Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2019

AGRICULTURAL SCIENCES P2

MARKS: 150

TIME: 2½ hours

* X A G S E 2 *

This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
2. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, where applicable.
7. 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–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 … is tightly bound to the soil particles and plants cannot absorb it.

A Capillary water
B Percolation water
C Gravitational water
D Hygroscopic water

1.1.2 Identify the soil forming process that occurs when soluble material is taken out of a soil in solution.

A Humification
B Leaching
C Mineralisation
D Bioturbation

1.1.3 Secondary minerals have the following properties:

(i) These are minerals that are in their original form
(ii) Formed when chemical elements undergo chemical change
(iii) They are found in much finer soils like silicate and aluminium clays
(iv) Examples are kaolinite, vermiculite, illite and montmorillonite

Choose the correct combination:

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

1.1.4 The chemical reaction on rocks in which hydrogen is lost:

A Carbonation
B Oxidation
C Hydrolysis
D Reduction

1.1.5 The conservation of Agricultural Resources Act (1983), category 3, states that invaders …

A pose a very high risk and may not be planted.
B are invasive, but they are also beneficial.
C can be useful as shade and ornamental trees.
D are not expensive and difficult to remove.

1.1.6 … are planted to produce an annual income for the farmer.

A Annual plants
B Cash crops
C Cereal crops
D Horticultural crops

1.1.7 The following properties describe subtropical crops:

(i) They grow well in warm climates
(ii) They also need a cool period in winter and can tolerate light frost
(iii) Examples include avocados and citrus fruits
(iv) Other examples include apples and grapes

Choose the correct combination:

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

1.1.8 Which ONE of the following is an example of a legume fodder crop?

A Red clover and lucerne
B Lucerne and kikuyu
C Red clover and rye grass
D Kikuyu and rye grass

1.1.9 This activity is a method of using the soil sustainably:

A Practising crop rotation
B Rainfall harvesting
C Monoculture farming
D Growing drought-tolerant crops

1.1.10 The … contain(s) genetic information of living organisms.

A cell wall
B nucleus
C cytoplasm
D chloroplasts (10 x 2) (20)

1.2 Choose a word/term/concept/phrase from COLUMN B that best matches a description in COLUMN A. Write only the letter (A–J) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 K.

COLUMN A		COLUMN B
1.2.1	Minerals not chemically changed	A Eutrophication
1.2.2	 Type of weathering	B Secondary minerals
1.2.3	Oil seed crops	C Coffee
1.2.4	Small bushes grown for making tea	D Soya beans
1.2.5	Nutrient pollution of water bodies which causes a bloom of algal growth	E Primary minerals
		F Physical weathering
		G Salinisation
		H Rooibos
		I Cotton
		J Chemical weathering

(5 x 2) (10)

1.3 Give ONE word/term/concept/phrase for each of the following descriptions. Write only the term next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 The formation of humus or compost from plant and animal remains

1.3.2 A variety of a particular plant species that has certain genetic characteristics

1.3.3 The release of harmful substances into the environment

1.3.4 The stage of mitosis where chromosomes line up along the equator

1.3.5 Organisms consisting of more than one cell (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 Stratosphere is the solid shell of the Earth.

1.4.2 Subtropical fruits are fruits that grow on trees that drop their leaves in winter.

1.4.3 Soil erosion is the hardening of the soil surface.

1.4.4 Mitochondrion produces sugar and starch during photosynthesis.

1.4.5 Meiosis is a type of cell division in which the parent cell divides once to form two genetically identical cells. (5 x 1) (5)

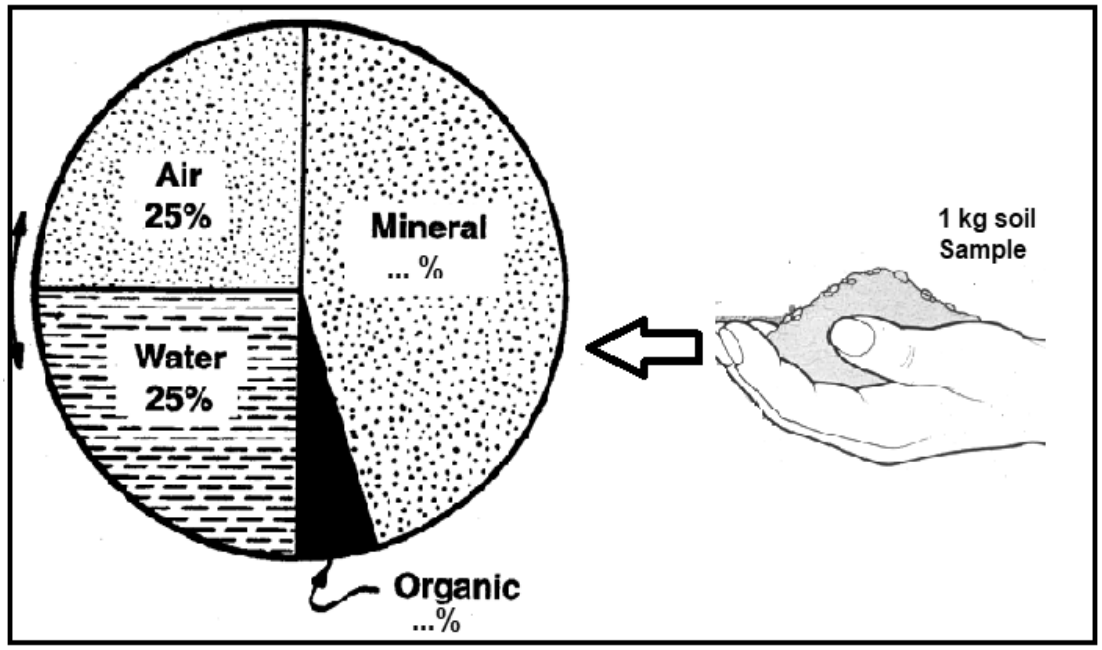
TOTAL SECTION A: 45

SECTION B

QUESTION 2: SOIL SCIENCES

Start this question on a NEW page.

2.1 The pie chart below represents soil components in a **1 kg** soil sample.



2.1.1 Indicate the ideal percentage of the following soil components:

(a) Organic (1)

(b) Mineral (1)

2.1.2 Provide TWO functions of oxygen in the soil air for plant growth. (2)

2.1.3 Calculate the quantity of mineral soil component in a **1 kg** soil sample. Leave your answer in grams. (3)

2.1.4 Distinguish between *gravitational water* and *hygroscopic water*. (2)

2.1.5 Describe TWO human activities which trigger the reduction of macro and micro-organisms population in the soil. (2)

2.2 Geologists use their expert knowledge in identifying and classifying various minerals by studying different properties of minerals.

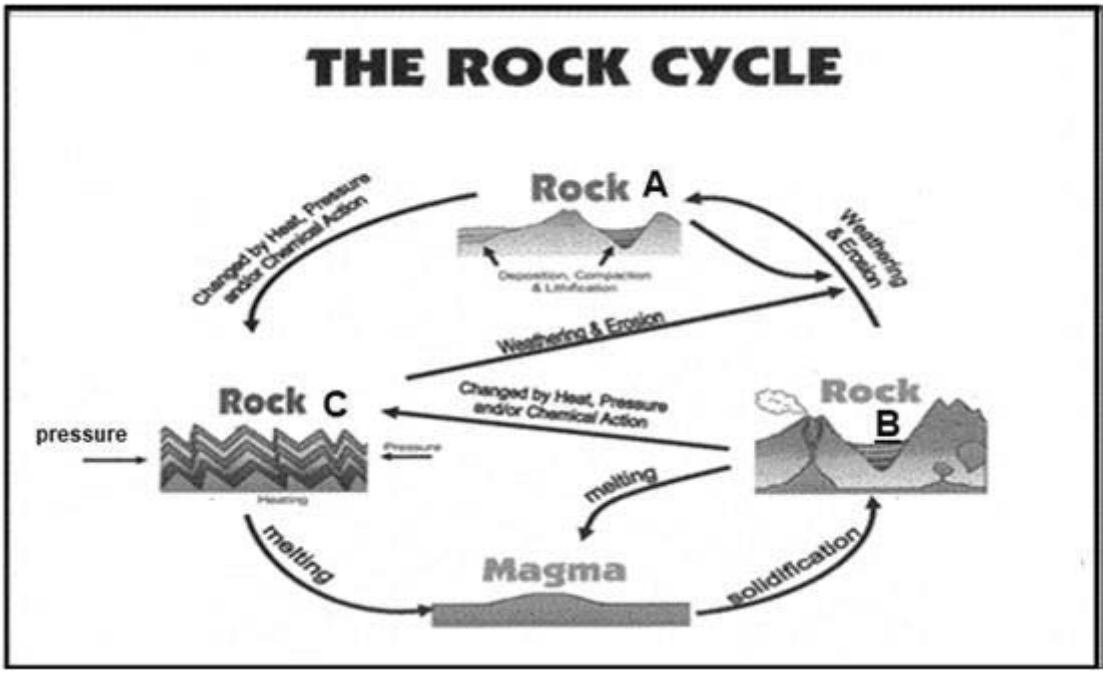
2.2.1 Identify the appropriate characteristics of minerals that match EACH of the following descriptions.

(a) The pattern which the mineral exhibits when it is split along different planes (1)
(b) The ability of a mineral to resist being scratched by another (1)
(c) The heaviness of the mineral (1)
(d) The ability of a mineral to allow light to pass through (1)
(e) Toughness and cohesiveness of a mineral (1)

2.2.2 With reference to formation, distinguish between *primary mineral* and *secondary mineral*. (2)

2.2.3 Name TWO examples of secondary minerals. (2)

2.3 Study the diagram on rock formation below and answer the questions that follow.



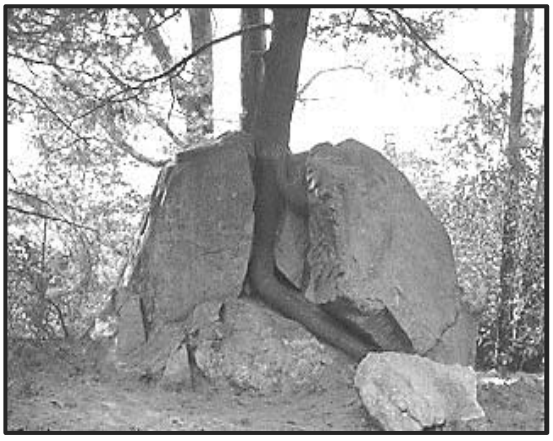
2.3.1 Name the type of rocks labelled **A, B** and **C** in the diagram above. (3)

2.3.2 Briefly explain how rocks labelled **A** and **B** are formed. (2)

2.3.3 Evaluate the suitability of soils formed from rock **C** for the cultivation of deep-rooted crops. (1)

2.3.4 Motivate your answer to QUESTION 2.3.3 above by providing TWO reasons. (2)

2.4 The pictures below show the weathering of rocks that result in soil formation.



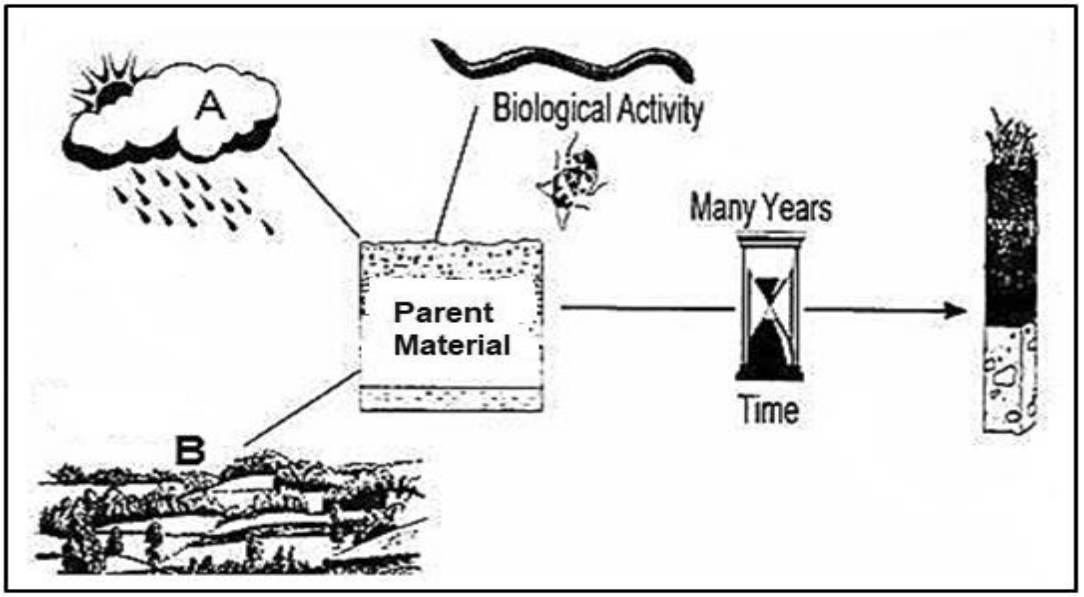
2.4.1 Name the main type of weathering illustrated in the pictures above. (1)

2.4.2 Motivate your answer to QUESTION 2.4.1. (1)

2.4.3 State any other type of weathering of rocks not mentioned above. (1)

2.4.4 Describe how oxygen facilitates chemical weathering in rocks. (2)

2.5 Soil is formed under the influence of various factors. The illustration below shows some of these factors.



Identify TWO soil forming factors labelled **A** and **B**. (2)
[35]

QUESTION 3: PLANT STUDIES

Start this question on a NEW page.

3.1 The pictures below show two examples of grain field crops grown by farmers in South Africa for commercial purposes and for family consumption.

Maize	Wheat
	

3.1.1 Supply TWO reasons why the growing of maize and wheat is crucial in South Africa. (2)

3.1.2 Give advice to a farmer who wants to start wheat production by explaining TWO climatic conditions suitable for winter wheat production. (2)

3.1.3 Discuss why deep, well-drained soil with no hard layers is good for maize production. (2)

3.1.4 Suggest the most appropriate class of field crops that match with each of the following descriptions:

(a) Crops that are normally processed before they are sold to the market (1)

(b) Grass plants that produce large seeds containing energy-giving carbohydrates (1)

3.1.5 Supply ONE industrial function of fibre from wood. (1)

3.2 Farmers grow horticultural crops countrywide in both large-scale and small-scale sectors. Large-scale farmers apply modern scientific knowledge like genetic engineering to develop more disease-resistant cultivars with high nutritional content. These farmers always consult horticulturists to gain more knowledge on various cultivars of horticultural crops before they choose them for production.

3.2.1 Briefly outline what is involved in horticulture. (1)

3.2.2 Refer to the scenario above and give TWO advantages of genetic engineering in the growing of horticultural crops. (2)

3.2.3 Discuss THREE factors that farmers should consider when selecting cultivars for vegetable crop production. (3)

3.2.4 Using disease-resistant crops has economic and environmental benefits. Justify this statement. (2)

3.2.5 Supply TWO classes of vegetable crops. (2)

3.3 The table below illustrates the total quantity of fruit crops that a group of farmers produced and exported to the world market in 2015 and 2016.

	2015		2016	
Fruit Crops	**Quantity produced (tons)**	**Exported (tons)**	**Quantity produced (tons)**	**Exported (tons)**
Bananas	600	350	640	400
Apples	700	400	880	550
Grapes	800	450	820	450
Oranges	700	500	920	550

3.3.1 Analyse the data in the table above and draw a bar graph comparing the quantities of fruit crops exported by the group of farmers in 2015 and 2016. (5)

3.3.2 Deduce the fruit crop with the highest increase in export in the table above. (2)

3.3.3 Predict TWO challenges in exporting bananas to the world market that the group of farmers are likely to encounter. (2)

3.3.4 Outline the importance of exporting fruit crops to the economy of South Africa. (1)

3.3.5 Calculate the percentage increase of oranges produced by the group of farmers from 2015 to 2016. (3)

3.4 Lantana camara has been declared an invasive plant that needs to be eradicated from the area because it has caused drastic loss of indigenous plants and depletion of underground water in the area it invades. This plant has few natural pests and diseases that can attack it unlike indigenous plants.

3.4.1 State the reason why Lantana camara was declared invasive species in the case study above. (1)

3.4.2 Provide a name given to plant species introduced in an area from other countries. (1)

3.4.3 Suggest the main reason that promote Lantana camara's population to increase more than that of indigenous plant species. (1)

[35]

QUESTION 4: SUSTAINABLE NATURAL RESOURCE UTILISATION AND BIOLOGICAL CONCEPTS

Start this question on a NEW page.

4.1 The pictures below show two farmers practising different tillage systems.

Farmer A: Zero tillage	Farmer B: Maximum tillage
	
This is a conservative tillage system with minimum or no tillage to the soil, which tends to promote organic residue accumulation and reduces soil erosion.	This system involves maximum disturbance to the soil by using heavy expensive machines that cause heavy compaction on soils and emit high carbon monoxide to the atmosphere.

4.1.1 Identify the farmer using an effective, economical and sustainable tillage system from the pictures above. (1)

4.1.2 Motivate your answer to QUESTION 4.1.1 above. (2)

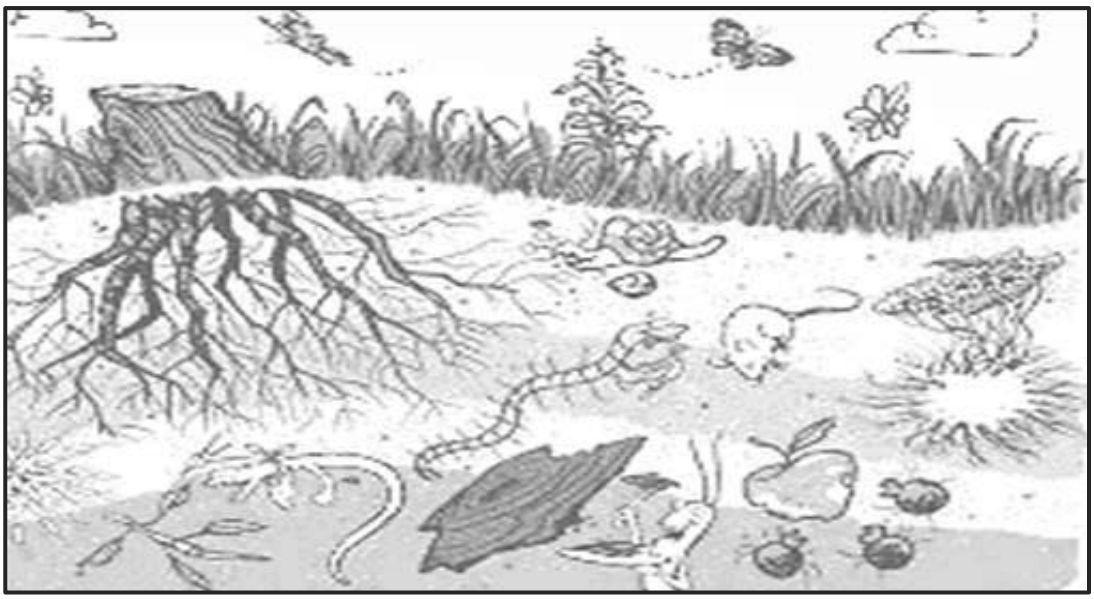
4.1.3 Suggest TWO adverse effects of the tillage system implemented by farmer **B** to the environment. (2)

4.1.4 Propose a method that farmer **A** can use to reduce water loss. (1)

4.1.5 Identify a possible way that can be used by farmers to reduce soil erosion in their fields. (1)

4.1.6 State TWO consequences of soil degradation to consumers. (2)

4.2 Analyse the diagram below showing macro-organisms in the soil and answer the questions which follow.



4.2.1 Outline TWO important aspects of soil living organisms. (2)

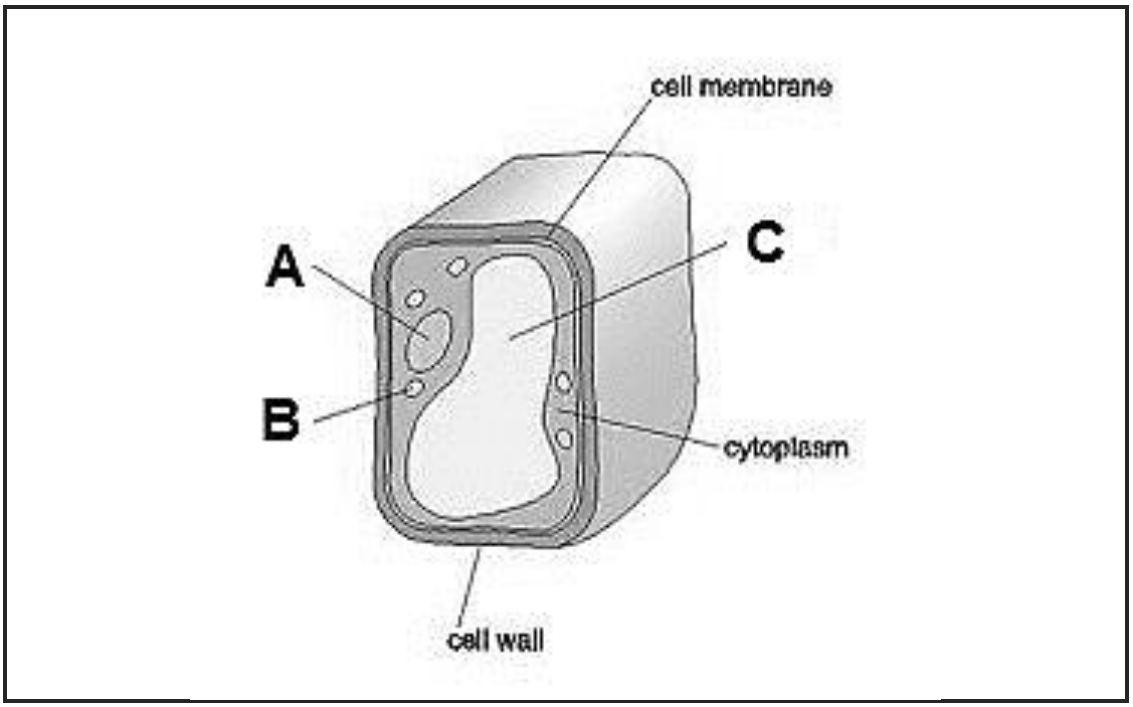
4.2.2 Intensive farming increases the population of soil organisms.

Critically assess the underlined statement and give TWO reasons to support your assessment. (3)

4.2.3 Recommend TWO waste management techniques that can reduce waste on the farm while increasing income to the farmer. (2)

4.2.4 Explain how the National Water Act of South Africa addresses the efficient and equitable use of water by farmers. (2)

4.3 The diagram below shows the cell of a living organism.



4.3.1 State whether the cell in the diagram above is extracted from plants or animals. (1)

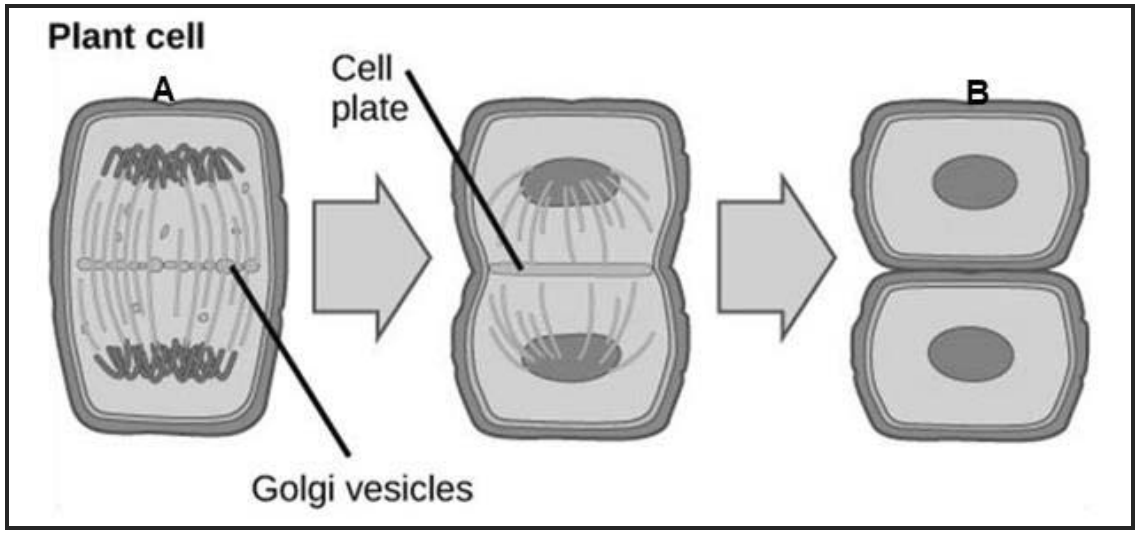
4.3.2 Justify your answer to QUESTION 4.3.1 by giving ONE visible reason from the diagram. (1)

4.3.3 Identify the structures labelled **A**, **B** and **C** from the diagram above. (3)

4.3.4 Describe the function of organelles in plant cells that contain chlorophyll. (2)

4.3.5 Differentiate, with ONE example each, between *plant tissues* and *plant organs.* (4)

4.4 The diagram below illustrates a certain type of cell division that occurs in plant cell.



4.4.1 Identify the type of cell division that is outlined in the diagram above. (1)

4.4.2 Justify your answer to QUESTION 4.4.1. (1)

4.4.3 Briefly explain TWO important aspects of the process identified in QUESTION 4.4.1. (2)

4.4.4 Name the phases labelled **A** and **B** in the diagram above. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150