have an **HB pencil** and an eraser for completing your Answer Sheet.
Follow the directions on the Answer Sheet when answering multiple-choice questions.
4. For each of the written-response questions, write your answer in **ink** in the space provided.
5. When instructed to open this booklet, **check the numbering of the pages** to ensure that they are numbered in sequence from page one to the last page, which is identified by

END OF EXAMINATION .

6. At the end of the examination, place your Answer Sheet inside the front cover of this booklet and return the booklet and your Answer Sheet to the supervisor.

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BIOLOGY 12 JUNE 1996 PROVINCIAL

Course Code = BI Examination Type = P

1. _____
(5)

2. _____
(6)

3. _____
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4. _____
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5. _____
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6. _____
(5)

OPTIONS: Score **only two** of the following options.

Option I: 7. _____
(10)

Option IV: 10. _____
(10)

Option II: 8. _____
(10)

Option V: 11. _____
(10)

Option III: 9. _____
(10)

Option VI: 12. _____
(10)

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BIOLOGY 12 PROVINCIAL EXAMINATION

	Value	Suggested Time
1. This examination consists of three parts:		
PART A: 52 multiple-choice questions	52	40
PART B: 6 written-response questions	28	50
PART C: Option section consisting of only written-response questions. Select only two options. Each option is worth 10 marks.	20	30
	Total: 100 marks	120 minutes
2. Multiple-choice questions must be answered in HB pencil on the answer sheet provided. All other questions are to be answered in INK in the spaces provided in this booklet.		
3. For written-response questions, organization and planning space has been incorporated into the space allowed for answering each question.		
4. You have two hours to complete this examination.		

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PART A: MULTIPLE CHOICE

Value: 52 marks

Suggested Time: 40 minutes

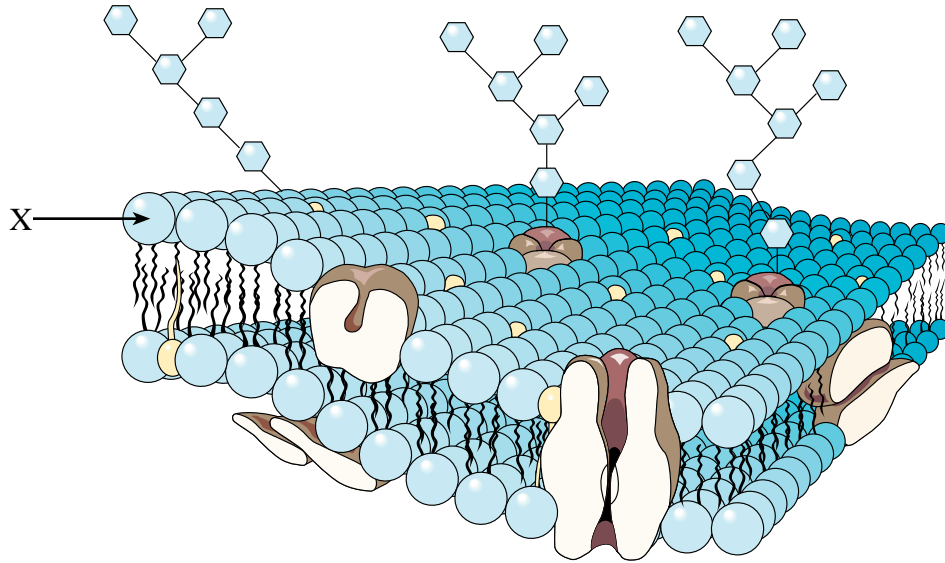
INSTRUCTIONS: For each question, select the **best** answer and record your choice on the Answer Sheet provided. Using an HB pencil, completely fill in the circle that has the letter corresponding to your answer.

1. The growth rate in most plants increases when water supply is plentiful. A possible explanation would be that water is a reactant in photosynthesis. This explanation is an example of
 - A. a theory.
 - B. a hypothesis.
 - C. a conclusion.
 - D. an observation.

2. Which of the following disrupts homeostasis?
 - A. Positive feedback.
 - B. Pressure filtration.
 - C. Thermoregulation.
 - D. Cellular respiration.

3. Water molecules are connected to each other by
 - A. buffers.
 - B. hydrolysis.
 - C. peptide bonds.
 - D. hydrogen bonds.

4. Which of the following is a component of molecule X, shown in the diagram below?



- A. Glucose.
- B. Fatty acid.
- C. Nucleotide.
- D. Amino acid.

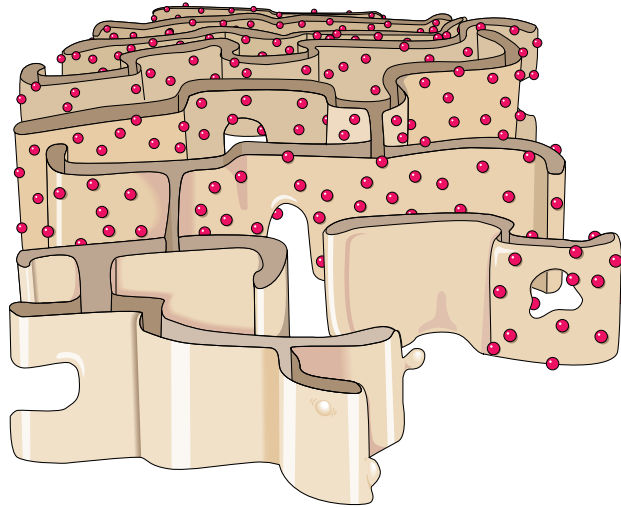
5. One of the functions of DNA is to

- A. secrete vacuoles.
- B. make copies of itself.
- C. join amino acids to each other.
- D. carry genetic information out of the nucleus.

6. An organelle composed of a stack of flattened saccules may function to

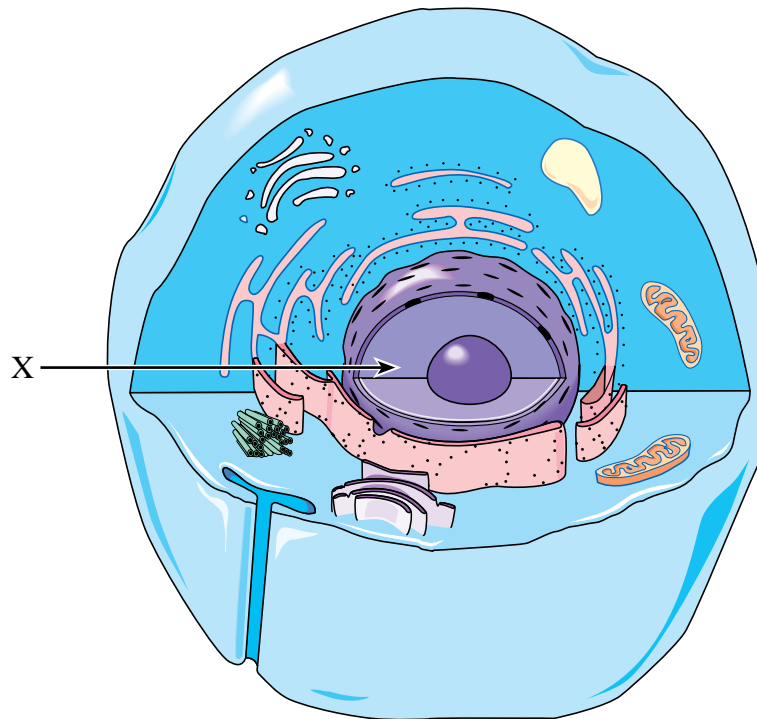
- A. propel the cell.
- B. replicate DNA.
- C. produce glucose.
- D. package proteins.

7. The organelle shown below is the



- A. nucleus.
- B. Golgi body.
- C. mitochondrion.
- D. endoplasmic reticulum.

8. The function of structure **X** in the diagram below is to

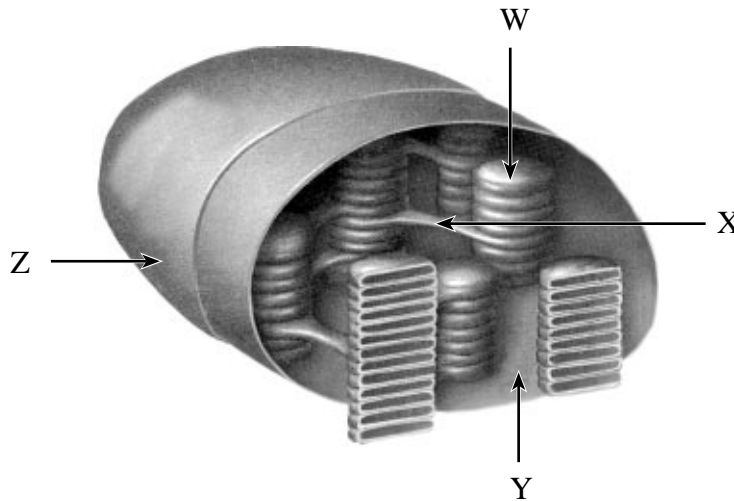


- A. store water.
- B. produce ATP.
- C. hydrolyze waste.
- D. control cellular activities.

9. Which of the following are the products of glycolysis?

- A. CO_2 , H_2O and ATP.
- B. NAD, ADP and H_2O .
- C. FADH_2 , NADH_2 and ATP.
- D. NADH_2 , pyruvic acid and ATP.

10. In the diagram below, which letter indicates the location of the carbon dioxide reducing reactions (Calvin Cycle)?



- A. W
- B. X
- C. Y
- D. Z

11. During photosynthesis, reduction of light intensity would likely cause

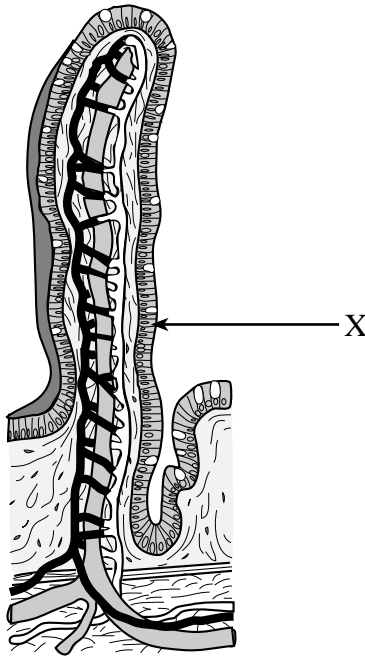
- A. decreased production of O_2 .
- B. increased production of CO_2 .
- C. increased production of NAD.
- D. decreased production of water.

12. Which of the following results in the production of phosphoglyceraldehyde (PGAL)?

- A. Photolysis.
- B. Glycolysis.
- C. Reduction of CO_2 .
- D. The electron transport chain.

13. The rate of photosynthesis would be **highest** if green plants were exposed to
- A. blue and red light.
 - B. red and green light.
 - C. blue and yellow light.
 - D. green and yellow light.
14. During daylight hours, green plants carry on
- A. respiration only.
 - B. photosynthesis only.
 - C. respiration and fermentation.
 - D. photosynthesis and respiration.
15. Similar cells which are joined together form
- A. a tissue.
 - B. an organ.
 - C. cytoplasm.
 - D. an organ system.

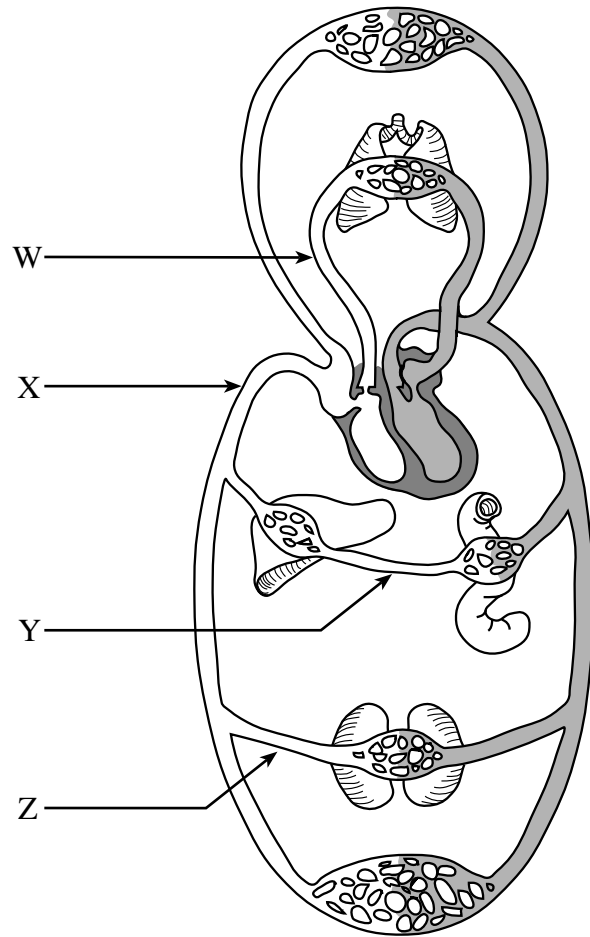
16. The tissue labelled **X** in the diagram below is



- A. muscle tissue.
- B. nervous tissue.
- C. epithelial tissue.
- D. connective tissue.

17. An example of absorption is the
- A. movement of food by peristalsis.
 - B. active transport of glucose into a villus.
 - C. hydrolysis of a peptide into amino acids.
 - D. release of secretin in the presence of HCl.
18. Which of the following is **not** a hydrolytic enzyme?
- A. Lipase.
 - B. Trypsin.
 - C. Amylase.
 - D. Carbonic anhydrase.
19. Which of the following is **not** a function of pancreatic juice?
- A. Raising pH.
 - B. Emulsifying.
 - C. Starch digestion.
 - D. Protein digestion.
20. The purpose of physical digestion is to
- A. hydrolyze large molecules.
 - B. increase the amount of feces.
 - C. increase the surface area of food.
 - D. slow the action of digestive enzymes.

21. Which vessel indicated on the following diagram would have the lowest concentration of urea?



- A. W
- B. X
- C. Y
- D. Z

22. Which of the following structures in fetal circulation functions to deliver blood, which is high in waste, to the placenta?

- A. Venous duct.
- B. Umbilical vein.
- C. Pulmonary veins.
- D. Umbilical arteries.

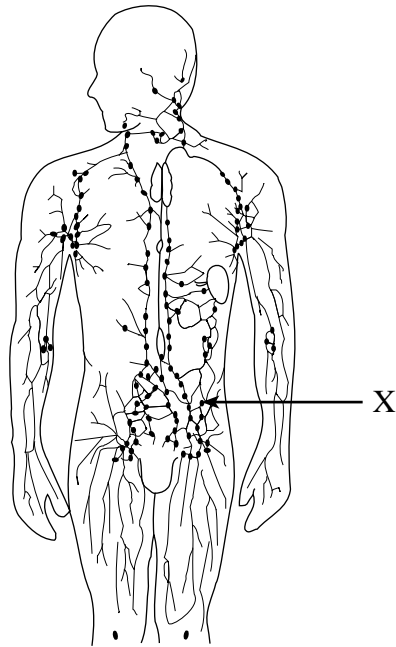
23. The **highest** blood pressure in the aorta occurs when the

- A. atria contract.
- B. heart muscle is relaxed.
- C. blood is pushed to the ventricle.
- D. blood is pumped from the heart.

24. High blood pressure can be the result of

- A. decreased blood volume.
- B. increased sodium absorption.
- C. decreased aldosterone release.
- D. increased opening of capillary beds.

25. The function of the structure labelled **X** in the diagram below of the lymphatic system is to



- A. form platelets.
- B. filter bacteria from fluid.
- C. remove urea from blood.
- D. exchange gases with tissues.

26. Arrange the following steps in the sequence which occurs during an inflammatory reaction.

1. Pus forms at injury site.
2. Damaged cells release histamines.
3. Increased permeability of the capillary wall.
4. Swelling and redness at injury site.

- A. 1, 2, 4, 3
- B. 2, 1, 3, 4
- C. 2, 3, 4, 1
- D. 3, 4, 2, 1

27. Which of the following transfusions would result in agglutination?

	DONOR	RECIPIENT
A.	O	AB
B.	B	O
C.	B	B
D.	O	A

28. Blood which lacks platelets would not be able to

- A. clot.
- B. carry oxygen.
- C. fight infections.
- D. transport nutrients.

29. Capillary beds are equipped with sphincter muscles in order to

- A. prevent the backflow of blood.
- B. expand and recoil with each heart beat.
- C. divert blood toward areas of increased metabolic activity.
- D. hold blood in the beds until nutrient and waste exchange is complete.

30. Which of the following are found **only** in the central nervous system?

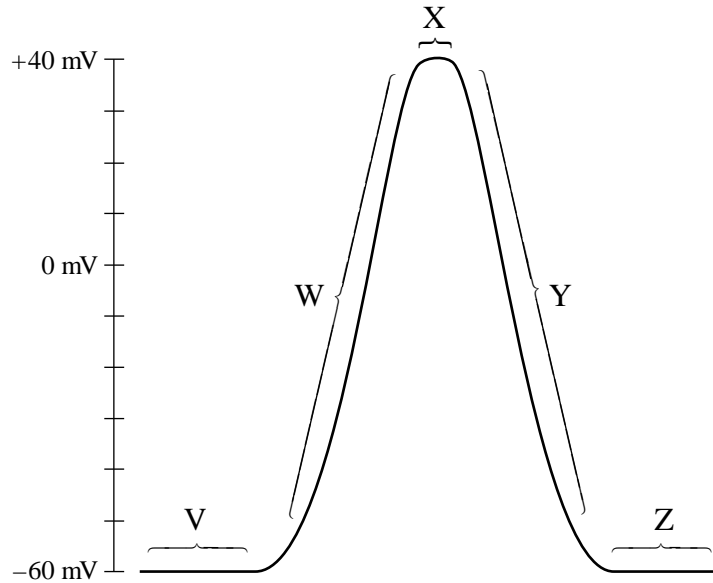
- A. Interneurons.
- B. Motor neurons.
- C. Sensory neurons.
- D. Sensory receptors.

31. The correct sequence for the transmission of a nerve impulse along a neuron is

- | |
|---|
| <ol style="list-style-type: none">1. Potassium gates open.2. Sodium ions diffuse into neuron.3. Resting potential.4. Recovery. |
|---|

- A. 1, 2, 3, 4
- B. 2, 3, 4, 1
- C. 3, 2, 1, 4
- D. 4, 3, 1, 2

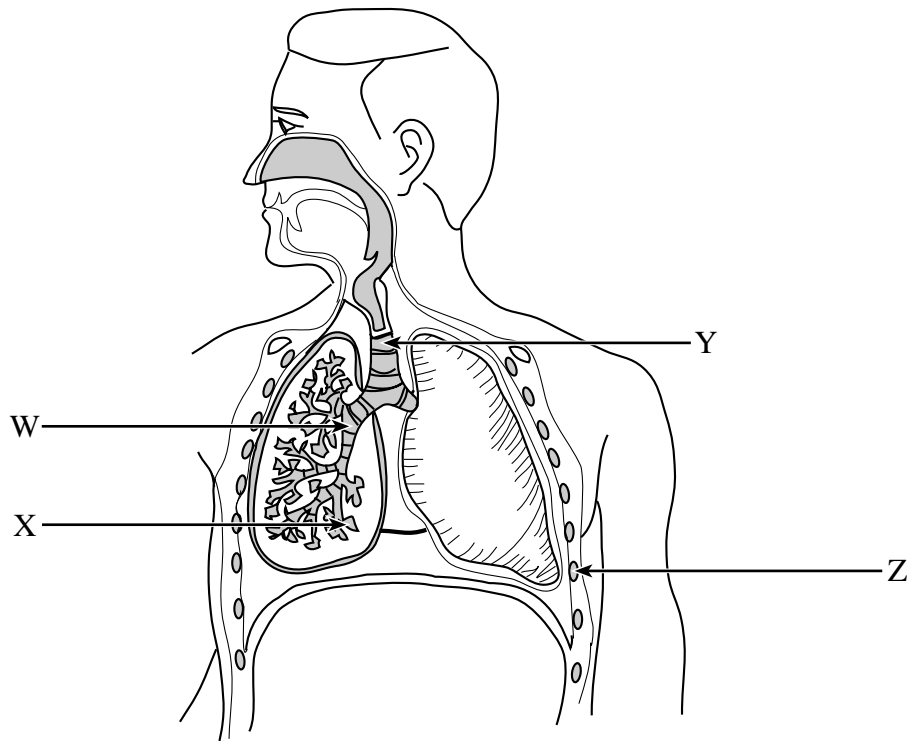
32. On the following graph, which letters indicate the areas in which the sodium/potassium pump is operating?



- A. V and W
B. W and Y
C. X and Y
D. V and Z
33. At a synapse, the neurotransmitters move to the receptor sites by
- A. osmosis.
B. diffusion.
C. active transport.
D. facilitated transport.
34. The speed of nerve impulse conduction is increased by the presence of
- A. axons.
B. myelin.
C. dendrites.
D. cell bodies.
35. A person recovering from a head injury finds that she has difficulty maintaining balance. Which part of the brain has been injured?
- A. Thalamus.
B. Cerebellum.
C. Hypothalamus.
D. Medulla oblongata.

36. In a reflex arc, the nerve impulse is initiated by
- A. the brain.
 - B. an effector.
 - C. a sensory neuron.
 - D. a sensory receptor.
37. The sympathetic nervous system is responsible for
- A. decreasing breathing rate.
 - B. increasing blood glucose levels.
 - C. increasing blood flow to the intestines.
 - D. decreasing blood flow to the skeletal muscles.
38. Damage to the corpus callosum could
- A. stimulate the parasympathetic system.
 - B. increase the heart rate but decrease the breathing rate.
 - C. inhibit the hypothalamus and stimulate the thyroid gland.
 - D. inhibit the sharing of information between cerebral hemispheres.
39. The vocal chords are found in which structure?
- A. Larynx.
 - B. Bronchi.
 - C. Pharynx.
 - D. Epiglottis.
40. Internal respiration is defined as
- A. exchange of gases between blood and air.
 - B. production of ATP, CO₂ and H₂O in cells.
 - C. exchange of gases between blood and tissues.
 - D. entrance and exit of air into and out of the lungs.
41. Oxygen-poor blood becomes oxygen-rich blood at the
- A. alveoli.
 - B. trachea.
 - C. bronchi.
 - D. bronchioles.

42. In the following diagram, which arrow points to a bronchus?



- A. W
- B. X
- C. Y
- D. Z

43. A puncture of the pleural membranes could lead to

- A. increased thoracic cavity pressure.
- B. decreased stimulation of carotid bodies.
- C. decreased contractions of the diaphragm.
- D. increased concentration of oxyhemoglobin (HbO_2) in the blood.

44. Which of the following is a controlling factor in increasing breathing rate?

- A. High pH at the medulla oblongata.
- B. High levels of CO_2 in the carotid artery.
- C. Low levels of glucose in the coronary vein.
- D. Low concentration of bicarbonate ions (HCO_3^-) in the aorta.

45. The excretory system regulates the amount of bicarbonate ion (HCO_3^-) in the blood in order to maintain homeostatic levels of
- A. water.
 - B. glucose.
 - C. ammonia (NH_3).
 - D. hydrogen ions (H^+).

46. The correct sequence for the path of urine is

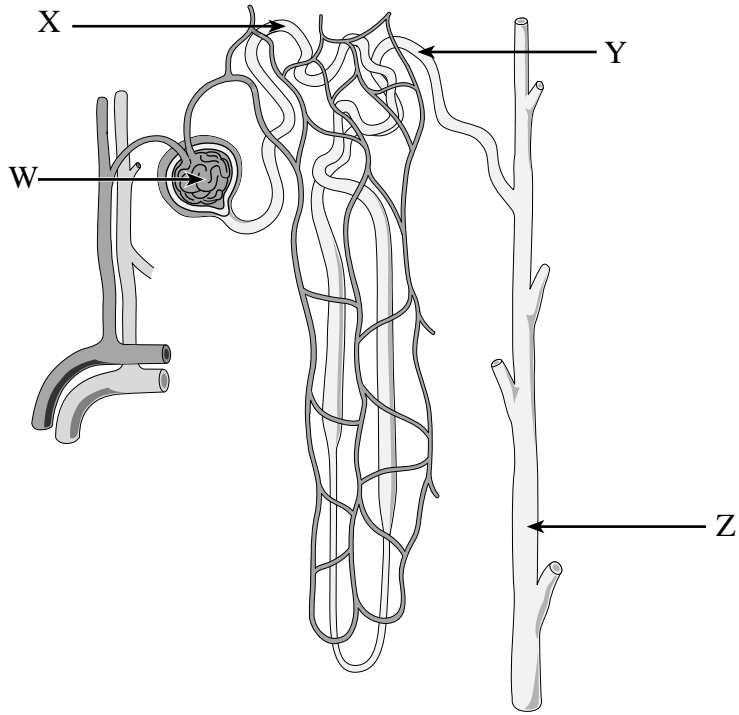
- 1. Ureter.
- 2. Urethra.
- 3. Kidney.
- 4. Urinary bladder.

- A. 1, 3, 2, 4
 - B. 3, 1, 4, 2
 - C. 3, 2, 1, 4
 - D. 3, 2, 4, 1
47. Which of the following would **not** be found in high concentration in the urine of a healthy individual?
- A. Salt.
 - B. Water.
 - C. Protein.
 - D. Uric acid.

48. Which of the following would **best** describe the blood in the renal artery?

RELATIVE AMOUNTS			
	UREA	OXYGEN	GLUCOSE
A.	high	high	high
B.	low	low	high
C.	none	low	none
D.	high	high	low

49. Which letter indicates where selective reabsorption occurs?



- A. W
- B. X
- C. Y
- D. Z

50. Peptide hormones

- A. enter the cell by phagocytosis.
- B. bind to special receptor sites on the membrane.
- C. pass through the cell membrane with no difficulty.
- D. pass through the cell membrane by active transport.

51. The hormones secreted by the posterior pituitary are
- A. antidiuretic hormone (ADH) and oxytocin.
 - B. aldosterone and antidiuretic hormone (ADH).
 - C. adrenocorticotrophic hormone (ACTH) and oxytocin.
 - D. aldosterone and thyroid stimulating hormone (TSH).
52. In some cases, bones lose calcium and become brittle. A possible way to solve this problem would be with injections of
- A. thyroxin.
 - B. adrenalin.
 - C. calcitonin.
 - D. parathormone (PTH).

**This is the end of the multiple-choice section.
Answer the remaining questions directly in this examination booklet.**

PART B: WRITTEN RESPONSE

Value: 28 marks

Suggested Time: 50 minutes

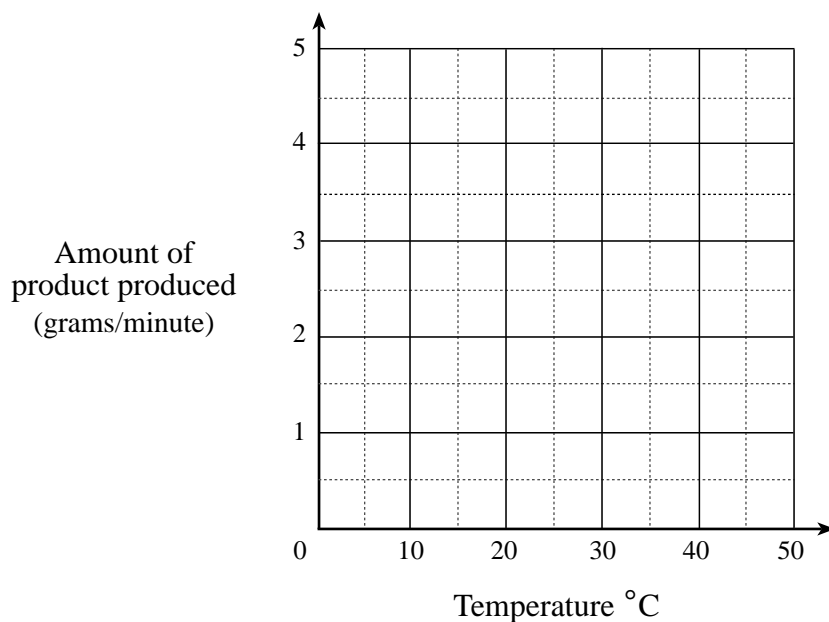
- INSTRUCTIONS:**
1. Use a **pen** for this part of the examination.
 2. Write your answers in the space below the questions.
 3. Organization and planning space has been incorporated into the space allowed for answering each question.
 4. You may not need all of the space provided to answer each question.

1. The following data show the rate of an enzyme-catalyzed reaction at various temperatures.

Temperature (°C)	Grams of product/minute
15	0.25
28	0.9
35	3.0
38	3.7
43	1.0

- a) Graph the data on the grid provided.

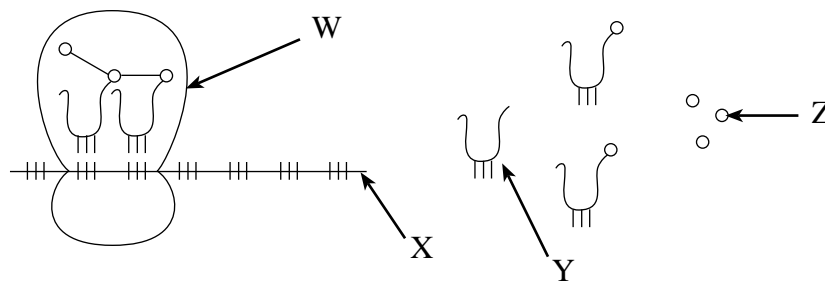
(1 mark)



- b) Use the graphed data to describe the effect of temperature on the rate of enzyme activity. **(4 marks)**

Score for Question 1:
1. _____
(5)

Use the following diagram to answer question 2.



2. The diagram above shows a part of the process of protein synthesis.

- a) Identify the following labelled structures. **(4 marks)**

W: _____

X: _____

Y: _____

Z: _____

- b) Name the part of protein synthesis represented by the diagram above. **(1 mark)**

- c) Where in the cell is **X** synthesized? **(1 mark)**

Score for Question 2:
2. _____
(6)

3. State **one** function of each of these parts of a cell.

a) Cell membrane:

(1 mark)

b) Mitochondrion cristae:

(1 mark)

c) Vacuole:

(1 mark)

d) Microtubule:

(1 mark)

Score for Question 3: 3. <u> </u> (4)

4. Describe the mechanisms involved in the digestion and absorption of fat. (4 marks)

Score for Question 4:
4. <u> </u> (4)

5. State **one** function of each of the following heart structures.

a) SA node:

(1 mark)

b) Coronary arteries:

(1 mark)

c) Atrioventricular valves:

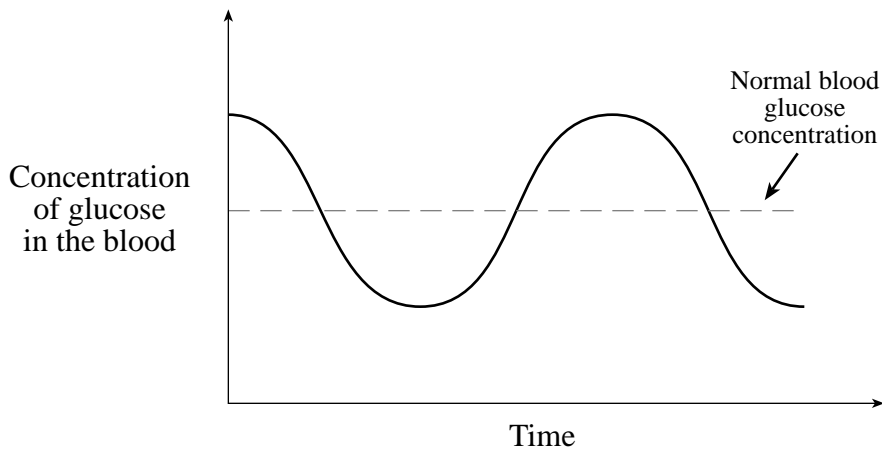
(1 mark)

d) Right ventricle:

(1 mark)

Score for Question 5: 5. <u> </u> (4)

6. The concentration of glucose in the blood was recorded over a set period of time and the following pattern was observed.



a) Does the above graph represent positive or negative feedback? **(1 mark)**

b) Explain the hormonal response when the

i) blood glucose concentration is high. **(2 marks)**

ii) blood glucose concentration is low. **(2 marks)**

Score for Question 6: 6. _____ (5)

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PART C: OPTION SECTION

Value: 20 marks

Suggested Time: 30 minutes

- INSTRUCTIONS:**
1. Select **two** options from the six options listed below.
 2. Answer **all** of the questions in each option that you select.
 3. If you answer questions in more than two options, only the **first two** 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
cyclosporin	
antibody	a) promotes dilation of blood vessels _____
allergen	b) inhibits viral replication and release _____
histamine	c) promotes release of IgE antibodies _____
MHC protein	d) results in active immunity _____
vaccine	e) inhibits immune system activity _____
interferon	f) promotes production and activity of monocytes _____
lymphokine	

2. Define *passive immunity* and give **one** example. **(2 marks)**

Definition: _____

Example: _____

3. State **one** role for each of the following.

a) T cell: **(1 mark)**

b) B cell: **(1 mark)**

Score for Option I: 7. _____ (10)
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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
sarcomere	
smooth muscle	a) site of blood cell production _____
skeletal muscle	b) filament that moves during muscle contraction _____
cardiac muscle	c) an involuntary striated tissue _____
lactic acid	d) found in the wall of the small intestine _____
actin	e) functional unit of a muscle fibre _____
spongy bone	f) product of anaerobic respiration _____
myosin	

2. List **two** causes of osteoporosis. **(2 marks: 1 mark each)**

i) _____

ii) _____

3. State **one** role for each of the following.

a) Sarcoplasmic reticulum: **(1 mark)**

b) Haversian canal: **(1 mark)**

Score for Option II:
8. _____ (10)

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
seminiferous tubule	
blastula	a) process that produces male sex cells _____
estrogen	b) produces components of seminal fluid _____
acrosome	c) secreted by the follicle _____
spermatogenesis	d) an embryo with three germ layers _____
Cowper's gland	e) contains enzymes necessary for fertilization _____
gastrula	f) site of egg production _____
ovary	

2. Give **two** effects that the secretion of testosterone has on the male body. **(2 marks: 1 mark each)**

i) _____

ii) _____

3. Give **one** function of each of the following.

a) Oviducts (Fallopian tubes): **(1 mark)**

b) Uterus: **(1 mark)**

Score for Option III: 9. _____ (10)
--

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
telophase	
ligase	a) plant cell lacking its cell wall _____
protoplast	b) stage in mitosis when chromosomes are located at each pole _____
prophase	c) genetic material containing genes from two organisms _____
restriction enzyme	d) caused by an extra 21st chromosome _____
recombinant DNA	e) joins DNA fragments together _____
Down's syndrome	f) the transfer of DNA from one cell to another by _____
transduction	viruses

2. a) Distinguish phenotypic from genotypic cures. **(1 mark)**

- b) Why are phenotypic cures used more frequently? **(1 mark)**

3. Define *transformation*. **(2 marks)**

Score for Option IV:
10. <u> </u> (10)

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
macrophage	
B cell	a) triggers uncontrolled cell growth _____
promoter	b) a tumor that metastasizes _____
malignant	c) a protein released by cells infected with a virus _____
anaplasia	d) ingests cancerous cells _____
interferon	e) produces antibodies _____
initiator	f) changes proto-oncogene to oncogene _____
killer T cell	

2. List **three** danger signals that may indicate the presence of cancer.

(3 marks: 1 mark each)

Signal 1: _____

Signal 2: _____

Signal 3: _____

3. Why can interleukin be an effective treatment for some forms of cancer? **(1 mark)**

Score for
Option V:

11. _____
(10)

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
fovea	
vitreous humor	a) allow for vision in low light _____
accommodation	b) area of acute vision _____
sclera	c) regulates light entrance _____
lens	d) refracts and focuses light _____
iris	e) changing shape of the lens _____
rods	f) tough outer coating _____
cones	

2. List the **four** types of taste and state the location on the tongue where each type of tastebud is concentrated. **(2 marks: ½ mark for each pair)**

	TASTE	LOCATION ON TONGUE
a)		
b)		
c)		
d)		

3. State **one** possible cause for conduction deafness and nerve deafness. **(2 marks: 1 mark each)**

Conduction deafness: _____

Nerve deafness: _____

Score for
Option VI:

12. _____
(10)

END OF EXAMINATION