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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

22 MAY 2024

LIFE SCIENCES

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your 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.

12 Round off all calculations to two TWO decimals after the comma.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

1.1.1 Which chemical is a product of photosynthesis that moves out of a green leaf through its stomata?

A Carbon dioxide
B Glucose
C Oxygen
D Water

1.1.2 The products of protein digestion are …

A amino acids.
B fatty acids.
C glycerol.
D simple sugars.

1.1.3 Where in a cell does cellular respiration take place?

A Nucleus
B Mitochondria
C Chloroplasts
D All cell membranes

1.1.4 The process that occurs in the capsules of some plants to form spores is:

A Mitosis
B Binary fission
C Meiosis
D Fertilisation

1.1.5 A closed blood system is found in:

A Annelida
B Insecta
C Cnidaria
D Porifera.

1.1.6 Which animal activity is NOT beneficial to farmers?

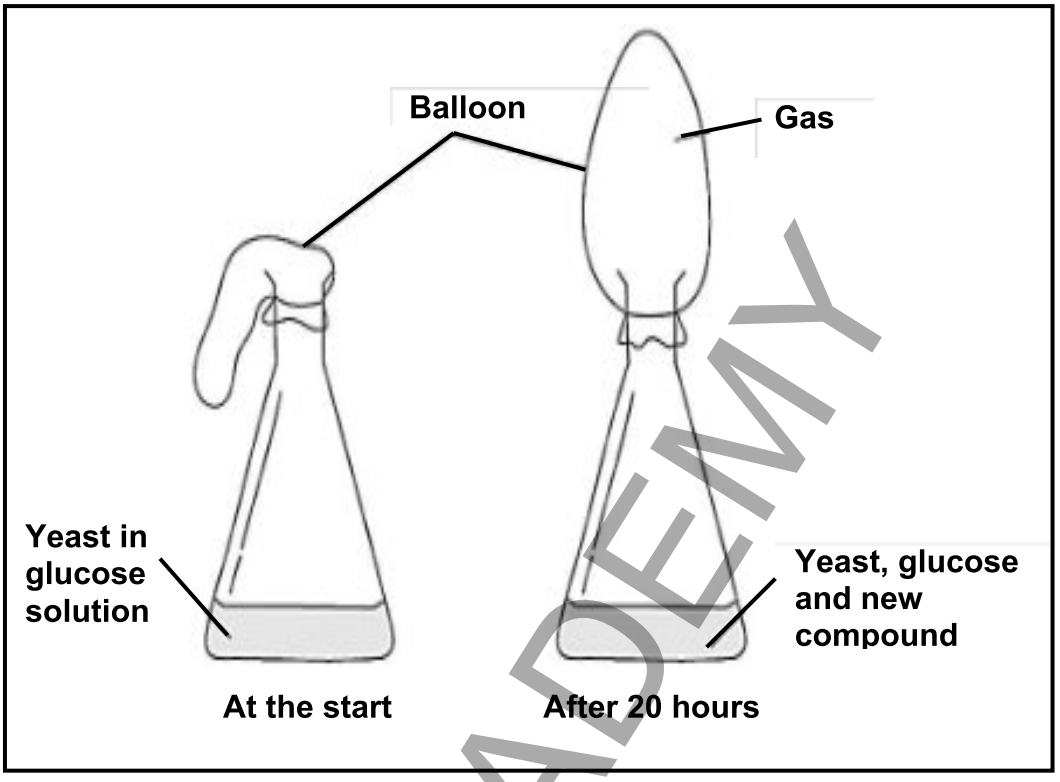
A Dogs herding sheep on a Karoo farm
B Soil organisms preying on crop pests and maintaining low numbers
C Swallows preying on insect larvae that destroy crop plants
D Mice feeding on wheat in storerooms

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1.1.7 The diagram below shows an experiment set up by a group of students to investigate respiration in yeast.



Which row of the table below CORRECTLY describes the contents of the flask after 20 hours?

	New compound	Gas produced
A	alcohol	oxygen
B	alcohol	carbon dioxide
C	lactic acid	oxygen
D	lactic acid	carbon dioxide

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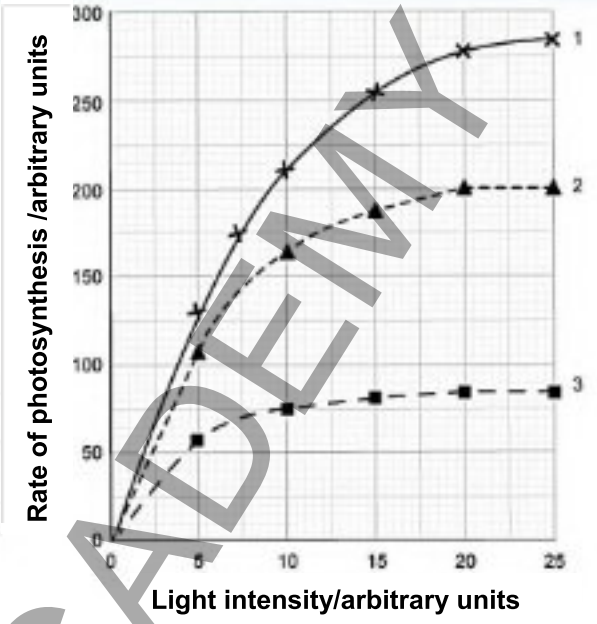
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1.1.8 The graph below shows the results of three experiments to measure the rate of photosynthesis under different conditions.

Experiment **1** measured the effect of light intensity on photosynthesis
Experiment **2** measured the effect of temperature on photosynthesis
Experiment **3** measured the effect of carbon dioxide on photosynthesis

Key:

	Temp (°C)	CO_2 (%)
1	30	0.13
2	20	0.13
3	30	0.13



Which row in the following table CORRECTLY identifies the limiting factor for photosynthesis in each experiment?

	1	2	3
A	light intensity	light intensity	carbon dioxide concentration
B	temperature	temperature	light intensity
C	light intensity	temperature	carbon dioxide concentration
D	light intensity	carbon dioxide concentration	temperature

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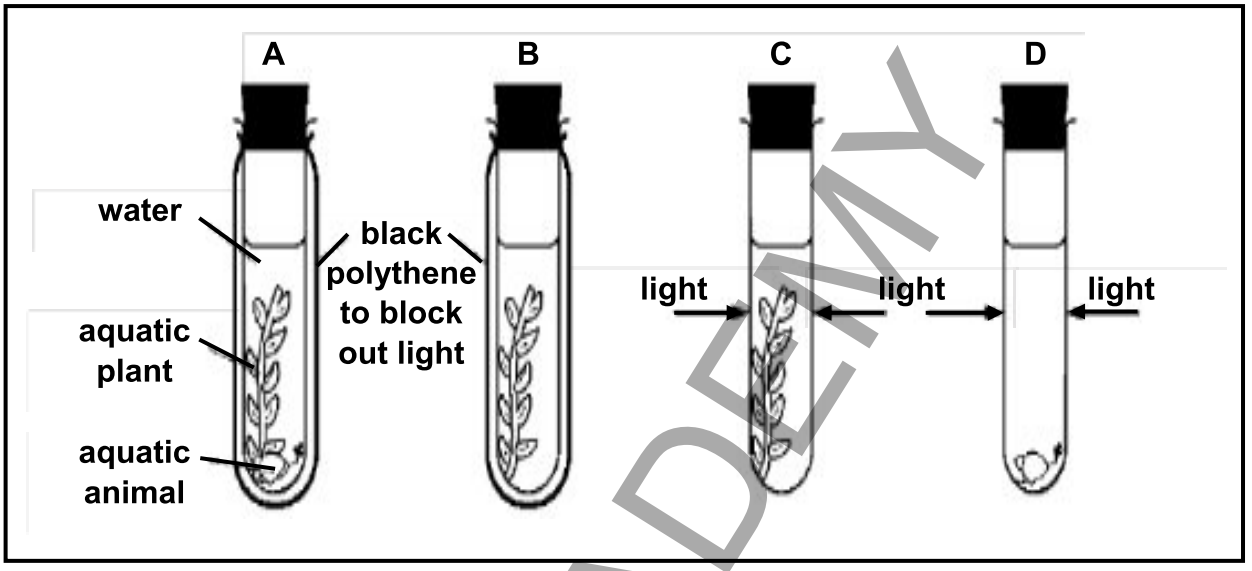
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1.1.9 The apparatus shown was used in an experiment.

The carbon dioxide content of the water in each test-tube was measured at the start of the experiment and again three hours later.

In which test-tube will the carbon dioxide concentration decrease?



(9 x 2) **(18)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.10) in the ANSWER BOOK.

1.2.1 A plant body with no true roots ,stem and leaves

1.2.2 A symbiotic relationship where both organisms benefit

1.2.3 Reproduction which uses non-reproductive parts of a plant to produce new plants

1.2.4 The collective name for a filament and an anther

1.2.5 Organic component of soil, formed by the decomposition of leaves and other plant material by soil microorganisms

1.2.6 The type of animal that does not have a backbone.

1.2.7 Tissue that transports water in plants

1.2.8 An underground stem in ferns

1.2.9 The incorporation of absorbed nutrients into the cells of the body

1.2.10 The process of producing ATP without oxygen (10 x 1) **(10)**

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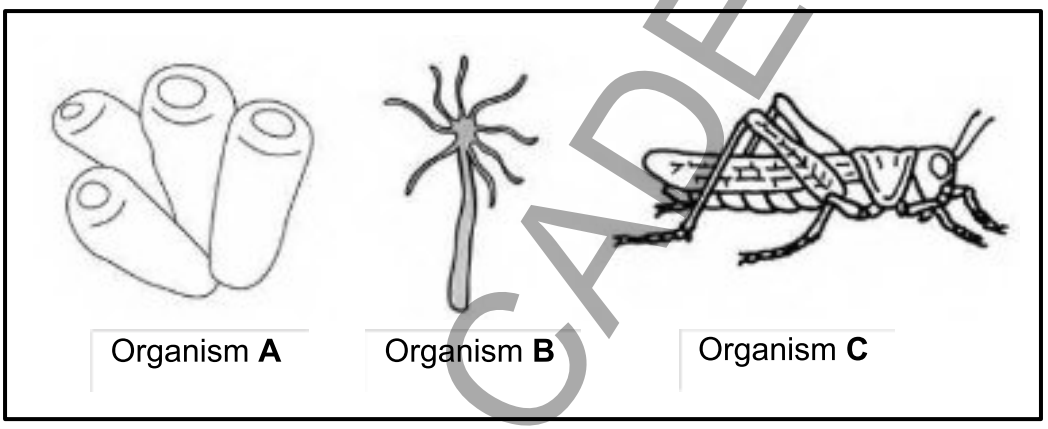
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1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.3)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

COLUMN I	COLUMN II
1.3.1 They are diploblastic	A: Porifera B: Cnidaria
1.3.2 The fuel required for cellular respiration	A: Glycogen B: Glucagon
1.3.3 Gametophyte is dominant	A: Ferns B: Mosses

(3 x 2) **(6)**

1.4 These diagrams show various organisms from the animal kingdom.



1.4.1 Give the letter of an organism that …

(a) has a haemocoel. (1)

(b) is sessile. (1)

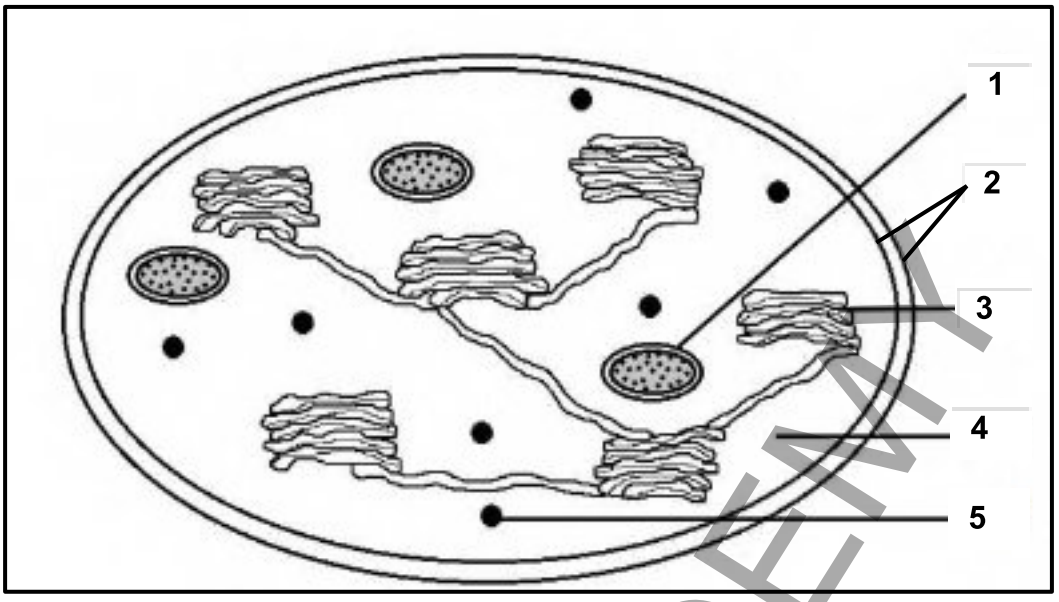
(c) has a mesoderm (1)

1.4.2 State the phylum to which organism **A**, **B** and **C** belong. (3)
(6)

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1.5 The diagram below represents a cell organelle.



1.5.1 Identify the organelle represented in the diagram. (1)

1.5.2 Give labels for:

(a) **2** (1)

(b) **3** (1)

1.5.3 Give the LETTER and NAME of the part that:

(a) Stores glucose (2)

(b) Forms enzymes for photosynthesis (2)

(c) Is the site of light independent reactions (2)

1.5.4 What is the name of the energy carrier molecule that is formed in light dependent phase? (1)
(10)

TOTAL SECTION A: 50

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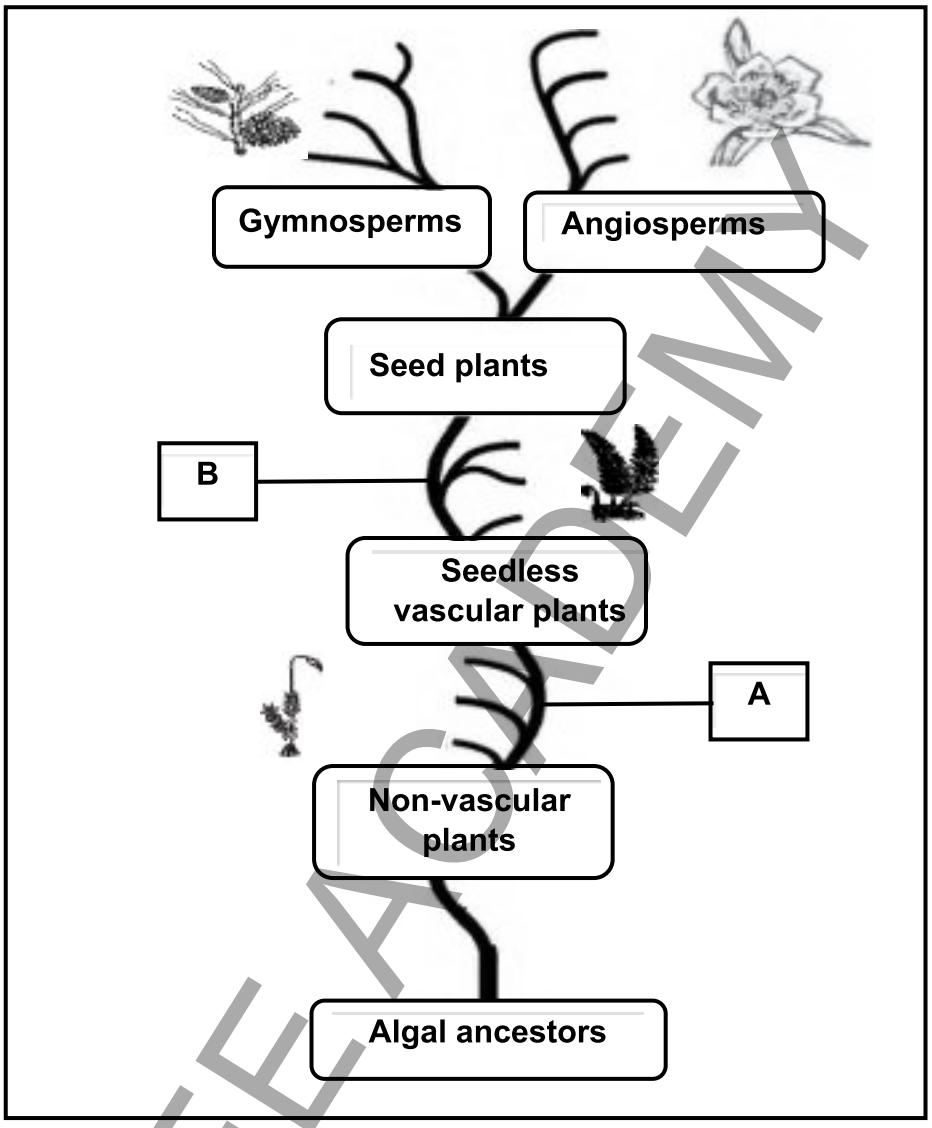
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SECTION B

QUESTION 2

2.1 The diagram below is a phylogenetic tree of plants and their algal ancestors.



2.1.1 State the most important adaptations that evolved at each of the positions labelled **A** and **B**. (2)

2.1.2 Name the division of plants is represented as nonvascular plants in the diagram. (1)

2.1.3 Explain why the seedless vascular plants can grow taller than the nonvascular plants. (2)

2.1.4 Give the collective name for all seed-bearing plants. (1)

2.1.5 In what way are the seeds of gymnosperms different to seeds of angiosperms? (2)

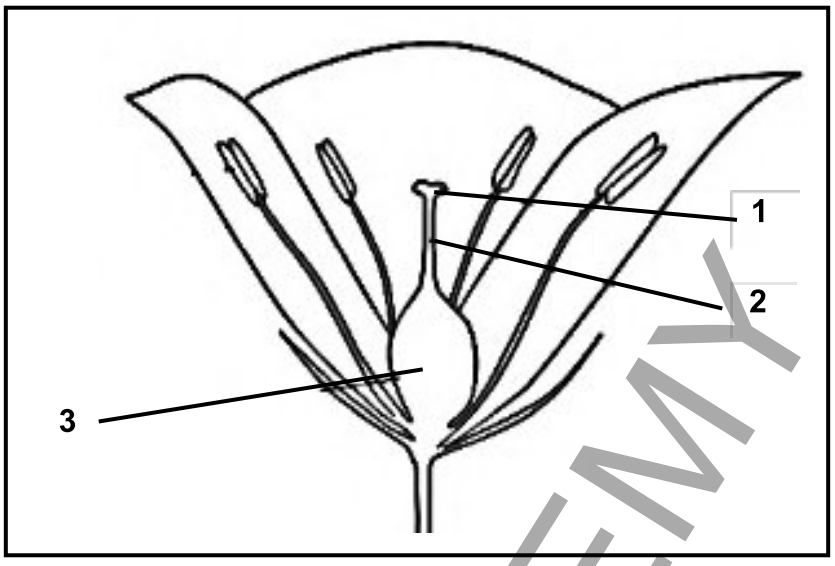
2.1.6 Explain why gymnosperms do not depend on water for fertilisation. (2)
(10)

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2.2 The diagram below shows the structure of a flower.



2.2.1 Identify parts labelled :

(a) **1** (1)

(b) **3** (1)

2.2.2 Give the function for the part labelled **2.** (1)

2.2.3 Explain how the part labelled **1** is structurally suited for insect pollination. (2)

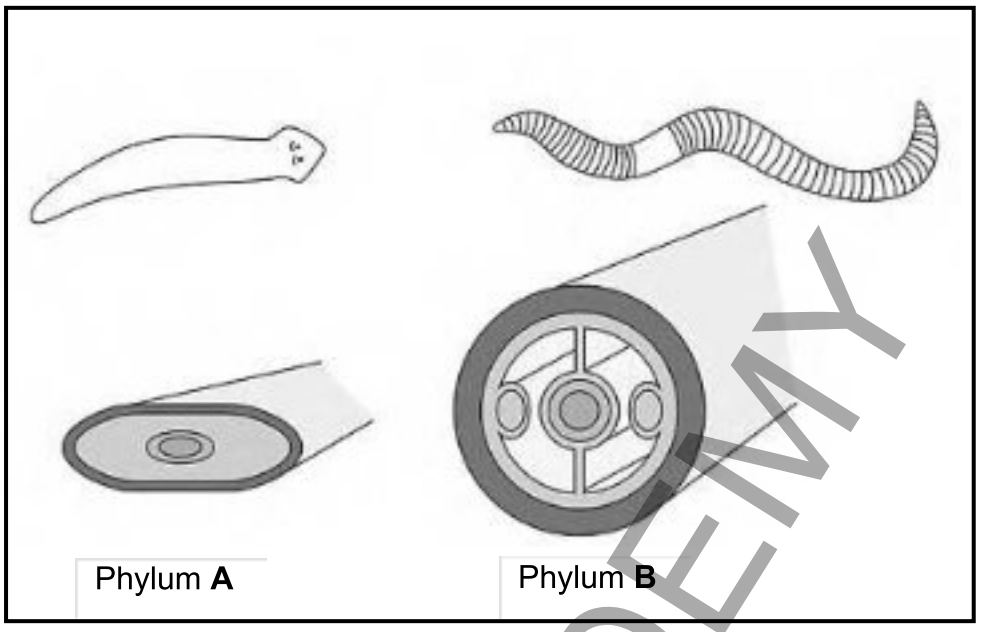
2.2.4 Tabulate TWO differences between wind and insect pollinated flowers (5)
(10)

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2.3 Study the diagrams below and answer the questions that follow.



2.3.1 Identify phylum:

(a) **A** (1)

(b) **B** (1)

2.3.2 Name the type of digestive system that occurs in each of the organisms **A** and **B.** (2)

2.3.3 Name type of symmetry that occurs in each of the organisms. (1)

2.3.4 Explain the advantage of this type of symmetry to these organisms. (5)

2.3.5 State TWO differences between the embryonic body plans of these organisms. (4)
(14)

2.4 A person eats a baked potato.

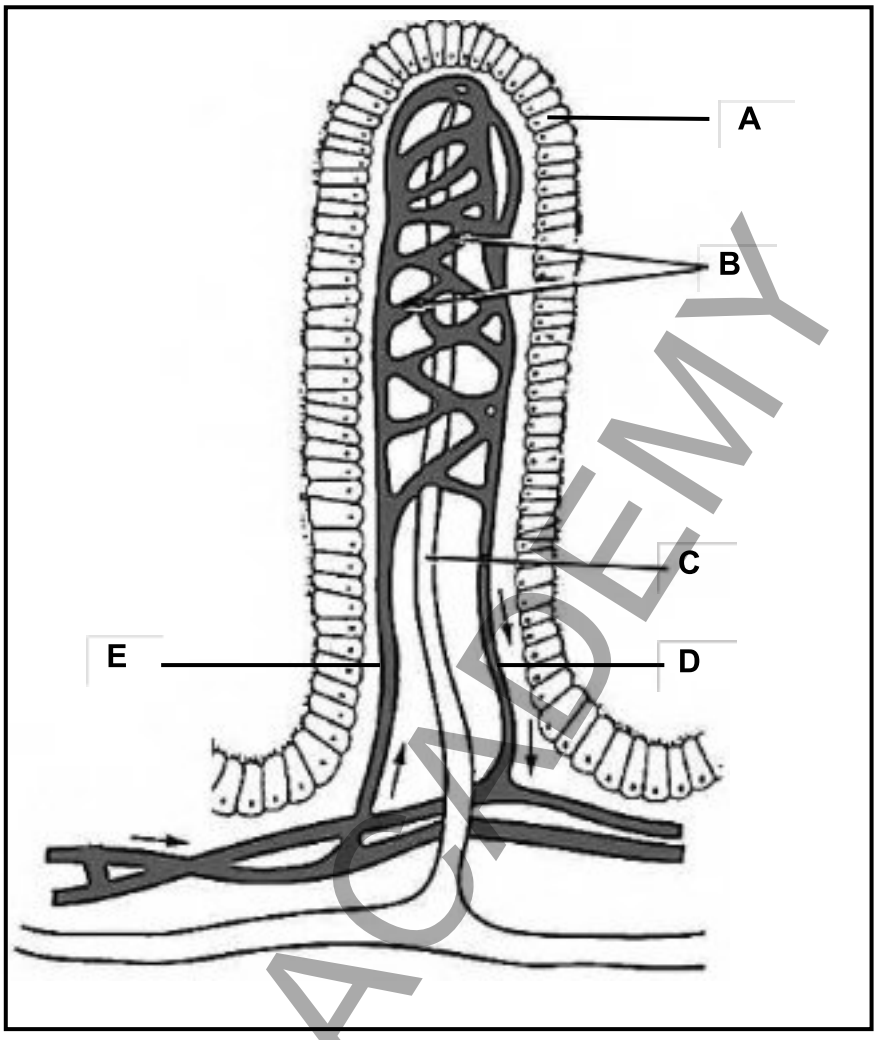
Briefly describe how this baked potato is digested **(6)**

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2.5 The accompanying diagram represents a structure associated with the human digestive system.



2.5.1 Identify the structure shown. (1)

2.5.2 In which organ is this structure found? (1)

2.5.3 State the main function of the structure shown above. (1)

2.5.4 Identify:

(a) **A** (1)

(b) **C** (1)

2.5.5 Name ONE substance which is found in higher concentration in **D** than in **E.** (1)

2.5.6 Explain TWO structural features of this structure shown that enable it to perform its function effectively. (4)

(10)

[50]

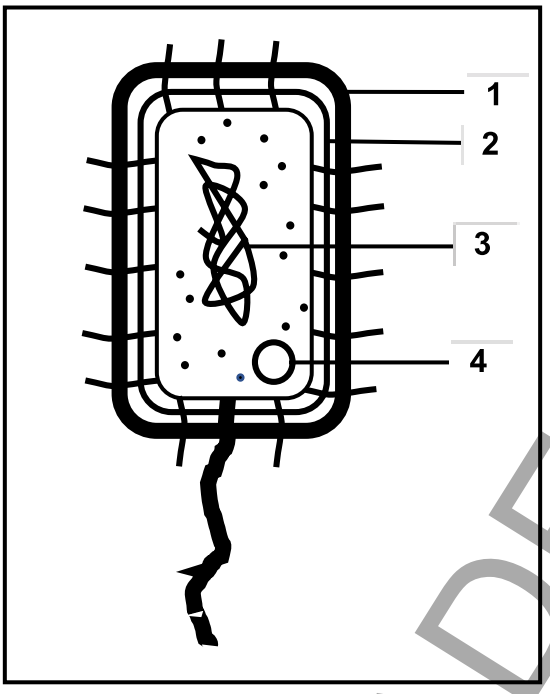
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QUESTION 3

3.1 Bacteria are prokaryotes. The diagram below shows a bacterial cell.



3.1.1 State what is meant by the term *prokaryote*. (1)

3.1.2 Give labels for:

(a) **2** (1)

(b) **3** (1)

3.1.3 Give the function of the part labelled **1.** (1)

3.1.4 The structure labelled **4** is a circular DNA called a *plasmid*. Describe how it can be used in the manufacture of insulin for diabetics? (5)

3.1.5 Briefly explain how bacteria develop resistance to antibiotics and how humans can contribute to the phenomenon. (3)
(12)

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3.2 Scientists conducted an investigation to determine which toothbrush sterilising method is the most effective in reducing bacterial growth.

The investigation was conducted as follows:

- 24 adult volunteers who were neither under dental treatment nor using antibiotics or antiseptic mouthwashes were selected
- The volunteers were divided into four groups
- The **first group** had to put their toothbrushes in Dettol once a day for five minutes then it must be washed thoroughly with water and kept as usual
- **Group 2** had to put their toothbrushes in a cup containing two teaspoons of table salt in 240ml water once a day for five minutes. The volunteers of this group were given a special cup and spoon in order to control the weight
- **Group 3** had to put their toothbrushes in hot tap water once a day for five minutes.
- **Group 4** used their toothbrushes in a normal way without the use of any kind of sterilization
- After 21 days toothbrushes were collected and transported to the laboratory in sterile bags
- The identification of the bacteria isolated from toothbrushes was performed and the percentage of bacterial contamination was calculated and recorded.

The table below shows the results of the investigation.

Group	Sterilizing Agent	Bacterial contamination (%)
1	Dettol	12,5
2	Salt	37,5
3	Hot water	50
4	None	100

3.2.1 Identify the Independent variable (1)

3.2.2 State THREE factors which were kept constant during the investigation (3)

3.2.3 Explain why was group 4 included in the investigation. (2)

3.2.4 State the conclusion for this investigation. (2)

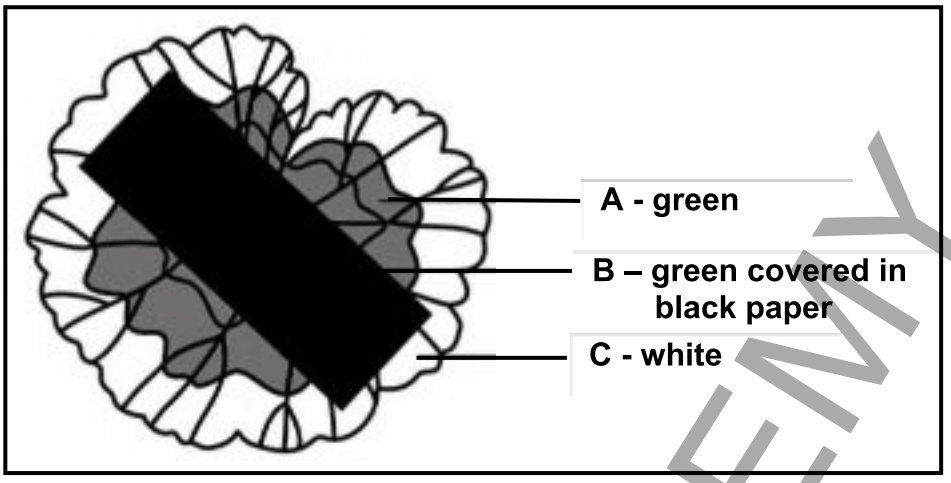
3.2.5 Draw a bar graph to show the data presented in the table of results. (6)
(14)

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3.3 The diagram below shows a variegated leaf being tested for photosynthesis. (A variegated leaf is a leaf that has a different colour on part of the leaf than on another).



Before the experiment, the leaf was destarched.

3.3.1 (a) Give ONE reason for destarching the leaf. (1)

(b) Describe how the destarching is done. (1)

3.3.2 State the factor being investigated with reference to the region of the leaf marked **B.** (1)

3.3.3 Describe ONE precaution when covering the leaf with black paper. (1)

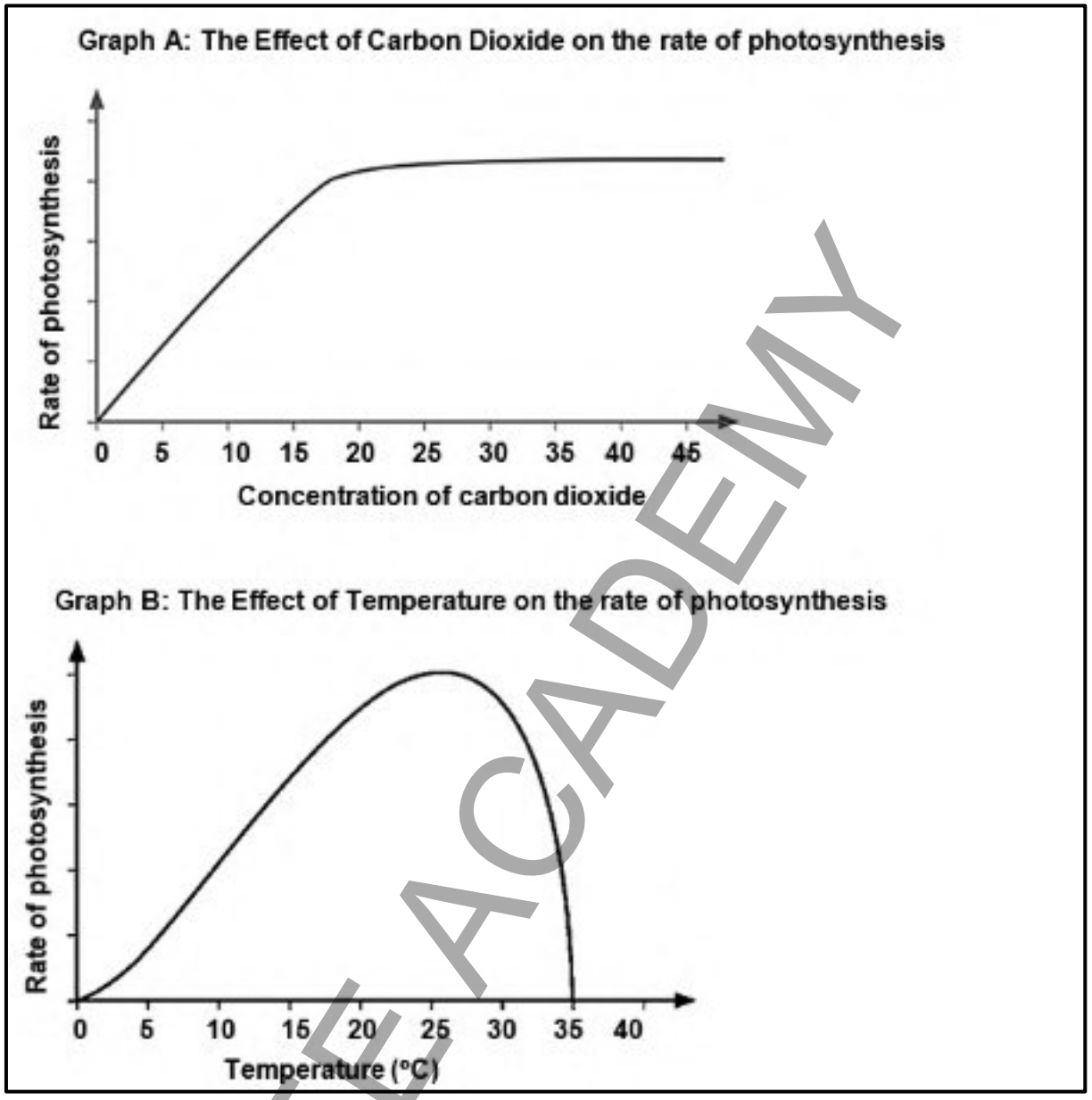
3.3.4 Suggest the possible result of the experiment in regions **B.** (2)
(6)

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3.4 Graph **A** and graph **B** below show the effect of carbon dioxide and temperature on the rate of photosynthesis.



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3.4.1 Explain why the shape of Graph **A** levels off after a while. (4)

3.4.2 In what way does the increase in temperature affect the process of photosynthesis? (2)

3.4.3 From the information in graph **B,** explain why the plant species being tested is NOT adapted to desert conditions. (2)
(8)

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3.5 Read the passage below.

Both aerobic and anaerobic respiration are used to supply energy during exercise. During some types of exercise, such as in sprinting the body is unable to supply enough oxygen to the muscles and lactic acid builds up in the cells. This is because the body cannot inhale enough oxygen to meet the muscles' requirements and the muscles go into 'oxygen debt'. This debt can 'repaid' breathing when the sprint ends.

In a 100m sprint, the total oxygen required by the muscles may be as much as 8 litres per minute. It is impossible for the body to deliver this amount of oxygen during the few seconds it takes to run the race. The maximum oxygen that can be taken into the body is about 4 litres per minute.

3.5.1 Write down a word equation for aerobic respiration. (2)

3.5.2 Describe how lactic acid is formed in the muscle cells. (3)

3.5.3 Explain how the 'oxygen debt' referred to in the passage is repaid. (3)

3.5.4 The runner took 12 seconds to complete the 100-m sprint.

Calculate the amount of oxygen in litres that he would need to inhale per second to prevent going into oxygen debt. (2)
(10)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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