Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES

Grade 10

TOPIC TEST: Chemistry of Life

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1 to 1.5) in your ANSWER BOOK, for example 1.6 D.

1.1 The role of water in nutrition is to …

A prevent the movement of food down the alimentary canal.
B prevent the lubrication of all passages.
C create an acidic medium in the stomach.
D be a solvent for chemical reactions.

1.2 Which ONE of the following describes an increase in the nutrient levels in dams and lakes because of the excess use of fertilisers by farmers?

A Photosynthesis
B Eutrophication
C Respiration
D Metabolism

1.3 Which ONE of the following elements is found in energy carriers?

A Phosphorus
B Hydrogen
C Potassium
D Calcium

1.4 Iron is necessary to prevent …

A rickets.
B the maintenance of water balance.
C muscle weakness.
D the yellowing of leaves.

1.5 Which ONE of the following leads to goitre when in short supply?

A Calcium
B Iodine
C Sodium
D Magnesium

(5 x 2) **(10)**

TOTAL SECTION A: 10

SECTION B

Question 2

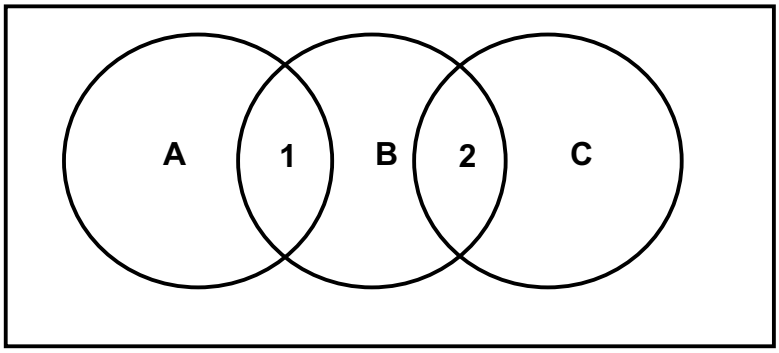
2.1 In the diagram below, the letters **A**, **B** and **C** represent THREE groups of organic compounds that you have studied.

Number **1** represents characteristics common to **A** and **B** only,

Number **2** represents characteristics common to **B** and **C** only**.**

B and **C** make up cell membranes.

C is made up of amino acids.



2.1.1 What is meant by *organic* compound? (2)

2.1.2 Name the organic compound represented by:

(a) **A**
(b) **B**
(c) **C** (3)

2.1.3 Name the monomers of:

(a) Carbohydrates
(b) Lipids (3)

2.1.4 List ONE function each of:

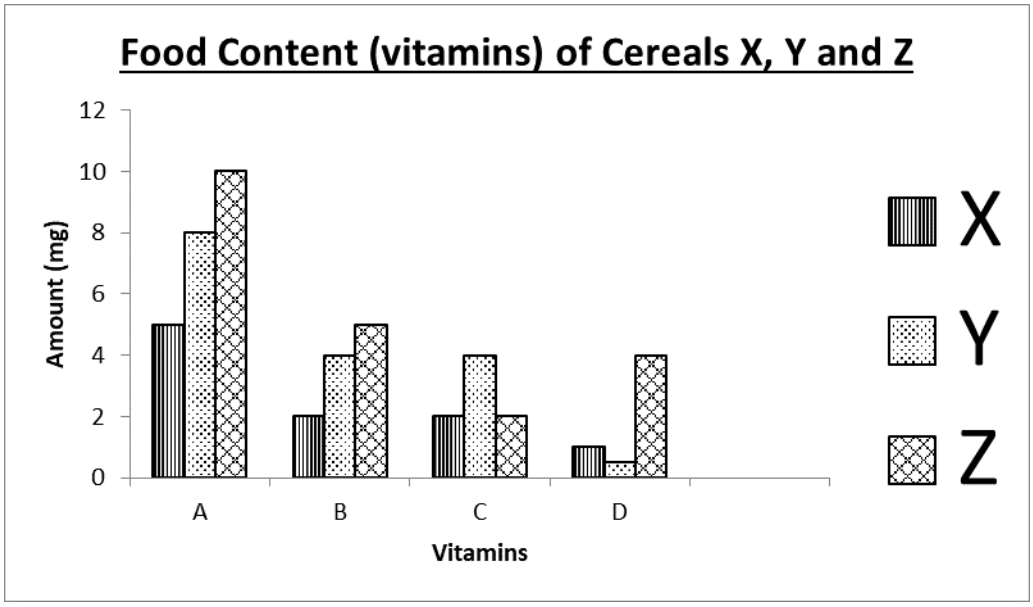
(a) Lipids
(b) Proteins (2)

2.1.5 What feature, in terms of their composition, distinguishes compound **B** from compound **C**? (2)

2.1.6 Which organic compound (**A**, **B** or **C**) is stored as glycogen in the liver of humans? (1)

[13]

2.2 The bar graphs below show the food content of three different types of cereal (**X**, **Y** and **Z**). Study the graphs then answer the questions that follow.



2.2.1 Name the deficiency disease that would result if a person lacked:

(a) Vitamin **A** (1)
(b) Vitamin **C** (1)

2.2.2 Health officials noticed that the children from schools in a particular area experienced a higher than average incidence of broken bones.

Explain why cereal **Z** should be recommended for these learners to make their bones stronger. (2)

2.2.3 The RDA (recommended daily allowance) of vitamin **B** is 8mg.

How many mg of vitamin **B** is provided by cereal **Y**? (1)

2.2.4 How many servings of cereal **Y** are required to obtain the RDA for vitamin **B**? Show all calculations. (2)
(7)

TOTAL QUESTION 2 20

Question 3

Amylase is an enzyme that hydrolyses (breaks down) starch into sugars in humans.

Sipho conducted an investigation where a solution of amylase was mixed with a starch suspension. The mixtures were kept in water baths at different temperatures for 15 minutes each.

At the end of the time, the samples were analysed to find out how much sugar was produced. The results of the above investigation are recorded in the table below:

Temperature (^{0}C)	0	10	20	30	40	50	60	70
Units of sugar	10	36	65	90	90	30	4	2

3.1 In this investigation identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.2 Describe how Sipho would test if the enzyme worked in the test tubes. (2)

3.3 State TWO ways by which Sipho could improve the reliability of the investigation. (2)

3.4 State TWO ways how Sipho could improve the validity of the investigation. (2)

3.5 Plot a line graph to show the results of the above investigation. (6)

3.6 Explain why the number of sugar units produced, decreased as the temperature increased above 40^0 C. (2)

3.7 Based on the results, what is the range for the optimum temperature for the action of amylase? (2)

3.8 Explain why one would have expected the optimum temperature to be in the range stated in Question 3.7 even before the investigation was conducted. (2)

TOTAL QUESTION 3 [20]

TOTAL SECTION B: [40]

GRAND TOTAL: [50]

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Grade 10

Topic Test Memorandum: Chemistry of Life

MARKS: 50 TIME: 60 minutes

SECTION A

QUESTION 1

1.1 D ✓✓
1.2 B ✓✓
1.3 A ✓✓
1.4 D ✓✓
1.5 B ✓✓

(5 x 2) **(10)**

TOTAL SECTION A: 10

SECTION B

QUESTION 2

2.1

2.1.1 - A compound which has carbon✓
- with hydrogen and oxygen✓ (2)

2.1.2 (a) Carbohydrate✓
(b) Lipid✓/ Fat
(c) Protein✓ (3)

2.1.3 (a) Monosaccharides✓
(b) Fatty acid✓ and glycerol✓ (3)

2.1.4 (a)
- Source of energy✓
- Serves as an insulating layer✓
- Structural component of cell membranes✓
- Protects certain organs✓ Any (1)

(Mark first ONE only)

(b)
- Structural component of cell membranes✓
- Source of energy✓
- Enzymes are protein in nature✓
- Some hormones are protein✓
- Haemoglobin is an iron-containing protein and transports gases ✓
- Antibodies protects the body against disease✓ Any (1)

(Mark first ONE only)

2.1.5
- **B** does not have N✓
- whereas **C** has N✓ (2)

2.1.6 **A**✓ (1)

(13)

2.2 2.2.1 (a) Night-blindness✓ / Xerophthalmia
(b) Scurvy✓ (2)

2.2.2
- Cereal **Z** has the highest✓
- content of vitamin **D**✓ (2)

2.2.3 4✓mg (1)

2.2.4 Y = 4mg
x = 8mg
$x = \frac{8}{4}$ ✓= 2✓ servings (2)

(7)

TOTAL QUESTION 2 20

QUESTION 3

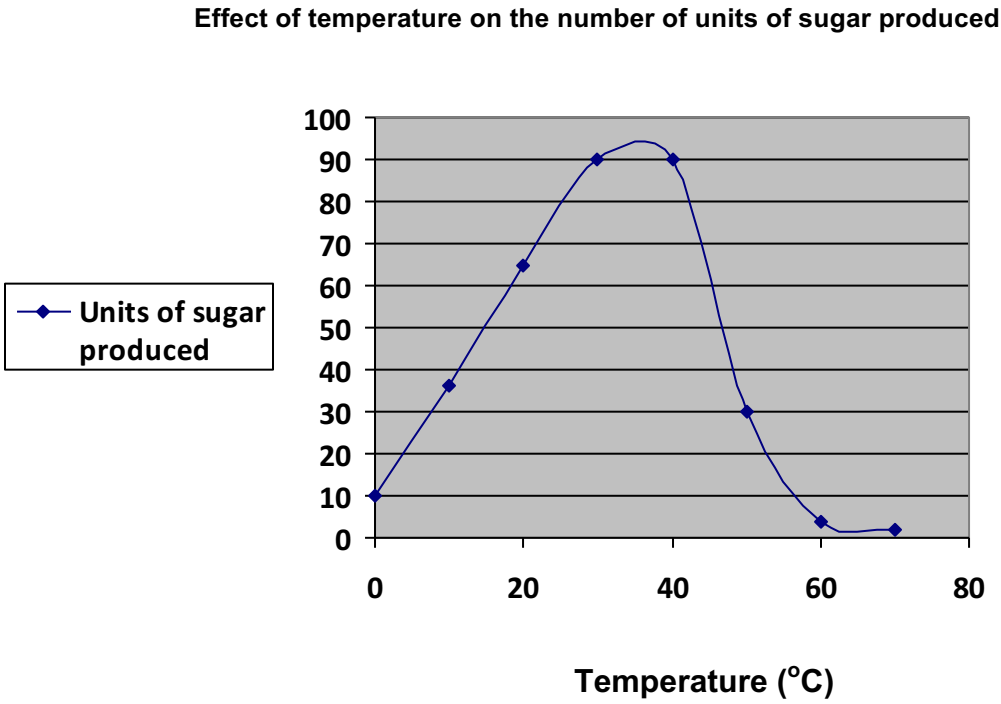
3.1 (a) Temperature✓
(b) Units of sugar✓ (2)

3.2 - He will use Fehlings A and Fehlings B✓/Benedict's solution
- which should change from blue to green✓/yellow/orange (2)

3.3 - Use many test tubes at each temperature✓
- Repeat the investigation✓ Any (2)
(Mark first TWO only)

3.4 - Use the same amount of starch✓
- Use the same amount of amylase✓
- Use the same amount of water when making the solution of amylase and the starch suspension✓
- Use the same size and shape of the water bath✓
- Use the same amount of water in the water bath✓ Any (2)
(Mark first TWO only)

3.5



Mark allocation for the graph

Criteria	Mark Allocation
Correct type of graph (line graph)	1
Title of graph including both variables	1
Correct label and scale for X-axis	1
Correct label and scale for Y-axis	1
Plotting of points	1 – 1 to 7 points plotted correctly 2 – all 8 points plotted correctly

(6)

3.6 - The enzyme becomes denatured✓
- so the action of the enzyme decreases✓ (2)

3.7 30^0 and 40^0C✓✓ (2)

3.8 The enzyme is from the human body✓
and should function best at human body temperature✓/37^0C (2)

TOTAL QUESTION 3 20

TOTAL SECTION B: 40

GRAND TOTAL: 50

Life Sciences Analysis Grid
Grade 10
Topic Test - Chemistry of Life

	Cognitive Levels			
Question	**A**	**B**	**C**	**D**
1.1	2			
1.2	2			
1.3	2			
1.4	2			
1.5	2			
2.1.1	2			
2.1.2			3	
2.1.3	3			
2.1.4	2			
2.1.5		2		
2.1.6		1		
2.2.1	2			
2.2.2		2		
2.2.3		1		
2.2.4		2		
3.1				2
3.2		2		
3.3				2
3.4				2
3.5	1	3	2	
3.6			2	
3.7				2
3.8			2	
Actual Marks	**20**	**13**	**9**	**8**
Norm Marks	20	12,5	10	7,5

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES

Grade 10

TOPIC TEST: Cell and Mitosis

MARKS: 50 **TIME: 60 minutes**

SECTION A

QUESTION 1

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 (1.1 to 1.5) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.1 Used to magnify a specimen	A: Objective lens B: Body tube
1.2 Gives colour to flowers	A: Leucoplasts B: Chromoplasts
1.3 Plays a role in cell division	A: Lysosomes B: Tonoplast
1.4 Makes up the cell membrane	A: Lipids B: Proteins
1.5 Chromosomes arrange at the equator	A: Metaphase B: Anaphase

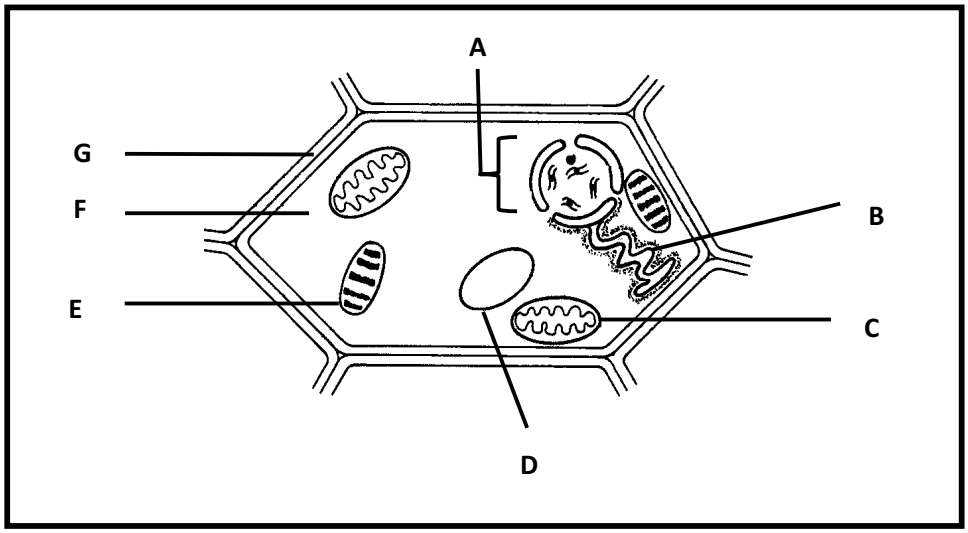
(5 x 2) **(10)**

TOTAL SECTION A: 10

SECTION B

Question 2

Study the diagram of a cell shown below.



2.1 Write down the LETTER only of the:

(a) Nucleus (1)

(b) Endoplasmic reticulum (1)

(c) Vacuole (1)

(d) Mitochondrion (1)

(e) Cytoplasm (1)

(f) Part that contains cellulose (1)

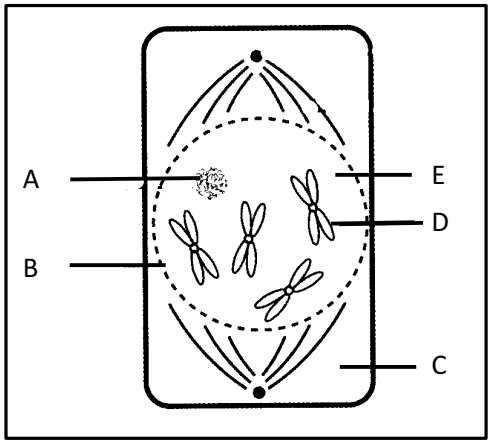
2.2 Provide one observable reason as to why this cell cannot be from the root of a plant. (1)

2.3 Explain ONE observation that you would make if this cell was placed in a concentrated sugar solution. (3)

[10]

QUESTION 3

3.1 Study the following diagram showing a phase of mitosis.



3.1.1 Identify the phase of mitosis represented. (1)

3.1.2 Write down the LETTER only of the part that represents the:

(a) Nucleolus (1)
(b) Nucleoplasm (1)

3.1.3 How many chromosomes would you expect in each of the daughter cells after mitosis. (1)
(4)

3.2 Study the following extract on the treatment of cancer.

> Chemotherapy either destroys the cancer cells directly or by destroying their DNA. Radiotherapy involves the use of radiation to destroy cancer cells.
>
> In an alternative method, traditional healers use the plant *Sutherlandia frutescens*. Recently scientists carried out tests using an extract from *Sutherlandia frutescens* on 10 vervet monkeys to treat cancer and found that it had no side effects.

3.2.1 According to the extract, name ONE method used in hospitals to treat cancer. (1)

3.2.2 What is the name of the genus of the plant used by traditional healers? (1)

3.2.3 Explain how 'destroying the DNA' can help fight cancer. (2)

3.2.4 State TWO ways in which scientists can improve the reliability of the results obtained in the test with the vervet monkeys. (2)
(6)

[10]

TOTAL SECTION B: 20

SECTION C

Question 4

The centrosome plays a role in mitosis, the mitochondrion in cellular respiration and the chloroplast in photosynthesis.

Describe the structure, location and suitability of the centrosome, the mitochondrion and the chloroplast in contributing to the success of the above processes.

Content:	(17)
Synthesis:	(3)
	(20)

NOTE: NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: 20

GRAND TOTAL: 50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Topic Test Memorandum: Cell & Mitosis

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

1.1 A only✓✓
1.2 B only✓✓
1.3 None✓✓
1.4 Both A and B✓✓
1.5 A only✓✓ (5 x 2) **(10)**

TOTAL SECTION A 10

SECTION B

Question 2

2.1
(a) A✓ (1)
(b) B✓ (1)
(c) D✓ (1)
(d) C✓ (1)
(e) F✓ (1)
(f) G✓ (1)

2.2 It has chloroplasts✓ (1)

2.3
- The cell membrane will pull away from the cell wall✓/the cell will plasmolyse
- since water will leave the cell✓ by osmosis
- and move into the concentrated sugar solution✓/ because of a concentration gradient (3)

(10)

SECTION B

Question 3

3.1	3.1.1	Prophase✓		(1)
	3.1.2	(a) A✓ (b) E✓		(1) (1)
	3.1.3	4✓		(1) **(4)**
3.2	3.2.1	- Chemotherapy✓ - Radiotherapy✓ **(Mark first ONE only)**	Any 1	(1)
	3.2.2	*Sutherlandia*✓		(1)
	3.2.3	- There will be no DNA replication✓ - and hence no mitosis✓		(2)
	3.2.4	- Repeat the investigation✓ - Increase the sample size of the monkeys✓ **(Mark first TWO only)**		(2) **(6)**
				[10]
			TOTAL SECTION B	**20**

SECTION C

Question 4

Centrosome
- The centrosome is located adjacent to the nucleus✓
- and is made up of microtubules✓.
- The centrosome splits into two centrioles during mitosis in animal cells✓
- And forms spindle fibres✓ between them
- for the attachment of centromeres of chromosomes✓
- and to pull chromatids to the poles✓
- when the spindle fibres contract✓. Any (5)

Mitochondrion
- The mitochondria are present in all cells✓/plant and animal cells
- but abundant in muscle cells✓/liver cells/active cells
- Where they produce energy✓ through cellular respiration.
- Mitochondria are rod shaped✓.
- The outer membrane is selectively permeable✓
- allowing the requirements and products of cellular respiration to pass through✓.
- The inner membrane is highly folded✓/have cristae
- thus increasing the surface area for cellular respiration✓.
- Ribosomes are present in the matrix✓
- to synthesise enzymes for cellular respiration✓. Any (6)

Chloroplast
- Chloroplasts are disc shaped✓
- And found in plant cells only✓
- mainly in cells of leaves✓
- where they can easily receive sunlight✓
- to produce organic compounds✓through photosynthesis.
- The double membrane of the chloroplast is selectively permeable✓
- to allow the requirements and products of photosynthesis to pass through✓.
- The lamellae/granum contains chlorophyll✓
- to trap light for photosynthesis✓.
- The stroma of the chloroplasts✓
- Contains starch granules✓/ enzymes for photosynthesis Any (6)

Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the topic	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay in sufficient detail
Information provided only on structure, location & suitability of the: - Centrosome - Mitochondrion - Chloroplast There is no irrelevant information	Information provided on structure, location & suitability of the: - Centrosome - Mitochondrion - Chloroplast Is arrange in a logical sequence	At least the following information is provided: - Centrosome (**3/5**) - Mitochondrion (**4/6**) - Chloroplast (**4/6**)
1 mark	1 mark	1 mark

TOTAL SECTION C 20
FINAL TOTAL [50]

Life Sciences Analysis Grid
Grade: 10
Topic Test - Cell & Mitosis

		Cognitive Levels				Cell	Mitosis
Question	**A**	**B**	**C**	**D**			
1.1		2				2	
1.2		2				2	
1.3		2					2
1.4		2				2	
1.5		2					2
2.1	5	1				6	
2.2			1			1	
2.3				3		3	
3.1.1	1						1
3.1.2	2						2
3.1.3			1				1
3.2.1		1					1
3.2.2		1					1
3.2.3			2				2
3.2.4				2			2
4	11		6	3		15	5
Actual Marks	**19**	**13**	**10**	**8**		**31**	**19**
Norm Marks	20	12,5	10	7,5		30	20

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES

Grade 10

TOPIC TEST: Plant and Animal Tissues

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.1 to 1.10) in your ANSWER BOOK .

1.1 The tissue which continually forms new cells in plants

1.2 Parenchyma cells that contain chlorophyll

1.3 A type of epithelial tissue lining the mouth and blood vessels

1.4 A cell type that transmits nerve impulses

1.5 A structure that attaches muscle to bone

1.6 A process that produces genetically identical individuals using biotechnology

1.7 The type of epithelial tissue lining the alimentary canal

1.8 The type of muscle tissue found in the heart

1.9 Cell with a nucleus that is associated with a sieve tube in phloem

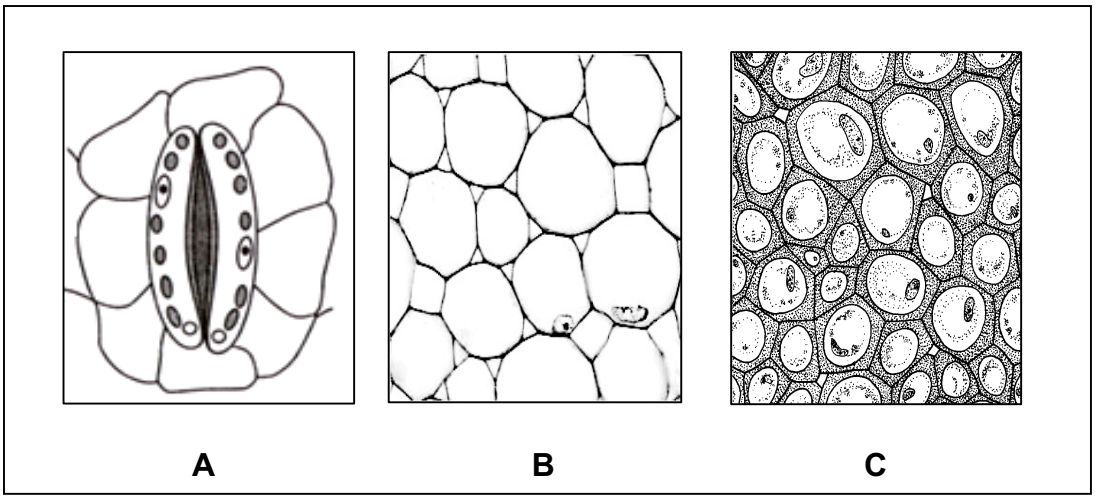
1.10 A connective tissue found under the skin that insulates the body and acts as a packaging tissue **(10)**

TOTAL SECTION A: 10

SECTION B

Question 2

2.1 Study the diagrams below showing different types of plant tissues.



2.1.1 Identify tissues **B** and **C**. (2)

2.1.2 Explain TWO structural adaptations of tissue **A** for its functions. (4)

2.1.3 Explain why tissue **C** would not be suitable as the main tissue in the root between the epidermis and the xylem. (2)

2.1.4 Tissue **A** also lines the root where it plays a role in increasing the surface area for absorption of water.

Draw a fully labelled diagram of an epidermal cell with a root hair. (4)

(12)

2.2 Tabulate TWO differences between xylem vessels and phloem sieve tubes. **(5)**

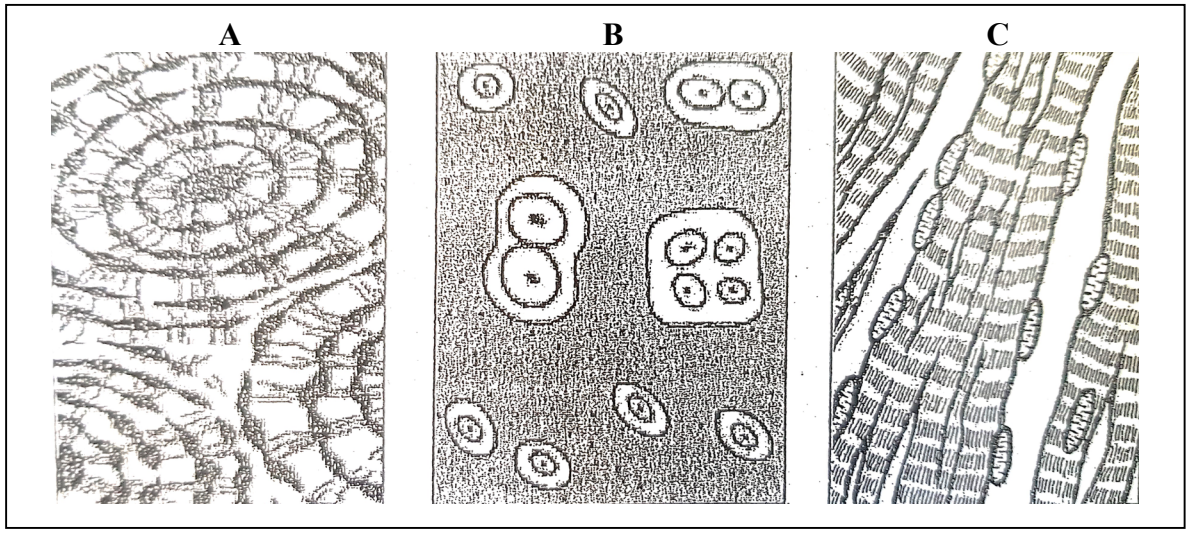
2.3 Ligaments join bone to bone.

Explain why you would expect ligaments to be made of yellow elastic tissue rather than white fibrous tissue. **(3)**

TOTAL QUESTION 2: 20

Question 3

3.1 Study the different types of mammalian tissues represented below.



3.1.1 Identify tissue **B** and **C** (2)

3.1.2 Name ONE place each in the human body where you would find tissues **A**, **B** and **C**? (3)

3.1.3 Explain ONE function of tissue **B** during breathing. (2)
(7)

3.2 The level of oxygen decreases with altitude.

An investigation was carried out to determine the influence of altitude on the number of red blood cells per mm^3 of blood in the human body.

The procedure was as follows:

- A sample of 50 men and 50 women were used.
- The red blood cell count was first taken at sea level.
- They were then taken to an altitude of 2000 metres above sea level.
- The red blood cell count was taken again after staying 3 weeks at the high altitude.

The results of the investigation are recorded in the table below:

Altitude	**Average number of red blood cells per mm^3 of blood**	
	Men	**Women**
At sea level	5 million	4,5 million
At 2000 metres above sea level	6,2 million	5,8 million

3.2.1 On the same system of axes, draw a bar graph to represent the average number of red blood cells per mm^3 of blood in men and women at sea level and at 2000 metres above sea level. (6)

3.2.2 State ONE way in which the reliability of the results was improved. (1)

3.2.3 State TWO factors that should be kept constant in the above investigation. (2)

3.2.4 Mountain climbers are often given the following advice:

- Ascend/climb to the high altitude slowly
- Stay a day or two at each altitude before climbing higher

Use information from the table to explain why this advice is given. (4)

(13)

TOTAL QUESTION 3: 20

TOTAL SECTION B: 40

GRAND TOTAL: 50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Grade 10

Topic Test Memorandum: Plant and Animal Tissues

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

1.1 Meristematic✓/Cambium
1.2 Chlorenchyma✓
1.3 Squamous✓/Endothelial
1.4 Neuron✓
1.5 Tendon✓
1.6 Cloning✓
1.7 Columnar epithelium✓
1.8 Cardiac✓
1.9 Companion cell✓
1.10 Areolar✓ **(10)**

TOTAL SECTION A [10]

SECTION B

Question 2

2.1 2.1.1 B – Parenchyma ✓

C – Collenchyma✓ (2)

2.1.2
- Epidermal cells are transparent ✓
- to allow sunlight to enter the leaf for photosynthesis✓

- Epidermal cells are closely packed ✓
- to protect underlying cells✓

- Epidermal cells in stems and leaves covered by cuticle✓
- to reduce water loss✓

- Presence of guard cells with stomata✓
- allow for gaseous exchange✓

- Guard cells have chloroplasts✓
- to allow for photosynthesis✓

(Mark first TWO only) Any 2 x 2 (4)

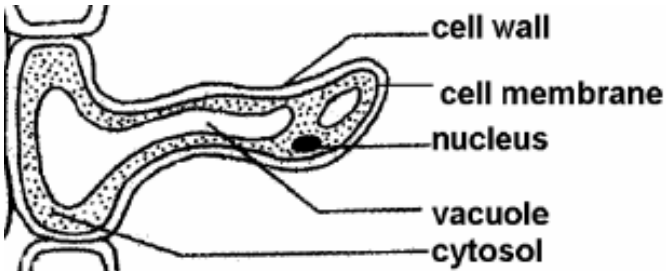
2.1.3
- Tissue C has closely packed cells✓/cells with no intercellular spaces
- so it will not allow for movement of water✓/gases

- The cells have thickened walls✓
- that will not allow water to pass through✓

Any 1 x 2 (2)

2.1.4

Criteria
Caption ✓
Root hair drawn✓
Any two correct labels



✓✓

Epidermal cell with root hair

(4)

(12)

2.2

Xylem vessels	**Phloem sieve tubes**
Conducts water and dissolved mineral salts✓	Conducts dissolved food✓
Walls are thickened✓/lignified	Walls are thin✓/made up of cellulose
Cross walls perforated✓/absent	Sieve plates present✓
Transport is from root to leaves✓	Transport is from leaves to roots✓

1 for table + Any 2 x 2 **(5)**

2.3
- White fibrous tissue is firm✓/not flexible
- Yellow elastic tissue is flexible✓
- allowing the ligaments to stretch✓ when the bones move **(3)**

TOTAL QUESTION 2 [20]

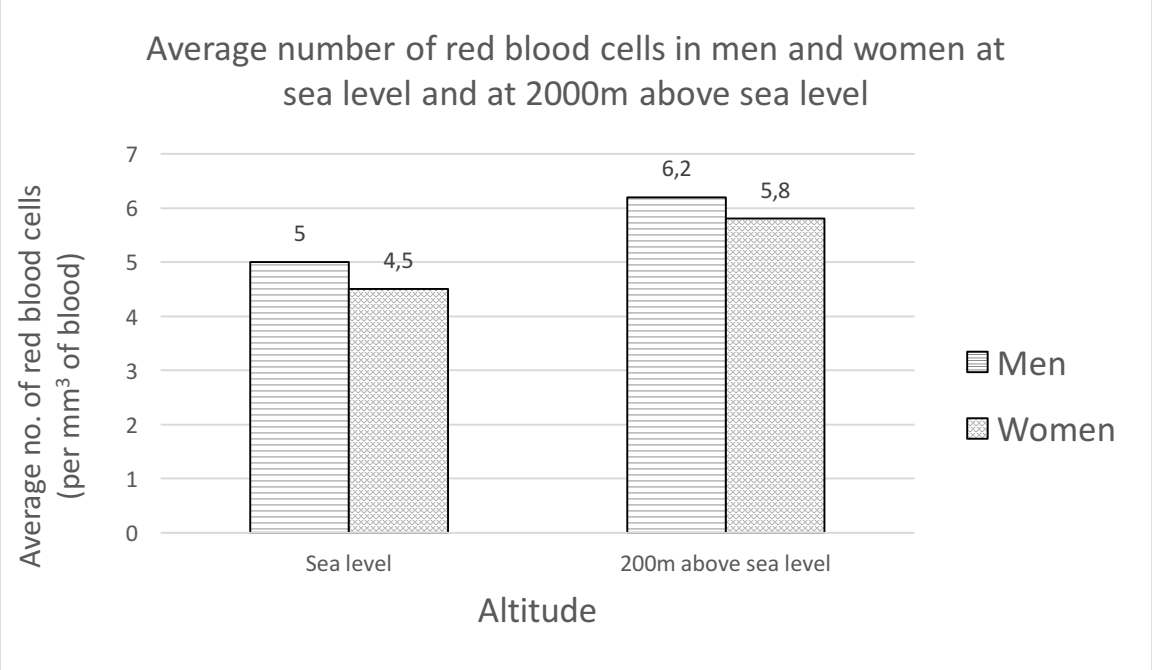
Question 3

3.1 3.1.1 A – Cartilage tissue✓
C – Striated muscle tissue✓ (2)

3.1.2 A – Femur✓/humerus/name of any bone
B – Ends of bone✓/C-shaped cartilage rings in trachea/between vertebrae/pinna/ribs
C – Any skeletal muscle✓ (3)

3.1.3 - It is able to keep the trachea/bronchi open at all times✓
- to allow an unimpeded flow of air✓ (2)
(7)

3.2
3.2.1



Correct type of graph	1
Caption	1
Correct labels for X-axis and Y-axis	1
Correct scale for X-axis and Y-axis	1
Plotting of bars	1: 1-3 bars plotted correctly 2: All 4 bars plotted correctly

(6)

3.2.2
- Large sample size✓
- Average red blood cell count used✓

(Mark first ONE only) (Any 1) (1)

3.2.3
- Same age of men and women✓
- Same weight of men/women✓
- Same time of measuring red blood cell count✓
- Same location at sea level/at 2000m✓
- Same method/instrument for measuring red blood cell count✓

(Mark first TWO only) (Any 2) (2)

3.2.4
- A slow climb will allow for a gradual increase in the red blood cell count✓
- Staying at each altitude also allows time for the body to form more red blood cells✓/acclimatize to the rarified atmosphere
- This is to ensure that sufficient oxygen can be obtained✓
- when the oxygen level decreases at the higher altitude✓ (4)

(13)

TOTAL QUESTION 3 [20]

TOTAL SECTION B [40]

GRAND TOTAL: 50

Life Sciences Analysis Grid

Grade: 10

Topic Test – Plant and Animal Tissues

	Cognitive Levels			
Question	**A**	**B**	**C**	**D**
1.1 to 1.10	10			
2.1.1	2			
2.1.2			4	
2.1.3			2	
2.1.4	4			
2.2	1	4		
2.3			3	
3.1.1	2			
3.1.2		3		
3.1.3		2		
3.2.1	1	3	2	
3.2.2				1
3.2.3				2
3.2.4				4
Actual Marks	**20**	**12**	**11**	**7**
Norm Marks	20	12.5	10	7.5

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES – Grade 10

TOPIC TEST: Support and Transport in Plants

MARKS:50 **TIME: 60 Minutes**

SECTION A

QUESTION 1

1. Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.1 to 1.10) in your ANSWER BOOK.

   1.1 Mass of central tissue in a dicot stem

   1.2 A waterproof band found in the cell walls of the endodermis that directs water into the xylem

   1.3 The substance found in the cell walls of the xylem to provide strength

   1.4 Movement of substances from a region of high concentration to a region of low concentration

   1.5 The loss of water in liquid form from openings on the margins of leaves

   1.6 Modified epidermal cells that control the opening of the stomata

   1.7 Movement of dissolved food from the leaves to the roots

   1.8 The meristematic tissue responsible for secondary thickening

   1.9 Markings in the transverse section of a tree used to determine the age of the tree

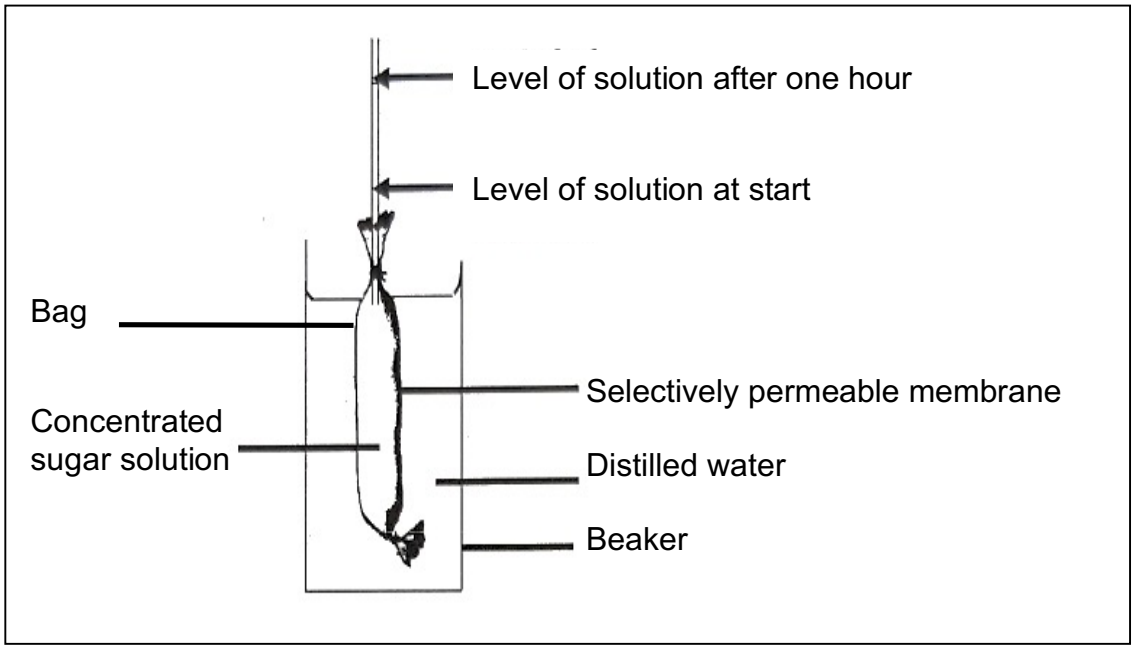
   1.10 Pores found in the epidermis of woody stems used for gas exchange **(10)**

TOTAL SECTION A: 10

SECTION B

QUESTION 2

2.1 The diagram below represents the apparatus used in an investigation.



2.1.1 What process is being demonstrated in this investigation? (1)

2.1.2 Explain the rise in the level of solution in the tube after 1 hour. (3)

2.1.3 Consider a root hair cell from a root that is in the ground.

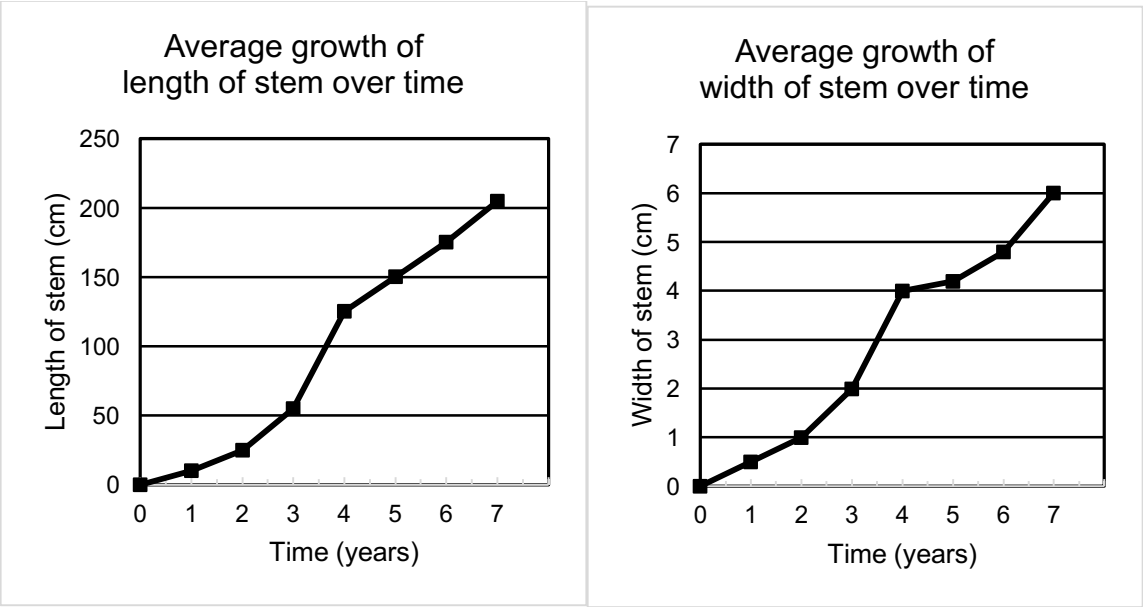
What would each of the following parts in the diagram represent in the above situation:

(a) The concentrated sugar solution (1)

(b) The selectively/differentially permeable membrane (1)

(6)

2.2 The graphs below show a comparison of the growth of the length of a stem to that of its width in a particular species of plant.



2.2.1 After how many years of growth was the plant's stem 4 cm wide? (1)

2.2.2 How long was the stem (in cm) at the time identified in QUESTION 2.2.1? (1)

2.2.3 The plant grew the fastest between years 2 and 4.

State TWO environmental conditions that could have favoured growth during this period. (2)

2.2.4 State ONE factor that the scientists kept constant in this investigation. (1)

2.2.5 State ONE way in which the reliability of the investigation was ensured. (1)
(6)

2.3 The table below shows the rate of water absorption by roots and the rate of transpiration by leaves during a 9 hour period.

TIME	Rate of water absorption (ml per hour)	Rate of transpiration (ml per hour)
07:00 – 08:00	1,5	2,5
08:00 – 09:00	3,2	4,1
09:00 – 10:00	4,5	5,5
10:00 – 11:00	5,2	7,0
11:00 – 12:00	5,7	8,4
12:00 – 13:00	7,6	10,3
13:00 – 14:00	8,0	8,5
14:00 – 15:00	8,5	7,4
15:00 – 16:00	9,1	6,2

2.3.1 It was concluded that the rate of water absorption was greater than the rate of transpiration during the period of the investigation.

Use the information in the table to provide evidence of why you would reject this conclusion. (2)

2.3.2 Explain why the stomata may close between 12:00 and 13:00. (2)

2.3.3 Explain any TWO precautions you would take when measuring the rate of transpiration using a potometer. (4)

(8)

TOTAL SECTION B: 20

SECTION C

QUESTION 3

Describe how water is lost from the leaves of a plant and how this results in the movement of water up the stem and in water absorption by the roots. Also explain how various environmental factors increase water loss.

Content: (17)
Synthesis: (3)
(20)

NOTE: NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Grade 10

Topic Test Memorandum: Support and Transport in Plants

MARKS: 50 TIME: 60 minutes

SECTION A

Question 1

1.	1.1	Pith✓/parenchyma	
	1.2	Casparian Strip ✓	
	1.3	Lignin✓	
	1.4	Diffusion✓	
	1.5	Guttation✓	
	1.6	Guard cells✓	
	1.7	Translocation✓	
	1.8	Cambium✓	
	1.9	Annual rings✓	
	1.10	Lenticels✓	(10)

TOTAL SECTION A: 10

SECTION B

Question 2

2.1 2.1.1 Osmosis✓ (1)

2.1.2
- Since the distilled water has a high concentration of water✓/high water potential
- and the concentrated sugar solution has a low concentration of water✓/low water potential
- water moved from the beaker✓
- through the selectively permeable membrane✓/into the bag

Any (3)

2.1.3 (a) Cell Sap✓ (1)
(b) Cell Membrane✓/tonoplast (1)

(6)

2.2 2.2.1 4✓years (1)

2.2.2 125 ✓cm (Accept 123-127) (1)

2.2.3
- Plenty rainfall✓
- Optimum temperatures✓
- Plenty CO_2✓
- Enough soil water✓
- High solar radiation✓ Any (2)

(Mark first TWO only)

2.2.4
- Period of the investigation✓
- Species of plant✓ Any (1)

] **(Mark first ONE only)**

2.2.5 Many plants used/average measurements used✓
(Mark first ONE only) Any (1)

(6)

2.3 2.3.1
- Amount of water absorbed is 53,3 ml✓/average of 5,92 ml per hour (2)
- Amount of water lost by transpiration is 59,9 ml✓/average of 6,66 ml per hour

2.3.2
- As a result of the high amount of water lost✓by transpiration
- which is greater than the amount of water absorbed✓
- the stomata closes to reduce further water loss✓ Any (2)

2.3.3
- Cut the stem of the plant underwater✓
- to prevent air from entering the xylem✓

- Apply petroleum jelly✓/Vaseline
- to make the potometer air-tight✓

- Cut the stem at an angle✓
- to expose more of the xylem✓ for water absorption

Any 2 x 2 (4)

(8)

TOTAL SECTION B: 20

SECTION C

Question 3

Water loss, upward movement of water and absorption of water

- When the stomata open✓
- to allow carbon-dioxide in for photosynthesis✓
- water evaporates through the stomata✓
- through transpiration✓
- As a result, water is drawn out of the mesophyll cells✓
- The mesophyll cells in turn draw water from the xylem vessels✓
- as a result of a concentration/water potential gradient✓
- This sets up a suction force✓/transpiration pull✓
- This force draws water into the xylem of the leaf✓
- as a continuous, unbroken column of water✓
- from the xylem of the stem✓
- When water is then drawn from the xylem of the root✓
- This creates a pressure gradient that extends across the root✓
- causing water to be absorbed into the root hairs✓
- allowing water to move from the epidermis of the root into the xylem of the root✓
- through the passage cells in the endodermis✓
- through lateral movement✓ Any (11) **(11)**

Environmental factors and water loss

- Wind✓
- blows away humid air around stomata and replaces it with dry air✓
- keeping water concentration within the leaf always higher than outside leaf✓

- High temperatures✓
- increase the kinetic energy of water✓
- increasing the movement/loss of water vapour molecules✓

- Under high light intensity✓
- which favours photosynthesis✓
- water is lost when the stomata opens for CO_2 uptake ✓ Any (6) **(6)**

Content: **(17)**
Synthesis: **(3)**
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic.	Ideas arranged in a logical/ cause-effect sequence.	Answered all aspects required by the essay in sufficient detail.
In this essay in Q3	All information is relevant to: - Water loss, upward movement and absorption of water - Effect of different environmental factors in increasing water loss There is no irrelevant information	All information regarding: - Water loss, upward movement and absorption of water - Effect of different environmental factors in increasing water loss is given in a logical manner	At least the following is provided: - **7/11** for water loss, upward movement and absorption of water - **4/6** for effect of different environmental factors in increasing water loss
Mark	1	1	1

TOTAL SECTION C: 20

GRAND TOTAL: 50

Life Sciences Analysis Grid

Grade: 10

Topic Test – Support & Transport in Plants

Question	Cognitive Levels					
	A	B	C	D		
1.1 - 1.10	10					10
2.1.1		1				1
2.1.2			3			3
2.1.3			2			2
2.2.1		1				1
2.2.2		1				1
2.2.3		2				2
2.2.4				1		1
2.2.5				1		1
2.3.1				2		2
2.3.2				2		2
2.3.3			4			4
4.	11	6		3		20
Actual Marks	**21**	**11**	**9**	**9**		**50**
Norm Marks	20	12.5	10	7.5		50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES – Grade 10

TOPIC TEST: Support in Animals

MARKS: 50 **TIME: 60 Minutes**

SECTION A

Question 1

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 (1.1 to 1.5) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.1	A part of the pectoral girdle	A: Scapula B: Clavicle
1.2	Caused by a lack of vitamin D or calcium	A: Rickets B: Osteoporosis
1.3	Found in all vertebrates	A: Exoskeleton B: Hydrostatic skeleton
1.4	Vertebra with flattened surfaces for the attachment of ribs	A: Thoracic B: Lumbar
1.5	A part of the forelimb	A: Tarsals B: Radius

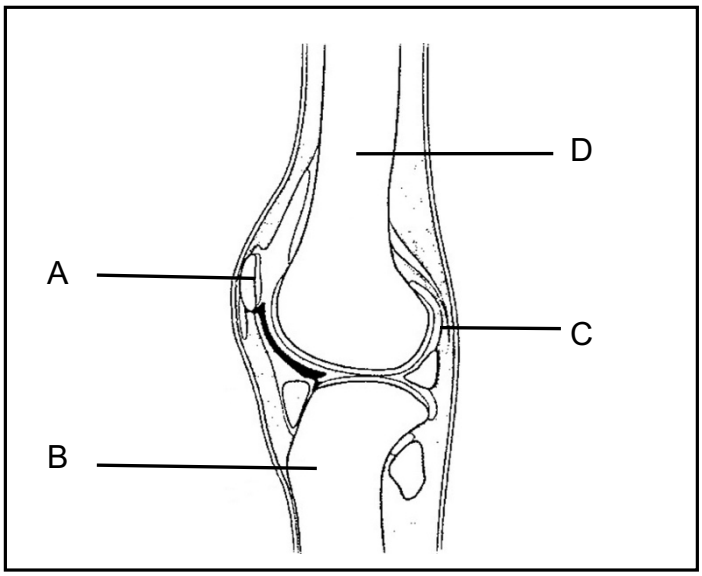
(5 x 2) **(10)**

TOTAL SECTION A: [10]

SECTION B

Question 2

2.1 The diagram below is a longitudinal section of the knee joint.



2.1.1 Name the type of synovial joint shown in the diagram. (1)

2.1.2 Describe the type of movement that is possible at the knee joint. (2)

2.1.3 Identify bones:

(a) **A** (1)

(b) **B** (1)

(c) **D** (1)

2.1.4 State ONE function of part **C**. (1)

2.1.5 Ligaments join bone **B** to bone **D**.

Explain TWO ways in which the tissue making up the ligaments is structurally adapted to perform its function. (4)

(11)

2.2 Movement of the body, such as walking and running, is brought about by the action of muscles.

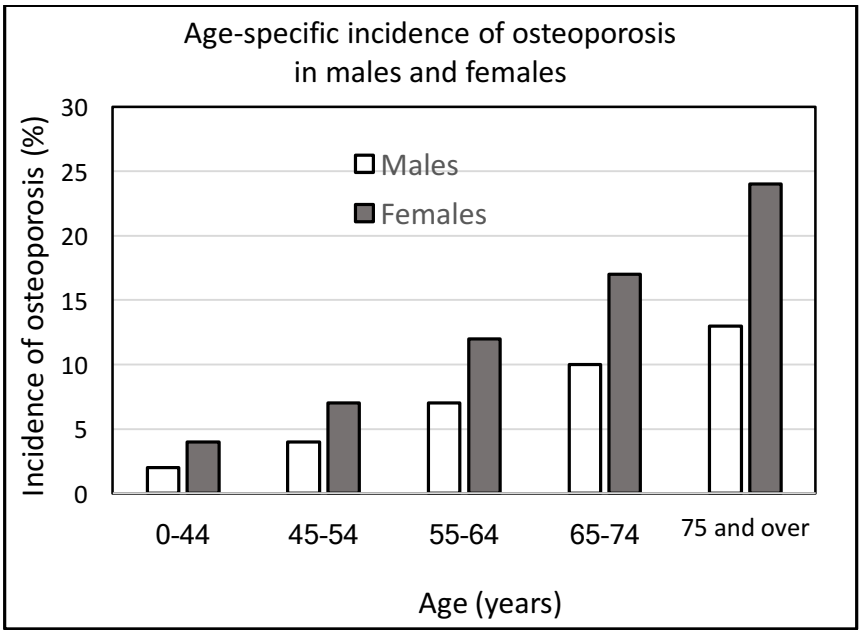
2.2.1 Name the structure that joins muscles to bones. (1)

2.2.2 Describe the structure of voluntary skeletal muscles. (3)

2.2.3 Describe how the muscles found in the upper arm work to pick up a bag from the floor and bring it towards your chest. (5)
(9)
[20]

Question 3

3.1 The graph below shows the results of an investigation using a sample of men and women.



3.1.1 In the above investigation identify the:

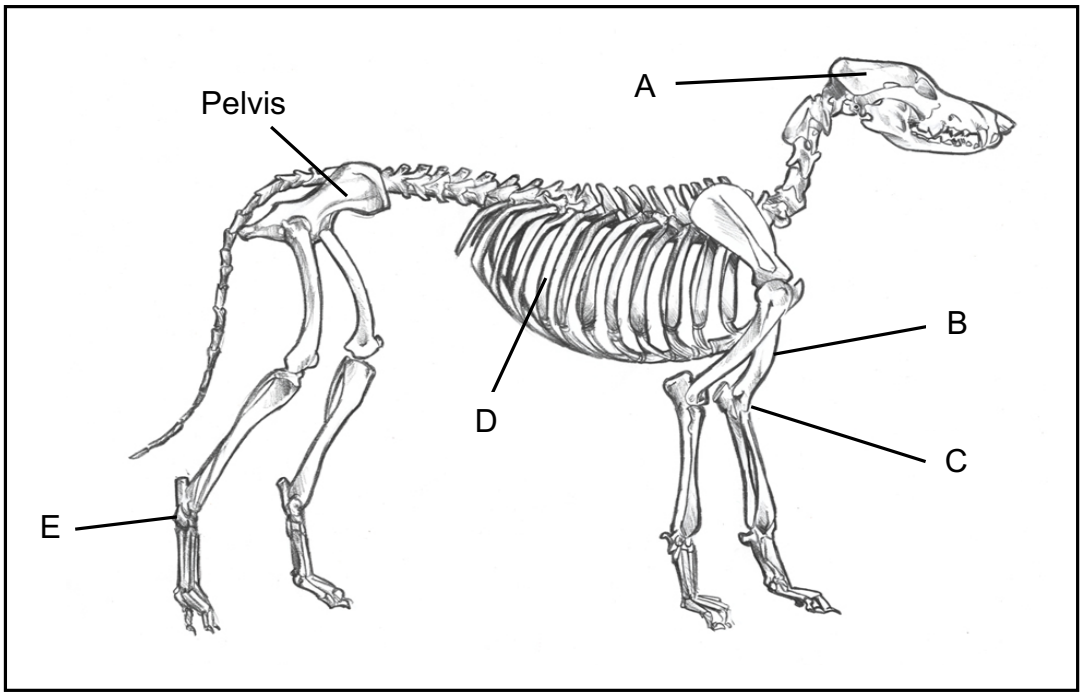
(a) Independent variables (2)

(b) Dependent variable (1)

3.1.2 State TWO ways in which the reliability of the results could be improved, other than repeating the investigation. (2)

(5)

3.2 The diagram below shows the skeleton of a greyhound dog.



3.2.1 The bones of the skeleton of the greyhound are similar to those of a human being.

Identify the bones labelled:

(a) **A** (1)

(b) **B** (1)

(c) **D** (1)

3.2.2 Name the type of joint found at:

(a) **C** (1)

(b) **E** (1)

3.2.3 Suggest why the pelvis of the greyhound is long and narrow as opposed to that of humans which is short and wide. (2)
(7)

3.3 Make a labelled drawing of a longitudinal section of a long bone to show its structure. **(4)**

3.4 Study the passage below and answer the questions based on it.

Devil's Claw

Traditionally, the root tubers of the devil's claw plant have been used in Africa as herbal preparations for a wide range of conditions, including arthritis, rheumatism, fever, sore muscles and to reduce cholesterol.

Devil's claw contains a chemical that has been shown to reduce inflammation that causes pain in joints and tendons.

3.4.1 Name the part of the plant that is used in herbal preparations. (1)

3.4.2 List TWO uses of devil's claw, according to the extract, other than for arthritis. (2)

3.4.3 State how the chemical from the devil's claw plant assists patients with arthritis. (1)

(4)
[20]

TOTAL SECTION B: 40

GRAND TOTAL: 50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Grade 10

Topic Test Memorandum: Support in Animals

MARKS: 50 TIME: 60 minutes

SECTION A

Question 1

1.1 Both A and B✓✓
1.2 Both A and B✓✓
1.3 None✓✓
1.4 A only✓✓
1.5 B only✓✓ (5 x 2) (10)

TOTAL SECTION A: [10]

SECTION B

Question 2

2.1 2.1.1 Hinge✓ (1)

2.1.2 - Movement in one direction✓/allows for flexion and extension
- with some rotation✓ (2)

2.1.3 (a) Patella ✓ (1)
(b) Tibia ✓ (1)
(c) Femur✓ (1)

2.1.4 Reduce friction at the joint✓ (1)

2.1.5 - Collagen fibres✓
- provide strength✓

- Elastic fibres✓
- allows the ligaments to stretch✓
(Mark first TWO only) (4)

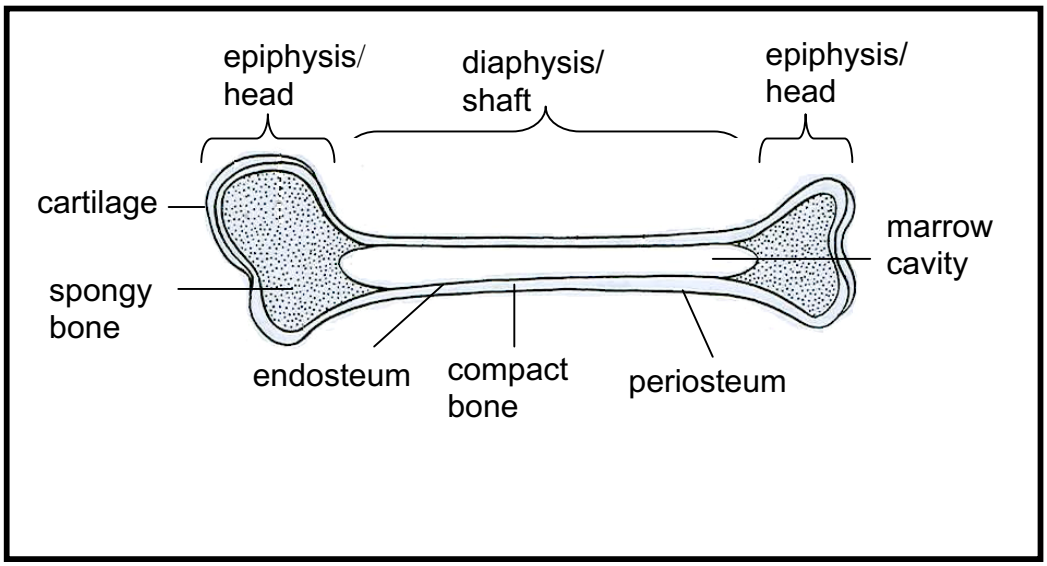
(11)

2.2	2.2.1	Tendons✓		(1)
	2.2.2	- They have myofibrils✓ - composed of actin and myosin filaments✓ - in units called sarcomeres✓ - located in the matrix/sarcoplasm✓ - surrounded by the sarcolemma✓ - Cytoplasm is striated ✓/not divided into cells	Any 3	(3)
	2.2.3	- The biceps✓ - contract✓ - and the triceps✓ - relax✓ - to bend the arm✓		(5) **(9)** **[20]**

Question 3

3.1	3.1.1	(a) Age✓ Gender✓		(2)
		(b) Incidence of osteoporosis✓		(1)
	3.1.2	- Increase the sample size✓ - Take random samples✓ **(Mark first TWO only)**		(2) **(5)**
3.2	3.2.1	(a) Cranium✓ (b) Humerus✓ (c) Rib✓		(1) (1) (1)
	3.2.2	(a) Hinge✓ (b) Gliding✓		(1) (1)
	3.2.3	- The greyhound is a quadruped✓ - with the pelvis only supporting the rear part of the body✓		(2) **(7)**

3.3



Mark allocation
Any FOUR correctly labelled parts✓✓✓✓ **(4)**

3.4 3.4.1 Root tubers✓ (1)

3.4.2
- Rheumatism✓
- Fever✓
- Sore muscles✓
- Reduces cholesterol✓

(Mark first TWO only) (Any 2) (2)

3.4.3 It reduces inflammation✓ (1)

(4)
[20]

TOTAL SECTION B: 40

GRAND TOTAL: 50

Life Sciences Analysis Grid
Grade: 10
Topic Test – Support in Animals

	Cognitive Levels				
Question	**A**	**B**	**C**	**D**	
1.1.1		2			
1.1.2		2			
1.1.3		2			
1.1.4		2			
1.1.5		2			**10**
2.1.1	1				
2.1.2		2			
2.1.3	3				
2.1.4		1			
2.1.5			4		**11**
2.2.1	1				
2.2.2	3				
2.2.3	5				**9**
3.1.1				3	
3.1.2				2	**5**
3.2.1			3		
3.2.2			2		
3.2.3				2	**7**
3.3	4				**4**
3.4.1	1				
3.4.2	2				
3.4.3	1				**4**
Actual Marks	21	13	9	7	**50**
Norm Marks	**20**	**12.5**	**10**	**7.5**	**50**

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES

Grade 10

TOPIC TEST: Transport in Mammals

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1 to 1.4) in your ANSWER BOOK, for example 1.5 D.

1.1 Which ONE of the following blood vessels supplies the heart tissue with oxygen and glucose?

A Coronary vein
B Pulmonary artery
C Coronary artery
D Aorta

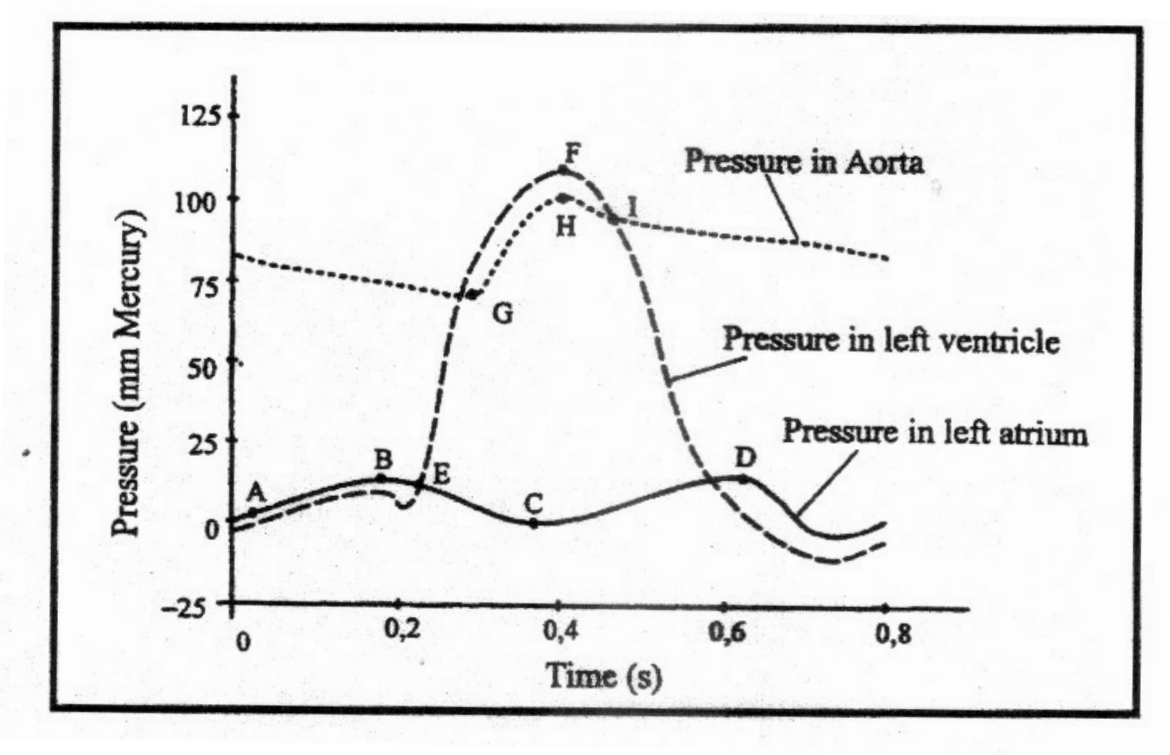
1.2 An *artery* is different from a *vein* in that it …

A has an endothelial layer.
B always carries oxygenated blood.
C does not contain smooth muscles.
D has a thicker smooth muscle layer.

1.3 As the level of exercise in a person increases we can expect that …

A the arteries supplying the skeletal muscles will constrict.
B the blood flow to the muscles will decrease.
C the arteries supplying the skeletal muscles will dilate.
D the body temperature will decrease.

1.4 Study the graph below showing changes in pressure during a heartbeat.



Using information from the graph, one may conclude that the atrial systole occurs between points …

A **E** and **C.**
B **A** and **B.**
C **E** and **F.**
D **G** and **H**.

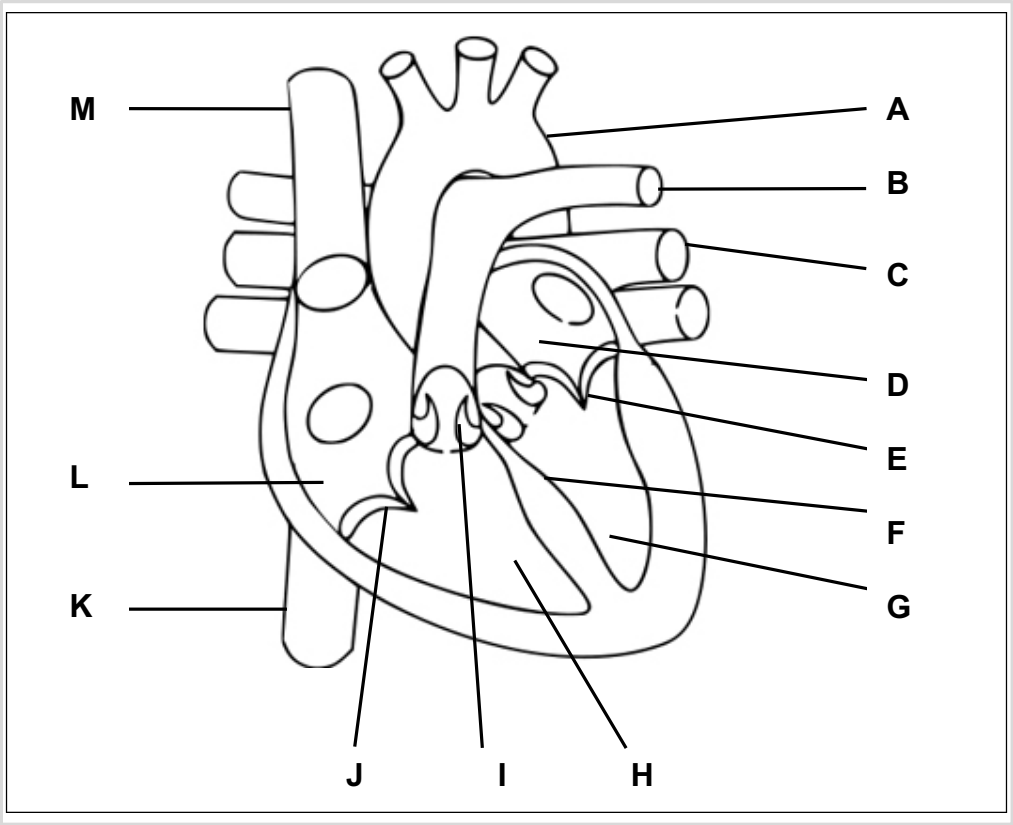
(4 x 2) **(8)**

TOTAL SECTION A: 8

SECTION B

Question 2

2.1 Study the diagram below showing a section through the heart.



2.1.1 Identify part:

(a) **A**
(b) **E**
(c) **G**
(d) **I**
(e) **K** (5)

2.1.2 Write down the LETTER only of the part that:

(a) Prevents backflow of blood from the right ventricle into the right atrium
(b) Transports blood to the lungs
(c) Receives blood from the superior vena cava
(d) Transports oxygenated blood into the heart (4)

2.1.3 Explain ONE consequence of a hole developing in part **F**. (2)

2.1.4 Explain why the wall of part **G** is thicker than that of part **H**. (2)

(13)

2.2 The table below shows the resting pulse rate of different mammals and the number of beats in the average life-time of each organism.

Mammal	Resting pulse rate (beats per minute)	Number of beats in average life-time (million)
Elephant	25	591
Humans	72	2700
Dog	100	525
Rat	350	560

2.2.1 Draw a bar graph showing the resting pulse rate of the different mammals. (6)

2.2.2 Use the information in the table to calculate the average life-span (in years) of an elephant. Show ALL working. (3)

(9)

TOTAL SECTION B: 22

SECTION C

Question 3

Matthew is an enthusiastic soccer player. He notices that by the end of the game his heart beats very fast.

Describe the events of the cardiac cycle. Also describe why and how the speed of the cardiac cycle increases as he plays soccer.

Content: (17)
Synthesis: (3)

NOTE: NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 50

ILEMBE AND PINETOWN DISTRICTS

GRADE 10 TOPIC TEST MEMO – Transport in Mammals

SECTION A

Question 1

1.1 C✓✓

1.2 D✓✓

1.3 C✓✓

1.4 B✓✓ (4 x 2) **(8)**

TOTAL SECTION A: [8]

SECTION B

Question 2

2.1 2.1.1
(a) Aorta✓
(b) Bicuspid valve✓
(c) Left ventricle✓
(d) Semi-lunar valves✓
(e) Inferior vena cava✓ (5)

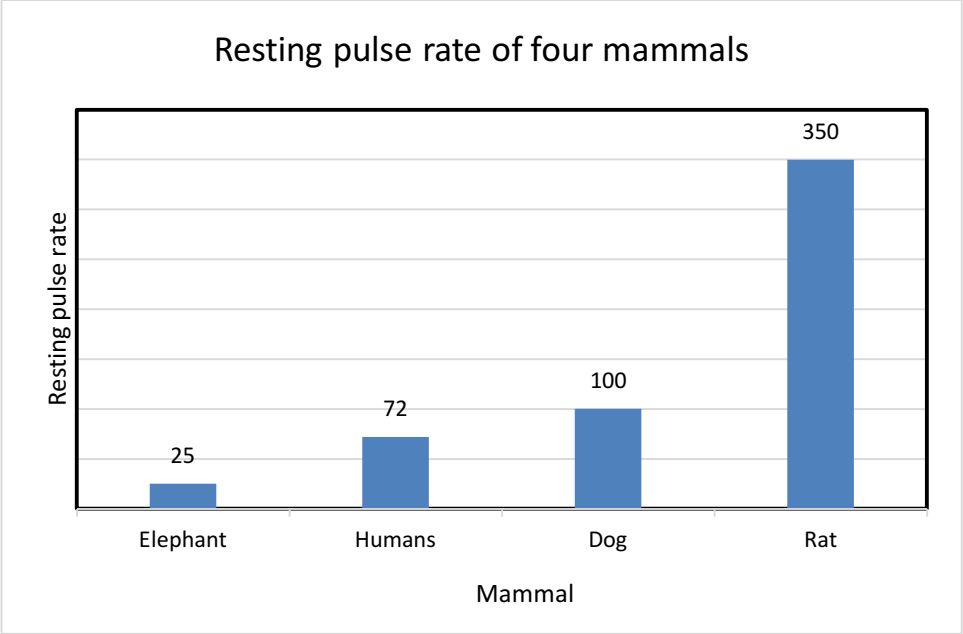
2.1.2
(a) J✓
(b) B✓
(c) L✓
(d) C✓ (4)

2.1.3
- Insufficient oxygen✓/excess carbon-dioxide
- since there will be a mixing of oxygenated and deoxygenated blood✓ (2)

2.1.4
- Part G pumps blood over a long distance✓/to all parts of the body
- whereas part H pumps blood over a short distance✓/to the lungs only (2)

[13]

2.2 2.2.1



Correct type of graph	1
Caption	1
Correct labels for X-axis and Y-axis (including units)	1
Correct scale for X-axis and Y-axis	1
Plotting of bars	1: 1-3 bars plotted correctly 2: All 4 bars plotted correctly

(6)

2.2.2 $\frac{591 \text{ million}}{25}$ ✓ /(60x24x365) ✓

44,97✓/45 years (3)

(9)
[22]

SECTION C

Question 3

The Cardiac Cycle

- During the atrial systole✓
- both atria contract at the same time✓
- The tricuspid and bicuspid valves open✓
- Blood flows from the atria into the ventricles✓

- During the ventricular systole✓
- both ventricles contract at the same time✓
- Both semi-lunar valves open✓
- Blood is forced from the right ventricle into the pulmonary artery✓
- and from the left ventricle into the aorta✓

- During general diastole✓
- the heart relaxes✓/ventricles and atria relax
- Deoxygenated blood enters the right atrium from the inferior and superior vena cava✓
- and oxygenated blood enters the left atrium from the pulmonary vein✓
- The tricuspid and bicuspid valves are open✓
- so blood also moves into the ventricles✓ Any (12) (12)

Mechanism to increase the speed of the cardiac cycle

- Due to the demand for energy✓
- a higher rate of respiration✓
- produces a high amount of carbon dioxide✓
- stimulating the sensory cells in the carotid artery✓
- which in turn stimulates the medulla oblongata✓
- Impulses are sent✓
- to the SA✓/AV node
- causing an increase in the heartbeat✓/speed of the cardiac cycle

(Any 5) (5)
Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logic sequence	Comprehensive
All information provided is relevant to the question	Ideas arranged in a logical cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All the information provided is relevant to the: - Cardiac cycle - Increase in speed of cardiac cycle There is no irrelevant information	All the information regarding the: - Cardiac cycle - Increase in speed of cardiac cycle is arranged in a logical manner	At least the following points should be included: - Cardiac cycle (**8/12**) - Increase in speed of cardiac cycle (**3/5**)
1 mark	**1 mark**	**1 mark**

TOTAL SECTION C: 20
GRAND TOTAL: 50

Life Sciences Analysis Grid

Grade:10

Topic Test – Transport in Mammals

COGNITIVE LEVELS

Question	A	B	C	D	TOTALS
1.1		2			
1.2		2			
1.3			2		
1.4				2	**8**
2.1.1	5				
2.1.2		4			
2.1.3				2	
2.1.4			2		**13**
2.2.1	1	2	3		
2.2.2			3		**9**
3.	17			3	**20**
Actual Marks	23	10	10	7	**50**
Norm Marks	**20**	**12.5**	**10**	**7.5**	

Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES – Grade 10

TOPIC TEST: ECOSYSTEMS

MARKS: 50 **TIME: 60 Minutes**

SECTION A

QUESTION 1

Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.1 to 1.5) in the ANSWER BOOK.

1.1 The variety of living organisms on earth

1.2 A group of food chains arranged to show how the feeding of organisms is connected

1.3 Factors that relate to the physical features of the land

1.4 An area with a particular climate and soil type that influences the plants and animals that live there

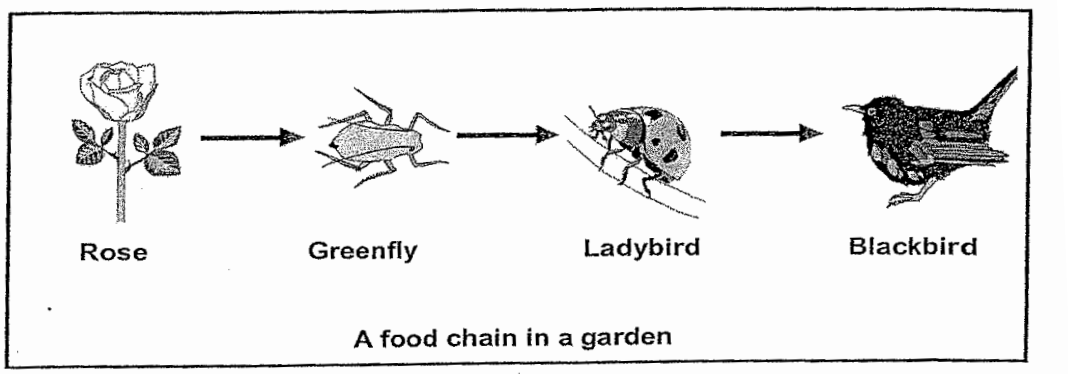
1.5 Organisms that feed on dead or decaying matter (5 x 1) (5)

TOTAL SECTION A: [5]

SECTION B

QUESTION 2

2.1 The diagram below represents a food chain in a garden.



A food chain in a garden

2.1.1. Name the organism above that represents a:

(a) Carnivore (1)
(b) Producer (1)

2.1.2. A rose bush contains 1000kJ/m^2/year of energy and only 10% of this energy is passed on at each trophic level of the food chain.

How much energy will be passed on to the greenfly? Show ALL calculations. (3)

2.1.3. If only the above food chain exists in an ecosystem, explain the effect of the death of the greenfly in that ecosystem. (3)
[8]

2.2 An investigation was carried out using 50 g of each of three soil types: sand, loam and clay placed on filter paper in a funnel. 80 ml of water was run through each soil. A measuring cylinder was placed below each set of apparatus to collect the water.

An incomplete set of results for the investigation is given in the table below:

	Soil A	**Soil B**	**Soil C**
Amount of water drained through each soil (ml)	40		25
Amount of water retained by each soil (ml)		15	

2.2.1 How much of water was retained by soil **C**? (1)

2.2.2 Which soil type (**A**, **B** or **C**) was sand? Give a reason for your answer. (2)

2.2.3 Identify TWO factors that should be kept constant in this investigation. (2)
(5)
[13]

QUESTION 3

The table below shows the results of a study that investigated the effect of temperature and light on the yield of tomatoes in two greenhouses on a farm.

TEMPERATURE (^{0}C)	AVERAGE YIELD OF TOMATOES PER PLANT (kg)	
	LOW LIGHT LEVELS	HIGH LIGHT LEVELS
5	0,5	0,5
10	1,5	2,5
15	3,0	5,0
20	3,6	8,5
25	3,5	7,8
30	2,5	6,2

3.1 State TWO steps the investigator may have taken into consideration during the planning stage of the investigation. (2)

3.2 Identify the:

(a) Independent variables (2)

(b) Dependent variable (1)

3.3 Plot bar graphs on the same system of axes showing the results of the average yield of the tomatoes from 20^0 C to 30^0 C for both light levels. (6)

3.4 State ONE way in which the scientists could have improved the reliability of the investigation. (1)

[12]

TOTAL SECTION B: 25

SECTION C

QUESTION 4

Describe the water cycle and the role of wetlands in the functioning of an ecosystem.

Content: (17)
Synthesis: (3)
(20)

NOTE: NO marks will be awarded for answers in the form of a table, flow charts or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 50

ILEMBE AND PINETOWN DISTRICTS

Grade 10 TOPIC TEST MEMO – Ecosystems

SECTION A

QUESTION 1

1.1 Biodiversity✓
1.2 Food web✓
1.3 Physiographic ✓
1.4 Biome✓
1.5 Saprophytes✓

(5 x 1) **(5)**

TOTAL SECTION A: [5]

SECTION B

QUESTION 2

2.1 2.1.1 (a) Ladybird✓/blackbird (1)
(b) Rose✓ (1)

2.1.2 Energy passed to greenfly = 1000kJ/m^2/year✓ x 10/100✓
= 100kJ/m^2/year✓ (3)

2.1.3
- There will be no food for the ladybird✓
- The ladybird dies or leaves the ecosystem✓
- then there will be no food for the blackbird✓
- The blackbird may die or leave as well✓
- Since there is no greenfly, the rose plants will flourish✓

(Any 3) (3)
(8)

2.2 2.2.1 55 ml ✓ (1)

2.2.2
- Soil B✓
- Had the lowest water holding capacity✓/Retained the least amount of water (2)

2.2.3
- Identical apparatus✓/funnel/measuring cylinder
- Same type/shape/size of filter paper✓
- Duration of the investigation✓/amount of time allowed for water to run through
- Same investigator✓
- Tomato plants of the same type✓/size/species

(MARK FIRST TWO ONLY) **(**Any 2) (2)
(5)
[13]

QUESTION 3

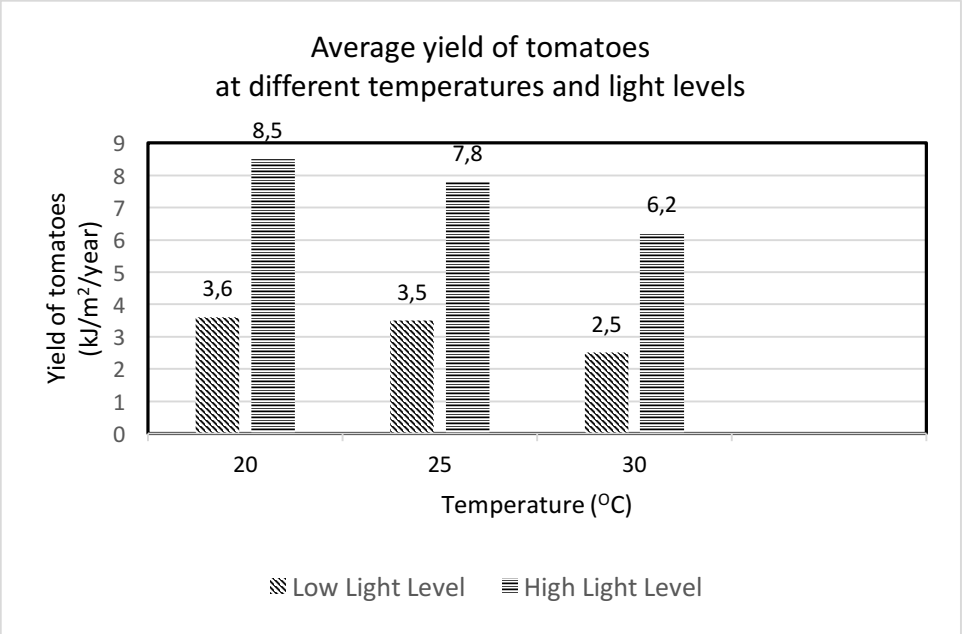
3.1 - Ask permission✓ from the owner of the farm
- Deciding on the venue✓
- Deciding on the duration✓
- Deciding how to vary the temperature in the greenhouses✓
- Deciding how to vary the light in the greenhouses✓
- Deciding on the species of tomato plant✓
- Deciding on the measuring techniques✓
- Deciding on the measuring apparatus✓
- Deciding on recording method✓

(MARK FIRST TWO ONLY) (Any 2) (2)

3.2 (a) Light✓
Temperature✓ (2)

(b) Yield of tomatoes ✓ (1)

3.3



Correct type of graph	1
Caption	1
Correct labels for X-axis and Y-axis including correct units	1
Correct scale for X-axis (correct width and spacing of bars) and Y-axis	1
Plotting of bars	1: 1-5 bars plotted correctly 2: All 6 bars plotted correctly

(6)

3.4 - Set up more plants in each greenhouse✓
- Repeat the investigation✓

(Mark first ONE only) (Any 1) (1)

(12)

SECTION C

QUESTION 4

The Water Cycle

- Water moves from the atmosphere to the earth✓
- in the form of rain, snow, fog, hail, dew, and frost✓/precipitation
- A part of the water that reaches the earth is absorbed by the upper layers of soil✓
- to form hygroscopic and capillary water✓
- Some of the water filters through the upper layers of the soil✓
- to the water table✓
- and is called gravitational water✓
- Some of the water runs off✓above the ground
- into streams and rivers that flow into lakes and oceans✓
- Water reaches the atmosphere again by evaporation✓
- from large water masses and from the soil✓
- Plants transpire✓
- and lose water to the atmosphere in the form of water vapour✓
- Larger amounts of water vapour in the atmosphere condense✓
- to form clouds✓ (Any 11) (11)

Role of Wetlands

Wetlands:

- have a high water table✓
- have soil with a high water holding capacity✓
- provide a regular water supply for the ecosystem✓
- store water for the ecosystem✓
- filters water naturally by the vegetation✓
- controls flooding✓
- reduce the amount of sediment in rivers✓
- keeps rivers flowing continuously✓
- provide a habitat for wildlife✓/maintains biodiversity
- provide reeds for weaving✓
- provide medicinal plants✓
- provide food for various organisms✓ (Any 6) (6)

Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the topic	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay
Only information relevant to the water cycle and wetlands is given. There is no irrelevant information	Information regarding the water cycle and wetlands are each described in a logical order.	Learners should obtain at least the following mark: - 7/11 for the water cycle and - 4/6 for wetlands
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 50

Life Sciences Analysis Grid

Grade: 10

Topic Test - ECOSYSTEMS

COGNITIVE LEVELS

Question	A	B	C	D	TOTALS
1.1	1				
1.2	1				
1.3	1				
1.4	1				
1.5	1				**5**
2.1.1(a)	1				
2.1.1(b)	1				
2.1.2		3			
2.1.3				3	**8**
2.2.1		1			
2.2.2			2		
2.2.3				2	**5**
3.1			2		
3.2			3		
3.3	2	2	2		
3.4			1		**12**
4	12	5		3	**20**
Actual Marks	21	11	10	8	**50**
Norm Marks	**20**	**12.5**	**10**	**7.5**	

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES

Grade 10

TOPIC TEST: Nutrient Cycles and Ecotourism

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

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 (1.1 to 1.5) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.1	Form in which plants require nitrogen	A: Nitrites B: Nitrates
1.2	Contains carbon	A: Proteins B: Carbohydrates
1.3	Plays a role in the balance of oxygen and carbon dioxide in the atmosphere	A: Respiration B: Photosynthesis
1.4	Plays a role in the water cycle	A: Evaporation B: Condensation
1.5	Conversion of nitrogen to nitrates	A: Lightning B: Denitrification

(5 x 2) **(10)**

TOTAL SECTION A 10

SECTION B

Question 2

2.1 The carbon cycle regulates the amount of carbon in ecosystems.

Describe:

2.1.1 The carbon cycle (6)

2.1.2 How animals such as lions obtain carbon contained in plants (2)

2.1.3 The impact of deforestation on the carbon cycle (2)

2.1.4 How any one human impact other than deforestation may affect the carbon cycle (2)

(12)

2.2 The table below shows South Africa's CO_2 emissions in relation to other countries with similar population sizes.

COUNTRY	**CO_2 EMISSION (%)**
South Africa	5
Japan	15
Russia	20
India	10
US	20
China	30

2.2.1 Draw a pie-chart to represent the information in the table. Show ALL calculations. (6)

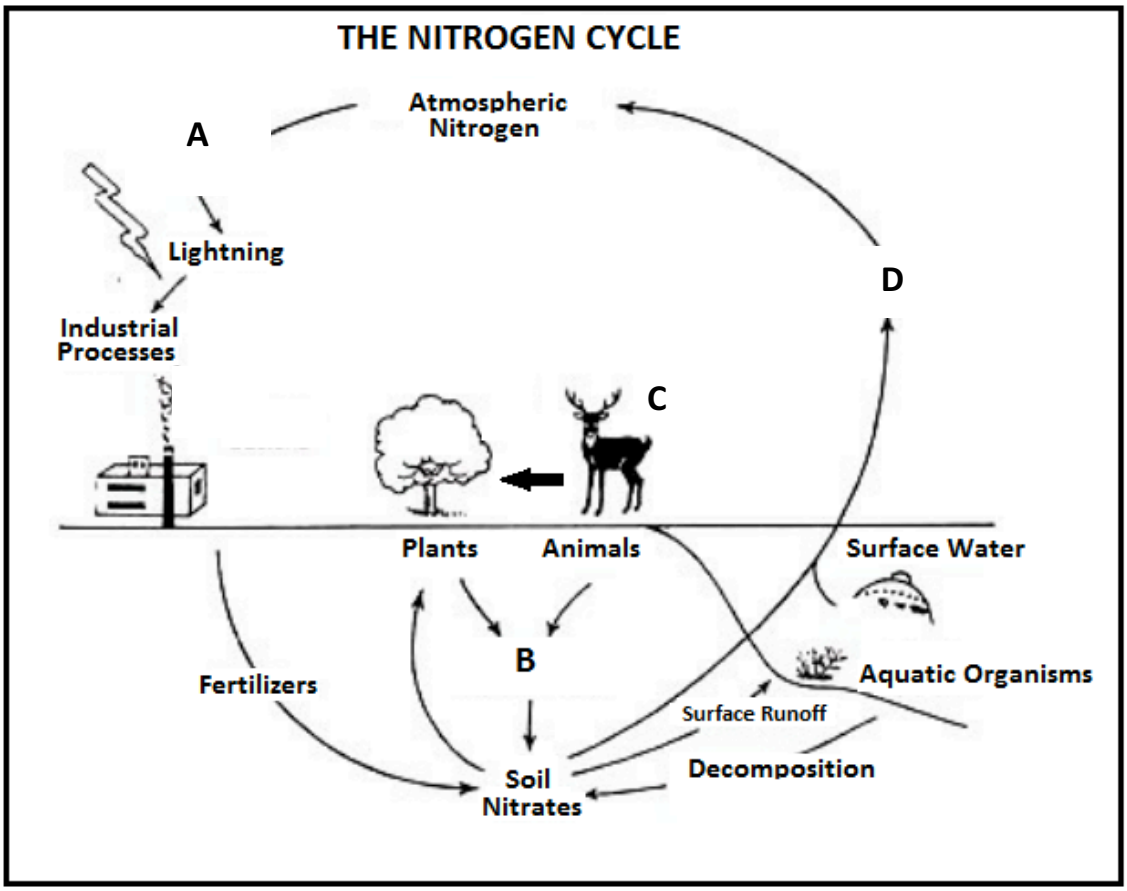
2.2.2 List TWO possible ways in which China can decrease carbon dioxide emissions. (2)

(8)

[20]

Question 3

3.1 The diagram below represents the nitrogen cycle.



3.1.1 Write down the LETTER only that represents:

a) Denitrification (1)

b) Conversion of atmospheric nitrogen to nitrates (1)

3.1.2 How does organism **C** obtain its nitrogen? (2)

3.1.3 Identify TWO types of organisms that play a role in process **B?** (2)

3.1.4 Clover plants, like pea plants, are leguminous plants.

Explain why farmers plant clover plants in their fields every few years. (3)

3.1.5 Explain why adding manure to the soil would increase the nitrate content of the soil. (3)

(12)

3.2 Read the following extract relating to the a tourism centre.

> In one of China's most popular tourism centres, the park's monkeys are kept in a very small area and regularly compete for food since it is provided in small quantities.
>
> It is thought that the above factors caused the monkeys to develop aggressive behavior towards each other and towards their young. This has led to the adult monkeys attacking and killing many of the infant monkeys.
>
> A team studied infant mortality in monkeys for six years before ecotourism began in 1991. They also collected data while tourists visited the animals between 1992 and 2004.
>
> Infant mortality had been low prior to ecotourism and was primarily caused by disease, the team found.

3.2.1 What was the main cause of infant mortality before ecotourism began? (1)

3.2.2 Explain how the researchers could link the increased infant mortality to ecotourism. (2)

3.2.3 Using information from the extract, suggest TWO ways in which the problem described could be avoided. (2)

3.2.4 Despite the above problem related to ecotourism, state THREE advantages of ecotourism. (3)

(8)

TOTAL SECTION B: [20]

GRAND TOTAL: 50

LIFE SCIENCES

Topic Test Memorandum: Nutrient Cycles and Ecotourism

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 1

1.1 1.1.1 B only✓✓

1.1.2 Both A and B✓✓

1.1.3 Both A and B✓✓

1.1.4 Both A and B✓✓

1.1.5 A only✓✓ **[10]**

TOTAL SECTION A : 10

SECTION B

Question 2

2.1 2.1.1
- Plants absorb carbon dioxide from the atmosphere✓
- to form organic compounds✓/during photosynthesis
- When the plants are fed upon by the consumers✓
- they obtain their carbon compounds✓
- When plants and animals respire✓
- they release CO_2 into the atmosphere✓
- When plants and animals die✓
- their organic compounds are broken down by decomposers✓
- releasing carbon and other nutrients into the soil✓
- Through the burning of fossil fuels✓
- carbon is released into the atmosphere as carbon dioxide✓ (Any 6) (6)

2.1.2
- Lions feed on herbivores✓
- which feed on plants✓ (2)

2.1.3
- Reduced intake of CO_2 by plants✓
- would increase the amount of CO_2 in the atmosphere✓ (2)

2.1.4
- Increased use of fossil fuels✓/increased industrialization/Increased use of private transport/decreased use of public transport/increased human population
- would increase the level of CO_2 in the atmosphere✓ (2)

(12)

2.2 2.2.1 South Africa: $\frac{5}{100}$ x 360˚ = 18

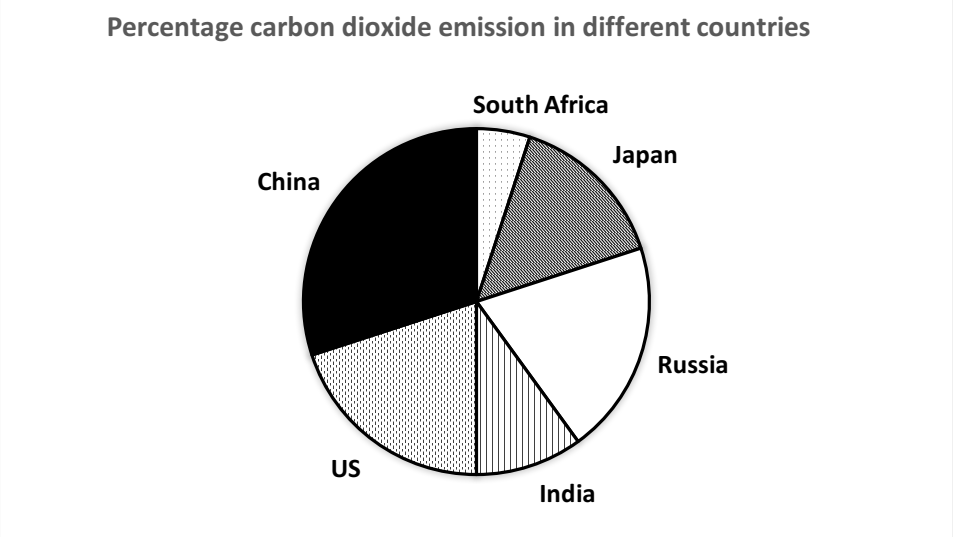
Japan: $\frac{15}{100}$ x 360˚ = 54

Russia: $\frac{20}{100}$ x 360˚ = 72

India: $\frac{10}{100}$ x 360˚ = 36

US: $\frac{20}{100}$ x 360˚ = 72

China: $\frac{30}{100}$ x 360˚ = 108



Criteria	Marks
Type of graph	1 mark
Caption	1 mark
Calculations	No calculations correct – 0 mark 1-5 calculations correct – 1 mark All 6 calculations correct – 2 marks
Correct proportion for each labelled slice	No proportions correct – 0 mark 1-4 proportions correct – 1 mark 6 proportions correct – 2 marks

(6)

2.2.2

- Use energy efficient appliances✓
- Drive fuel efficient vehicles✓
- Use public transport✓
- Recycle/reuse products✓
- Change to renewable energy supply✓ (Any 2) (2)

(Mark first TWO only)

(8)

[20]

Question 3

3.1	3.1.1	a) D✓ b) A✓	(1) (1)
	3.1.2	- From proteins✓ - obtained through feeding on plants✓	(2)
	3.1.3	- Bacteria✓ - Fungi✓ **(Mark first TWO only)**	(2)
	3.1.4	- The roots of clover plants have nitrogen fixing bacteria✓ - which convert atmospheric nitrogen✓ - into nitrates✓	(3)
	3.1.5	- The manure will be decomposed into ammonia✓ - which will be converted by bacteria first to nitrites✓ - and then to nitrates✓	(3)
			(12)
3.2	3.2.1	Disease✓	(1)
	3.2.2	- They compared the infant mortality before ecotourism✓ - and after ecotourism✓	(2)
	3.2.3	- Increase the amount of space allocated to the monkeys✓ - Provide sufficient food to avoid competition✓ **(Mark first TWO only)**	(2)
	3.2.4	- Improves infrastructure✓/buildings/roads - Creates employment✓ - Improves the economy✓ - Protection of the natural environment✓ - New business opportunities✓ (Any 3) **(Mark first THREE only)**	(3)
			(8)
			[20]
		TOTAL SECTION B	**40**
		FINAL TOTAL	**50**

Life Sciences Analysis Grid

Grade: 10

Monthly Test: Nutrient Cycle and Ecotourism

		Cognitive Levels				
Question	**A**	**B**	**C**	**D**		
1.1		2				
1.2		2				
1.3		2				
1.4		2				
1,5		2				
2.1.1	6					
2.1.2	2					
2.1.3			2			
2.1.4			2			
2.2.1	1	3	2			
2.2.2				2		
3.1.1	2					
3.1.2	2					
3.1.3		2				
3.1.4			3			
3.1.5			3			
3.2.1	1					
3.2.2				2		
3.2.3				2		
3.2.4	3					
Actual Marks	**17**	**15**	**12**	**6**		
Norm Marks	20	12,5	10	7,5		50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

ILEMBE AND PINETOWN DISTRICTS

LIFE SCIENCES - Grade 10

TOPIC TEST: History of Life on Earth

MARKS: 50 **TIME: 60 minutes**

SECTION A

Question 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 to 1.5) in the ANSWER BOOK, for example 1.6 D.

1.1 Palaeontology is a study of …

A the half-life of radioactive substances.
B continental drift.
C fossils.
D changes during the Cambrian explosion.

1.2 Which ONE of the following organisms is regarded as a link between fish and amphibians?

A Trilobite
B Ammonite
C Coelacanth
D Fossil bivalves

1.3 Study the following list of characteristics:

(i) Well-developed teeth
(ii) Wings with feathers
(iii) Characteristics of birds and reptiles
(iv) No tail

Which ONE of the following combinations of characteristics applies to *Archaeopteryx*?

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

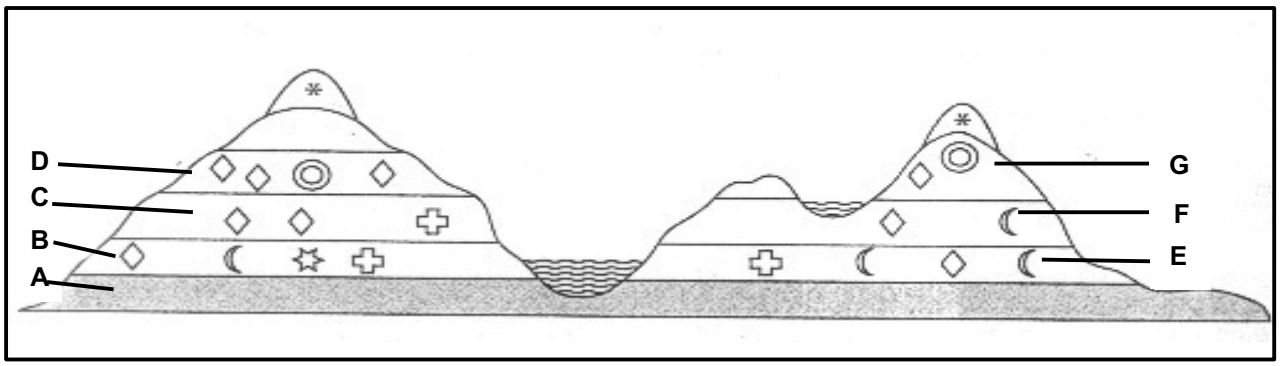
1.4 Study the following list of characteristics:

(i) Transitional species
(ii) Currently extinct
(iii) Living fossil
(iv) Belongs to the genus *Latimeria*

Which ONE of the following combinations of characteristics applies to the coelacanth?

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

1.5 The following diagram shows different layers of rock labelled **A** to **G**. The symbols represent different fossils.



Which ONE of the following is correct for the TWO layers that have the same geological age, with an appropriate reason?

	LAYERS OF ROCK	REASON
A	B and E	The fossil species are different
B	B and G	The fossil species are the same
C	D and F	The fossil species are different
D	D and G	The fossil species are the same

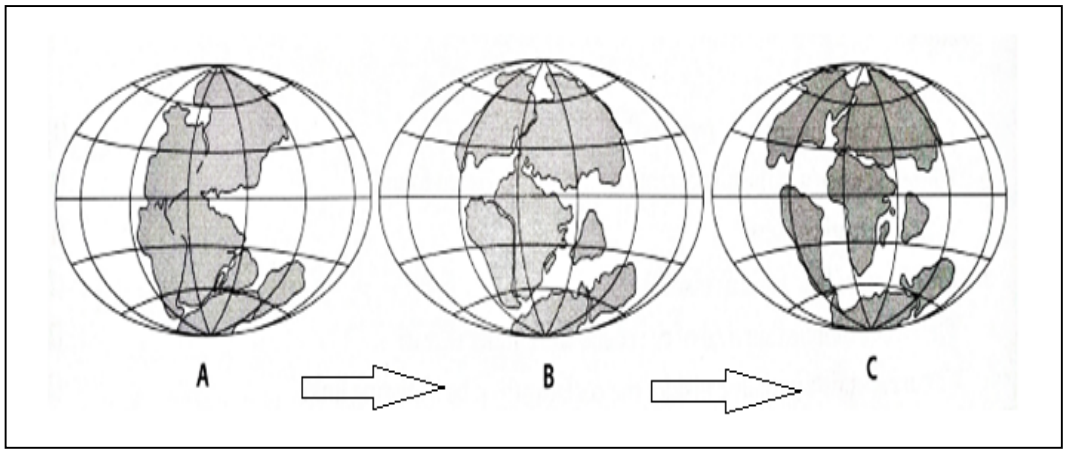
(5 x 2) **(10)**

TOTAL SECTION A: 10

SECTION B

Question 2

2.1 Study the maps below showing the changes that took place during a geological event.



2.1.1 Name the giant continent labelled **A**. (1)

2.1.2 Identify the geological event that is represented in the diagrams above. (1)

2.1.3 Name the TWO super-continents formed from the continent in Diagram **A.** (2)

2.1.4 Identify the eras, corresponding to different stages in the geological event, labelled:

(a) **X** (1)
(b) **Y** (1)
(c) **Z** (1)

2.1.5 The black bands below the map indicate warm periods and the white bands show periods of ice ages.

(a) How many warm periods occurred during this geological event? (1)

(b) Which ice age (**1**, **2**, **3** or **4**) was of the longest duration? (1)

(c) State ONE possible consequence that these ice ages may have had on the diversity of life on earth. (1)

(10)

2.2 Describe how fossils are formed. **(6)**

2.3 Define each of the following terms:

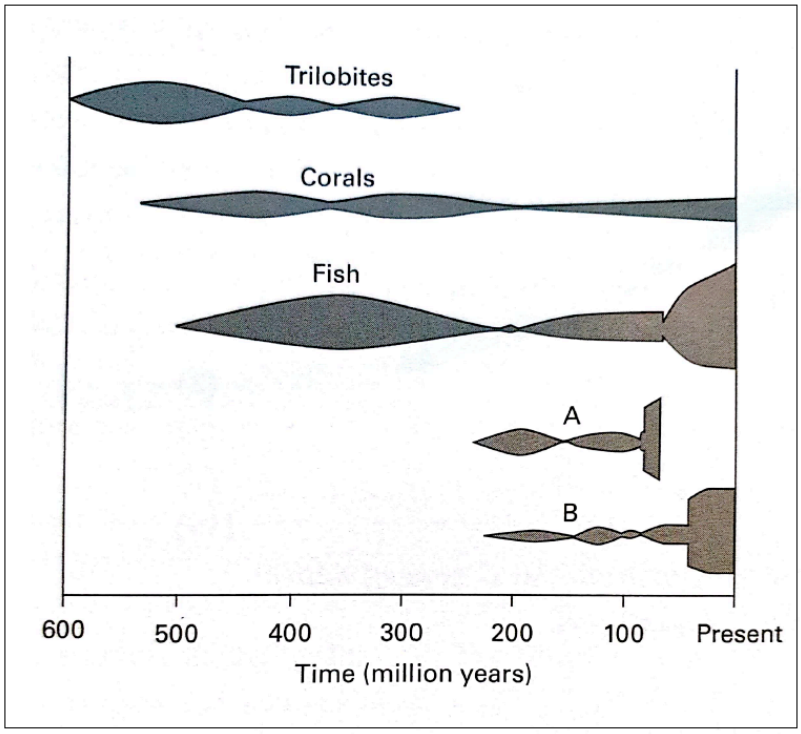
2.3.1 Cambrian explosion (2)

2.3.2 Mass Extinction (2)
(4)

[20]

QUESTION 3

3.1 The chart below shows the abundance of different groups of organisms during the last 600 million years. The width of the shape indicates abundance.



3.1.1 According to the chart, which organisms existed 300 million years ago? (3)

3.1.2 Which group (**A** or **B**) is more likely to represent the dinosaurs? (1)

3.1.3 Give a reason for your answer to QUESTION 3.1.2. (1)

3.1.4 Which group of organisms was the most successful in the period 300 to 400 million years ago? (1)

3.1.5 State how you arrived at your answer to QUESTION 3.1.4. (1)

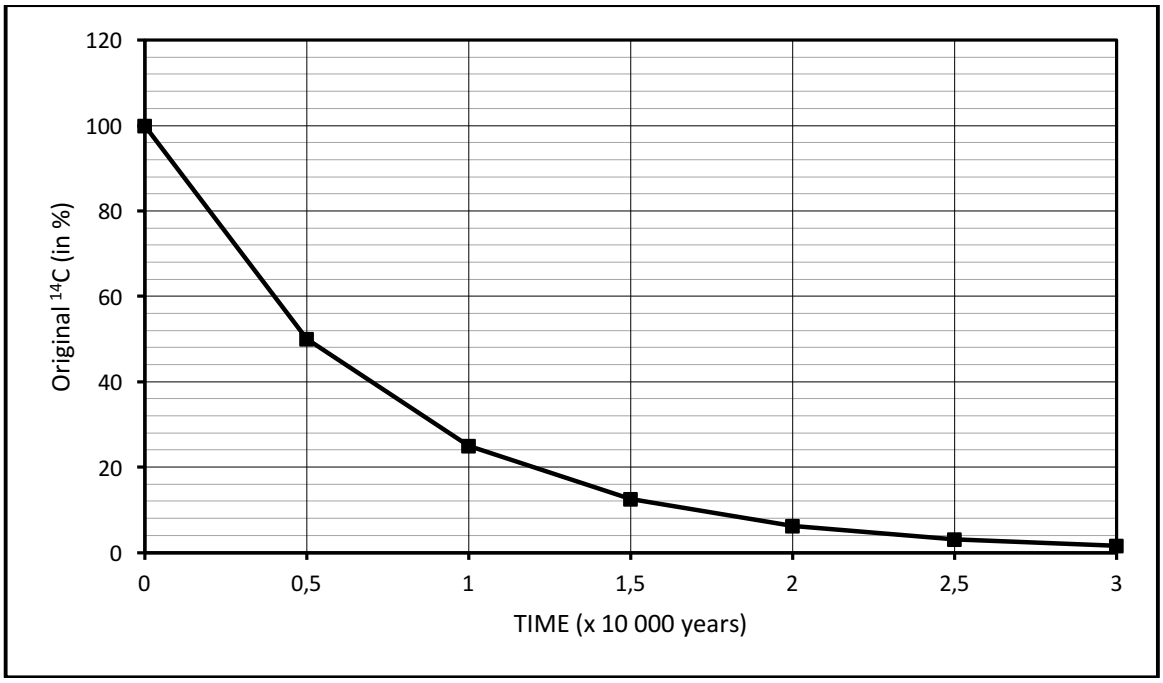
3.1.6 According to the chart, which group of animals became extinct about 250 million years ago? (1)

3.1.7 A scientist estimates a piece of rock containing a trilobite fossil to be 200 million years old.

Provide one possible explanation for the above. (2)

3.1.8 Suggest TWO reasons why there are gaps in the fossil record. (2)
(12)

3.2 Study the following graph showing the decay of Carbon-14 (^{14}C).



3.2.1 What is the half-life of ^{14}C according to the graph? (2)

3.2.2 4% of the original ^{14}C was found in a fossilised snail shell.

Using the information in the graph, determine the age of the fossil. (1)

3.2.3 Explain why a scientist cannot use ^{14}C to determine the age of a dinosaur fossil. (3)

3.2.4 What is the advantage of radiometric dating over relative dating? (2)
(8)
[20]

TOTAL SECTION B: 40

GRAND TOTAL: 50

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Topic Test Memorandum: HISTORY OF LIFE ON EARTH

MARKS: 50 TIME: 60 minutes

SECTION A

QUESTION 1

1.1

1.1	C✓✓
1.2	C✓✓
1.3	B✓✓
1.4	D✓✓
1.5	D✓✓

(5 x 2) **(10)**

TOTAL SECTION A: 10

SECTION B

QUESTION 2

2.1

2.1.1 Pangaea✓ (1)

2.1.2 Continental drift✓ (1)

2.1.3 Laurasia✓ and Gondwanaland✓ (2)
(Mark first TWO only)

2.1.4
(a) X – Paleozoic✓ (1)
(b) Y – Mesozoic✓ (1)
(c) Z – Cenozoic✓ (1)

2.1.5
(a) 4 ✓ (1)
(b) 2✓ (1)
(c) The ice ages reduced the number of species on earth✓/ reduced the biodiversity on earth (1)
(Mark first TWO only)

(10)

2.2
- The plant or animal dies✓
- it is rapidly covered with sediment✓
- Soft tissues decay✓
- Hard body parts e.g. bone, shell etc. remain intact✓
- as the organic material hardens or is replaced with minerals✓
- More layers of sediment form over hundreds of years✓
- Sediment solidifies and forms rock✓ around the fossil (Any 6) **(6)**

2.3 2.3.1 Cambrian Explosion
- Period during which many life forms appeared on earth✓
- over a relatively short period of time ✓ (2)

2.3.2 Mass Extinction
- The elimination of many species/families✓
- during the same period of time✓ (2)

(4)
[20]

QUESTION 3

3.1 3.1.1
- Trilobites✓
- Corals✓
- Fish✓ (3)

3.1.2 A✓ (1)

3.1.3 They have become extinct✓ (1)

3.1.4 Fish✓ (1)

3.1.5 The chart is the widest for fish in this period✓ (1)

3.1.6 Trilobites✓ (1)

3.1.7 A possible mistake in dating procedure✓
since trilobites became extinct 50 million years before✓
OR
Extinction date is based on the youngest fossil of species found✓
so maybe the trilobites became extinct 200 million years ago✓ (2)

3.1.8
- Conditions for formation of fossils were not conducive✓
- Soft bodied organisms/invertebrates do not fossilise easily✓
- Not all fossils have yet been found✓
- Mistakes in the dating process✓
- Some fossils wrongly classified✓
- No transitional/intermediate fossils✓ if changes were rapid

(Any 2 x 1) (2)

(Mark first TWO only) **(12)**

3.2	3.2.1	5 000 years✓✓	(2)
	3.2.2	Accept any answer in the range 22500 - 25 000 years✓	(1)
	3.2.3	- ^{14}C has a very short half-life✓/decays very quickly - Since dinosaurs lived millions of years ago✓ - the level of ^{14}C will be insignificant✓/too low to be detected	(3)
	3.2.4	- Radiometric dating can be used to determine the age of a fossil✓ - whereas relative dating can only be used to determine the order of appearance of different organisms✓	(2) **(8)** **[20]**
		TOTAL SECTION B:	**40**
		GRAND TOTAL:	**50**

Life Sciences Analysis Grid
Grade: 10
Topic Test - History of Life

		Cognitive Levels			
Question	**A**	**B**	**C**	**D**	
1.1					
1.1.1	2				
1.1.2	2				
1.1.3		2			
1.1.4		2			
1.1.5				2	10
2.1.1	1				
2.1.2		1			
2.1.3	2				
2.1.4	3				
2.1.5 (a)		1			
2.1.5 (b)		1			
2.1.5 (c)			1		10
2.2	6				6
2.3.1	2				
2.3.2	2				4
3.1.1		3			
3.1.2			1		
3.1.3			1		
3.1.4				1	
3.1.5				1	
3.1.6		1			
3.1.7				2	
3.1.8			2		12
3.2.1			2		
3.2.1			1		
3.2.3				3	
3.2.4		2			8
Actual Marks	**20**	**13**	**8**	**9**	**50**
Norm Marks	20	12,5	10	7,5	50