INSERT STUDENT I.D. NUMBER (PEN)

STICKER IN THIS SPACE

AUGUST 1995

PROVINCIAL EXAMINATION

MINISTRY OF EDUCATION

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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FOR OFFICE USE ONLY

INSERT STUDENT I.D. NUMBER (PEN)

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_____ – _____

BIOLOGY 12 AUGUST 1995 PROVINCIAL

Course Code = BI Examination Type = P

1. _____
(5)

2. _____
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4. _____
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5. _____
(4)

6. _____
(5)

7. _____
(4)

OPTIONS: Score **only two** of the following optional sections.

Option I. 8. _____
(10)

Option II. 9. _____
(10)

Option III. 10. _____
(10)

Option IV. 11. _____
(10)

Option V. 12. _____
(10)

Option VI. 13. _____
(10)

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BIOLOGY 12 PROVINCIAL EXAMINATION

1. This examination consists of **three** parts:

		Value	Suggested Time
PART A	52 multiple-choice questions	52	40
PART B	7 written-response questions	28	50
PART C	Optional areas consisting of only written-response questions. Answer **only two** sections. Each section 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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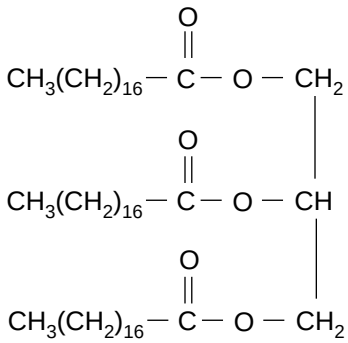
PART A: MULTIPLE-CHOICE

Value: 52 marks (one mark per question) **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.

Use the following diagram to answer question 1.



1. The above chemical compound is classified as a

   A. lipid.
   B. protein.
   C. nucleic acid.
   D. carbohydrate.

2. Carbohydrates are composed of

   A. amino acids.
   B. nucleic acids.
   C. monosaccharides.
   D. glycerol and fatty acids.

3. Which substance is produced in **every** dehydration synthesis reaction?

   A. Fat.
   B. Water.
   C. Protein.
   D. Carbohydrate.

4. Two sugars found in nucleic acids are

   A. sucrose and ribose.
   B. glucose and fructose.
   C. deoxyribose and ribose.
   D. deoxyribose and glucose.

OVER

5. Which of the following would be a result of the substitution of one base pair in DNA by a different base pair during replication?

   A. A mutation would occur.
   B. tRNA would bond to DNA.
   C. Phosphate would join with adenine.
   D. Uracil would appear in the DNA strand.

Use the following information to answer question 6.

1. Catalysts.
2. Building blocks of DNA.
3. Structural components of cell membrane.
4. Main source of energy in cellular respiration.

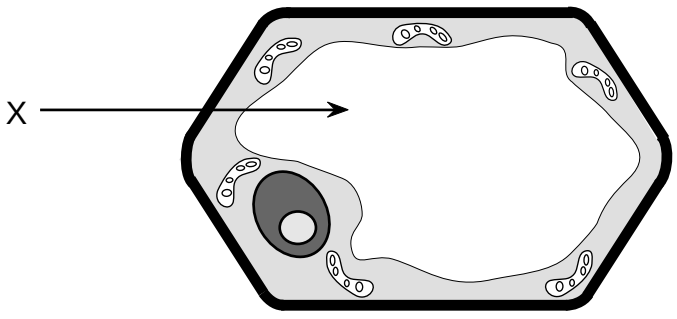
6. Proteins act as

   A. 1 and 2.
   B. 1 and 3.
   C. 2 and 3.
   D. 3 and 4.

7. The **greatest** number of ATP molecules is produced when the end product of cellular respiration is

   A. water.
   B. alcohol.
   C. oxygen.
   D. lactic acid.

Use the following diagram to answer question 8.



8. Which of the following statements describes the function of the organelle labelled **X** in the diagram above?

   A. It controls cellular activity.
   B. It stores water and nutrients.
   C. It is responsible for digesting old cell parts.
   D. It takes in proteins made outside of the cell.

9. Enzymes consist of chains of

   A. fatty acids.
   B. nucleotides.
   C. amino acids.
   D. carbohydrates.

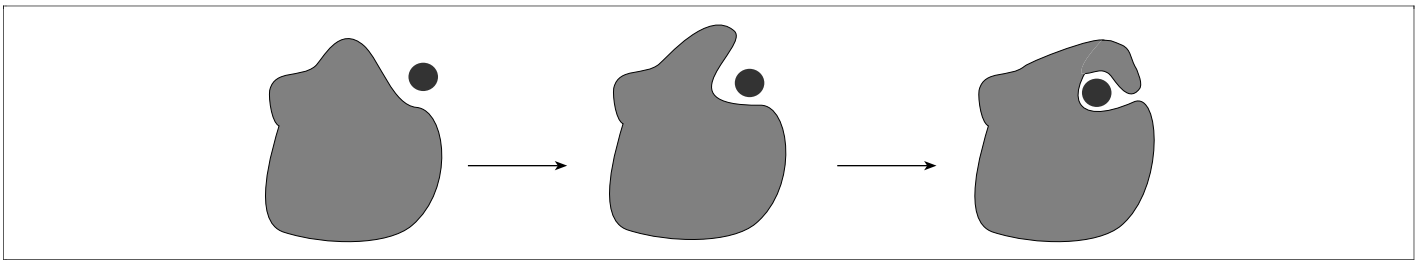
10. The active site of an enzyme is

   A. formed by the substrate.
   B. altered by heavy metals.
   C. altered by the substrate concentration.
   D. destroyed during its reaction with a substrate.

11. A cell would tend to **gain** water if it were moved from

   A. an isotonic solution to a hypotonic solution.
   B. an isotonic solution to a hypertonic solution.
   C. a hypotonic solution to an isotonic solution.
   D. a hypotonic solution to a hypertonic solution.

Use the following diagram to answer question 12.



12. The process taking place in the diagram above is

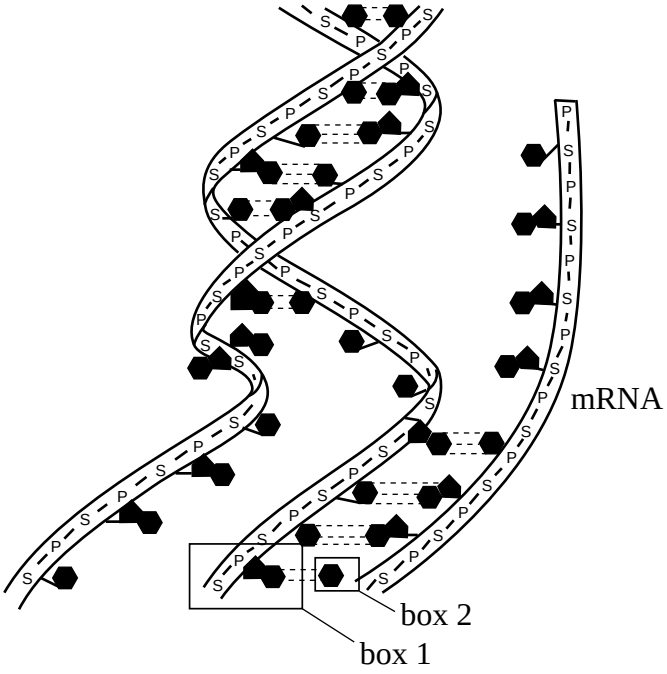
   A. osmosis.
   B. exocytosis.
   C. phagocytosis.
   D. facilitated transport.

13. A reaction catalyzed by a human enzyme was carried out at 20° C. If there is an excess of substrate, which of the following would cause the **greatest** increase in the rate of the reaction?

   A. Lowering the temperature to 10° C.
   B. Adding more enzyme and raising the temperature to 30° C.
   C. Adding more substrate and raising the temperature to 30° C.
   D. Adding more enzyme and lowering the temperature to 10° C.

OVER

Use the following diagram to answer questions 14 and 15.



14. The process shown in the diagram above is called

    A. translation.
    B. transcription.
    C. translocation.
    D. transformation.

15. If the base in box 1 of the above diagram is adenine, then the base in box 2 must be

    A. uracil.
    B. guanine.
    C. thymine.
    D. cytosine.

16. The organelle that stores starch is a

    A. plastid.
    B. nucleus.
    C. ribosome.
    D. mitochondrion.

17. During the process of photophosphorylation,

    A. ATP energy is used to absorb light.
    B. light energy is used to produce ATP.
    C. light energy is converted into carbohydrates.
    D. carbohydrates produce ATP using light energy.

18. Abnormal liver function in humans affects the digestion of

A. fats.
B. sugars.
C. proteins.
D. starches.

19. Lacteals **primarily** absorb

A. lipids.
B. proteins.
C. minerals.
D. carbohydrates.

20. Which reaction represents external respiration? (Hb = hemoglobin)

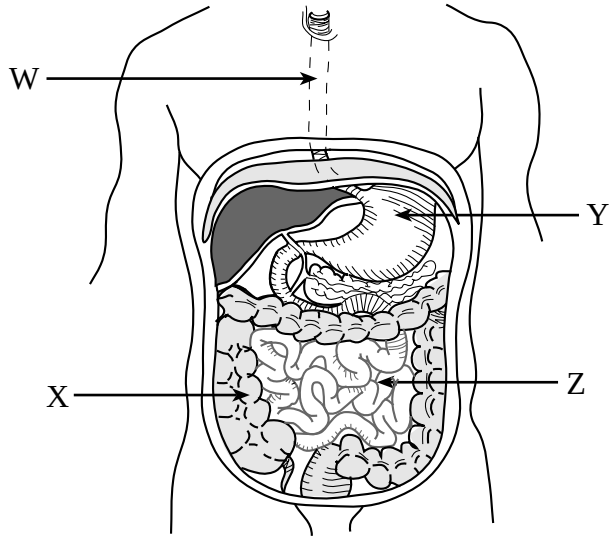
A. $Hb + CO_2 \rightarrow HbCO_2$

B. $CO_2 + H_2O \rightarrow H^+ + HCO_3^-$

C. $HbO_2 \rightarrow Hb + O_2$

D. $H^+ + HCO_3^- \rightarrow H_2O + CO_2$

Use the following diagram to answer question 21.



21. In the above diagram, **most** water absorption occurs at

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

OVER

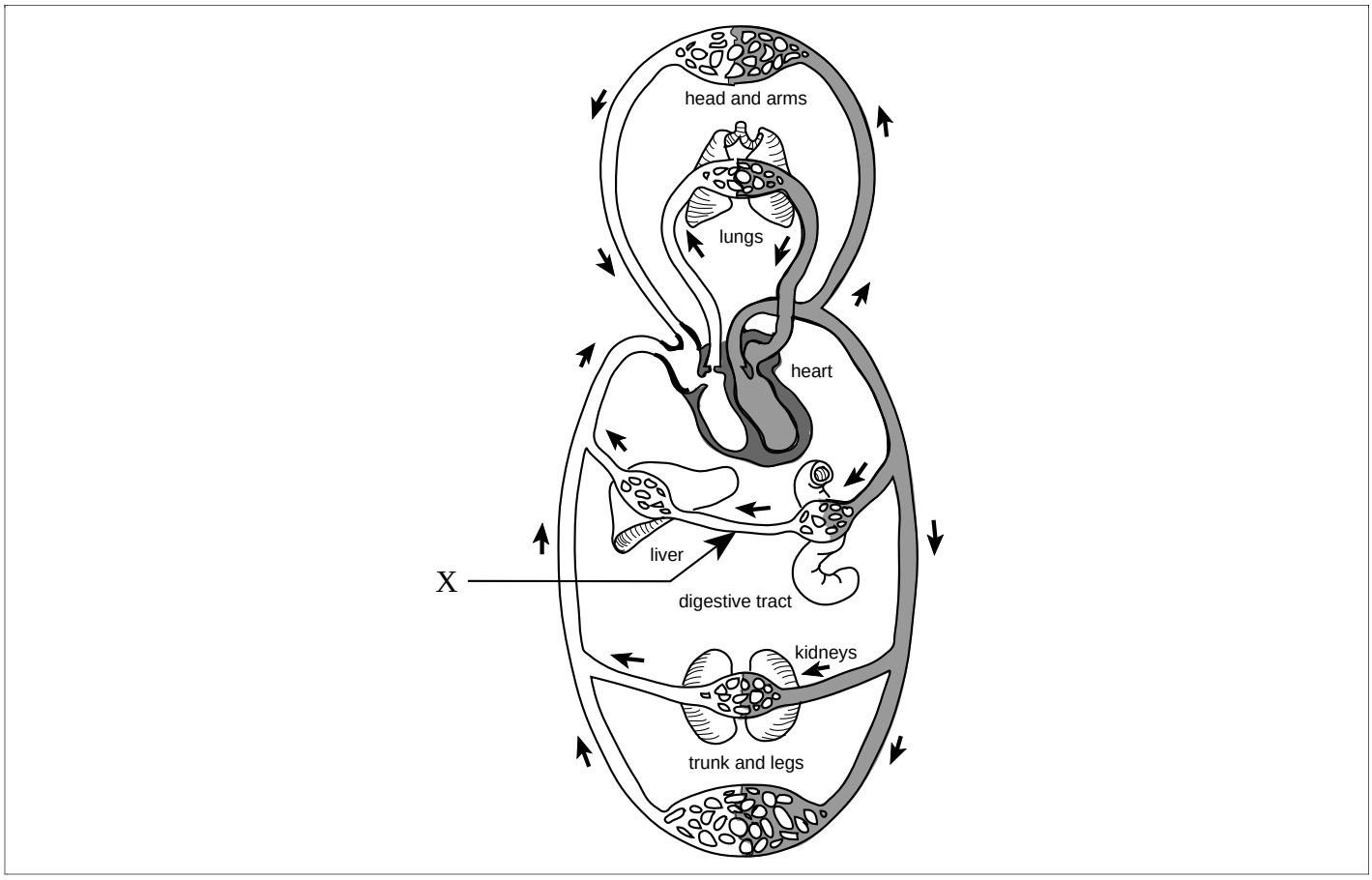
22. Bile is released as a result of

A. gastrin entering the blood.
B. sympathetic nerves being stimulated.
C. the duodenum secreting CCK (cholecystokinin).
D. the presence of carbohydrates in the digestive tract.

23. A poison that destroys carbonic anhydrase will cause death from

A. destruction of the sino-atrial node.
B. a lack of oxygen entering the cells.
C. a blockage of excitatory transmitters.
D. an accumulation of nitrogen in the blood.

Use the following diagram to answer question 24.



24. The blood vessel labelled **X** in the above diagram is the

A. iliac vein.
B. renal vein.
C. jugular vein.
D. hepatic portal vein.

25. In what form is most of the carbon dioxide $\left(CO_2\right)$ transported in the blood?

A. Dissolved gas.
B. Bicarbonate ions.
C. Reduced hemoglobin.
D. Carbaminohemoglobin.

26. The **main** function of the valves in the heart is to

A. prevent back-flow of blood.
B. divide the heart into four chambers.
C. control the volume of blood leaving the heart.
D. control the volume of blood entering the heart.

27. The correct path of blood from the heart to the head and back to the heart again is

A. right ventricle, vena cava, carotid artery, jugular vein, left atrium.
B. left ventricle, aorta, jugular vein, vena cava, carotid artery, right atrium.
C. left ventricle, aorta, carotid artery, jugular vein, vena cava, right atrium.
D. right atrium, carotid artery, aorta, jugular vein, vena cava, left ventricle.

28. The artery that provides oxygen and nutrients to heart tissue is the

A. carotid.
B. systemic.
C. coronary.
D. pulmonary.

29. Which of the following is **directly** involved in the conversion of prothrombin to thrombin?

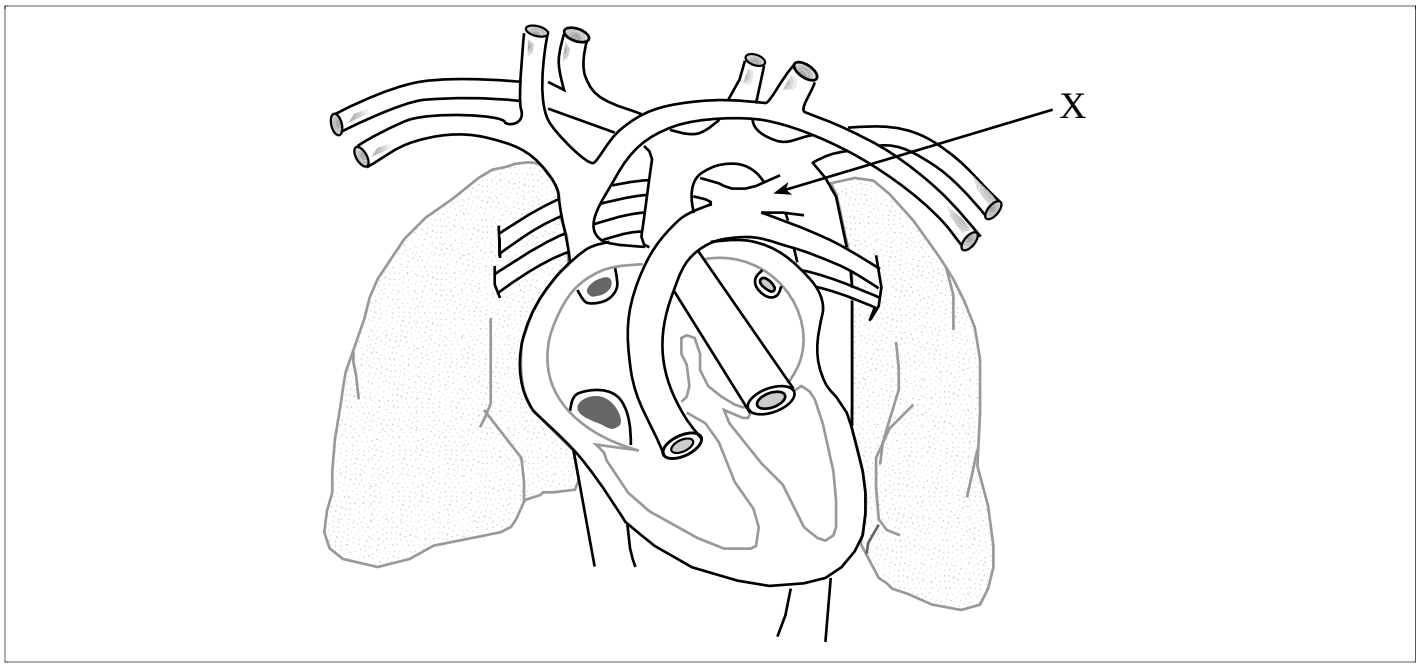
A. Fibrin.
B. Carbonic anhydrase.
C. Calcium ions $\left(Ca^{2+}\right)$.
D. Magnesium ions $\left(Mg^{2+}\right)$.

30. Which of the following would occur if an impulse from the SA node were blocked before it reaches the AV node?

A. The heart would not contract.
B. Only the atria would contract.
C. Only the ventricles would contract.
D. Blood would travel only to the pulmonary system.

OVER

Use the following diagram to answer question 31.



31. The function of structure **X** in the fetus is to

    A. reduce blood flow to the lungs.
    B. transport blood to the right ventricle.
    C. carry deoxygenated blood to the lungs.
    D. carry blood away from the left ventricle.

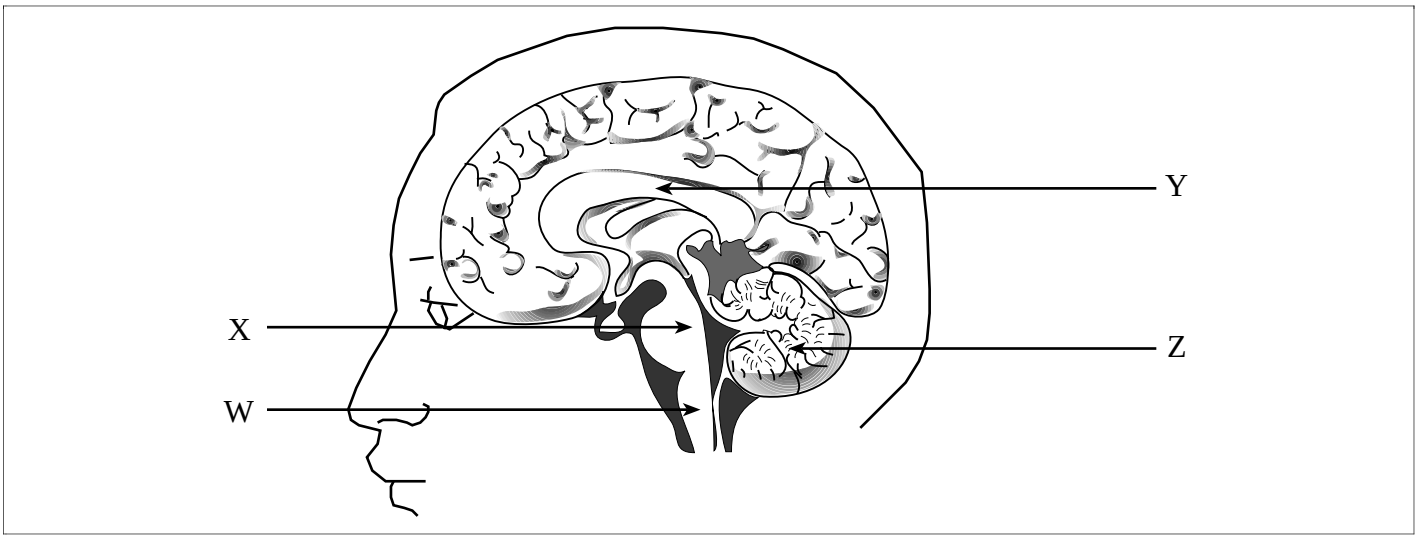
32. Which of the following would be considered part of the peripheral nervous system?

    A. An interneuron.
    B. The hypothalamus.
    C. A sympathetic nerve.
    D. The brain and spinal cord.

33. Following the “fight or flight ” response, parasympathetic nervous system stimulation would cause

    A. peristalsis to decrease.
    B. the bronchioles to dilate.
    C. the heart rate to decrease.
    D. the liver to release glycogen.

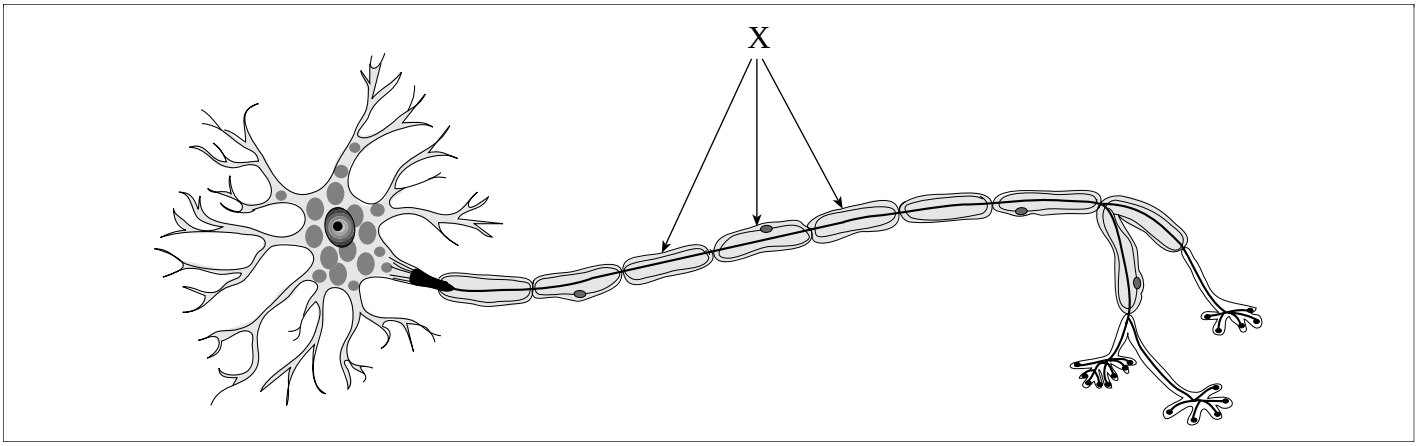
Use the following diagram to answer question 34.



34. Which part of the brain in the diagram above is responsible for coordination and balance?

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

Use the following diagram to answer question 35.

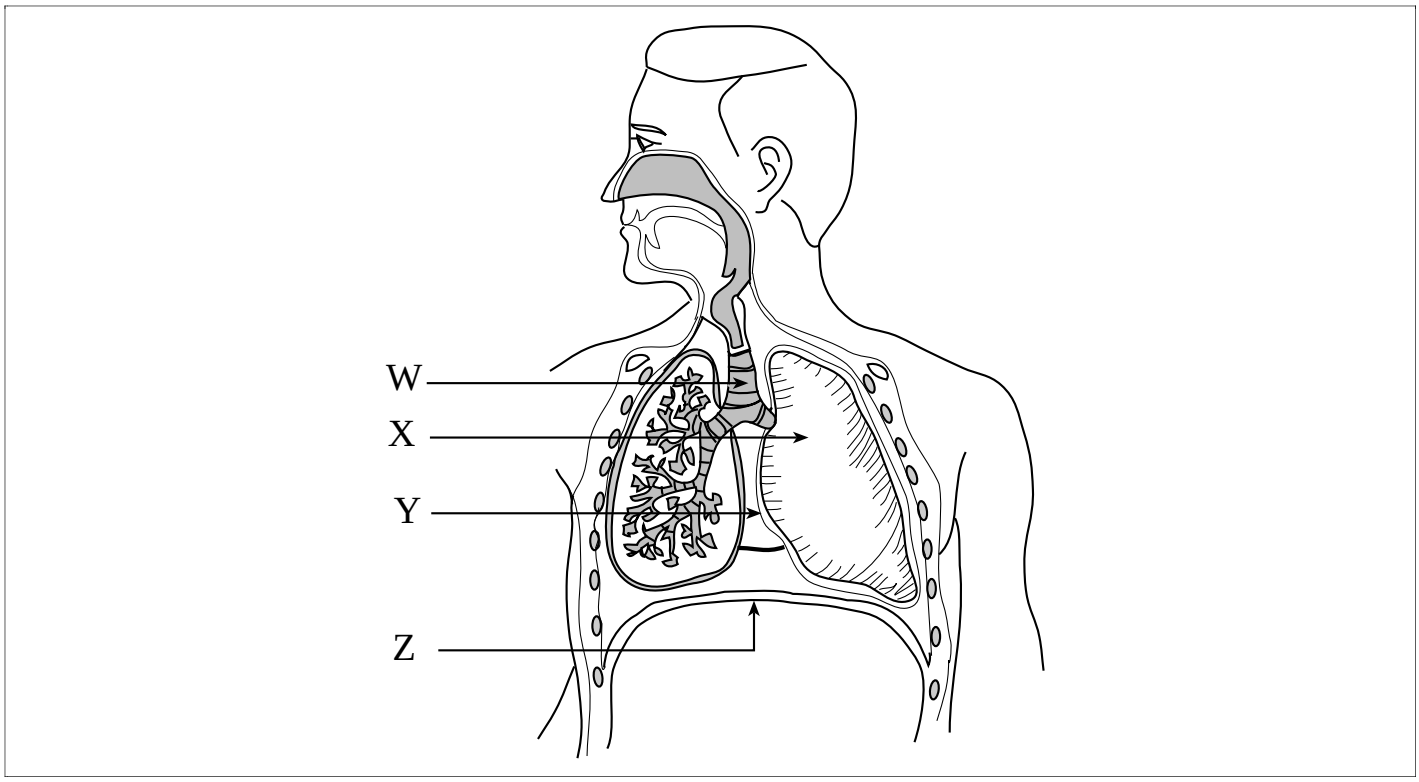


35. The structure made from the cells labelled **X** is destroyed. The **likely** result would be

A. blockage of receptor sites.
B. slowing of the nerve impulse.
C. continuous stimulation of a sensory receptor.
D. an increase in the number of nodes of Ranvier.

OVER

Use the following diagram to answer question 36.



36. Which letter indicates a structure which contracts to help cause inspiration?

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

37. Where does gas exchange take place in the lungs?

A. Alveoli.
B. Trachea.
C. Bronchi.
D. Bronchioles.

38. Urine leaves the bladder through the

A. ureter.
B. urethra.
C. loop of Henle.
D. collecting duct.

39. Blood entering the kidney is filtered by the

A. glomerulus.
B. distal tubule.
C. loop of Henle.
D. collecting duct.

40. The glomerulus is located between the

A. efferent arteriole and renal vein.
B. renal artery and afferent arteriole.
C. afferent arteriole and efferent arteriole.
D. efferent arteriole and peritubular capillaries.

41. The process that moves glucose from the proximal convoluted tubule into the peritubular capillaries is

A. osmosis.
B. tubular excretion.
C. pressure filtration.
D. selective reabsorption.

42. Which of the following would cause the kidney to produce a more concentrated urine?

A. Increased blood volume.
B. Increased alcohol intake.
C. Decreased blood pressure.
D. Decreased ADH secretion.

43. Hormone-producing cells of the adrenal gland secrete

A. insulin and glucagon.
B. thyroxin and calcitonin.
C. cortisol and aldosterone.
D. adrenalin and antidiuretic hormone (ADH).

44. Which of the following shows growth hormone's (GH) source and target organ?

A. Anterior pituitary $\rightarrow$ bone.
B. Thyroid gland $\rightarrow$ pancreas.
C. Posterior pituitary $\rightarrow$ kidney.
D. Hypothalamus $\rightarrow$ parathyroid glands.

OVER

45. Low levels of sodium ions $\left(Na^{+}\right)$ in the body result in the secretion of

A. insulin.
B. thyroxin.
C. aldosterone.
D. parathormone (PTH).

46. Which of the following supports the idea that the secretion of enzymes from the pancreas is controlled by hormones?

A. The sight and smell of food causes the pancreas to secrete enzymes.
B. If the nerves leading to the pancreas are cut, no enzymes are secreted.
C. If there is no food in the stomach, the pancreas will not secrete enzymes.
D. If the nerves leading to the pancreas are cut and weak acid is placed in the intestine, the pancreas secretes enzymes.

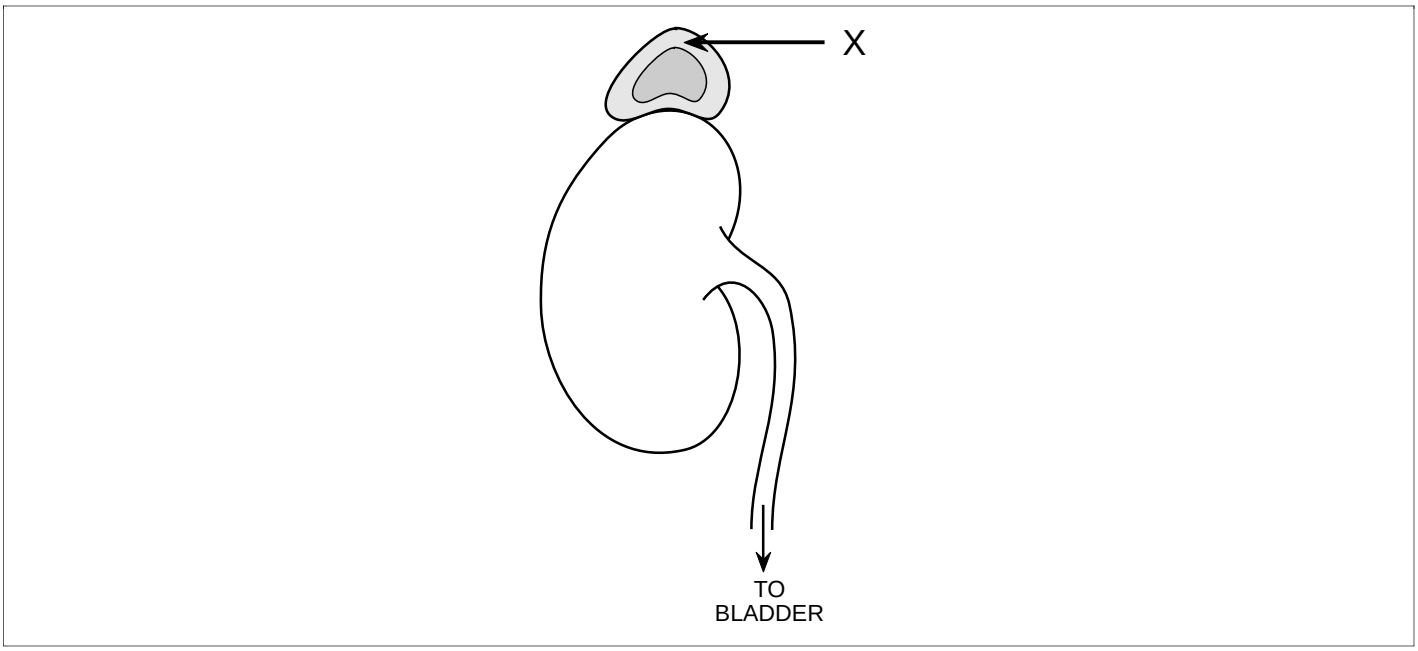
47. The posterior pituitary gland releases

A. adrenalin.
B. aldosterone.
C. parathormone (PTH).
D. antidiuretic hormone (ADH).

48. Which of the following is **not** an endocrine gland?

A. Adrenal gland.
B. Thyroid gland.
C. Salivary gland.
D. Pituitary gland.

Use the following diagram to answer question 49.



49. Stimulation of gland **X** will cause the release of a substance which in turn will result in an increase in

    A. bile production.
    B. glycogen storage.
    C. calcium in the blood.
    D. amino acids in the blood.

50. Which of the following is an example of homeostasis by endocrine glands?

    A. Secretion of salivary enzymes.
    B. Maintenance of antibody levels.
    C. Control of the central nervous system.
    D. Regulation of calcium levels in the plasma.

51. Glucose levels in the blood are lowered by the hormone

    A. insulin.
    B. glucagon.
    C. parathormone (PTH).
    D. cholecystokinin (CCK).

OVER

52. Low blood volume will result in

A. increased secretion of ADH and aldosterone.
B. decreased secretion of ADH and aldosterone.
C. increased secretion of ADH and a decrease in aldosterone.
D. decreased secretion of ADH and an increase in aldosterone.

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

PART B: WRITTEN-RESPONSE

Total Value: 28 marks **Suggested Time: 50 minutes**

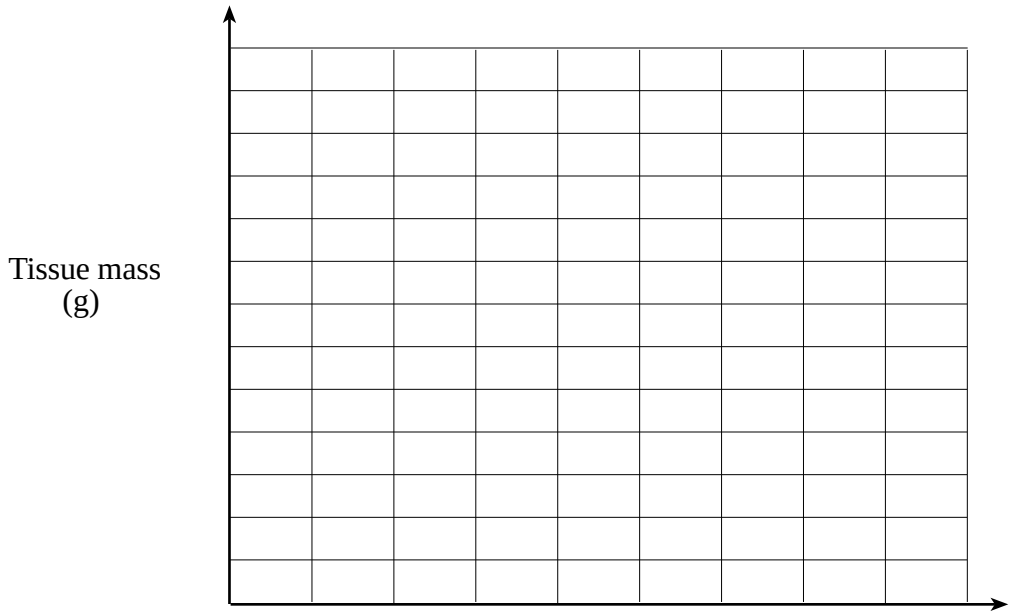
INSTRUCTIONS:

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 a starch 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)**

_____

_____

_____

_____

OVER

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: _____

Explanation: _____

_____

_____

_____

_____

_____

Score for Question 1.

1. _____ (5)

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

a) Increased light intensity: **(1 mark)**

_____

_____

_____

b) Warmer temperatures: **(1 mark)**

_____

_____

_____

c) Increased carbon dioxide (CO_2) concentration: **(1 mark)**

_____

_____

_____

Score for Question 2.

2. _____ (3)

OVER

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

a) Chloroplasts:

_____

_____

b) Mitochondria:

_____

_____

c) Lysosomes:

_____

_____

Score for Question 3.
3. _____ (3)

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: _____

Location: _____

_____

_____

Tissue Type 2: _____

Location: _____

_____

_____

Tissue Type 3: _____

Location: _____

_____

_____

Tissue Type 4: _____

Location: _____

_____

_____

Score for Question 4.

4. _____ (4)

OVER

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

a) Pyloric sphincter:

_____

_____

_____

_____

b) Villi:

_____

_____

_____

_____

c) Peristalsis:

_____

_____

_____

_____

d) *E. coli*:

_____

_____

_____

_____

Score for Question 5.

5. _____ (4)

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: _____

Function: _____

_____

_____

Component 2: _____

Function: _____

_____

_____

Component 3: _____

Function: _____

_____

_____

Component 4: _____

Function: _____

_____

_____

Component 5: _____

Function: _____

_____

_____

Score for Question 6.
6. _____ (5)

OVER

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: _____

_____

_____

b) Thyroid gland: _____

_____

_____

c) Pancreas: _____

_____

_____

d) Testis: _____

_____

_____

Score for Question 7.
7. _____ (4)

PART C: OPTIONAL AREAS

Total Value: 20 marks **Suggested Time: 30 minutes**

INSTRUCTIONS:

1. Select **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

OVER

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	_____
interferon	b) prevents virus from entering surrounding cells	_____
histamine	c) matures in the thymus gland	_____
T cell	d) produces antibodies	_____
B cell	e) constricts air passageways	_____
primary immune response	f) results from a booster shot	_____
neutrophil		

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

_____

_____

_____

_____

_____

3. a) List **two** places other than the blood where macrophages can be found. **(1 mark: $\frac{1}{2}$ mark each)**

   i) _____

   ii) _____

   b) List **two** things that macrophages engulf. **(1 mark: $\frac{1}{2}$ mark each)**

   i) _____

   ii) _____

Score for Option I.

8. ___ ___
   tens units
   (10)

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	_____
ligament	b) a freely moving joint	_____
sarcomere	c) cell membrane in muscles	_____
creatine phosphate	d) source of energy for muscle cells	_____
sarcolemma	e) attaches muscle to bone	_____
skeletal muscle	f) found in ears and tip of the nose	_____
synovial		

2. a) List **two** characteristics of smooth muscle. **(1 mark: $\frac{1}{2}$ mark each)**

   Characteristic 1: _____

   _____

   Characteristic 2: _____

   _____

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

   _____

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

   _____

   _____

   _____

   _____

   _____

Score for Option II.

9. ___ ___
   tens units
   (10)

OVER

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	_____
luteinizing hormone	b) causes the endometrium to thicken	_____
estrogen	c) an organ of copulation	_____
vagina	d) contains enzymes necessary to penetrate egg	_____
urethra	e) area for maturation of sperm	_____
epididymis	f) secretes testosterone	_____
interstitial cell		

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

   Method 1: _____

   Method 2: _____

   Method 3: _____

   Method 4: _____

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

   Difference 1: _____

   _____

   _____

   Difference 2: _____

   _____

   _____

Score for Option III.

10. ___ ___
tens units
(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	
conjugation		
transformation	a) used to produce new plant varieties	_____
transduction	b) cloned gene fragment	_____
amniocentesis	c) extrachromosomal DNA in bacteria	_____
trisomy XYY	d) one bacterium donates DNA **directly** to another bacterium	_____
DNA probe	e) when bacteria pick up DNA released from dead cells	_____
plasmid	f) DNA carried to a new cell by a virus	_____
protoplast		

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

   Process 1: _____

   Process 2: _____

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: _____

   _____

   _____

   Physical: _____

   _____

   _____

Score for Option IV.

11. ___ ___
tens units
(10)

OVER

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	_____
oncogene	b) body fluid containing leukocytes	_____
interleukin	c) an immune system booster	_____
anaplasia	d) cancer of connective tissue	_____
metastasis	e) DNA that makes cell cancerous	_____
carcinoma	f) causes secondary tumours to form	_____
sarcoma		

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

   Characteristic 1: _____

   Characteristic 2: _____

   Characteristic 3: _____

   Characteristic 4: _____

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

   _____

   _____

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

   _____

Score for Option V.

12. ___ ___
tens units
(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	
sour receptors		
mechanoreceptors	a) most are located at the back of the tongue	_____
proprioceptors	b) found on the retina	_____
photoceptors	c) many are found in the nasal cavity	_____
thermoreceptors	d) sensitive to the flow of heat	_____
olfactory receptors	e) most are located at the front of the tongue	_____
bitter receptors	f) many are found in the inner ear	_____
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)**

_____

_____

_____

_____

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

Location: _____

Function: _____

_____

Score for Option VI.

13. ___ ___ (10)
tens units

END OF EXAMINATION