PHOENIX NORTH LIFE SCIENCES CLUSTER

NOVEMBER EXAMINATIONS – 2017

LIFE SCIENCES - PAPER 1

GRADE : 10

TIME : 2,5 hours

MARKS : 150

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MODERATOR : MR. V. RAMOTHAR (SOLVISTA SECONDARY)

THIS QUESTION PAPER CONSISTS OF 13 PAGES OF PRINT.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Write ALL the answers in your 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 the question paper.
5. Present your answers according to the instructions of each question.
6. All drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. You may use a non- programmable calculator, protractor and compass.
10. 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),for example 1.1.11 B

1.1.1 What is the main function of the nucleus ...

A provides tensile strength

B structural support

C provides energy to the cell

D provides cells genetic material

1.1.2 Covering tissues in plant organs

A xylem

B epidermis

C phloem

D root hair

1.1.3 The red pigment in blood that carries oxygen is ....

A known as haemoglobin

B found in platelets

C found in the leucocytes

D found in the nucleus

1.1.4 The reason the female pelvic girdle is wider and lighter than a male's pelvic girdle is because :

A. to allow for pregnancy and childbirth

B. for quicker movements

C. for greater water retention

D. to allow for buoyancy

1.1.5 The last set of fused vertebrae in the human vertebral column is the ....

A lumbar

B sacrum

C cervical

D coccyx

1.1.6 Which ONE of the following is not a connective tissue?

A blood

B bone

C tears

D cartilage

1.1.7 The head of the long bone is called the ....

A periosteum

B epiphysis

C endosteum

D diaphysis

1.1.8 The main function associated with simple squamous epithelium

A Diffusion

B Active transport

C Secretion

D absorption

1.1.9 Helps to protect the knee

A tarsal bone

B patella

C femur

D fibula

1.1.10 Tissue that joins bone to bone ....

A tendons

B ligaments

C bone

D hyaline cartilage

10 X 2 = (20)

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

1.2.1 Transparent covering of the epidermis of leaves.

1.2.2 Largest bone in the body.

1.2.3 Organelles in animal cells that contain digestive enzymes.

1.2.4 The release of liquid water through the hydathodes.

1.2.5 Growth of tumour that forms as a result of uncontrolled mitosis.

1.2.6 Type of nerve tissue that carry impulses from the receptors to the central nervous system.

1.2.7 Pairs of voluntary muscles that work opposite to each other.

1.2.8 Projections on the inner membrane of the mitochondrion .

1.2.9 The cell organelle concerned with the production of ATP.

1.2.10 Teeth used for tearing meat

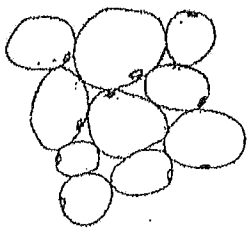
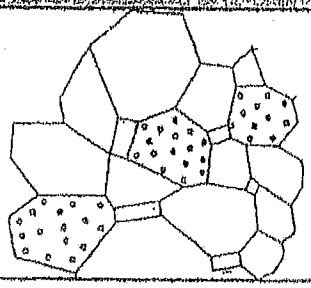
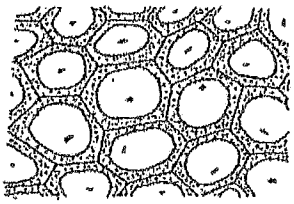
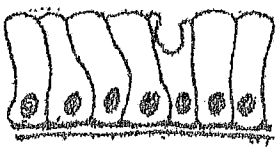
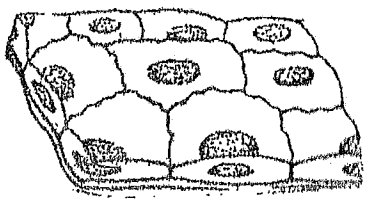
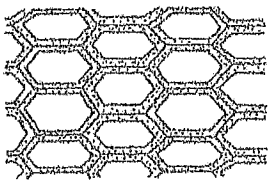
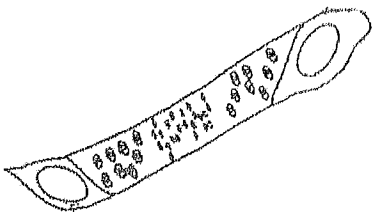
1.2.11 A concentric ring in the stem of a woody plant , marking the yearly secondary growth.

1.2.12 Most abundant plant tissue with thin walls and intercellular spaces , used mostly for storage

(12)

1.3 For each of the following descriptions given in Column 1, two diagrams A and B are provided in Column 2. State whether each of the following descriptions apply to :

A only , BOTH A and B, NEITHER A nor B

COLUMN 1 (description)	COLUMN 2 DIAGRAM A	DIAGRAM B
1.3.1 Responsible for transporting food in plants.		
1.3.2 Have thin cell walls		
1.3.3 Found in hollow organs such as the stomach and intestines.		
1.3.4 Form/s walls of blood capillaries and alveoli of lungs.		
1.3.5 Provides strength and support in plants		

1.4 Four different mixtures (**A, B, C and D**) were made up as follows and placed in separate containers.

MIXTURE A	MIXTURE B	MIXTURE C	MIXTURE D
Protein Glucose	Fat Glucose	Starch Protein	Starch Fat Glucose

Unfortunately, all the labels on the containers fell off. A Grade 10 learner was given the task of correctly re-labelling the containers. She carried out food tests on the contents of each container and obtained the following results:

Container	Test for starch	Test for protein	Test for fat	Test for glucose
1	Blue-black	Violet/brick-red	clear	Blue
2	Blue-black	Blue/white	Translucent/greasy spot	Yellow-orange
3	Brown	Violet/brick -red	clear	Yellow-orange
4	Brown	Blue/white	Translucent /greasy spot	Yellow-orange

From the above results, work out which mixture (**A, B, C or D**) is found in each of the following containers:

1.4.1 Container 1

1.4.2 Container 2

1.4.3 Container 3

1.4.4 Container 4

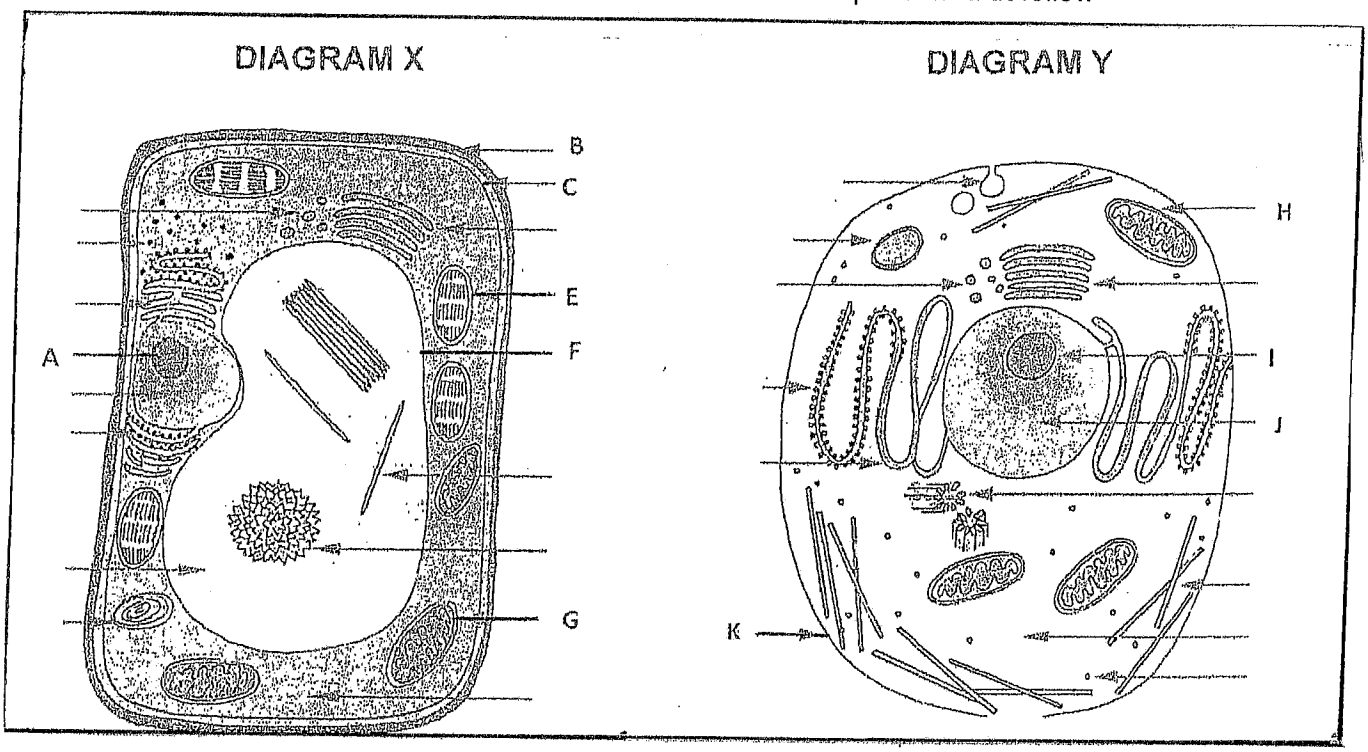
(8)

TOTAL SECTION A : {50}

SECTION B

QUESTION 2

2.1 Study the diagram of the cells below and then answer the questions that follow



2.1.1 Identify Diagram X and Diagram Y . (2)

2.1.2 provide labels for parts labelled A and E. (2)

2.1.3 State the function of Part labelled C : (1)

2.1.4 Why do plant cells have larger vacuoles than animal cells (2)

(7)

2.2 Read the passage below and then answer the questions.

Enzymes have been in use to humans for thousands of years. One example is the use of the enzyme papain by people living in areas of Africa. Much of the meat eaten in these areas is very fibrous and tough. This type of meat would need to be cooked for hours to break down the fibrous protein, and so make the meat edible. The people in these areas have learned that after covering the meat with fruit extracts from the paw-paw tree, for several hours, the meat is tenderised/softened. The other important factor is that after cooking, the process of tenderisation is stopped and the meat is no longer broken down. People not used to working with paw-paw fruit find that if they handle the ripe fruit with their bare hands, they can become very sore and red.

Adapted from Heavy Hoey 1991

2.2.1 Name the enzyme present in paw-paw. (1)

2.2.2 Use your knowledge of how enzymes work to suggest how the enzyme in paw-paw brings about tenderisation/softening of meat. (2)

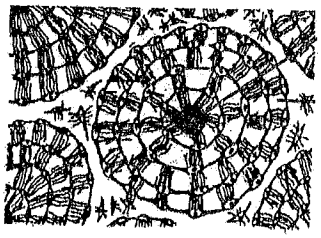
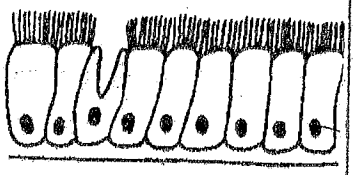
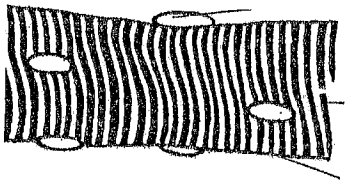
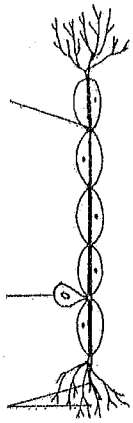
2.2.3 What evidence in the passage supports the statement that high temperatures destroy enzymes? (1)

2.2.4 What term is used to describe the destruction of the enzymes by high temperatures (1)

2.2.5 Suggest what would happen if meat is soaked in paw-paw extract for two days. (1)

(6)

2.3 Look at the diagrams of the different animal tissues below and answer the questions that follow.

			
Connective tissue	Epithelial tissue	Muscle tissue	nerve tissue

2.3.1 Which tissue can be found lining the trachea? (1)

2.3.2 Which tissue carry impulses in the body? (1)

2.3.3 Which type of connective tissue is shown? (1)

2.3.4 Identify the type of muscle tissue shown. (1)

2.3.5 Which tissue has a cleansing role to play in the body? (1)

2.3.6 Draw an labelled diagram of a **motor neuron**. (4)

(9)

2.4 The following table shows an analysis of the nutrients found in a 100 g portion of breakfast. The breakfast was made up of eggs, bread and butter.

NUTRIENTS IN A 100 g PORTION	FOOD TYPES		
	Eggs	Bread	Butter
Carbohydrates (g)	0	20,2	0,1
Fats (g)	12,5	0,2	85,2
Protein (g)	11,8	2,5	0
Calcium (mg)	56	3,3	13,8
Iron (mg)	2,8	0,6	0,15
Vitamin A (mg)	675	12	2344
Vitamin C (mg)	0	57	0,2

2.4.1 Name a nutrient that is essential for the manufacture of enzymes. (1)

2.4.2 Name a vitamin deficiency disease that could result from a diet that consists mainly of eggs. (1)

2.4.3 Identify the food type that would be best for a person who suffers from night blindness. Give a reason for your answer. (3)

2.4.4 What role does each of the following elements play in the human body?

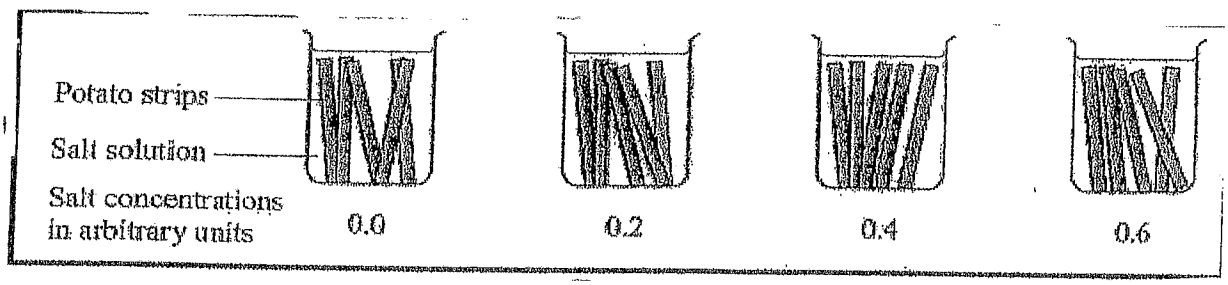
(a) iron (1)

(b) calcium (1)

2.4.5 Briefly explain why an athlete should include bread in his/her diet. (2)

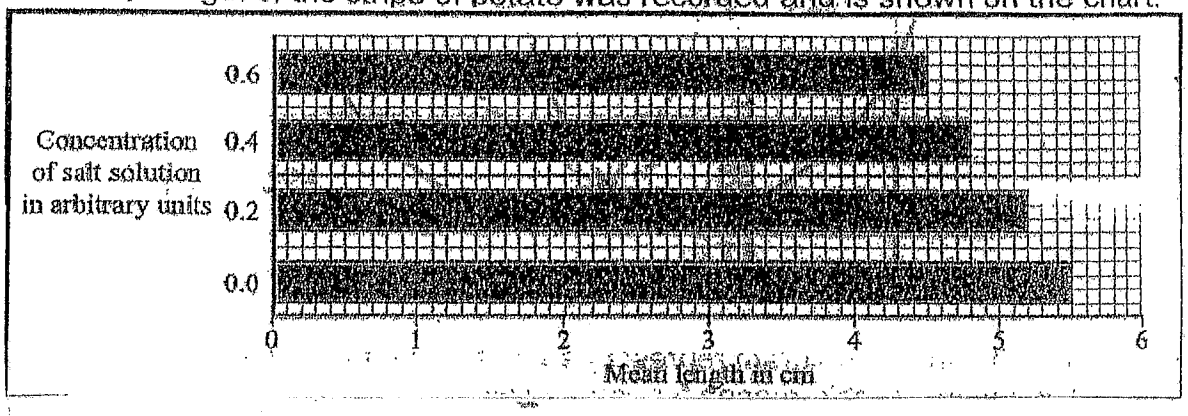
(9)

2.5 Thin strips of potatoe tissue were cut. They were all the same width and exactly 5cm long. They were placed in a series of salt solution of different concentrations . An investigation was carried out to determine under what conditions plant cells lose the most amount of water. Answer the questions that follow:



After two hours, the strips were removed, carefully dried and measured for length.

The mean length of the strips of potato was recorded and is shown on the chart.



2.5.1 State a hypothesis for the above investigation (2)

2.5.2 State :

2.5.2.1 The independent variable (1)

2.5.2.2 The dependant variable (1)

2.5.3 What process caused the change in length of potatoe strips (1)

2.5.4 At what concentrations would you expect the length of the potatoe strip to increase in length (2)

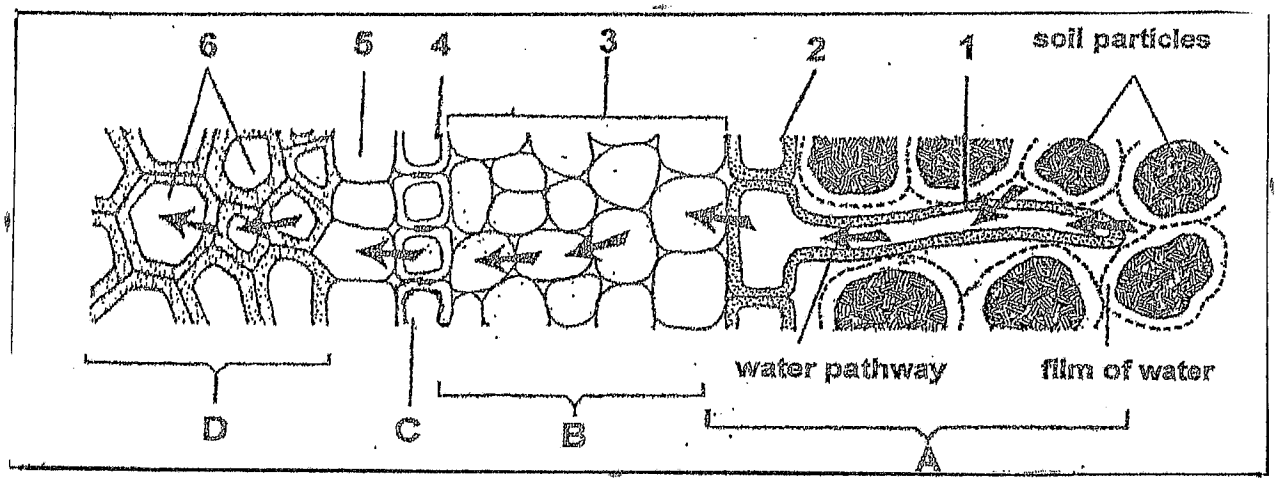
2..5.5 At what concentration did the potatoe strips lose the most amount of water (2)

(9)

TOTAL QUESTION 2 : {40}

QUESTION 3

3.1 The diagram below shows the transverse section of a root. Study the diagram and answer the questions set.



3.1.1 Provide labels for tissues 3, 4 and 5 respectively. (3)

3.1.2 State ONE function of tissue 6. (1)

3.1.3 Label I forms a finger-like structure. Explain TWO ways in which this structure is adapted for its function. (2)

3.1.4 Name any ONE force which develops in D, that's responsible for the upward movement of water (1)

3.1.5 Describe how most of the water that is absorbed passes from A through to D. (3)

3.1.6 " A leaf is considered as an organ"

3.1.6.1 Discuss the above statement with reasons (4)

(14)

3.2 Study the table below which illustrates the rate of water absorption by roots and the rate of transpiration by leaves.

TIME	RATE OF WATER ABSORPTION (ml per hour)	RATE OF TRANSPIRATION (ml per hour)
06 : 00	1.5	0,5
08 : 00	1,5	2,0
10 : 00	3.2	4,5
12 : 00	4.5	6,0
14 : 00	5.7	7,4
16 : 00	7.6	9,3
18 : 00	8.0	5,5

3.2.1 Define transpiration. (2)

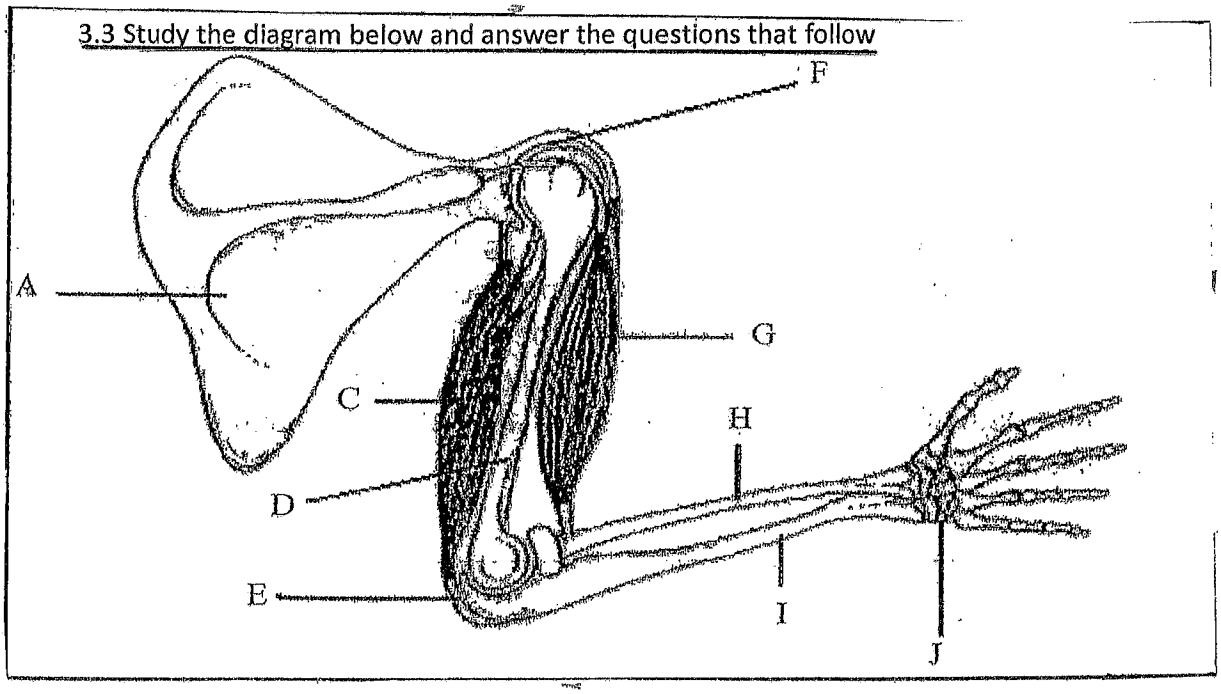
3.2.2 At what time does maximum transpiration occur from this plant? (1)

3.2.3 During which time period did the rate of water loss from the plant exceed the rate of water absorption. Suggest a reason for this. (4)

3.2.4 Draw line graphs, on the same set of axes, to illustrate the results in the table. (10)

(17)

3.3 Study the diagram below and answer the questions that follow



3.3.1 Name the part of the skeleton which the above diagram represents (1)

3.3.2 Identify parts labelled A and D. (2)

3.3.3 State the type of joints found at E and F. (2)

3.3.4 What type of muscle tissue is C
(2)

3.3.5 Briefly explain how the forearm is brought towards the body (2)

(9)

TOTAL QUESTION 3 : {40}

TOTAL SECTION B : {80}

SECTION C

QUESTION 4 (ESSAY)

Mitosis is a process whereby one cell (mother cell) divides to give rise to two cells (daughter cells) with the identical genetic make-up as the original (mother) cell. However, in certain instances cells in the body divide by mitosis in an uncontrolled manner resulting in cancer.

Write an essay to describe the process of mitosis in animals.
Also include in your essay a description of ways in which cancer can be treated.

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

Content : (17)

Synthesis : (3)

TOTAL QUESTION 4: (20)

GRAND TOTAL : 150

GRADE : IO LIFE SCIENCE PAPER 1 NOVEMBER EXAM 2017 TOTAL : 150

MARKING MEMO

SECTION A

QUESTION 1

1.1.1 D ✓
1.1.2 B ✓
1.1.3 A ✓
1.1.4 A ✓
1.1.5 D ✓
1.1.6 C ✓
1.1.7 B ✓
1.1.8 A ✓
1.1.9 B ✓
1.1.10 B ✓ (2X 10 = 20)

1.2.1 Cuticle ✓
1.2.2 femur ✓
1.2.3 lysosomes ✓
1.2.4 guttation ✓
1.2.5 cancer ✓
1.2.6 sensory neuron ✓
1.2.7 antagonistic muscles ✓
1.2.8. cristae ✓
1.2.9 mitochondrion ✓
1.2.10 canines ✓
1.2.11 annual rings ✓
1.2.12 parenchyma ✓ (12)

1.3.1 B only ✓
1.3.2 neither A or B ✓
1.3.3 B only ✓
1.3.4 B only ✓
1.3.5 both A and B ✓ (10)

1.4.1 C ✓
1.4.2 D ✓
1.4.3 A ✓
1.4.4 B ✓ (8)

TOTAL SECTION A : {50}

SECTION B
QUESTION 2

2.1.1 Diagram X - Plant Cell (1)
Diagram Y – Animal Cell (1)
2.1.2 A – nucleolus (1)
E – chloroplast (1)
2.1.3 C – Allow substances to enter or leave the cell (1)
2.1.4 Vacuoles may store food and nutrients that a cell may use to survive. They may also store waste products so that the rest of the cell is protected from contamination. Reserve storage is needed due to the immobility of a plant cell compared to an animal cell. Large vacuoles help to maintain turgidity in plant cells. (2)

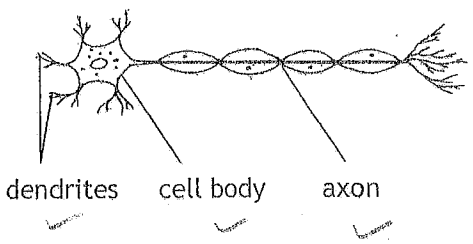
TOTAL 7 MARKS

2.2.1 papain (1)
2.2.2 the enzyme (papain) and the substrate (meat) forms an enzyme – substrate complex
The substrate molecule now changes by the rearrangement of existing molecules or
The breakdown of the substrate molecule. (2)
2.2.3 after cooking, the process of tenderisation is stopped and the meat is no longer broken down (1)
2.2.4 denaturation (1)
2.2.5 it would be completely digested (1)

total marks 6

2.3.1 epithelial/ciliated (1)
2.3.2 nerve tissue (1)
2.3.3 bone (1)
2.3.4 skeletal/striated (1)
2.3.5 epithelial/ciliated (1)
2.3.6 Diagram of labelled motor neuron (4)

motor neuron.



Heading	1 mark
Correct drawing	1 mark
Any 2 labels	2 marks

Total marks 9

2.4.1 protein (1)

2.4.2 scurvy (1)

2.4.3 butter (3)

Has the highest amount of vitamin A, which helps to prevent night blindness

2.4.4 (a) required for haemoglobin production (1)

(b) builds strong bones and teeth/involved in muscle contraction/ Involved in transmission of nerve impulses (1)

2.4.5 bread has a high amount of carbohydrates which is a primary source of energy (2)

TOTAL MARKS 9

2.5.1 The potato strips placed in the highest salt concentration will lose the most amount of water or the potato strips placed in the lowest salt concentration will lose the least amount of water or there will be no water loss or gain in the potato strip (2)

2.5.2.1 Independent variable salt solution (1)

2.5.2.2 Dependant length of potato/loss of water (1)

2.5.3 Osmosis (1)

2.5.4.1 0,0 and 0,2 / low concentration (2)

2.5.5 0,6 Arbitary units (2)

TOTAL MARKS 9

TOTAL QUESTION 2 : {40}

QUESTION 3

3.1.1 3- parenchyma/cortical cells (1)

4- endodermis (1)

3- pericycle (1)

3.1.2 Transports water, mineral salts or provides support ANY 1 (1)

3.1.3 elongated – increases surface for water absorption

Thin walled-facilitates endosmosis

Cell sap has lower water potential-facilitates endosmosis

(any two) (2)

3.1.4 root pressure/transpiration pull/capillarity ANY 1 (1)

3.1.5 most of the water passes by diffusion/major pathway

From root hair cell along cell walls of the cortex

To neighbouring intercellular airspaces

Not passing through any cortical cells

Intercellular airspaces closer to the stele have a lower water potential than those closer to the root hair

Water therefore moves along this water potential gradient until it reaches the endodermis

(any 3) (3)

3.1.6.1 An organ performs a specific function and is made up of tissues, usually main tissue and interspersed or supportive tissue that integrate the organ into the whole organism. The leaf's function is photosynthesis and the shape is optimisation of 2 main selection factors, chlorophyll exposure and water retention. Due to the above reasons the leaf is considered to be an organ ANY 4 POINTS (4)

TOTAL MARKS 14

3.2.1 Transpiration is the loss of water, in the form of water vapour, from the aerial parts of the plant,mainly through the stomata. (2)

3.2.2 16 : 00 hours (1)

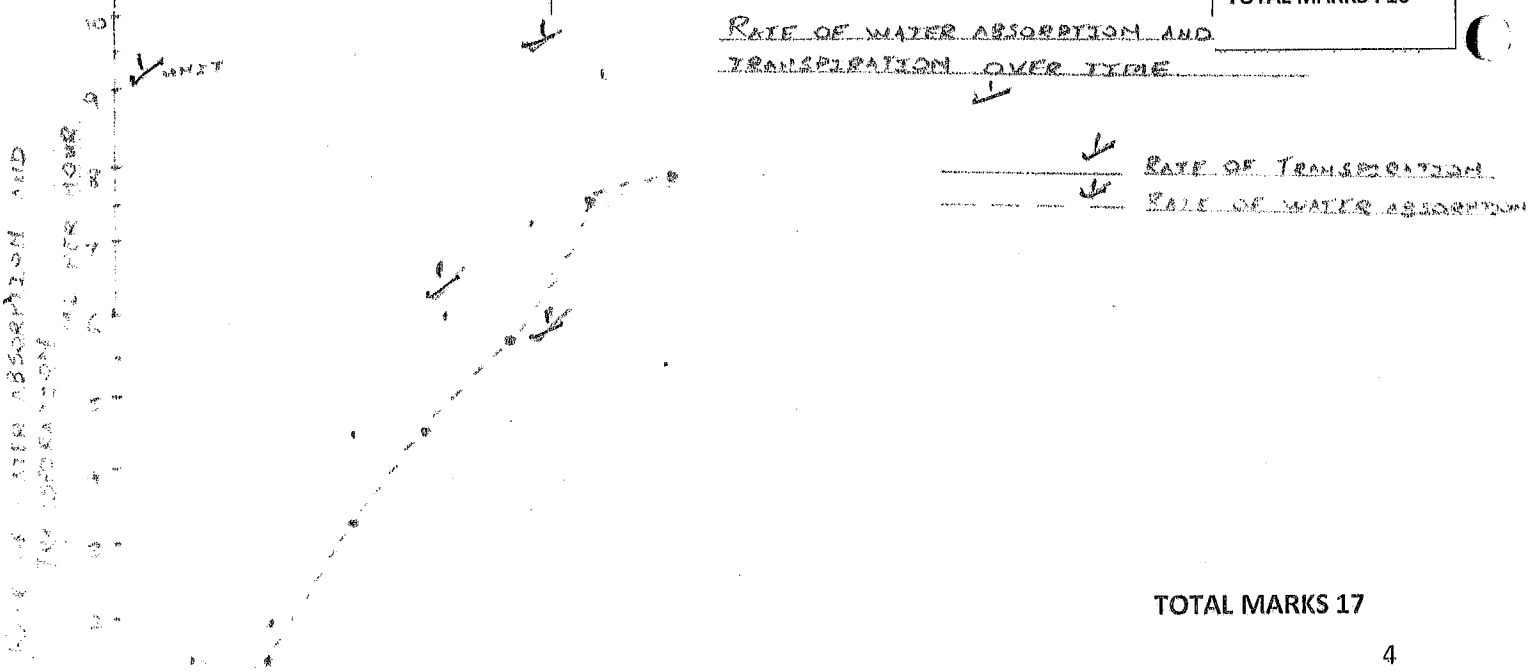
3.2.3 from 08 : 00 to 16 : 00

During the day the stomata are open and transpiration results in more water loss from the leaves than water absorbed by the roots.

At night-stomata are closed- no/less transpiration (4)

3.2.4 line graph (10 marks breakdown for line graph)

	Description	marks
	Correct type of graph	1
Title	Both variables	1
Label	X Axis	1
Label	Y Axis	1
	Unit X & Y axes	2
Plotting & labelling of graphs	a) Plotting & joining the dots correctly on the line graphs b) Labelling the graphs (learner can label on the graphs or a key may be provided)	a) 2 b) 2
		TOTAL MARKS : 10



TOTAL MARKS 17

3.3.1 Appendicular skeleton ✓

3.3.2 A – Scapula ✓ (1)

D – Humerus ✓ (1)

3.3.3 C – Hinge joint ✓ (1)

F – Ball & Socket joint ✓ (1)

(2)

3.3.4 Striated/Voluntary muscle (1)

3.3.5 The biceps and triceps muscles are antagonistic muscles. When the biceps contracts the triceps muscles relax, the arm is then brought towards the body. (2)

TOTAL MARKS: 9

TOTAL QUESTION 3 : [40]

TOTAL SECTION B : [80]

SECTION C

QUESTION 4 (ESSAY)

Process of mitosis

Interphase: In preparation for the division of the nucleus, DNA replicates so that the genetic material is doubled in the chromatin network.

Prophase: The chromatin network unwinds to form visible chromosomes. Each chromosome is actually made up of two identical parts called chromatids (because of DNA replication). The centrosome splits and starts moving to the poles. The nuclear membrane and nucleolus start to disappear. Spindle fibres emerge from the centriole.

Metaphase: The chromosomes arrange themselves along the middle of the cell in a single row, attached to spindle fibres.

Anaphase: When the spindle fibres contract, the two chromatids are pulled apart towards opposite ends of the cell causing the chromosomes to split at the centromeres. Each chromatid is actually a single stranded chromosome, since DNA replication took place.

Telophase: Two groups of chromosomes are now present, one at each end of the cell. Thus we have two nuclei within which we have the same number and kind of chromosomes as the original. The division the cytoplasm, called cytokinesis, then takes place, forming two identical cells. (Any relevant information pertaining to the process of mitosis will be considered in the marking memo)

Max 23

Treatment of cancer (any 2 X 2)

6

Chemotherapy- drugs are injected intravenously into the patient and the cancerous cells are destroyed ✓

Radiotherapy- X-rays are focussed onto the tumour which results in the killing of the cancerous cells ✓

Surgery- involves the removal of the cancerous cells eg women with breast cancer may have their breast removed by surgery ✓

Max: 4

Content : (17)

Synthesis: (3)

CRITERION	RELEVANCE (R)	LOGICAL (L)	COMPREHENSIVE C)
	All information is relevant to the topic	Facts are arranged in logical sequence	All aspects have been sufficiently addressed 7 of the 13 points were considered 2 of the 4 points were considered
	1	1	1

TOTAL SECTION C : {20}

GRAND TOTAL : 150