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

Province of the EASTERN CAPE EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2025

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

SEE ACADEMY

This question paper consists of 16 pages.

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 provided.
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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. All calculations to be rounded off to TWO decimal spaces.
12. 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 The structure which prevents the food bolus from entering the trachea when swallowing:

A Epiglottis
B Tongue
C Glottis
D Teeth

1.1.2 A function of the kidney:

A CO_2 homeostasis
B Breakdown of bile pigments
C Blood pH homeostasis
D Deamination

1.1.3 The part of the alimentary canal in which the villus is found:

A Oesophagus
B Large intestine
C Stomach
D Small intestine

1.1.4 Factor(s) which facilitate oxygen absorption into the human body:

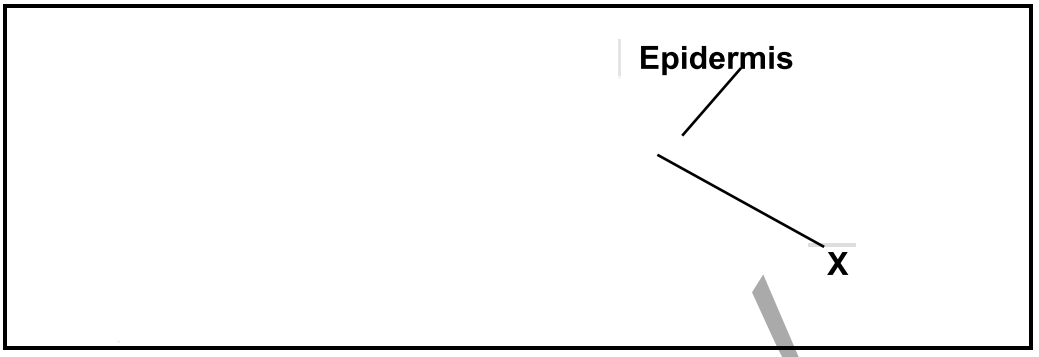
A Air breathed in has less oxygen than air breathed out
B Alveoli having thick walls for oxygen storage and a large surface area
C There are few alveoli in each lung
D The concentration of oxygen in the blood is lower than in the alveoli

SEE ACADEMY

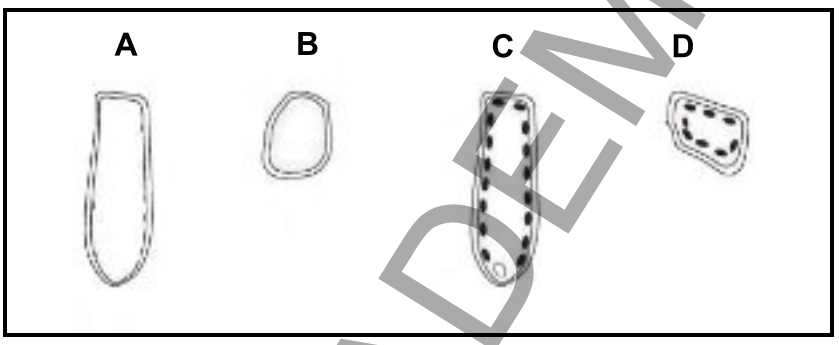
Copyright reserved

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

1.1.5 A cross-section of a dicot leaf is shown below.



Which type of cell is expected to be found at layer **X**?



1.1.6 The table below shows the composition of four air samples.

AIR SAMPLE	O_2 %	CO_2%	N_2 %
P	21	0,04	78
Q	16	4,04	78
R	4	0,40	39
S	20	4,00	39

Which air sample represents **inspired air** and which air sample represents **expired air**?

	INSPIRED AIR	EXPIRED AIR
A	S	R
B	P	S
C	P	Q
D	Q	S

SEE ACADEMY

Copyright reserved

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

1.1.7 Substances which are removed from the blood during tubular secretion.

A Water, sodium ions and hormones
B Glucose and sodium ions
C Undigested food and creatine
D Hormones, urea and creatine

1.1.8 The correct path that urine takes through the excretory system

A Kidney → urethra → bladder → ureter
B Kidney → ureter → bladder → urethra
C Bladder → kidney → ureter → urethra
D Ureter → kidney → urethra → bladder

1.1.9 Osmoregulation is the way the body controls the amount of water and salts it contains.

Consider the table below. What is most likely to happen in the body on a cold day when a person drinks a lot of water?

	UREA CONCENTRATION	RENAL TUBULE PERMEABILITY	URINE VOLUME
A	Low	Permeable	High
B	High	Impermeable	Low
C	Low	Impermeable	Low
D	High	Permeable	High

1.1.10 The inside of the trachea (windpipe) is lined with a special tissue called ciliated columnar epithelium. This tissue has tiny hair-like structures called cilia.

What is the main function of the cilia in the trachea (windpipe)?

A Increase surface area for gaseous exchange
B Help gases move quickly because they are close to blood vessels
C Trap dirt and pathogenic (harmful) microbes (germs)
D Excrete metabolic waste products (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 Process of taking air into and expelling it from the lungs

1.2.2 The hormone which assists in the regulation of sodium ions

1.2.3 Large flat and uneven teeth used for grinding and crushing food

1.2.4 Region which connects the nasal cavity with larynx and leads into the trachea and the oesophagus

1.2.5 Release of a useful substance (enzymes, saliva) from cells or glands

1.2.6 Semi-liquid mass of partially digested food which has gone through mechanical and chemical digestive processes of the stomach

1.2.7 Folded portion of the nephron between the loop of Henle and the collecting tubule

1.2.8 Process which requires no energy to move water from a region of high water potential to a region of low water potential (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 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Part(s) of the chloroplast in which chlorophyll is located	A: Thylakoid B: Lamellae
1.3.2	Cell(s) which make up the surface of the villus	A: Compound columnar B: Goblet
1.3.3	Structure(s) which assist in keeping the trachea open	A: Circular muscle B: Epiglottis
1.3.4	A part of the blood circulatory system of the kidney	A: Convoluted tubules B: Renal calyxes

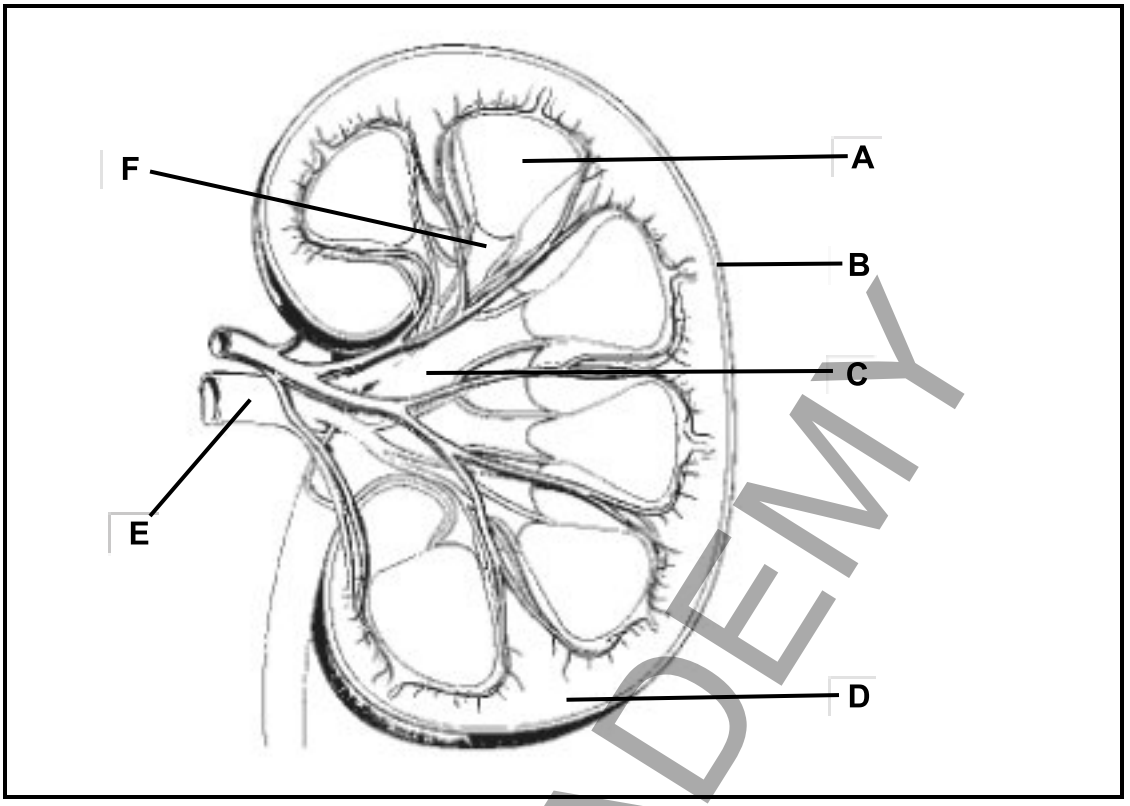
(4 x 2) (8)

SEE ACADEMY

Copyright reserved

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

1.4 A macroscopic diagram of the kidney is shown below.



1.4.1 Identify the label and state the name of the …

(a) cup-shaped structure which surrounds the renal papillae and funnels urine. (2)

(b) part that has layers of fat (adipose tissue) to protect the kidney from mechanical injury. (2)

(c) part that collects urine from the calyces and channels it into the ureter. (2)

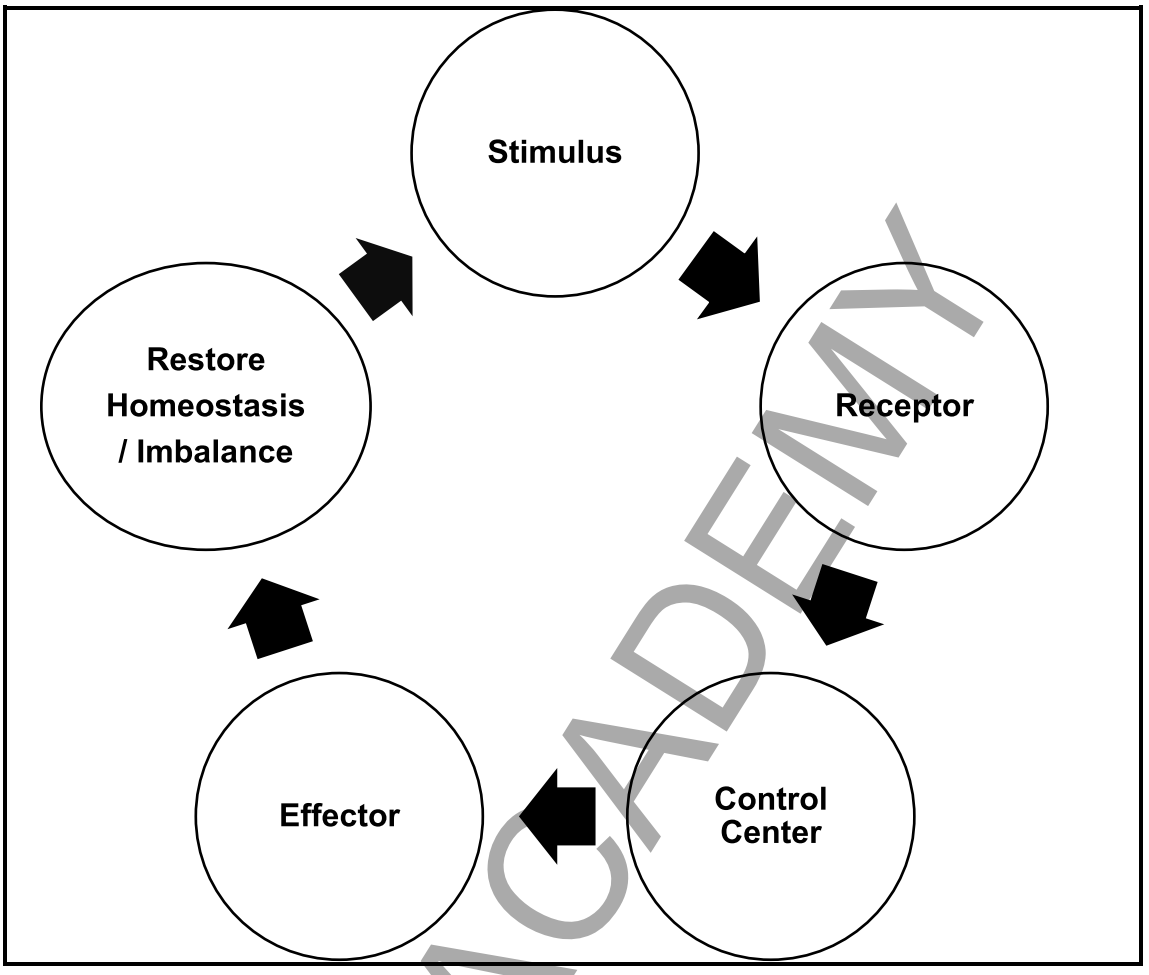
1.4.2 Explain why part **D** appears darker red or brown compared to part **A**. (1)

SEE ACADEMY

Copyright reserved

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

1.5 Negative feedback mechanisms are essential processes which ensure homeostasis. A simple negative feedback loop with its components is shown below.



1.5.1 Define the term *homeostasis*. (2)

1.5.2 Carbon dioxide regulation is an important example of a negative feedback mechanism.

When the level of carbon dioxide in the human body becomes too high which part of the body acts as the:

(a) Receptor (1)

(b) Effector (2)

1.5.3 Give TWO reasons why it is important for carbon dioxide levels in the blood not to remain high. (2)
[50]

TOTAL SECTION A: 50

SEE ACADEMY

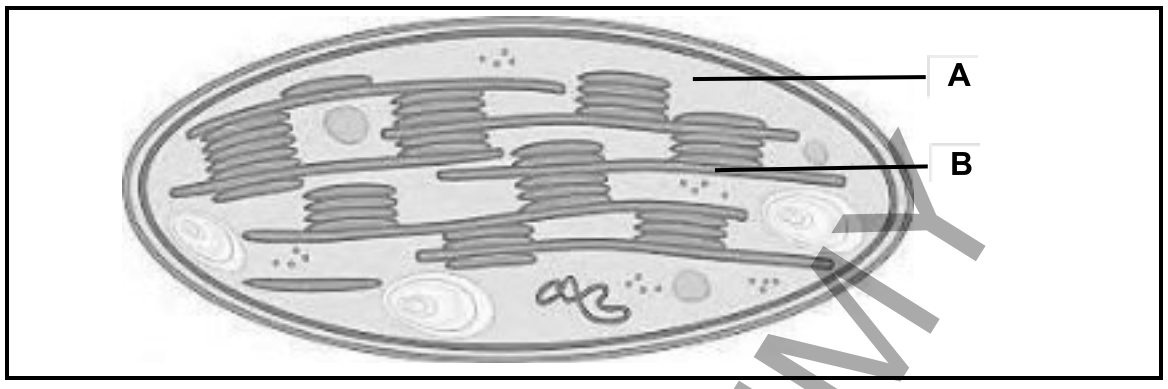
Copyright reserved

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

SECTION B

QUESTION 2

2.1 Study the organelle below that is found in a cell.



2.1.1 Identify the organelle shown above. (1)

2.1.2 State TWO visible reasons for the answer given to QUESTION 2.1.1. (2)

2.1.3 Beside their locations, tabulate TWO differences between the processes which occur at **A** and **B**. (5)

2.1.4 List TWO biological importances of the process which occurs within the given organelle. (2)

2.1.5 Describe ONE visible structural feature within the organelle that makes it suitable for its primary function. (2)

SEE ACADEMY

Copyright reserved

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

2.2 Read the extract below and answer the questions that follow.

GREENHOUSES HELP GROW FOOD EVEN WHEN THE WEATHER IS UNFAVOURABLE

In Russia, winters are very cold and the time for growing food is short. Greenhouses give a safe and warm space for growing vegetables all year round, even when it is −25 °C outside. In places like Siberia, people can now grow local vegetables instead of buying them from other countries. Russian greenhouses use clean energy from the sun (solar) and the earth (geothermal). Greenhouses also help people get jobs and support local businesses.



2.2.1 List ONE benefit of greenhouse systems on the local community. (1)

2.2.2 Explain how Russian greenhouses are energy efficient. (2)

2.2.3 The best temperature for growing plants in a greenhouse is 28 °C. Outside, the temperature is −25 °C.

(a) Give TWO ways to keep the temperature warm inside the greenhouse when it is very cold outside. (2)

(b) Calculate the percentage difference in temperature between outside (−25 °C) and inside (28 °C) the greenhouse. (3)

2.2.4 Greenhouses use UV-A and UV-B light bulbs when there is not enough sunlight.

(a) Briefly discuss the relationship between light intensity and the photosynthetic rate of plants. (3)

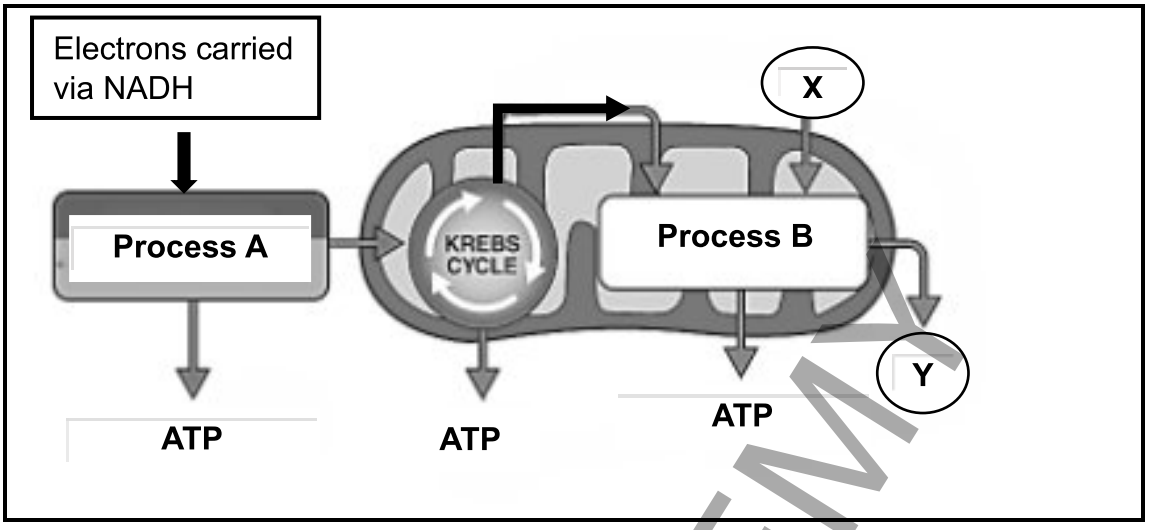
(b) Explain ONE limiting factor of light intensity in plants. (2)

SEE ACADEMY

Copyright reserved

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

2.3 Cellular respiration is a 3-phase process in which ATP is formed. A schematic representation of this process is given below.



2.3.1 Identify:

(a) Process **A** (1)

(b) Reactant **X** (1)

(c) Product **Y** (1)

2.3.2 Is process **A** an anabolic or catabolic process?
Give ONE reason for the answer. (2)

2.3.3 Between **A** and **B**, which process produces more ATP?
Give a reason for the answer. (2)

2.3.4 Describe the events of the Krebs cycle. (4)

2.3.5 An athlete complained about muscle cramps after running a marathon for four and a half hours.

Using your understanding of cellular respiration, explain why this has occurred. (3)

SEE ACADEMY

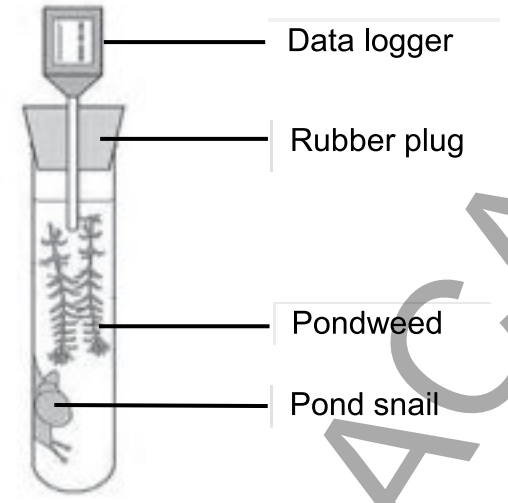
Copyright reserved

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

2.4 A scientist investigated how photosynthesis and respiration affect carbon dioxide levels in water. The experiment used pondweed (a plant) and a pond snail (an animal).

Experimental design:

- The apparatus was left in a well-lit room for 5 days.
- After 5 days, the scientist completely covered the boiling tube with black paper.
- A data logger was used to record carbon dioxide (CO_2) levels every day for 15 days.
- The results are shown in the table below.



TIME IN DAYS	CARBON DIOXIDE CONCENTRATION IN ARBITRARY UNITS
0	5
1	5
2	5
3	5
4	5
5	5
6	5,3
7	5,4
8	5,5
9	6,4
10	6,5
11	6,5
12	6,6
13	6,8
14	7,1
15	7,4

2.4.1 Identify the dependent variable of the investigation. (1)

2.4.2 State a suitable control for the investigation. (2)

2.4.3 Account for the carbon dioxide concentration between day 0 and day 5. (2)

2.4.4 Suggest a reason why carbon dioxide concentration increased after day 5. (2)

2.4.5 The snail died on day 10. Explain why this happened. (2)

2.4.6 State a suitable conclusion for the investigation. (2)

[50]

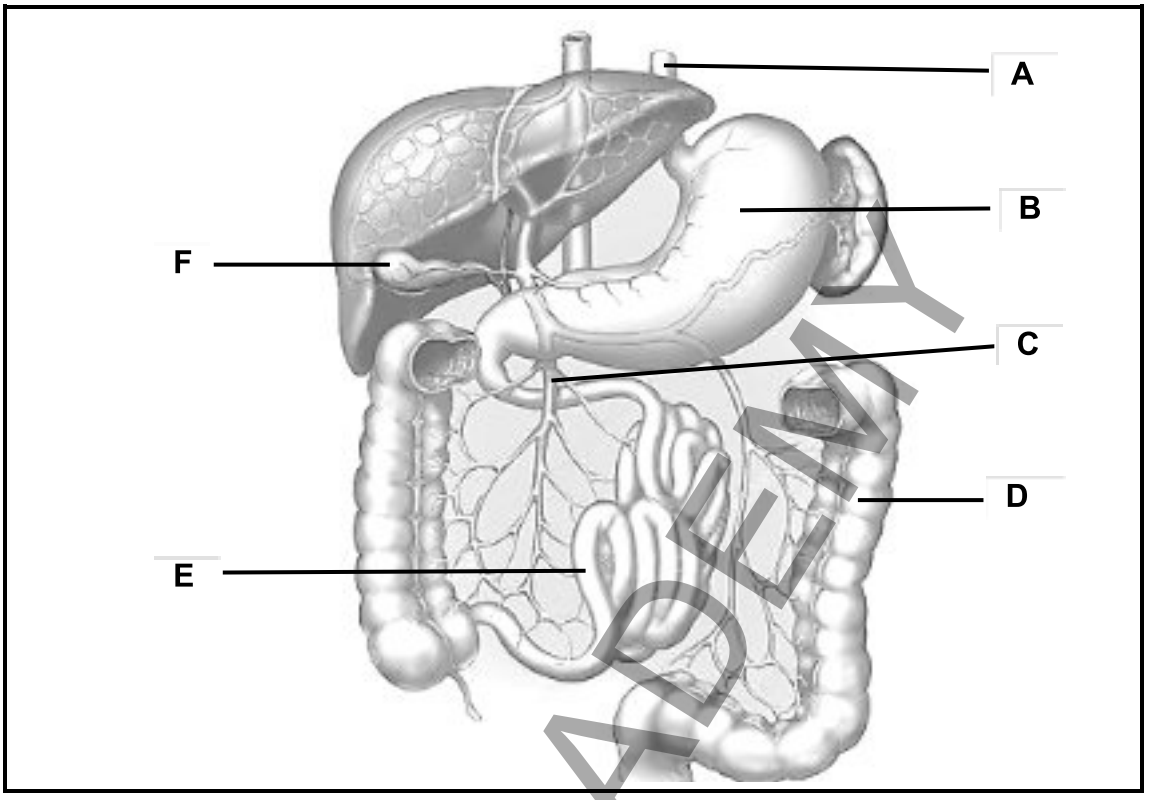
SEE ACADEMY

Copyright reserved

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

QUESTION 3

3.1 Below is a diagram of some parts of the digestive system.



3.1.1 Provide suitable labels for:

(a) Tube **A** (1)

(b) Vein **C** (1)

3.1.2 Explain THREE ways structure **E** is adapted for its function. (6)

3.1.3 Distinguish between the *physical* and *chemical* digestion which occur simultaneously in structure **B.** (4)

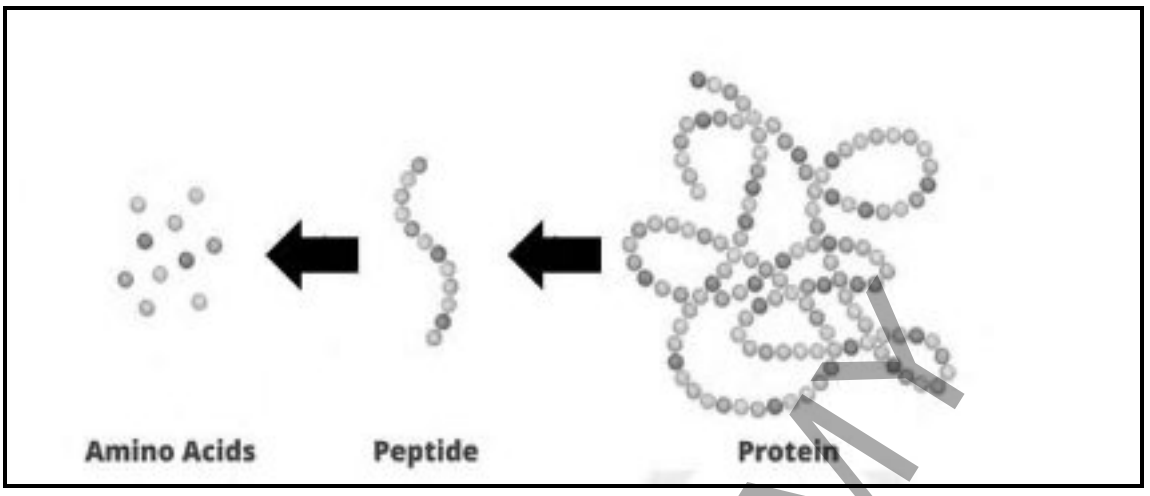
3.1.4 Explain why fat absorption is still possible, despite structure **F** being surgically removed. (2)

SEE ACADEMY

Copyright reserved

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

3.2 The diagram below shows one of the five phases of human nutrition.



3.2.1 Based on the diagram above, name the phase of human nutrition shown. Also, name the enzyme responsible for breaking down proteins during this phase. (2)

3.2.2 Where in the human body will the enzyme mentioned in QUESTION 3.2.1 be produced? (1)

3.2.3 During which phase of human nutrition will proteins be formed in the human body? (1)

3.2.4 Identify and discuss the final phase of human nutrition. Mention the structure(s) involved and their biological importance. (3)

3.3 Bread is masticated in the human mouth.



3.3.1 Explain the importance of mastication in human nutrition. (2)

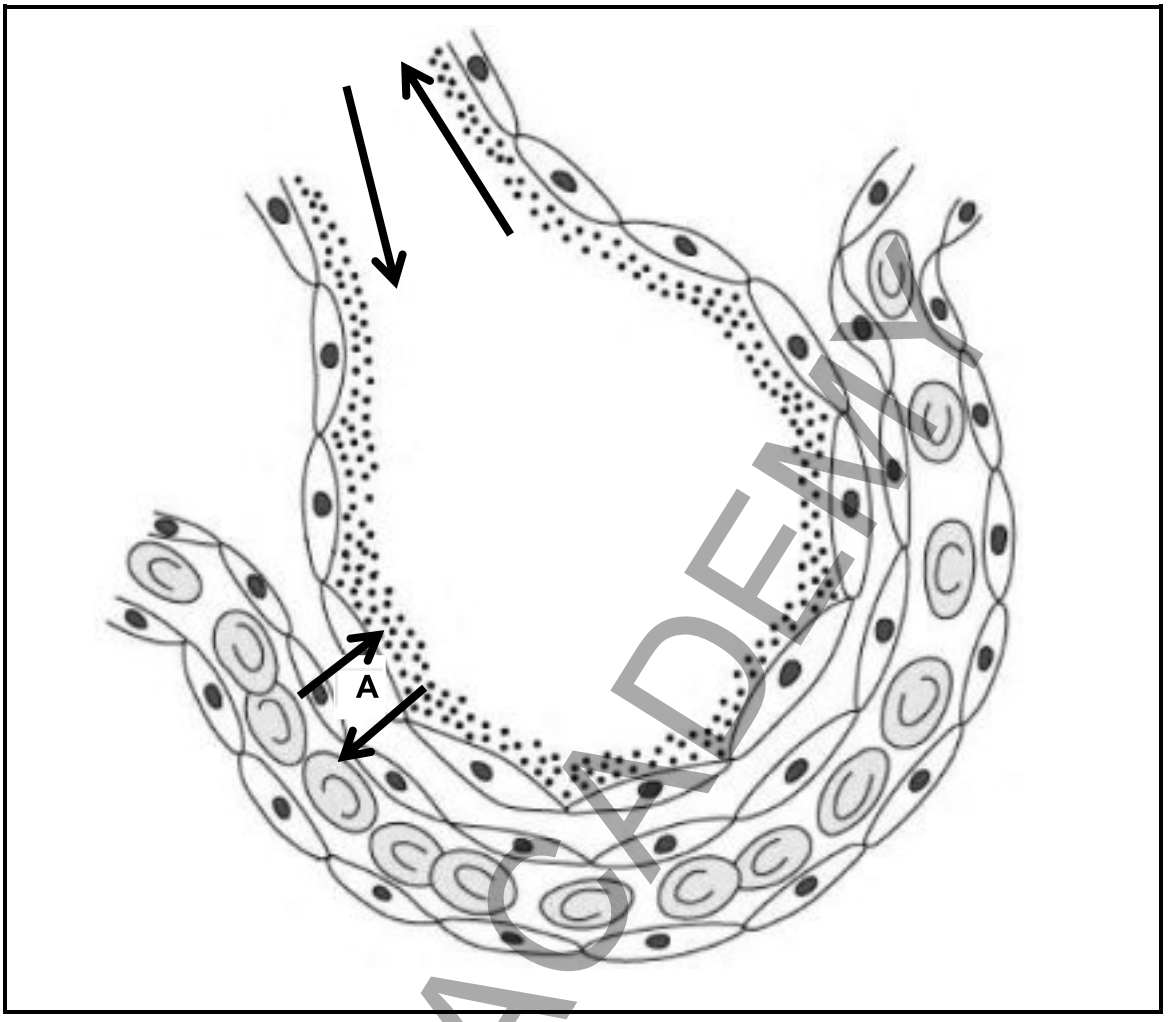
3.3.2 Explain why bread tastes sweeter after a short period of time in the mouth. (2)

SEE ACADEMY

Copyright reserved

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

3.4 The diagram below shows an alveolus, a small, hollow, air-filled sac located in the lungs.



3.4.1 Identify the type of movement represented by **A**. (1)

3.4.2 Identify and describe TWO visible features of the alveolus that make it an effective gaseous exchange surface. (4)

3.4.3 List TWO ways in which oxygen is transported in the body. (2)

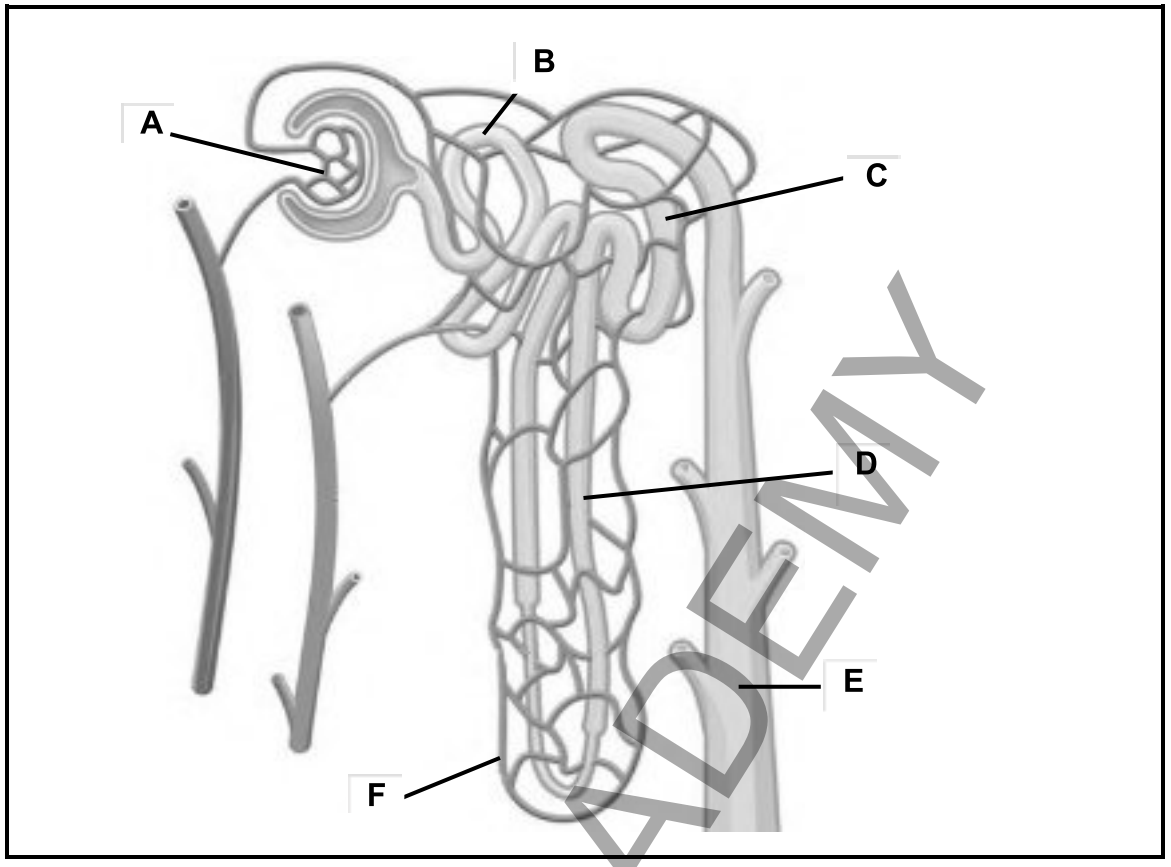
3.4.4 Describe how a bullet wound to the chest could affect effective ventilation of the lungs. (5)

SEE ACADEMY

Copyright reserved

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

3.5 The diagram below shows a nephron.



3.5.1 List TWO letters from the nephron diagram that are located in the renal cortex. (2)

3.5.2 Identify and discuss TWO significant processes which occur between the renal tubule and network **F**. (4)

3.5.3 Bartter syndrome is a rare genetic disorder which causes ineffective reabsorption of sodium ions, despite aldosterone's secretion. Sodium pumps are also unable to actively pump sodium out.

(a) Identify and write down the name of the part Bartter syndrome will most likely affect. (2)

(b) Discuss how Bartter syndrome will negatively affect osmoregulation. (5)

[50]

TOTAL SECTION B: 50
GRAND TOTAL: 150

SEE ACADEMY

Copyright reserved