Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

JUNE 2016

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 13 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers 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. ALL drawings must be done in pencil and labelled in blue or black ink.
7. Draw diagrams, flow charts or tables only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

SECTION A

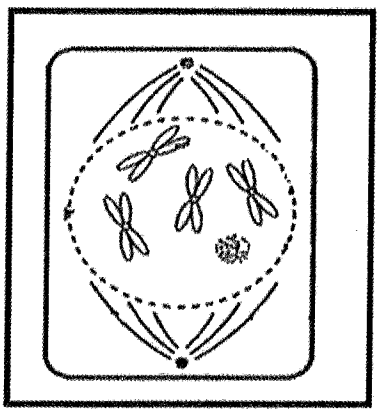
QUESTION 1

1.1 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 (1.1.1 to 1.1.5) in your ANSWER BOOK, for example 1.1.6 D.

1.1.1 The chamber of the heart that pumps deoxygenated blood to the lungs via the pulmonary artery is the …

A right atrium.
B left ventricle.
C left atrium.
D right ventricle.

QUESTIONS 1.1.2 to 1.1.3 refer to the following diagram of a phase of mitosis.



1.1.2 After completion of this division, the nucleus of each new cell will have …

A two chromosomes.
B four chromatids.
C four chromosomes.
D eight chromosomes.

1.1.3 Which ONE of the following occurs in the phase drawn in the diagram above?

A DNA replication
B Chromatin network unwinds to form visible chromosomes
C Chromosomes separate to form chromatids
D Division of the cytoplasm

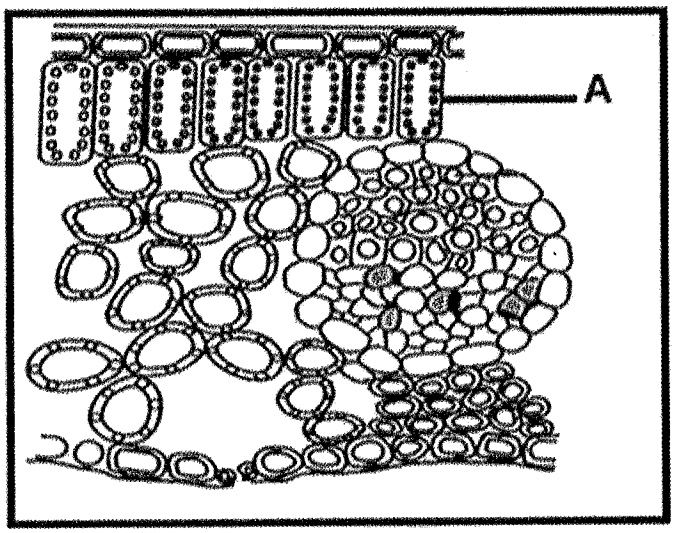
1.1.4 The following elements are found in some organic compounds:

(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

1.1.5 The diagram below represents a cross section through a dicotyledonous leaf.



The cell labelled **A** is ...

A spongy mesophyll.
B palisade mesophyll.
C epidermal cell.
D guard cell.

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

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 Unicellular epidermal outgrowths that increase the absorption surface of the root

1.2.2 Openings in the lower epidermis, responsible for gaseous exchange

1.2.3 The apparatus that is used to investigate the effect of environmental factors on the rate of transpiration

1.2.4 The membrane system in a cell on which ribosomes sometimes occur

1.2.5 Blood vessel that carries oxygenated blood to the left atrium of the heart

1.2.6 The membrane around a vacuole

1.2.7 The largest artery in the body which leaves the left ventricle

1.2.8 The chamber of the heart which has the pacemaker in its wall

1.2.9 Carbohydrates made up of more than two monosaccharides

1.2.10 An organelle in a cell that contains digestive juices

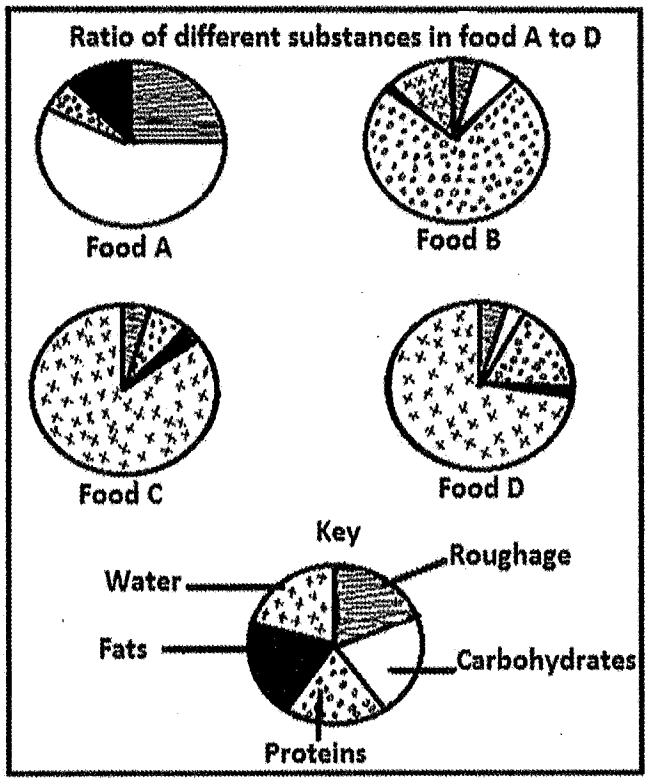
(10 x 1) **(10)**

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 (1.3.1 to 1.3.5) in the ANSWER BOOK.

COLUMN I	**COLUMN II**
1.3.1 Contraction of the heart muscles	A Systole B Diastole
1.3.2 Source of reserve energy	A Vitamins B Fats
1.3.3 Site of protein synthesis	A Ribosomes B Lysosomes
1.3.4 Found between the right atrium and the right ventricle	A Bicuspid valve B Tricuspid valve
1.3.5 Used to test for the presence of starch	A Fehling's solution B Iodine solution

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

1.4 Study the pie charts below which show the ratio of different substances in foods **A** to **D**.



1.4.1 Which food (**A**, **B**, **C** or **D**) should be given to a person who wants to run a 40 km race? (1)

1.4.2 Explain your answer in QUESTION 1.4.1. (2)

1.4.3 Name the main component of food **B**. (1)

1.4.4 Give TWO functions of the component named in QUESTION 1.4.3. (2)

1.4.5 Which food (**A**, **B**, **C** or **D**) is recommended for somebody who lives in cold place? (1)

1.4.6 Explain your answer in QUESTION 1.4.5. (2)

1.4.7 Name the only TWO substances that are not found in all of the food types. (2)

(11)

1.5 Complete the following table by writing down only the numbers (1.5.1 to 1.5.9) and your answer next to it.

Cell organelle	**Function**	**Found in plants only/animals only/both**
Golgi apparatus	1.5.1	Both
1.5.2	Cellular respiration	1.5.3
Chloroplasts	1.5.4	1.5.5
Leucoplasts	1.5.6	1.5.7
1.5.8	Give colour to flowers and fruits	1.5.9

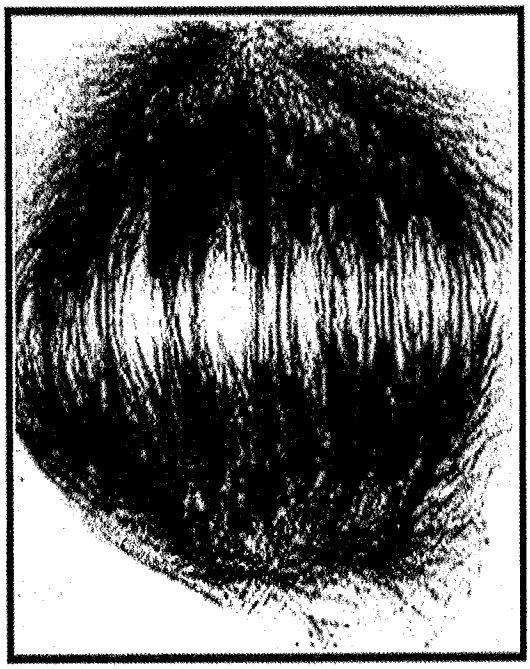
(9)

TOTAL SECTION A 50

SECTION B

QUESTION 2

2.1 Study the micrograph of dividing animal cell.



2.1.1 Identify the phase shown in the micrograph above. (1)

2.1.2 Give an observable reason for your answer in QUESTION 2.1.1. (1)

2.1.3 Name the structure in the cell that is responsible for the event in QUESTION 2.1.2. (1)

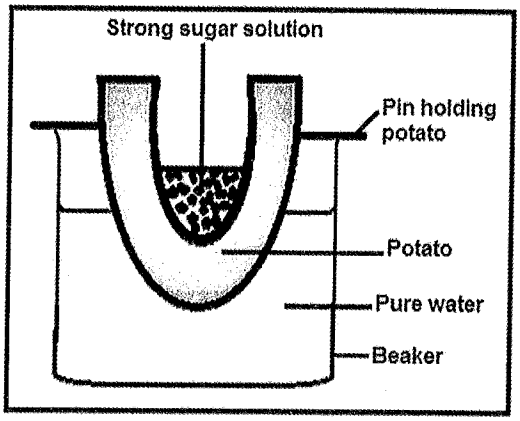
2.1.4 Draw a labelled diagram of the phase that occurs before the one shown in the micrograph. Use only two chromosomes in your diagram. (5)

2.1.5 State the phase that comes after the phase shown in the micrograph above. (1)

2.1.6 Name the disease caused by uncontrolled mitosis of the body cells. (1)

2.1.7 State ONE treatment of the disease mentioned in QUESTION 2.1.6. (1)
(11)

2.2 Study the diagram below showing an investigation on osmosis.



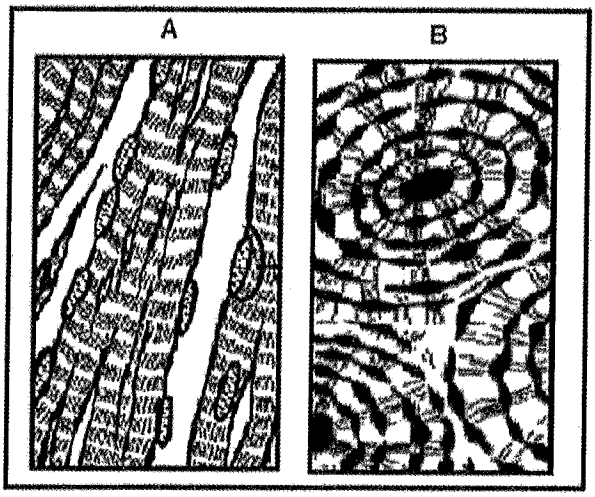
2.2.1 State ONE planning step that should be considered before undertaking such an investigation. (1)

2.2.2 Explain the importance of the potato in this investigation. (2)

2.2.3 List TWO observations that you would make in this investigation. (2)

2.2.4 State TWO differences between the process investigated in the diagram above and diffusion. (4)
(9)

2.3 Study the following diagrams of the human tissues.



2.3.1 Identify tissues labelled **A** and **B**. (2)

2.3.2 Name the organ in the body where tissue **A** is found. (1)

2.3.3 State the function of tissue labelled **B**. (1)

2.3.4 A person experiences a drop in the glucose level in his body below the normal level. In addition, the tissue labelled **A** fails to increase the rate of its contraction.

Explain the effect that this would have on the person. (4)
(8)

2.4 Study the data in the following table showing the ability of tendons and ligaments to stretch and answer the questions relating to it.

One sample is a tendon and the other is a ligament.

Amount of stretch measured in mm						
	Test 1	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Average**
Sample A	0.04	0.08	0.1	0.06	0.9	1.18
Sample B	2.1	1.9	1.8	2.0	1.8	9.6

2.4.1 Which sample is most likely to be a tendon? (1)

2.4.2 Explain your answer to QUESTION 2.4.1. (2)

2.4.3 Give ONE function of ligaments. (1)

2.4.4 Explain ONE feature of ligaments that make them well suited for their function. (2)

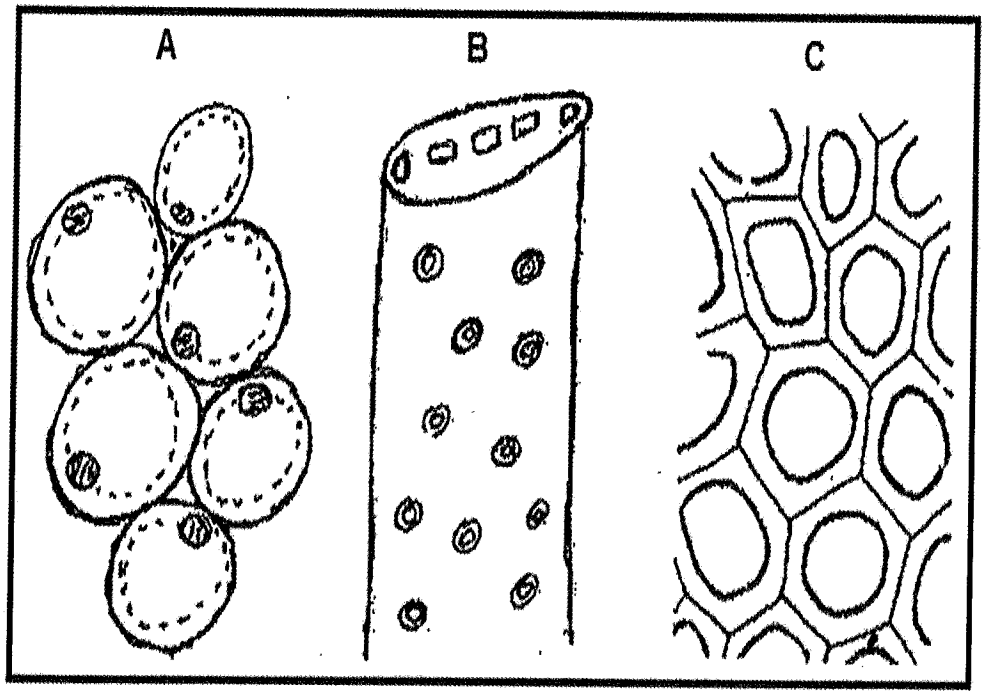
2.4.5 Why was the investigation performed five times? (1)

2.4.6 Calculate the difference in the amount of stretch in sample **A** between tests 2 and 4. Show all working. (3)
(10)

2.5 Explain the significance of the intercellular air spaces between the spongy mesophyll. (2)
(2)
(40)

QUESTION 3

3.1 Study the following plant tissues.



3.1.1 Give the LETTER and the NAME of the tissue which:

(a) Transports water and minerals up a plant (2)

(b) Provides mechanical support to the plant (2)

3.1.2 Explain TWO ways in which tissue **B** is structurally suited for its function. (4)
(8)

3.2 Read the passage below and answer the questions

The use of stem cells

A patient in King Edward Hospital has been injected with human embryonic stem cells in an attempt to help him walk again. A group of doctors from Mandela University hope that the stem cells will help the nerves in the damaged spinal cord regenerate before the patient becomes permanently disabled.

The experiment uses cells obtained from five day-old embryos. This treatment offers hope to patients suffering from spinal injuries. Researchers want to unlock the potential of stem cells for new ways of treating cancer and other illnesses.

Some are against the use of human embryos to harvest stem cells.

3.2.1 What are *stem cells*? (2)

3.2.2 Suggest the possible result of damage to the spinal nerves. (1)

3.2.3 Explain why some people support the use of stem cells. (2)

3.2.4 Suggest TWO reasons why doctors prefer to use stem cells from the umbilical cord blood or placenta instead of embryonic stem cells. (2)

(7)

3.3 The table below shows the percentage incidence of high level of cholesterol in different population groups in KZN.

Population Group	Percentage of individuals having high levels of cholesterol
A	30%
B	65%
C	10%
D	25%

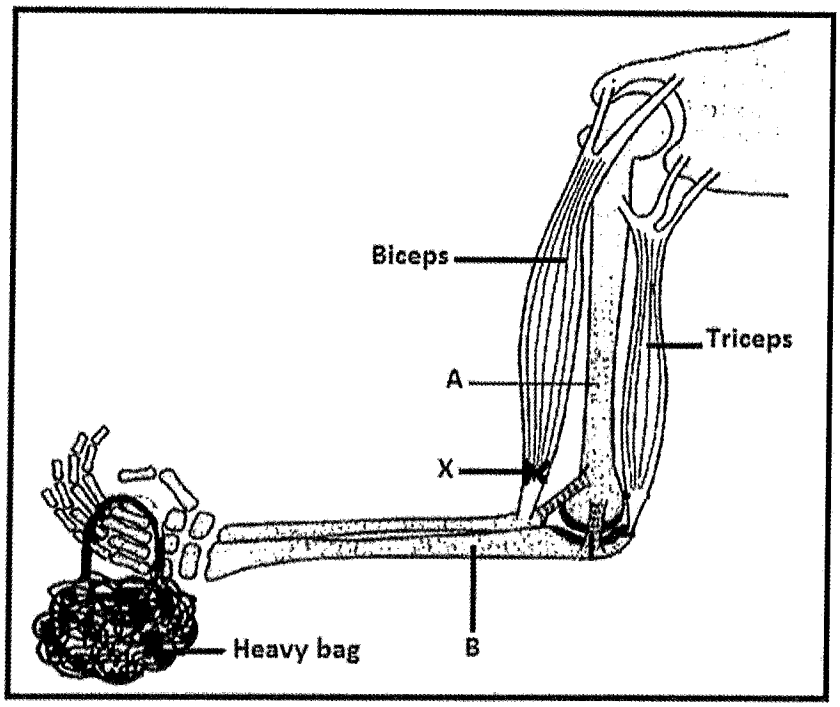
3.3.1 Draw a bar graph to represent the data in the table. (6)

3.3.2 According to the graph, which population group (**A**, **B**, **C** or **D**), is least affected by high cholesterol. (1)

3.3.3 Give TWO possible reasons why the population group named in QUESTION 3.3.2 is least affected by high cholesterol. (2)

(9)

3.4 The diagram shows the bones and muscles of the arm of a person holding a heavy bag.



3.4.1 Identify bone **A** and **B**. (2)

3.4.2 Name the type of synovial joint found between bones **A** and **B**. (1)

3.4.3 Name and describe the disease that affects the synovial joints. (3)

3.4.4 Explain why biceps and triceps are said to act antagonistically. (2)

3.4.5 If the biceps are damaged at point **X**, explain how this would affect the functioning of the arm. (3)
(11)

3.5 Tabulate TWO differences between arteries and veins. (5)
(5)
(40)

SECTION C

QUESTION 4

Describe how water loss from the leaves of a plant results in the movement of water up the stem, explain how various environmental factors increase water loss and state the structural features of leaves that help reduce water loss.

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

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

TOTAL SECTION C: 20
GRAND TOTAL: 150

GREENBERRY

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

MEMORANDUM

COMMON TEST

JUNE 2016

NATIONAL SENIOR CERTIFICATE

GRADE 10

N.B. This memorandum consists of 7 pages.

SECTION A
QUESTION 1

1.1.1 D✓✓
1.1.2 C✓✓
1.1.3 B✓✓
1.1.4 D✓✓
1.1.5 B✓✓ (5 x 2) **(10)**

1.2

1.2.1 Root hair✓
1.2.2 Stoma✓
1.2.3 Potometer✓
1.2.4 Endoplasmic reticulum✓
1.2.5 Pulmonary vein✓
1.2.6 Tonoplast✓/vacuolar membrane
1.2.7 Aorta✓
1.2.8 Right atrium✓
1.2.9 Polysaccharides✓
1.2.10 Lysosome✓
(10 x 1) **(10)**

1.3

1.3.1 A only✓✓
1.3.2 B only✓✓
1.3.3 A only✓✓
1.3.4 B only✓✓
1.3.5 B only✓✓
(5 x 2) **(10)**

1.4

1.4.1 A✓ (1)
1.4.2 - Carbohydrates✓ for energy✓ (2)

1.4.3 Proteins✓ (1)

1.4.4 - Energy source✓
- Component of cell membranes✓
- Component of chromosomes✓
- Control functions of living organisms✓ e.g. enzymes (Any) (2)
(Mark first TWO only)

1.4.5 A✓ (1)

1.4.6 - Has more fats✓ acting as insulating layer✓/preventing heat loss (2)

1.4.7 - Water✓
- Carbohydrates✓ (2)
(Mark first TWO only)

(11)

1.5

1.5.1 Distributes and secretes materials✓ (1)
1.5.2 Mitochondrion✓ (1)
1.5.3 Both✓ (1)
1.5.4 Photosynthesis✓ (1)
1.5.5 Plants only✓ (1)
1.5.6 Store food/starch✓ (1)
1.5.7 Plants only✓ (1)
1.5.8 Chromoplasts✓ (1)
1.5.9 Plants only✓ (1)
(9)

TOTAL SECTION A 50

SECTION B
QUESTION 2

2.1

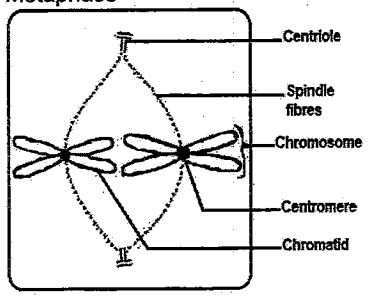
2.1.1 Anaphase✓ (1)

2.1.2 - Chromatids pulled towards opposite poles✓ (1)

2.1.3 Spindle fibres✓ (1)

2.1.4

Metaphase



Caption	1
Two chromosomes lined up at the centre of the cell	1
Any three correct labels	3

(5)

2.1.5 Telophase✓ (1)

2.1.6 Cancer✓ (1)

2.1.7 - Chemotherapy✓/radiotherapy
- Surgery cutting out✓
- Traditional medicines✓
(Mark first ONE only) Any (1)
(11)

2.2

2.2.1 - Identify investigation variables✓
- Identify area for investigation✓
- Collect all required apparatus✓
(Mark first ONE only) Any (1)

2.2.2 - Act as permeable membrane✓
allowing only water molecules to pass through✓
(Mark first TWO only) (2)

2.2.3 - Increase in sugar solution level✓
- Decrease in pure water level✓ (2)

2.2.4 Osmosis: - Movement of only water molecules✓
- through selectively permeable membranes✓
Diffusion: - Movement of any molecules✓
- Membrane not a requirement✓
(2 x 2) (4)
(9)

2.3

2.3.1 A Cardiac muscle✓
B Bone✓ (2)

2.3.2 Heart✓ (1)

2.3.3 Gives strength and support✓ (1)

2.3.4 - Heart beat will be slower✓
- Low blood pressure✓
- Less glucose sent to the cells✓
- Reduced cellular respiration✓
- Less energy produced✓ Any (4)
(8)

2.4

2.4.1 A✓ (1)

2.4.2 - Tendons stretch less✓
- thus allowing the bone to move✓ (2)

2.4.3 Join bone to bone✓ at joints (1)
(Mark first ONE only)

2.4.4 - Ligaments have yellow elastic fibres✓
- Able to stretch✓/allow bones to move at joints (2)

2.4.5 To increase reliability✓ (1)

2.4.6 0.08 mm – 0.06mm✓

= 0.2✓ mm✓ (3)
(10)

2.5 - Allow fast diffusion of carbon dioxide and oxygen✓
- for photosynthesis and respiration✓ (2)
(2)
(40)

QUESTION 3

3.1

3.1.1 (a) B✓ Xylem vessels✓ (2)
(b) C✓ Sclerenchyma✓ (2)

3.1.2 - Cells are elongated and non living✓/joined end to end forming long, continuous tubes✓

- Contains thickened✓/lignified walls to withstand pressure of water✓

- Perforated with pits✓ for lateral water transport✓ (Any 2 x 2) (4)
(Mark first TWO only) **(8)**

3.2

3.2.1 - Unspecialized cells✓
- Can differentiate to any kind of specialized cell✓ (2)

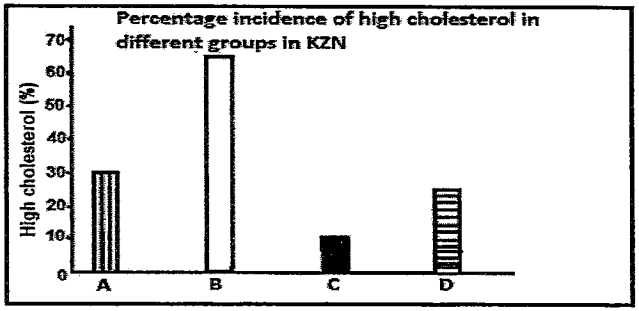
3.2.2 Never walk again✓/ permanently disabled /no reflex action (1)

3.2.3 - It can help couples with reproductive problems✓
- To get a child ✓
- Can form new tissue✓
- Can replace diseased✓cells/damaged cells (Any 2) (2)

3.2.4 - Does not involve destruction of embryos✓/no abortion necessary
- Against the use of humans in research✓
- Immoral✓
- Playing God✓ (Any 2) (2)
(Mark first TWO only) **(7)**

3.3

3.3.1



Population groups

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 to 3 bars plotted correctly 2: all 4 bars plotted correctly

(6)

3.3.2 C✓ (1)

3.3.3 - Awareness of high cholesterol✓
- Use of correct diet✓
- Physical training✓ (Any 2) (2)
(Mark first TWO only) **(9)**

3.4

3.4.1 A - Humerus✓
B - Ulna✓ (2)

3.4.2 Hinge joint✓ (1)

3.4.3 Arthritis✓ (1)

- Cartilage and synovial fluid sacs between joints break down✓
- Bones no longer protected and cushioned/bones rub together✓
- Pain and inflammation occurs in joints✓ Any (2) (3)

3.4.4 - When the biceps contract✓
- the triceps relax✓

OR

- When the biceps relax✓
- the triceps contract✓ (2)

3.4.5 - Biceps will not contract or relax✓
- The arm will not move effectively✓
- since only the triceps will function✓ (3)
(11)

3.5

Arteries	**Veins**
Carry blood away from the heart✓	Carry blood to the heart✓
Thick wall✓ (muscle layer is thick)	Thin wall (muscle layer is thin) ✓
Blood is under pressure✓	Blood not under pressure✓
No valves✓	Has valves✓

(Mark first TWO only) (Any 2 x 2 + 1 Mark for table) **(5)**

(40)

SECTION C

QUESTION 4

Upward movement of water

- When the stomata open✓
- to allow carbon-dioxide in for photosynthesis✓
- water evaporates from the cavity✓ below the stomata
- through transpiration✓
- This sets up a concentration gradient in the leaf✓
- As a result water is drawn out of the mesophyll cells✓
- The mesophyll cells in turn draw water from the xylem vessels✓
- In this way a steady column of water moves up the stem✓
- through a suction force called transpiration pull✓ Any (6)

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 of water vapour molecules✓
- High humidity✓ decreases the concentration gradient for water loss✓
- Under high light intensity✓ water is lost since the stomata are kept open for photosynthesis✓

Any (8)

Leaf structure to reduce water loss

- Small leaves✓ reduce surface area for water loss
- Thick cuticle✓ reduce water loss
- Small number of stomata✓ reduces transpiration
- Sunken stomata✓ pocket water vapour
- Hairs on leaves✓ reflect light falling on leaves Any (3)

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
There is no irrelevant information	Each part of the essay is arranged in a logical sequence	At least (4) points on upward movement; (5) points on environmental factors and (2) points on leaf structure are given.
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150