EKURHULENI NORTH DISTRICT
JUNE EXAM
2023

LIFE SCIENCES
GRADE 10

Marks: 150
Time: 2 ½ hours

Number of Pages: 18

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions

1. Answer ALL questions in the ANSWER BOOK provided.

2. Start the answer to EACH question at the top of a NEW page.

3. Number the answers correctly according to the numbering system used in this question paper.

4. Present your answers according to the instructions of each question.

5. If answers are not presented according to the instructions of each question, candidates will lose marks.

6. All drawings should be done in pencil and labelled in blue or black ink.

7. Draw diagrams or flow charts only when requested to do so.

8. The diagrams in this question paper may NOT necessarily be drawn to scale.

9. The use of graph paper is NOT permitted.

10. Non-programmable calculators, protractors and compasses may be used.

11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the **LETTER (**A-D) next to the question number (1.1.1 –1.1.10) on the answer sheet. Example, 1 .1.11. D

1.1.1   Which of the following process is not involved in the water cycle?

      A.   Diffusion.

      B.   Condensation.

      C.   Evaporation.
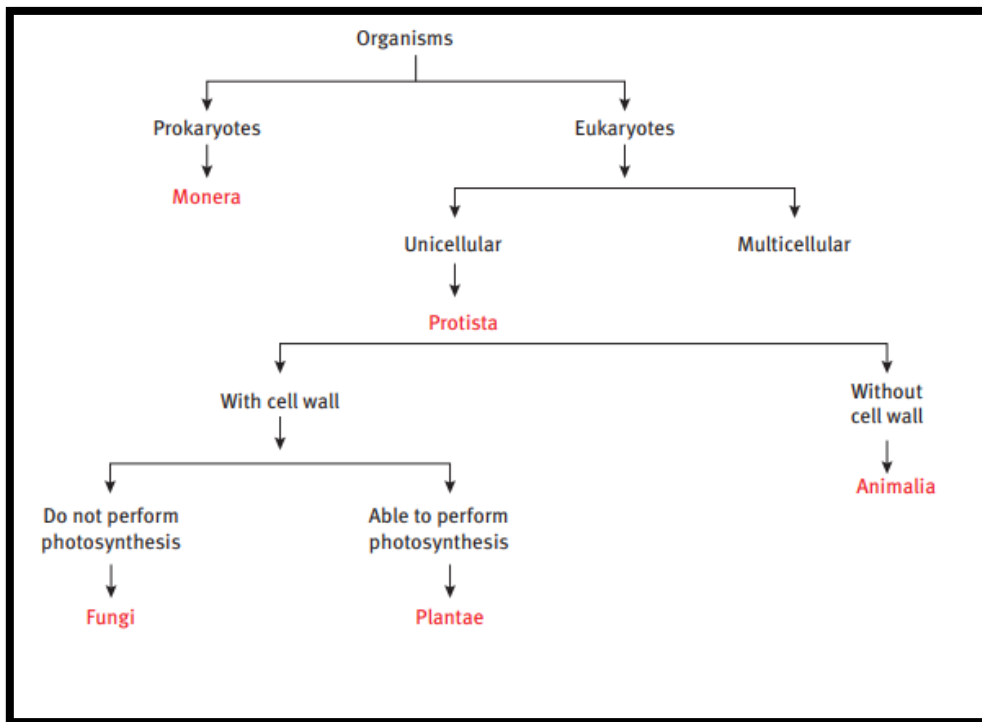
      D.   Precipitation.

1.1.2   The following elements are found in some organic compounds:

     (i) Hydrogen

     (ii) Nitrogen

     (iii) Oxygen

     (iv) Carbon

    Which of the above elements are found in proteins but not in carbohydrates and lipids?

     A (i), (ii), (iii) only

     B.(i) only

     C.(i) and (iii) only

     D.(ii) only

1.1.3   Which classification system does the diagram below represent?

A. The Two Kingdom classification system

B. The Three Kingdom classification system

C. The Four Kingdom classification system

D. The Five Kingdom classification system

1.1.4   The monomer of lipids is…

A.   saccharide.

B.   3 glycerol and one fatty acid

C.   polysaccharide.

D.   amino acids.

1.1.5   Which of the following is an abiotic component?

A.   bacteria

B.   animals

C.   pear trees

D.   water

1.1.6 Proteins differ from carbohydrates in that….

     A.   they are not sensitive to temperature.

     B.   some are enzymes.

     C.   they all supply the main source of food for energy.

     D.   they all react negatively with Millon's reagent.

1.1.7 What is the magnification of a light microscope if a specimen 10 µm long is seen as 2 mm long under the microscope?

A. 20

B. 200

C. 0,2

D. 3

1.1.8 Which difference between a plant and animal cell is CORRECT?

Plant Cell	Animal Cell
A. Contains a chloroplast	Contains a chloroplast
B. Contains a large vacuole	Contains many small vacuoles
C. Contains no cell membrane	Contains a cell membrane
D. Contains a nucleus	Contains a cell wall

1.1.9 The diagram shows an animal whose scientific name is Loxodonta africana. To which species does it belong?

A. Africana

B. Loxodonta

C. Mammal

D. Vertebrate
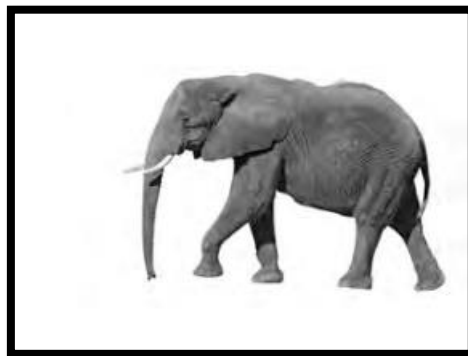
1.1.10 A sample of soil has the following characteristics:
large particles, larg spaces, holds little water, and feels gritty. This type of soil is:

A. Clay

B. Loam

C. Sand

D. Silt

(2 x 10)   **[20]**

1.2 Give the correct term for each of the following. Write only the term next to the relevant question number.

1.2.1 The movement of land masses during the history of the Earth.   (1)

1.2.2 The green pigment found in a chloroplast of a plant cell.   (1)

1.2.3 The part of the light microscope that is used to control the amount of light. (1)

1.2.4 Large reptiles that became extinct about 65 million years ago.   (1)

1.2.5 A biome that is characterised by the abundance of grass and is mainly made of flat grassland vegetation   (1)
**[5]**

1.3. Indicate whether each of the statements 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 in your **ANSWER BOOK**.

		COLUMN A	COLUMN B
	1.3.1	Used to test for the presence of starch	A. Fehling's solution B. Iodine solution
	1.3.2	The gas that is released in the atmosphere as the by-product of photosynthesis	A. Oxygen B. Carbon dioxide
	1.3.3	Used to estimate the age of a fossil	A. Relative dating B. Radiometric dating
	1.3.4	The process that increases the level of oxygen in the atmosphere	A. Respiration B. Photosynthesis

(2x 4)   **[8]**

1.4 Use the diagram below and answer the following questions:

Cell 1   Cell 2
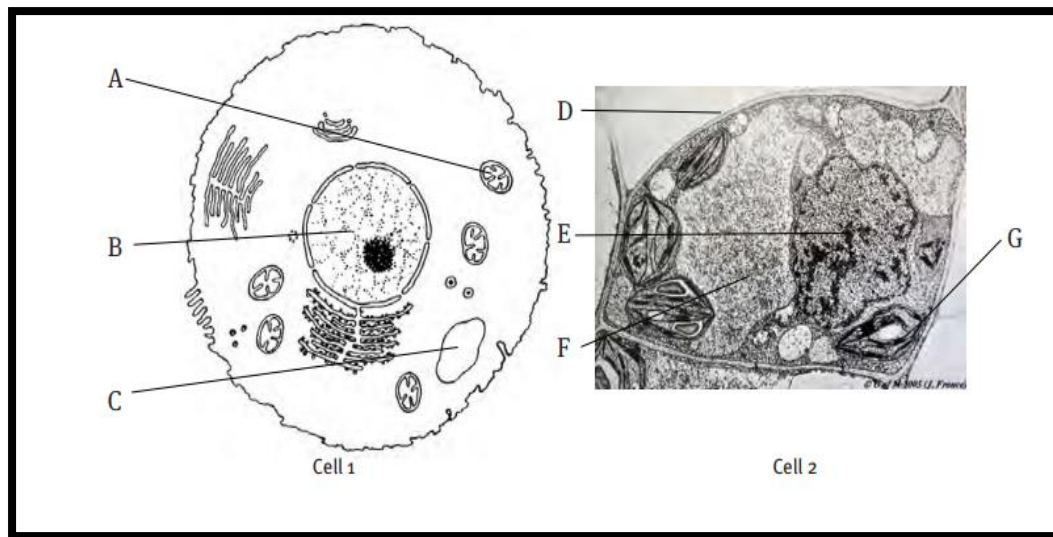
1.4.1 Provide labels for A, B, C and D.   (4)
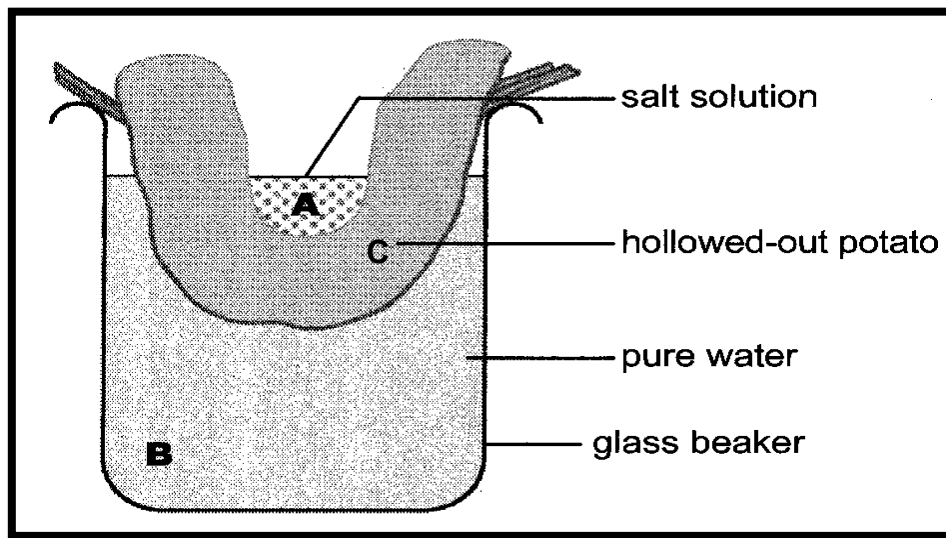
1.4.2 State ONE functions of D.   (1)

1.4.3 Which cell is taken from a plant? Provide a reason for your answer.   (2)

1.4.4 Draw a fully labelled drawing of structure A.   (5)

[12]

1.5   Study the representation of a hollowed potato that has been filled with a salt solution and placed in a glass beaker containing water. Answer the questions that follow.

1.5.1   What type of movement is shown in the picture above?   (1)

1.5.2   Given the name of the structure (or part) that acts as a differential membrane in the diagram above?   (1)

1.5.3   Which part **A** or **B** has the highest water potential as shown in the diagram.   (1)

1.5.4   After standing for a few hours, the levels of liquid **A** and **B** will have changed. Which compartment will show an increase in the amount of fluid? Explain why this happens.   (2)

[5]

TOTAL MARKS SECTION A: 50 <u>SECTION B</u>

QUESTION 2

2.1 The following nutritional information is printed on a box of breakfast cereal.
Study the table and answer the questions that follow:

Nutrition Information	Typical value per 100 g	Per 30 g serving with 125 ml of semi-skimmed milk
ENERGY	1639 kJ 387 kcal	743 kJ 175 kcal
PROTEIN	5 g	6 g
CARBOHYDRATE	85 g	32 g
of which sugars	35 g	17 g
starch	50 g	15 g
FAT	2.5 g	3 g
of which saturates	1 g	1.5 g
FIBRE	2 g	0.6 g
SODIUM	0.3 g	0.15 g
SALT	0.75 g	0.35 g
VITAMINS:	(% RDA)	(% RDA)
VITAMIN D	4.2 µg (83)	1.3 µg (25)
THIAMIN (B$_1$)	0.9 mg (83)	0.3 mg (30)
RIBOFLAVIN (B$_2$)	1.2 mg (83)	0.7 mg (47)
NIACIN	13.3 mg (83)	4.2 mg (26)
VITAMIN B$_6$	1.2 mg (83)	0.4 mg (31)
FOLIC ACID	166 µg (83)	58 µg (29)
VITAMIN B$_{12}$	2.1 µg (83)	1.2 µg (46)
MINERALS:		
CALCIUM	456 mg (57)	288 mg (36)

2.1.1 Which type of nutrient makes up the largest part of 30g of above cereal?   (1)

2.1.2 Name the building blocks of the type of nutrient named in question 2.1.1   (1)

2.1.3 State **TWO** functions of protein in the human body.   (2)

2.1.4 Calculate the percentage of salt per 30g serving.   (3)

2.1.5 Name any inorganic nutrient in this cereal.   (1)

2.1.6 Which nutrient from this cereal will promote strong bones and teeth.   (1)

[9]

2.2 Study the following graph showing the results of an experiment conducted by Lerato to determine the effect of temperature on enzyme activity in an alkaline medium
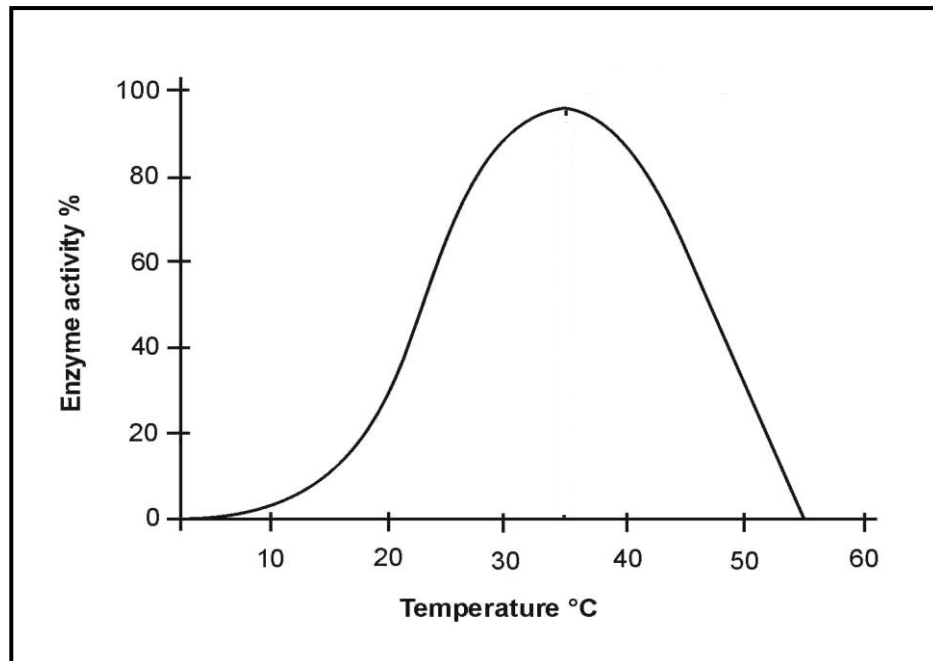
2.2.1 What was the aim of the experiment? (2)

2.2.2 Name the dependent variable in the experiment. (1)

2.2.3 What is the optimum temperature for maximum enzyme activity? (1)

2.2.4 Why does the enzyme activity decrease when the temperature is greater than 40^0C? (2)

2.2.5 From the graph read off and write down the enzyme activity at 20^0C (1)

2.2.6 Why do most washing powders have protease as their enzyme? (2)

2.2.7 What can Lerato conclude from her experiment? (2)

[11]

2.3 Study the table below that shows the decay of carbon-14 over time and then answer the questions that follow.

DECAY OF CARBON-14								
Years from the present	0	5730	11460	17190	22920	**X**	34380	40110
Number of half-lives elapsed	0	1	2	3	4	5	6	7
Percentage of original carbon-14 remaining	100	50	25	12.5	6.25	**Z**	1.56	0.78

2.3.1 Name **TWO** types of methods used to determine the age of fossils.   (2)

2.3.2 Calculate the value of:

   (a) **X**   (2)

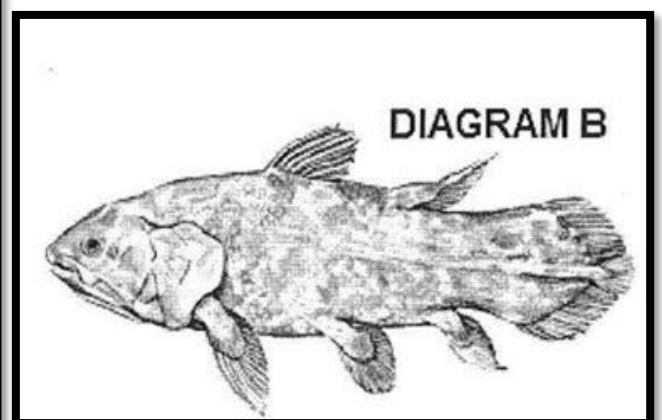   (b) **Z**   (2)

2.3.3 Explain why it would not be possible to date a fossil which existed 80 million years ago using the decay of carbon-14.   (2)

2.3.4 Give **TWO** reasons why there are gaps in the fossil records   (2)

[10]

2.4 Study the fossil in Diagram A and the organism in Diagram B

DIAGRAM A

DIAGRAM B

2.4.1 Name the organism in diagram.
    a) A (2)
    b) B (2)

2.4.2 Explain **TWO** reasons why scientists concluded that this prehistoric bird represented by **Diagram A**, is a transitional fossil. (4)

2.4.3 Describe how the hard parts of organism **A** became fossilized. (4)

2.4.4 Explain why organism **B** is called a "living fossil". (2)
[14]

2.5 Organisms are named according to a specific naming system. The scientific name for humans is *Homo sapiens*.

2.5.1 What part of the name is:
   a) The genus (2)
    b) The species (2)

2.5.2 The plant *Mentha longifolia* is called spearmint or wild mint in English, *kruisement* in Afrikaans and *kwena* in Sotho.

Explain how using the plants scientific name would help a botanist who comes from China and does not know any of the languages mentioned above. (2)
[6]
TOTAL MARKS QUESTION 2: 50

QUESTION 3

3.1 Study the nutrient cycle below and answer the questions that follow.
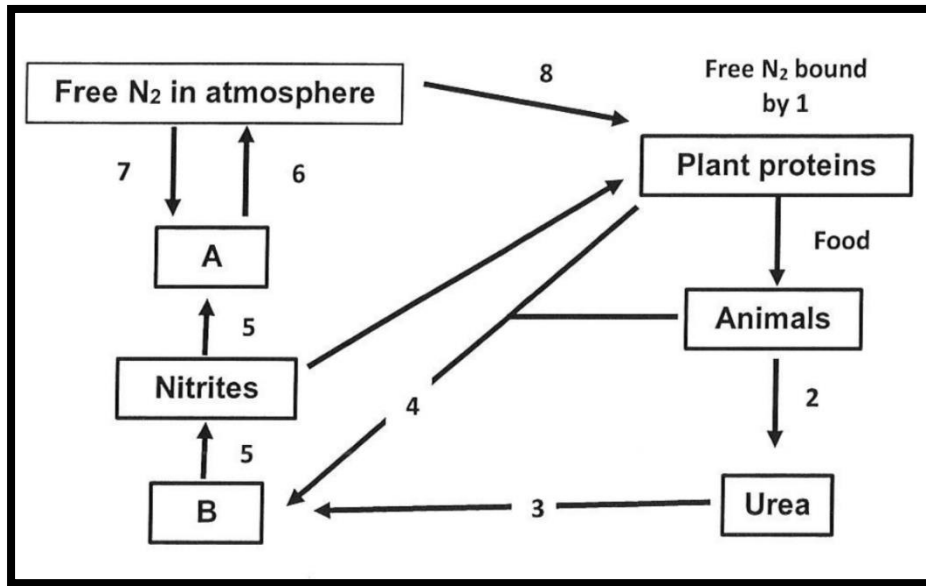
3.1.1 Name the nitrogen compound found at:

　　a) A

　　b) B   (2)

3.1.2 Name the process which will cause the changes at:

　　a) 5   (1)

3.1.3 Although there is free nitrogen in the atmosphere, it cannot be used by plants and animals in this form. It must be converted to a nitrate first.

　　State **TWO** ways in which free nitrogen is converted to nitrates.   (2)

                                                                              [5]

3.2   Acid rain is a serious environmental problem in some areas of the world. Lakes in Canada, Norway and Scotland are highly acidic as a result of acid rain. The figure below shows a cause of acid rain.
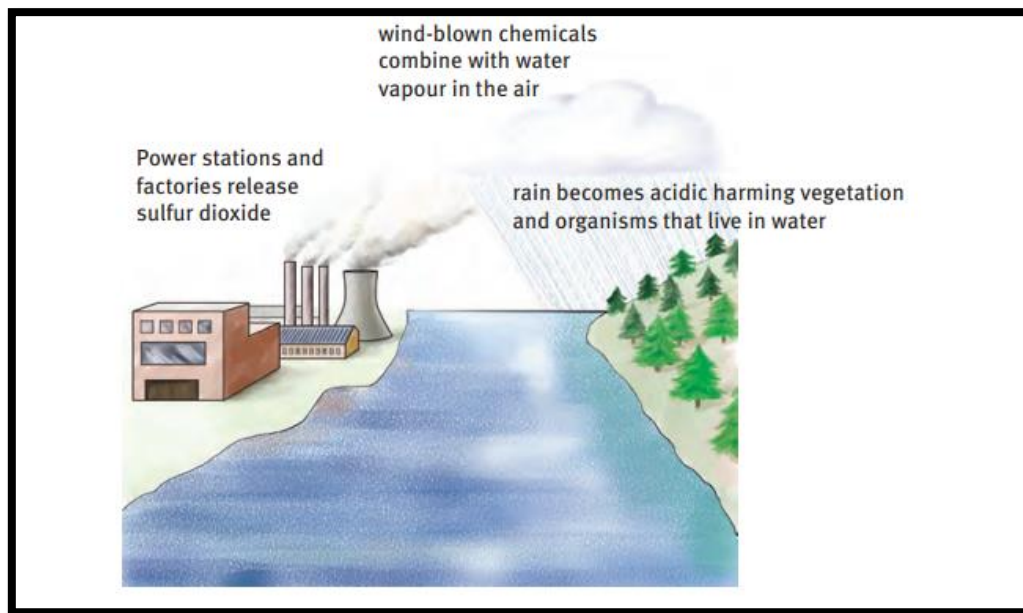
3.2.1 State ONE cause of acid rain other than that shown in the figure.   (1)

3.2.2 Describe TWO effects of acid rain on forest ecosystems.   (2)

3.2.3 Describe TWO different ways to reduce pollution so that there is less acid rain.   (2)

[5]

3.3   Study the diagrams that show part of the Earth's history and answer the questions that follow.
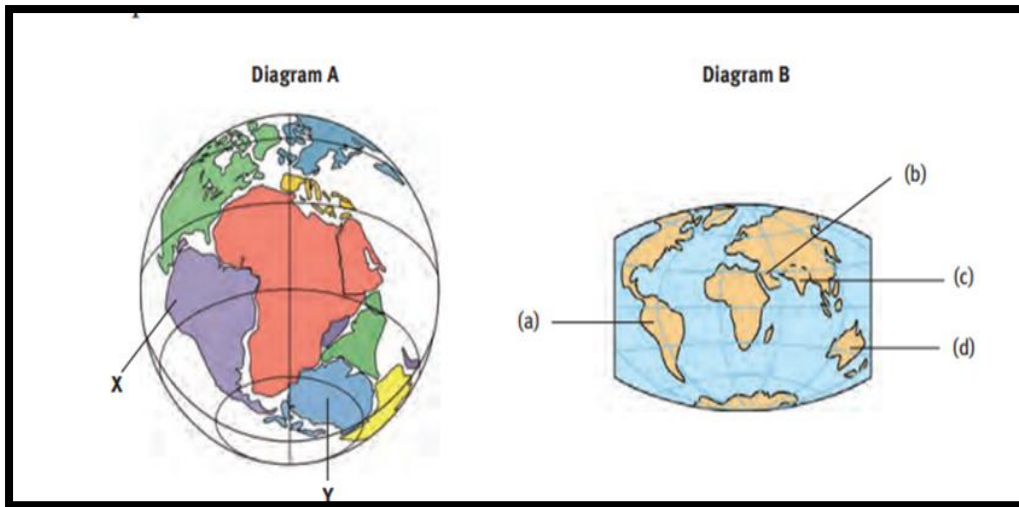
3.3.1 Identify diagram **A**.   (1)

3.3.2 Match parts **X** and **Y** with the continents in diagram **B**. Use the letters in diagram **B**.   (2)

3.3.3 Name the modern continents that made up Laurasia.   (3)

3.3.4 Name and explain the theory demonstrated by the two diagrams above.   (2)

[8]

3.4 The diagram below shows different organisms in no particular order belonging to different kingdoms of classification.
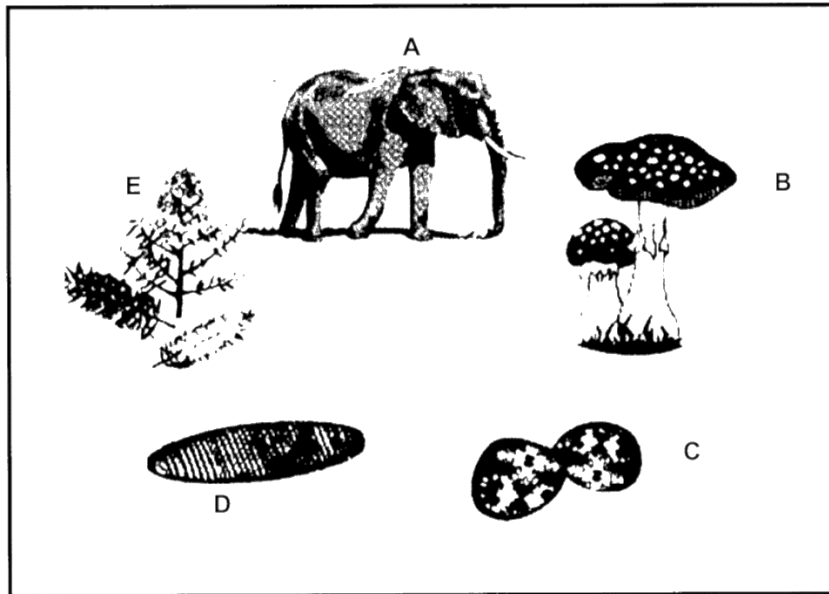
3.4.1 Give only the **LETTER** and the **NAME** of the kingdom that:

    a) Reproduce sexually and asexually by means of spores   (2)

    b) Contain chlorophyll and make their own food by photosynthesis.   (2)

3.4.2 Diagram **A** is an African elephant. Its scientific name is *Loxodonta africana.*

    a) State the genus name of the African elephant.   (2)

    b) Name the kingdom in which African elephants belong.   (1)

3.4.3 State **ONE** criterion that scientists used to classify organisms.   (1)

3.4.4 Into which class would you classify all organisms that have fur on their bodies and can maintain a constant internal body temperature?   (1)

[9]

3.5 The following is a diagram of a "food web"
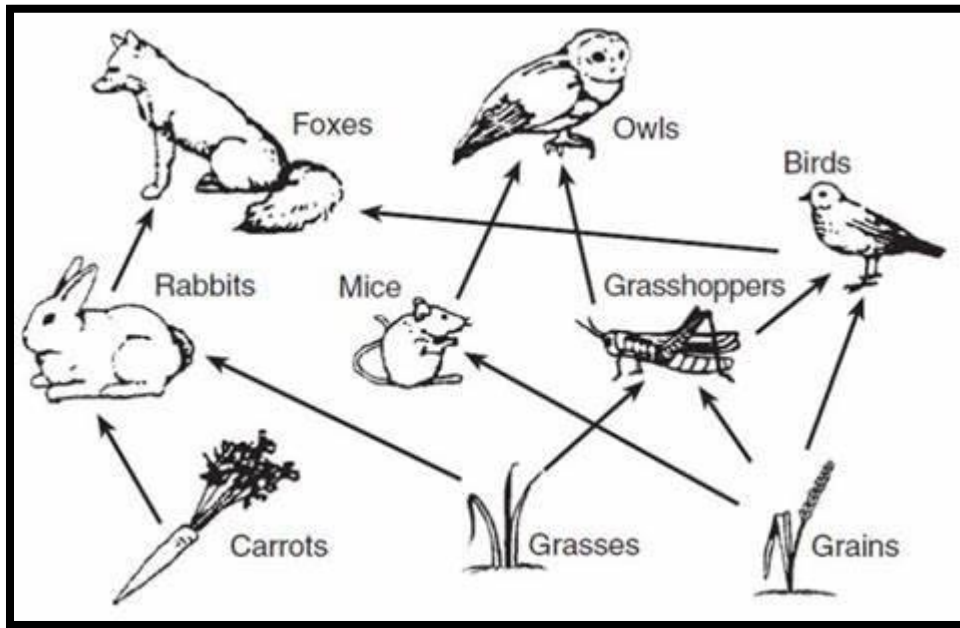
3.5.1 Explain what is a producer. (2)

3.5.2 What do the arrows represent? (1)

3.5.3 From the above food web, single out one food chain with four trophic levels. Write out this food chain. (2)

3.5.4 Give the name of one organism that is found in the trophic level containing the most amount of energy. (1)

3.5.5 Give the name of TWO secondary carnivores. (2)

3.5.6 If all the birds are removed from this ecosystem. Explain how this would affect the number of:
a) foxes
b) rabbits (2)

[10]

3.6 The relationship between two species of mites, **Species A** and **Species B** was investigated in a laboratory experiment. One of the species is a herbivore and the other is a carnivore that feeds on the other species of mites. The herbivorous mites were placed in a container with plenty of food. A few days later, some carnivorous mites were added to the container. The number of mites of each species was estimated every week for five weeks. The results of the experiment are given in the following table.

Time (weeks)	Population of Species A	Population of Species B
1	190	100
2	320	240
3	900	600
4	550	450
5	300	250

3.6.1 Draw a line graph of these results on the same set of axes.   (8)

3.6.2 State the:
    a) independent variable   (1)
    b) Dependent variable   (1)

3.6.3 Predict what might happen to the number of Species A if Species B was to suddenly disappear.   (2)

3.6.4 State **ONE** way in which the reliability of this investigation can be improved?
                                              (1)
                                              [13]

TOTAL MARKS QUESTION 3: 50

GRAND TOTAL: 150