Downloaded from SEE academy: www.seeacademy.co.za

Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2022

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Which of the chemical equations below represents the process of photosynthesis?

A Glucose + Water + Light energy → Starch + Carbon dioxide
B Carbon dioxide + Water + Light energy → Starch + Oxygen
C Oxygen + Carbon dioxide + Light energy → Glucose + Oxygen
D Carbon dioxide + Water + Light energy → Glycogen + Oxygen

1.1.2 The chemical substance used to extract chlorophyll from leaves is …

A diluted iodine solution.
B clear lime water.
C alcohol.
D hydrochloric acid.

1.1.3 Which ONE of the following raw materials, required for photosynthesis, is controlled by the stomata?

A Carbon dioxide
B Water
C Mineral salts
D Oxygen

1.1.4 The main function of chlorophyll is to …

A give plants a green colour.
B protect plants from dangerous cosmic rays.
C synthesise all the enzymes required for the chemical reaction.
D absorb light energy.

1.1.5 Which ONE of the following stages of photosynthesis releases oxygen gas?

A Glycolysis
B Light independent phase
C Light dependent phase
D Oxidative phosphorylation

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

1.1.6 Which of the following digestive juices contains no enzymes?

A Pancreatic juice
B Gastric juice
C Bile
D Saliva

1.1.7 Study the list of processes associated with the human digestive system:

(i) Detoxification
(ii) Deamination
(iii) Emulsification
(iv) Peristalsis

Which ONE of the following combinations describes the digestive functions of a human liver?

A (i), (ii), (iii) and (iv)
B (i) and (ii)
C (i), (ii) and (iii)
D (i), (iii) and (iv)

1.1.8 The epiglottis prevents the flow of …

A food and water into the trachea.
B oxygen into the lungs.
C carbon dioxide out of the trachea.
D viruses and bacteria into the lungs.

1.1.9 During inhalation of air into the lungs …

A the volume of the thoracic cavity increases and the pressure decreases.
B the volume of the thoracic cavity decreases and the pressure increases.
C the volume and the pressure within the thoracic cavity remain the same.
D the pressure within the thoracic cavity remains constant, irrespective of the change in volume.

1.1.10 Which of the following tubes transport urine from the kidney to the urinary bladder?

A Ureter
B Urethra
C Proximal convoluted tubule
D Distal convoluted tubule

(10 x 2) (20)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.8) in the ANSWER BOOK.

1.2.1 The part of the chloroplast in which the light-independent reactions of photosynthesis take place

1.2.2 The cell organelle in which ATP molecules are produced during cellular respiration

1.2.3 The stage of cellular respiration during which two pyruvic acid molecules are synthesised

1.2.4 A single-celled fungus used in the making of bread

1.2.5 The two main branches of the trachea

1.2.6 The region of the kidney where renal pyramids are found

1.2.7 The removal of metabolic waste products from living organisms

1.2.8 The structural and functional unit of the human kidney (8 x 1) (8)

1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY, BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **BOTH A and B** or **none** next to the question numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Mesophyll tissue	A: Palisade tissue B: Spongy tissue
1.3.2	The phase of cellular respiration during which carbon dioxide is released	A: Glycolysis B: Krebs cycle
1.3.3	The double membrane covering the lungs	A: Plasma membrane B: Pleural membrane

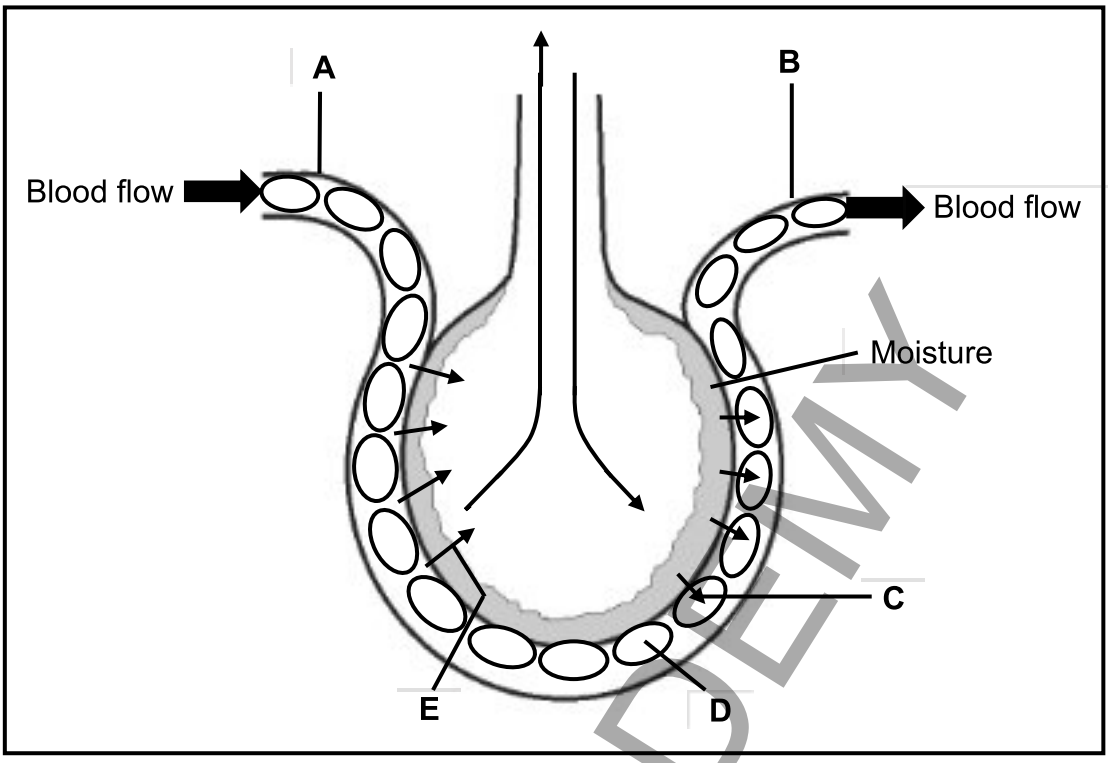
(3 x 2) (6)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

1.4 The diagram below represents the structure of an alveolus.



1.4.1 Identify the:

(a) Gas represented by **C** (1)

(b) Process at **E** (1)

1.4.2 Give the LETTER and NAME of the part that:

(a) Transports deoxygenated blood (2)

(b) Contains haemoglobin (2)

(c) Connected to pulmonary vein (2)

1.4.3 Name the tissue that lines the:

(a) Alveolus (1)

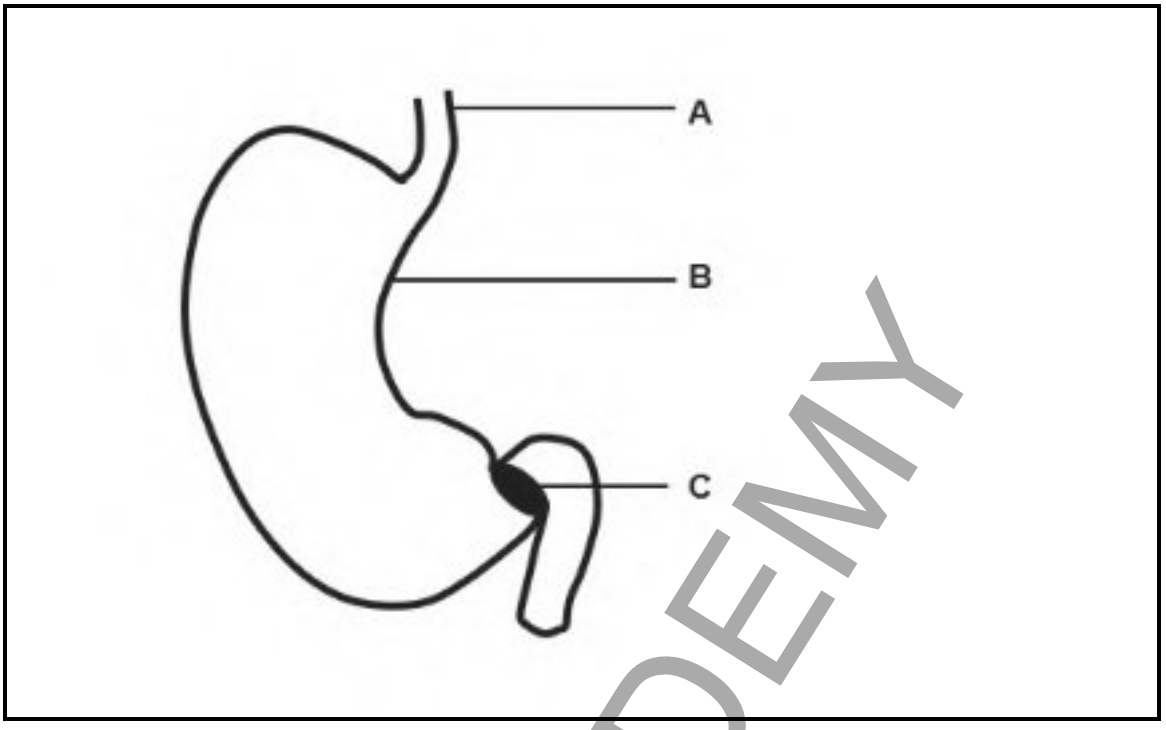
(b) Blood capillary (1)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

1.5 The diagram below represents a part of the human digestive system.



1.5.1 Identify parts:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

1.5.2 State the function of part labelled **C.** (1)

1.5.3 Name the:

(a) Digestive glands found on the mucosa layer of part **B** (1)

(b) Acid secreted by the glands mentioned in QUESTION 1.5.3(a) (1)

TOTAL SECTION A: 50

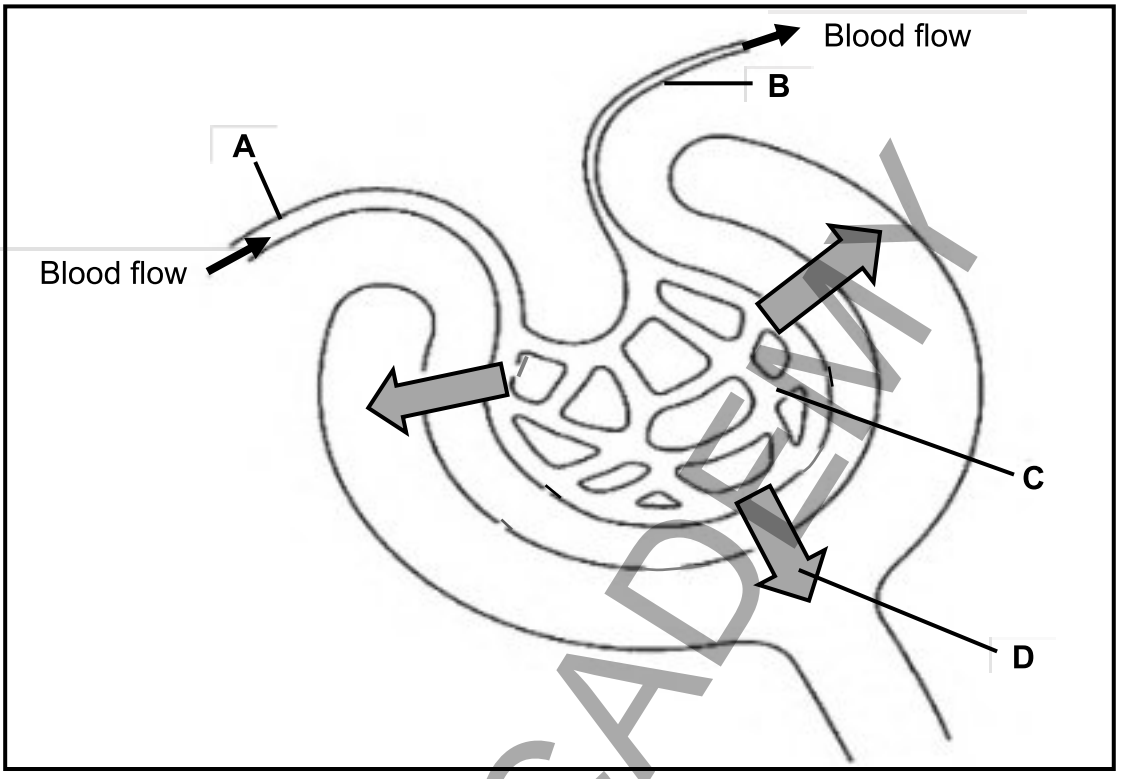
SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

SECTION B

QUESTION 2

2.1 The diagram below represents a part of the human kidney.



2.1.1 Name the:

(a) Part shown in the diagram (1)

(b) Process that takes place in the part represented in the diagram. (1)

2.1.2 Identify:

(a) Part **A** (1)

(b) Part **C** (1)

(c) Process **D** (1)

2.1.3 Explain why high amounts of protein (albumen) in the urine indicate kidney damage. (3)

2.1.4 Name the essential nutrient that will not be reabsorbed from the content of **D**, in diabetes patients. (1)

2.1.5 Explain THREE ways in which the part shown in the diagram is structurally adapted to perform its function. (3 x 2) (6)

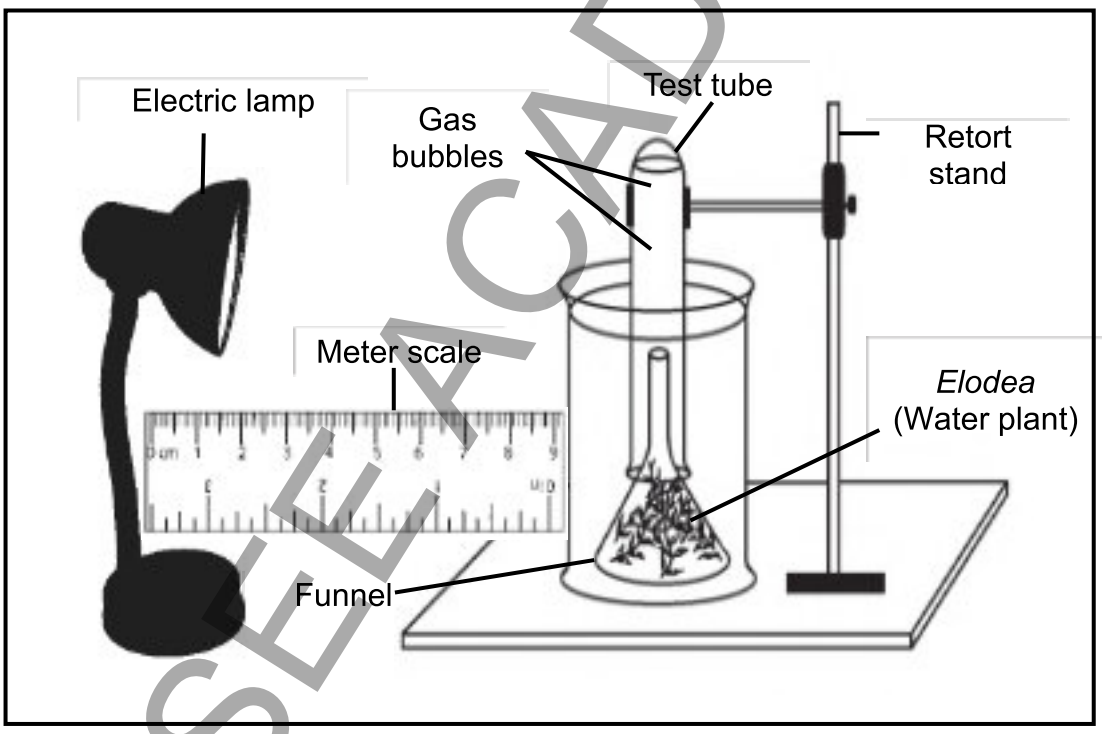
SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

2.2 An experiment was conducted to determine the effect of light intensity on the rate of photosynthesis.

The procedure was as follows:

- Water plants of the *Elodea* species were placed under a glass funnel in a beaker containing water.
- A test tube containing water with no air bubbles was fitted over the glass funnel as shown in the diagram.
- Two pinches of bicarbonate of soda were added to the water before the start of the experiment.
- After switching off all the lights, a lighted table lamp was placed 1 metre away from the beaker.
- A meter scale was placed between the table lamp and the beaker.
- The number of air bubbles released by the plants in a 1-minute period was counted and recorded in a table.
- The above steps were repeated at different light intensities by moving the lamp to different distances.
- A test was conducted to identify the gas collected in the test tube.



2.2.1 Formulate a hypothesis for this experiment. (2)

2.2.2 Identify the independent variable in the experiment. (1)

2.2.3 How was the dependent variable measured in this experiment? (2)

2.2.4 Name the gas released as bubbles. (1)

2.2.5 State TWO variables that should have been kept constant during this experiment. (2)

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

2.2.6 Why was a pinch of bicarbonate of soda added to the beaker at the start of the experiment? (1)

2.2.7 Describe the test conducted to identify the gas mentioned in QUESTION 2.2.4. (2)

2.2.8 The table below shows the number of bubbles released by the *Elodea* plants when the light source was at different distances.

DISTANCE BETWEEN THE PONDWEED AND LIGHT SOURCE (METRES)	NUMBER OF BUBBLES GIVEN OFF IN 1 MINUTE
1,0	8
0,5	28
0,25	105
0,125	105

(a) Calculate the percentage increase in the number of bubbles when the light source was shifted from 1,0 m to 0,5 m. Show ALL your calculations. (3)

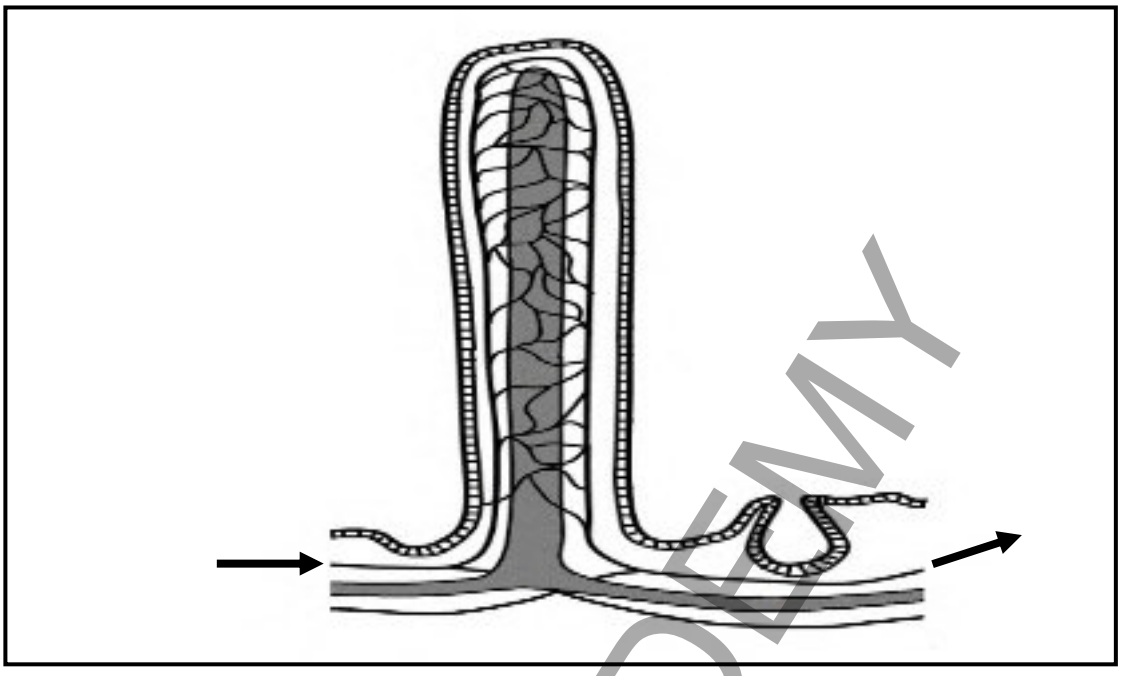
(b) Explain how the result obtained in this experiment is beneficial for the greenhouse farming of crops. (3)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

2.3 The diagram below represents one of the many structures found in the human digestive canal.



2.3.1 Identify the structure shown in the diagram. (1)

2.3.2 In what organ is the structure mentioned in QUESTION 2.3.1 found? (1)

2.3.3 State the function of this structure. (1)

2.3.4 Define the process by which substances may move into this structure. (2)

2.3.5 Explain how the structure shown in the diagram is structurally adapted to perform its function effectively. (6)

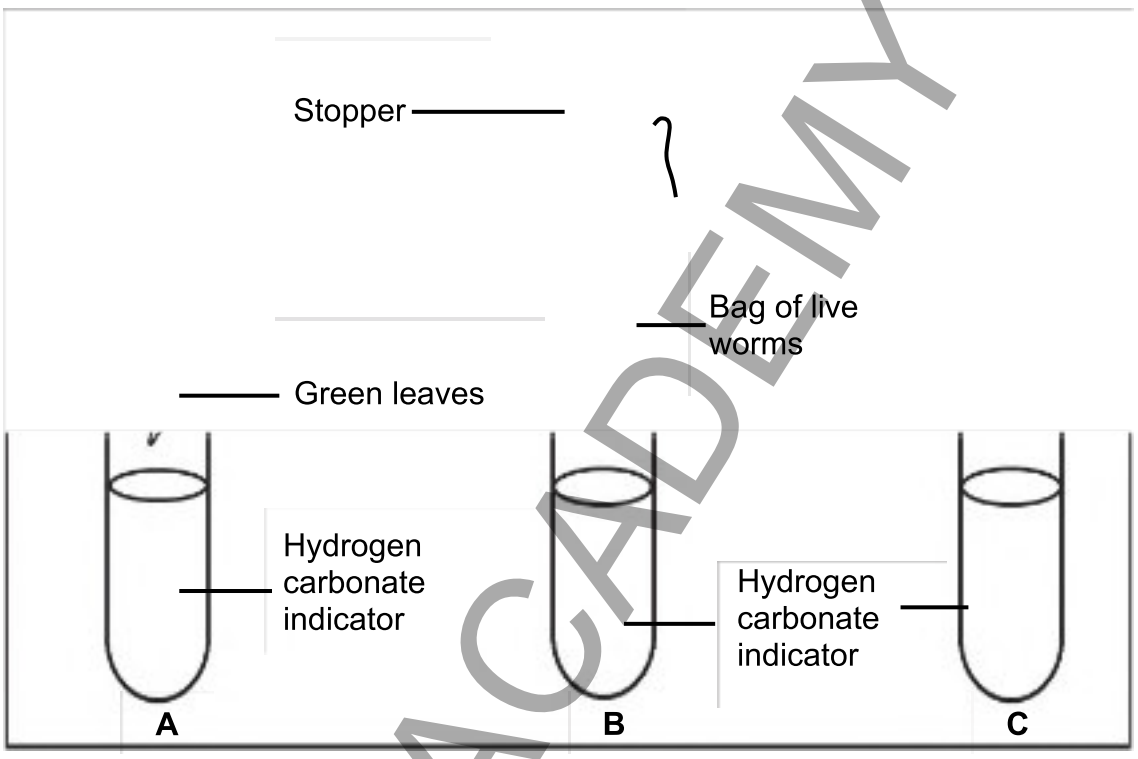
SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

2.4 The diagram below represents an experiment set up by a group of learners. All three tubes were exposed to light for 3 hours. Hydrogen carbonate was used as an indicator to test the different levels of carbon dioxide in the test tubes.

Hydrogen carbonate indicator turns:

- Purple in the presence of a small amount of carbon dioxide
- Yellow in the presence of a large amount of carbon dioxide
- Orange in the presence of a moderate amount of carbon dioxide



The result of the experiment is given in the table below:

	Test tube A	Test tube B	Test tube C
Colour of indicator at the start of the experiment	Orange	Orange	Orange
Colour of indicator after 3 hours	Purple	Yellow	Orange

2.4.1 State a reason for closing each test tube with a stopper. (1)

2.4.2 Explain why the indicator in test tube **B** became yellow after 3 hours. (2)

2.4.3 What is the purpose of test tube **C** in the investigation? (1)

2.4.4 Explain why the colour of the indicator would change to orange/yellow, if test tube **A** is placed in a dark cupboard for the entire day. (3)

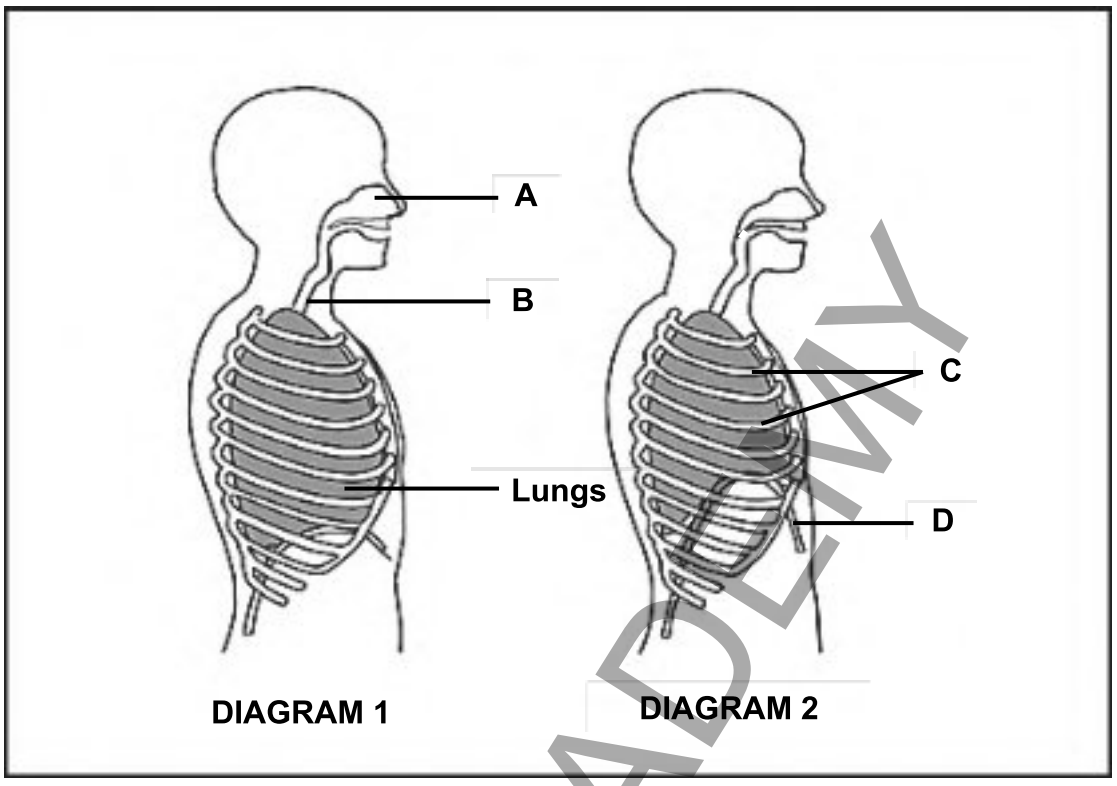
[50]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 3

3.1 The diagrams below represent the process of breathing in humans.



3.1.1 Name the breathing muscles:

(a) Represented by **D** (1)

(b) Found between **C** (1)

3.1.2 Which diagram (**1** or **2**) shows exhalation? (1)

3.1.3 State TWO observable features to support your answer in QUESTION 3.1.2. (2)

3.1.4 Identify the LETTERS representing the air pathway where coronaviruses would settle and multiply, before gaining entry into the lungs. (2)

3.1.5 If the coronavirus infects the thin inner lining of the alveoli, large amounts of mucus and fluid are secreted as a reaction. This substantially lowers the efficiency of gaseous exchange. This condition is known as pneumonia.

(a) Explain why there is a substantial increase in breathing rate and heart rate amongst the patients who suffer from pneumonia. (4)

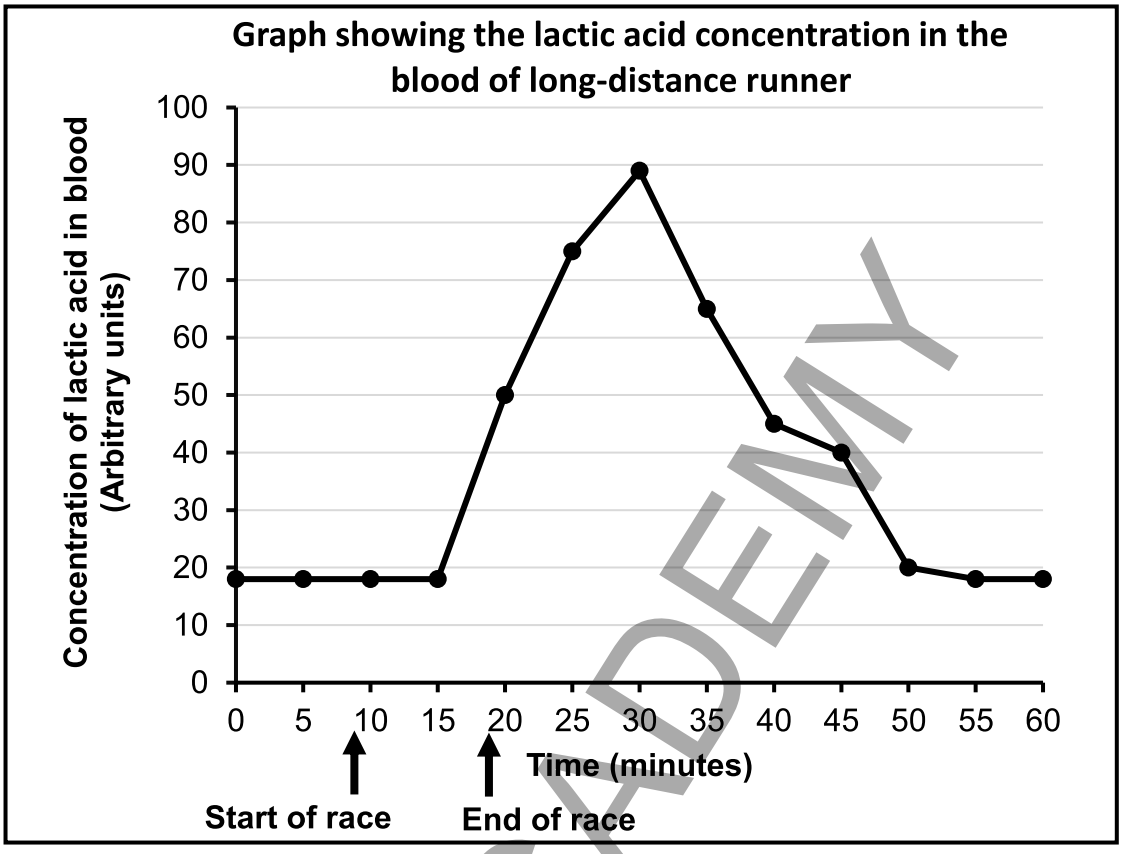
(b) Explain why the patients require a ventilator to maintain life.
(A ventilator is a machine that actively pumps highly concentrated oxygen directly into the lungs of the patient through an attached tube inserted into the part labelled **B.**) (4)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

3.2 The graph below represents the lactic acid levels in the blood of a long-distance runner.



3.2.1 Name the:

(a) Type of respiration that takes place in the cells of a long-distance runner 15 minutes after the race has started (1)

(b) Site where lactic acid accumulates during this process (1)

3.2.2 According to the graph, what is the acceptable level of lactic acid in the blood? (1)

3.2.3 For how long did the lactic acid concentration continue to increase after the end of the race? (1)

3.2.4 Explain why there is an increase in the lactic acid concentration in the blood. (4)

3.2.5 Explain why a long-distance runner who is suffering from severe muscle cramp, is advised to rest immediately. (4)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

3.3 Read the extract below.

> Hypernatremia is the medical term used to describe having too much sodium in the blood. Sodium is an important nutrient for proper functioning of the body. Most of the body's sodium is found in the blood.
>
> Hypernatremia can occur when there is too much water loss or too much sodium gain in the body. The result is too little body water for the amount of total body sodium.

3.3.1 What is *hypernatremia*? (1)

3.3.2 With reference to the extract, state TWO possible reasons for hypernatremia. (2)

3.3.3 Explain why sodium ions are actively pumped out at certain regions of the loop of Henle into the medulla region of the kidney. (3)

3.3.4 Describe how constant sodium concentration in the blood of a healthy human is maintained, when the level of sodium is decreased below the normal level. (4)

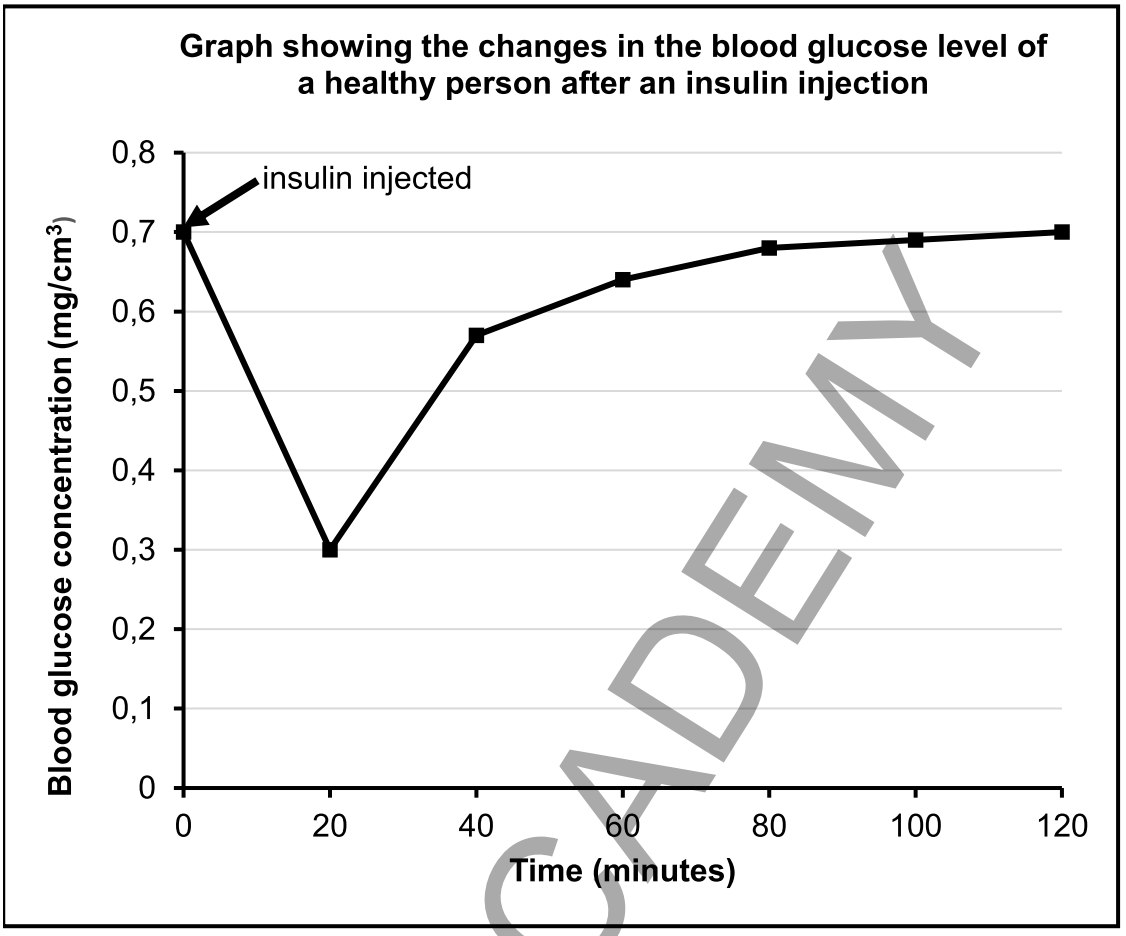
3.3.5 Explain why the levels of antidiuretic hormone (ADH) remains high in a patient who is severely dehydrated with diarrhoea and vomiting. (2)

SEE ACADEMY

Copyright reserved

Downloaded from SEE academy: www.seeacademy.co.za

3.4 The graph below shows the changes in the blood glucose levels of a healthy person after an insulin injection.



3.4.1 State the amount of glucose that was present in the person's blood:

(a) At the time of injection (1)

(b) 10 minutes after the insulin injection (1)

3.4.2 Explain the drastic drop in the blood glucose level of the normal healthy person after the injection. (3)

3.4.3 Explain how the normal blood glucose level is restored two hours after the injection. (4)

3.4.4 Some diabetes patients collapse due to a sudden drop in the blood glucose level. In order to raise the blood glucose level, they are given a concentrated glucose solution, rather than starch containing food. Explain the reason for this treatment. (2)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

SEE ACADEMY

Copyright reserved