Basic Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

JUNE 2015

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 150

TIME: 2 ½ hours

N.B. This question paper consists of 12 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 compass where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.5) in your ANSWER BOOK, for example 1.1.6 B.

1.1.1 Chloroplasts ...

A play a role in heredity.
B absorb radiant energy during photosynthesis.
C control all vital activities of plant cell.
D control all substances entering the plant cell.

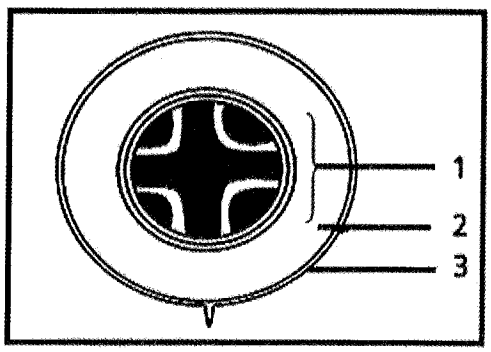
1.1.2 Study the list below.

(i) Not smoking
(ii) Eating a healthy diet
(iii) Drinking alcohol
(iv) Eating low fibre
(v) Using sunscreens

Which ONE of the following combinations are strategies that may reduce the risk of cancer?

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

1.1.3 The diagram below represents a transverse section of a young plant root.



Which ONE of the following combinations are the correct labels for the parts numbered **1**, **2** and **3**?

	1	2	3
A	Xylem	Epidermis	Endodermis
B	Stele	Cortex	Epidermis
C	Pericycle	Endodermis	Epidermis
D	Vascular cylinder	Pith	Pericycle

1.1.4 All of the following are phases of mitosis except ...

A prophase.
B telophase.
C interphase.
D anaphase.

1.1.5 Study the list of tissues below.

(i) Squamous tissue
(ii) Blood tissue
(iii) Cuboidal tissue
(iv) Tendon

Which ONE of the following combinations represents examples of connective tissues?

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

(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 A tissue that gives rise to new xylem and phloem

1.2.2 A tissue in plants that transports manufactured food

1.2.3 The type of epithelium consisting of a thin, single layer of cells

1.2.4 The process during which the cytoplasm divides after the nucleus divides

1.2.5 The structure in the living cell controlling the activities of the cell

1.2.6 The process by which DNA produces identical copies of itself

1.2.7 An organelle in a plant cell that stores starch

1.2.8 The phase in mitosis where two identical cells result

1.2.9 A pore in the epidermis of a leaf surrounded by two guard cells

1.2.10 The cells in a leaf with large intercellular air spaces between them

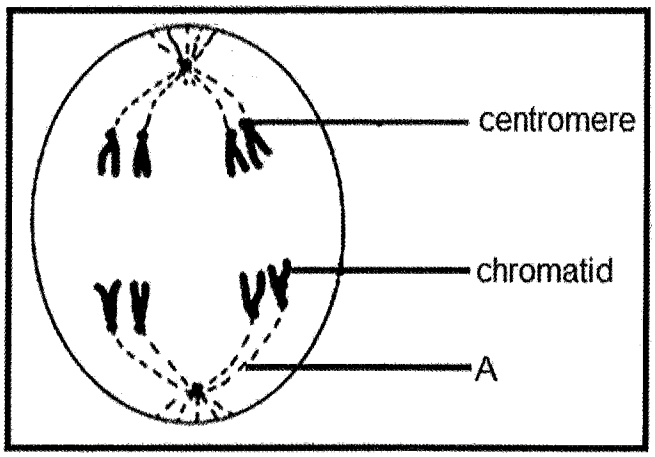
(10 x 1) **(10)**

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	Found in the human vertebral column	A: Scapula B: Atlas
1.3.2	Strengthening tissue in young dicot stem	A: Phloem B: Parenchyma
1.3.3	Structure that provides plant cells with support	A: Cell wall B: Nucleus
1.3.4	Phase in which the nuclear membrane reappears	A: Prophase B: Metaphase
1.3.5	Waxy layer reducing water loss	A: Cuticle B: Cortex

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

1.4 Study the diagram below, which shows a phase in mitosis.



1.4.1 Identify the phase of mitosis represented by the diagram. (1)

1.4.2 What is the role of part **A** during the phase mentioned in QUESTION 1.4.1? (1)

1.4.1 How many chromosomes are shown in the diagram? (1)

1.4.2 How many chromosomes would be found in the daughter cells at the end of mitosis? (1)

1.4.3 Describe the events taking place in the phase before the one shown in the above diagram. (3)

1.4.4 State THREE ways in which mitosis is biologically important. (3)

(10)

1.5 Study the table below which shows the results of certain tests on FIVE different food types: **A, B, C, D** and **E.**

FOOD TYPE	BENEDICT'S/ FEHLING'S TEST	IODINE TEST	BIURET/ MILLON'S TEST
A	Orange	Yellow	Pale blue/ white
B	Blue	Blue black	Pale blue/ white
C	Orange	Yellow	Purple/ brick red
D	Blue	Blue black	Purple/ brick red
E	Orange	Blue black	Purple/ brick red

1.5.1 Which food type (**A, B, C, D** or **E**) contains the following:

a) Only starch (2)

b) Only glucose (2)

c) Only protein and glucose (2)

d) Starch, glucose and protein (2)

1.5.2 Rice contains starch and protein but no glucose.
Which food type (**A, B, C, D** or **E**) is probably rice? (2)

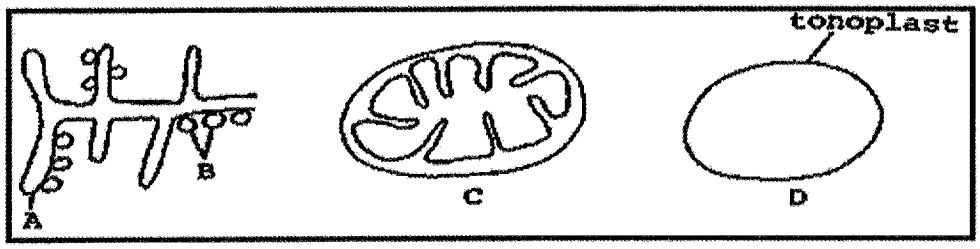
(10)

TOTAL SECTION A 50

SECTION B

QUESTION 2

2.1 Study the following diagrams and answer the questions that follow.



2.1.1 Write down the LETTER and NAME of the part that is responsible for:

(a) Facilitating transport of large molecules within cytoplasm
(b) Protein synthesis
(c) Providing turgidity to plant cells (6)

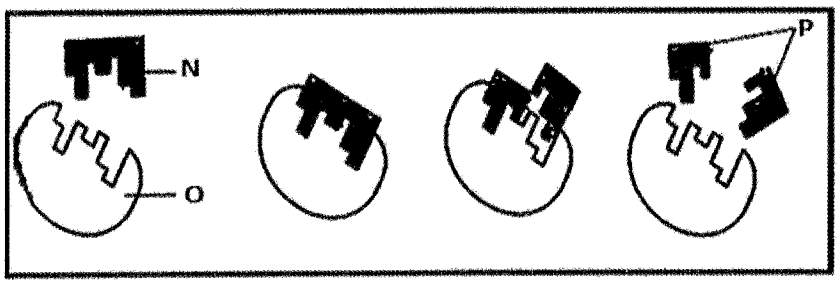
2.1.2 Would there be more of structure **C** in cells of the skin or cells of the muscles? (1)

2.1.3 Explain your answer in QUESTION 2.1.2. (3)

2.1.4 Tabulate THREE differences between a plant and an animal cell. (7)

(17)

2.2 Study the diagram of enzyme action and answer the questions that follow.



2.2.1 Provide labels for the parts **N, O** and **P**. (3)

2.2.2 What property of enzymes is illustrated in the above diagram? (1)

2.2.3 List TWO properties of enzymes other than the one mentioned in QUESTION 2.2.2. (2)

(6)

2.3 The table below shows the composition of human milk and cow's milk per 100 ml.

SUBSTANCE	COW'S MILK	HUMAN MILK
Water	87,2 g	87,0 g
Protein	3.2 g	1,4 g
Fat	2,1 g	4,2 g
Carbohydrates	4,3 g	7,6 g
Calcium	110 mg	18 mg
Iron	1,0 mg	0,9 mg
Sodium	94 mg	14 mg
Vitamin A	0.32 mg	0,32 mg
Vitamin C	2 mg	3,6 mg
Vitamin D	0,5 mg	0.3 mg

2.3.1 From the table, name the:

(a) Vitamin that forms the smallest constituent of cow's milk. (1)

(b) Nutrient that is required to form part of the haemoglobin molecule. (1)

(c) Vitamin that occurs in greater concentration in human milk than in cow's milk. (1)

2.3.2 State TWO reasons why proteins are required by human infants. (2)

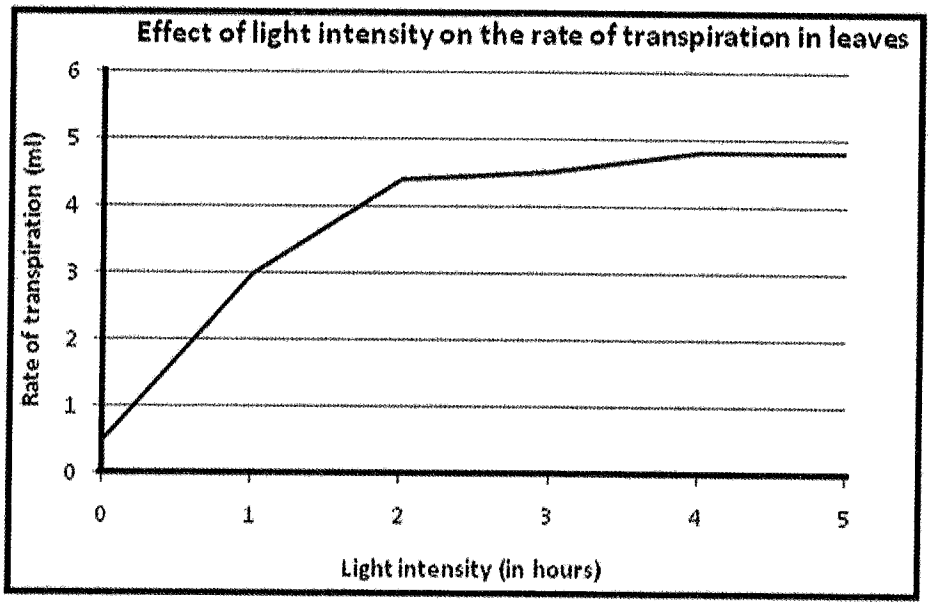
2.3.3 If cow's milk is used for feeding human infants, it is diluted by adding water.

Use information from the table to suggest a reason for diluting cow's milk. (2)

2.3.4 Calculate the difference in the vitamin D content between human milk and cow's milk. Show your working. (3)

(10)

2.4 Study the line graph below showing the effect of light intensity on the rate of transpiration in leaves.



2.4.1 Identify the dependent variable in the above investigation. (1)

2.4.2 State the effect of increasing the light intensity from **0 to 2**. (1)

2.4.3 Explain why an increase in light intensity above **2** does not increase the rate of transpiration much further. (2)

2.4.4 List TWO factors that should be kept constant in the above investigation. (2)

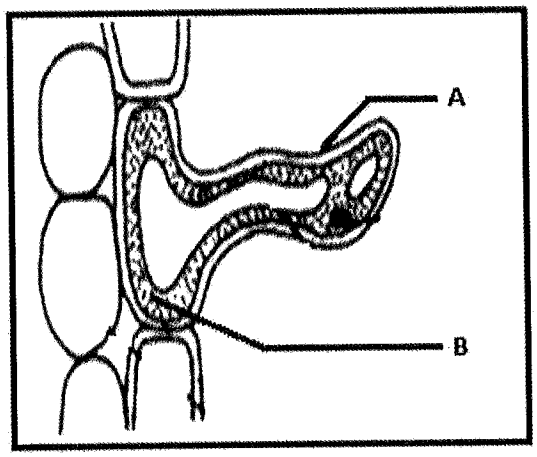
2.4.5 Why should the factors mentioned in QUESTION 2.4.4 be kept constant when conducting the investigation? (1)

(7)

[40]

QUESTION 3

3.1 Study the diagram below of a root hair cell.



3.1.1 Identify parts **A** and **B**. (2)

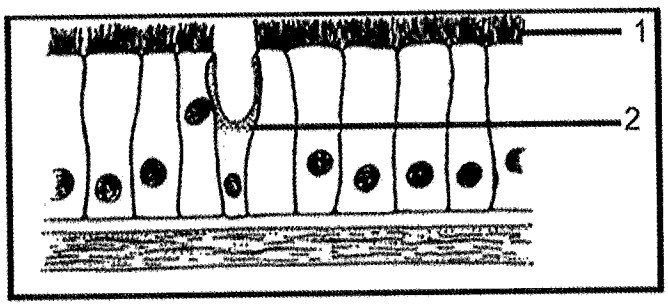
3.1.2 Explain TWO ways in which root hair is adapted for the absorption of water. (4)

3.1.3 Explain TWO ways in which the xylem tissue is adapted for transporting water. (4)

3.1.4 Explain why a high temperature in the soil will increase absorption of water by the root hair. (2)

(12)

3.2 Study the diagram below.



3.2.1 Identify the tissue shown above. (1)

3.2.2 Describe the role played by this tissue in the trachea of a human. (3)

3.2.3 How is a similar tissue in the alimentary canal different from the one represented above? (1)

(5)

3.3 Read the passage below and answer the questions.

Soccer players around 35 years old and above usually experience problems with their **ligaments** and **tendons**.

Tendons are long fibres, made of tough connective tissue, attaching muscles to bone. They have a large number of white non elastic fibres. Tendons are inelastic. This allows them to transmit the forces of contraction and relaxation to the bones so that movement can take place.

Ligaments are long fibres made up of tough connective tissue. They join bone to bone and have a large number of yellow elastic fibres. They can stretch to allow bones to move at joints

3.3.1 Based on the text above state:

(a) ONE structural difference between ligaments and tendons (2)
(b) ONE functional difference between ligaments and tendons (2)
(c) The type of tissue making up tendons and ligaments (1)

3.3.2 Explain why tendons need to be inelastic. (2)

3.3.3 What would happen if ligaments were made up of inelastic fibres? (2)

3.3.4 If you dislocate your shoulder once, it may happen more easily at another time. Explain why you think this is so. (2)

3.3.5 Suggest TWO things that athletes can do to prevent injuries to their ligaments and tendons (2)
(13)

3.4 An investigation was conducted in four different provinces in South Africa to determine the percentage of people living with arthritis.

The results of the investigation are shown in the table below.

PROVINCE	PEOPLE WITH ARTHRITIS (%)
Kwazulu-Natal	24
Gauteng	48
Eastern Cape	18
Limpopo	10

3.4.1 Draw a pie chart to represent the data in the table. (6)

3.4.2 State TWO symptoms of arthritis. (2)

3.4.3 Explain why the hands, neck, knees and feet are mostly affected by arthritis. (2)
(10)
[40]

SECTION C

QUESTION 4

Explain how the shape and cell wall features of **epidermal**, **phloem** and **spongy mesophyll** tissues are suited to their function in the plant body.

Content: (17)
Synthesis: (3)

(20)

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

TOTAL SECTION C: 20

GRAND TOTAL: 150

Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

MEMORANDUM

COMMON TEST

JUNE 2015

NATIONAL
SENIOR CERTIFICATE

GRADE 10

N.B. This memorandum consists of 7 pages including this page.

SECTION A
QUESTION 1

1.1

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

1.2

1.2.1 Cambium✓
1.2.2 Phloem✓
1.2.3 Squamous✓
1.2.4 Cytokinesis✓
1.2.5 Nucleus✓
1.2.6 Replication✓
1.2.7 Leucoplast✓/chloroplast
1.2.8 Telophase✓
1.2.9 Stoma✓
1.2.10 Spongy mesophyll ✓ (10 x 1) **(10)**

1.3

1.3.1 B only✓✓
1.3.2 None✓✓
1.3.3 A only ✓✓
1.3.4 None✓✓
1.3.5 A only✓✓ (5 x 2) **(10)**

1.4

1.4.1 Anaphase✓ (1)

1.4.2 Pulls chromatids towards opposite poles✓ (1)

1.4.3 Four✓ (1)

1.4.4 Four✓ (1)

1.4.5 - Chromosomes arranged on the equator✓
- in a single row✓
- attached to spindle fibres✓ (3)

1.4.6 - Allows for growth✓
- Replace and repair damaged cells or tissues✓
- Produce identical cells to parent cells✓
- For asexual reproduction in most unicellular organisms✓
(Mark first THREE only) Any (3) **(10)**

1.5.1

(a) B✓✓ (2)
(b) A✓✓ (2)
(c) C✓✓ (2)
(d) E✓✓ (2)

1.5.2 D✓✓ (2) **(10)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1

2.1.1 (a) A✓ – Endoplasmic reticulum✓
(b) B✓ – Ribosomes✓
(c) D✓ – Vacuole✓ (6)

2.1.2 Muscles✓ (1)

2.1.3 - Needed for more respiration✓
- to release more energy✓
- for performing activities✓ (3)

2.1.4

Plant cell	Animal cell
Cell wall✓	No cell wall✓
Regular shape✓	Irregular shape✓
Chloroplasts✓	No chloroplasts✓
Large vacuoles✓	Small or no vacuoles✓
Lysosomes✓	No lysosomes✓
No centrosomes/centrioles✓	Centrosomes/centrioles✓

(Mark first THREE only) 1 mark for table +(3 x 2) (7)

(17)

2.2

2.2.1 N – Substrate✓
O – Enzyme✓
P – Products✓ (3)

2.2.2 Enzymes are substrate specific✓ (1)

2.2.3 - Sensitive to temperature✓
- Sensitive to pH ✓ (2)

(6)

2.3

2.3.1 (a) Vitamin A✓ (1)
(b) Iron✓ (1)
(c) Vitamin C✓ (1)

2.3.2 - They are building blocks of cell membranes✓
- Synthesis of enzymes and hormones✓
- Components of chromosomes and cell organelles✓ (any 2) (2)
Mark first TWO only

2.3.3 - To reduce the amount of proteins and minerals (Ca, Na),✓
- to more acceptable and suitable levels for babies✓/similar to the composition to human milk✓ (2)

2.3.4 (0,5 mg – 0,3 mg)✓ = 0,2✓ mg✓ (3)
(10)

2.4 2.4.1 Rate of transpiration✓ (1)

2.4.2 It increases the rate of transpiration✓ (1)

2.4.3 - Stomata closes✓
- to reduce excessive water loss✓/prevent wilting (2)

2.4.4 - Humidity✓
- Wind✓
- Temperature✓ (any 2) (2)
(Mark first TWO only)

2.4.5 To increase validity✓/ensure that light intensity is the only variable (1)
(7)
(40)

QUESTION 3

3.1

3.1.1 A – Cell wall✓
B – Cytoplasm✓/cytosol (2)

3.1.2
- Elongated✓,
to expose a large surface area for absorption✓
- Small✓
to grow between fine particles and maintain contact with water✓
- Large vacuole✓
with low water concentration allowing osmosis✓
- Thin cell wall,✓/no cuticle
- to allow membrane to be in contact with water✓ (any 2 x 2) (4)
(Mark first TWO only)

3.1.3
- No cross walls✓
  to facilitate capillarity✓/ for easy water movement
- Has bordered pits✓
  for lateral transport✓
- Lignin✓
  for support✓/ prevent collapse/ withstand pressure
- No living contents✓/hollow
  for unimpeded water movement✓
- Long tubes✓/cells joined end to end
  to transport water to greater heights✓ (any 2 x 2) (4)
  (Mark first TWO only)

3.1.4 - Water molecules will have a higher amount of kinetic energy,✓
- allowing them to move into the root hair more readily ✓ (2)
(12)

3.2

3.2.1 Ciliated epithelium✓ (1)

3.2.2 - Cilia moves dust particles✓
- trapped in the mucus✓
- which is then moved towards pharynx✓
- where it is coughed out or swallowed✓ (any 3) (3)

3.2.3 Tissue in the alimentary canal is not ciliated✓ (1)
(5)

3.3

3.3.1 (a) **Structural**
- Ligaments have yellow elastic fibres✓
- Tendons have white non elastic fibres✓ (2)
(Mark first ONE only)

(b) **Functional**
- Ligaments join bone to bone at joints✓
- Tendons attach muscles to bones✓ (2)
(Mark first ONE only)

(c) Connective✓tissue (1)

3.3.2 - To transmit the contraction and relaxation of muscles to bones✓
- so that movement takes place.✓ (2)

3.3.3 - Unable to stretch✓
- not allowing bones to move at joints✓ (2)

3.3.4 - Ligaments✓
- can be damaged, / stretched or torn✓ (2)

3.3.5 - Regular exercises✓
- Body warm ups✓ before vigorous exercise (2)
(Mark first TWO only)

(13)

3.4

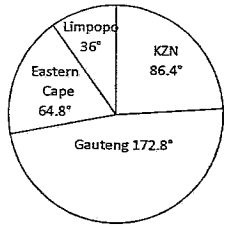
3.4.1 KZN = 24 ÷ 100 x 360° = 86.4°

Gauteng = 48 ÷ 100 x 360° = 172.8°

Eastern Cape = 18 ÷ 100 x 360° = 64.8°

Limpopo = 10 ÷ 100 x 360° = 36°

% of people with arthritis in 4 provinces in S.A.



Correct type of graph	1 mark
Caption	1 mark
Correct calculations	1: 1-3 calculations correct 2: all 4 calculations correct
Correct proportion and labeling of sectors	1: 1 - 2 sectors correct 2: 3 - 4 sectors correct

(6)

3.4.2 - Stiffness at the joints✓
- Mild to severe pain at the joints✓ (2)
(Mark first TWO only)

3.4.3 - Arthritis affects joints and tissues such as muscles and tendons around joints✓
- These body parts consists of many joints, muscles and tendons✓that could be affected (2)
(10)
(40)

SECTION C

QUESTION 4

Epidermal tissue
- Thick cell wall✓
  offers protection to underlying tissues✓
- Transparent cells ✓
  allow light in for photosynthesis✓
- Covered with cuticle✓
  to reduce water loss✓
- Thick and thin walls in guard cells ✓
  to control stomatal opening✓
- Projections in root hair✓
  to absorb water and mineral salts✓ (any 4 x 2) (8)

Phloem
- Sieve tubes are hollow✓
  allowing for easy transport of manufactured food✓
- Sieve tubes are long/continuous✓
  allowing transport through great distances✓
- Sieve plates have pores✓
  allowing food to pass through✓
- Companion cells have a nucleus✓
  to control the activities of the phloem✓ (any 3 x 2) (6)

Spongy mesophyll
- Cells rounded/irregular in shape✓
  allowing air spaces for gaseous exchange✓
- Cell walls are thin✓
  to allow water/CO_2 in for photosynthesis✓ (any 2 x 2) (4)

Content: Max (17)
Synthesis: (3)

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 **THREE** tissues are given.	Structure is appropriately linked to function.	At least **TWO** structural adaptations for **EACH** tissue are described.
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150