GREENBURY SECONDARY
DEPT. OF EDUCATION – KZN

LIFE SCIENCES-GRADE 10
FINAL EXAMINATION 2015

PAPER 1

TIME: 2½ HOURS **MARKS: 150**

EXAMINER: K. GOVENDER **MODERATORS: C. JUGDHAW, S. SINGH, T. RAMPURTHAB**

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

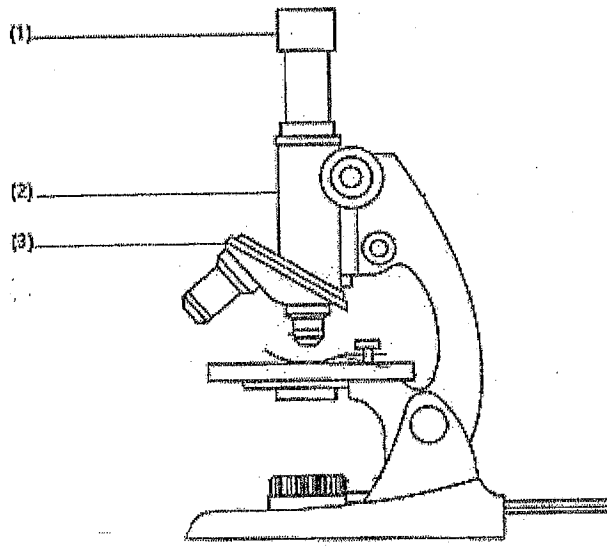
1. This paper consists of **14** pages.
2. Answer ALL the questions.
3. Write ALL the answers in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. The diagrams in the question paper are NOT necessarily drawn to scale.
8. Write neatly and legibly.

SECTION A

QUESTION ONE

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 1.1.8) in the ANSWER BOOK, for example 1.1.11 D.

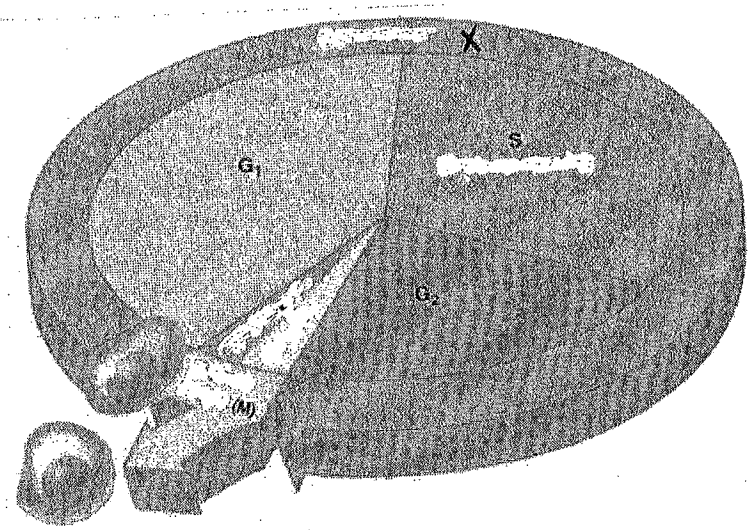
1.1.1 In the microscope diagram below, the labels for **1**, **2** and **3** respectively, are...



A. stage, arm and base
B. eye piece, body tube and rotating nose piece
C. fine adjustment screw, condenser and course adjusting screw
D. objective, diaphragm and clamp

1.1.2 The diagram below shows the CELL CYCLE. **X** in the diagram represents.....

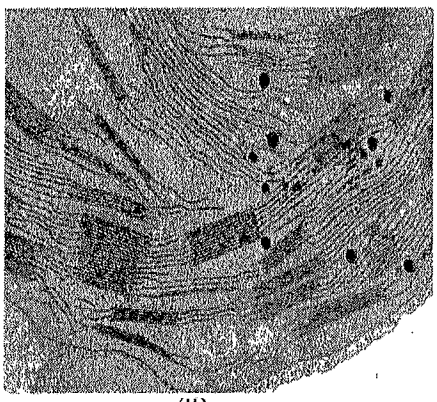
A. Interphase
B. DNA replication
C. Growth of the cell
D. Cell division



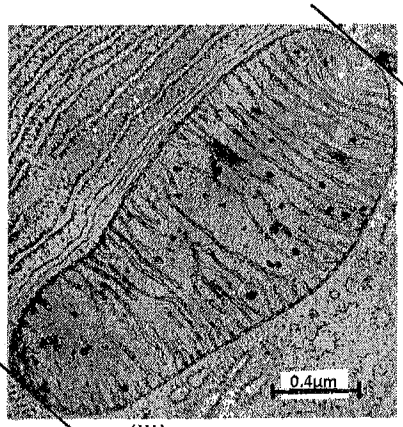
p.t.o Question 1.1.3 .....

Question 1.1.3 and 1.1.4 are based on the micrographs below, which represent cellular organelles.

(i)



(ii)



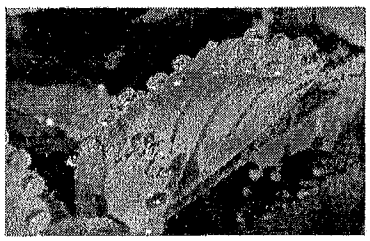
(iii)

( ) 1.1.3 The functions of the three organelles respectively, are.....
A. Cellular respiration, photosynthesis and secretion
B. Secretion, cellular respiration and photosynthesis
C. Secretion, photosynthesis and cellular respiration
D. Photosynthesis, secretion and cellular respiration

1.1.4 The actual size of micrograph (iii) is.....
A. 0,065 µm
B. 2.1 µm
C. 980 µm
D. 0,006 µm

1.1.5 The picture below indicates a process that takes place in plant leaves. Which of the conditions mentioned below the diagram, is NOT a requirement for this process?

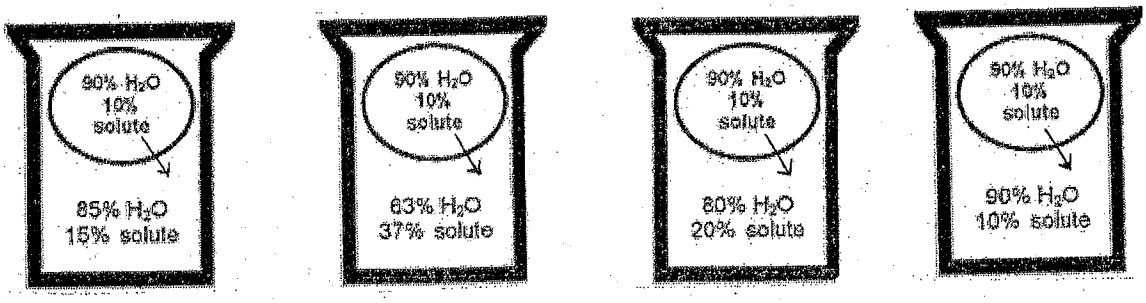
( )



A. High humidity
B. High soil water content
C. Very low transpiration rate
D. High wind speed

p.t.o 1.1.6 Below .....

1.1.6 Below are animal cells placed in beakers of various concentrations. The arrow shows the net movement of water by osmosis. In which beaker is the direction INCORRECTLY shown?



Beaker 1 Beaker 2 Beaker 3 Beaker 4

A. Beaker 1
B. Beaker 2
C. Beaker 3
D. Beaker 4

1.1.7 A grade 10 learner carried out various food tests. The result of food sample A is recorded in the table below.

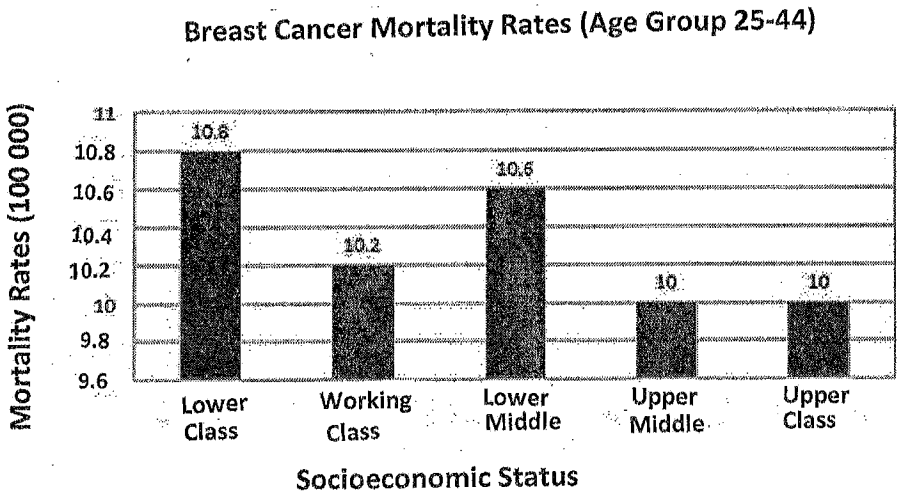
SAMPLE	REAGENTS		
	x	y	z
A	Tested negative with yellowish brown colour	Tested negative with blue colour	Tested positive with bright orange colour

The organic compound present in **sample A,** and the **reagent** that proved this, is...

	Organic compound	**Reagent**
A.	Glucose	Fehling's A and Fehling's B
B.	Oils	Ether
C.	Proteins	Millon's Reagent
D.	Starch	Iodine

p.t.o 1.1.8 The .....

1.1.8 The graph below gives us the following information.....



From the graph above, what assumption can be made?

A. Women from any socio economic status can get breast cancer.
B. Cancer affects any age group.
C. Breast cancer is caused by poor diet.
D. The incidence of breast cancer is very high in South Africa.

1.1.9 Medical biotechnology does NOT involve....
A. Manipulating genes of other organisms to create vaccines.
B. Using other organisms to make antibiotics.
C. Harvesting, storing and giving blood to people who need transfusions.
D. Cloning human organisms for organ transplants.

(9 x 2 =18)

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 1.2.9) in the ANSWER BOOK.

1.2.1 Nerve fibres that carry impulses towards the cell body.
1.2.2 Cells found in cartilage.
1.2.3 Fluid filled spaces in which osteocytes are found.
1.2.4 Plastids that are responsible for colour in plants.
1.2.5 Cylindrical structures that are at right angles to each other, responsible for cell division, in animal cells.
1.2.6 Type of skeleton in a jelly fish.
1.2.7 Opening at the base of a human skull through which the spinal cord leaves the brain.
1.2.8 Neck bones of the vertebral column in the human skeleton.
1.2.9 The main organ in the plant that is responsible for photosysnthesis.

(9)

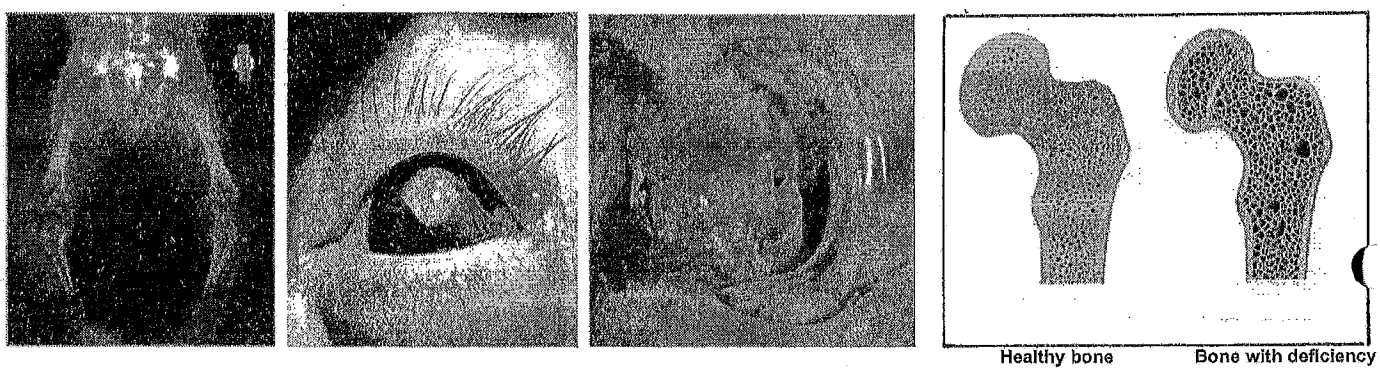
p.t.o 1.3 Indicate .....

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	Chlorophyll containing tissue	A B	Palisade mesophyll Guard cells
1.3.2	Contains xylem and phloem tissue	A B	Petiole Leaf margin
1.3.3	Found on cell walls of Xylem tissue	A B	Plasmodesmata Pits
1.3.4	Division of the nucleus	A B	Karyokinesis Cytokinesis
1.3.5	Treatment for cancer	A B	Chemotherapy radiation

(5 x 2 = 10)

1.4 The pictures below show the symptoms of FOUR deficiency diseases.



A **B** **C** **D**

For each condition mentioned below match the symptom depicted by the picture. Write only the LETTER of the picture next to the number corresponding to the condition. Then, write the NUTRIENT that is deficient, which is causing this condition,next to the letter.

1.4.1 Osteoporosis
1.4.2 Rickets
1.4.3 Night blindness
1.4.4 Scurvy (8)

p.t.o 1.5 The .....

1.5 The following questions are based on **fertilizers** and its **impact** on the environment. Answer the questions.

1.5.1 Name TWO nutrient compounds that are found in fertilizers to enrich the soil. (2)

1.5.2 High levels of these minerals enter the rivers and dams and cause algal bloom. Name this phenomenon. (1)

1.5.3 Name the physiological process that the aquatic plants will fail to undergo because of the algal bloom. (1)

1.5.4 The death of organisms in the water results in decomposers increasing in numbers. How does this further decrease the water quality in the river or dam? (1)
(5)

TOTAL SECTION A: 50

SECTION B

QUESTION TWO

2.1 The diagram below and the diagrams on Page 8, shows a cell, a model of a cell structure and an organelle. Study the diagrams carefully and then answer the questions that follow.

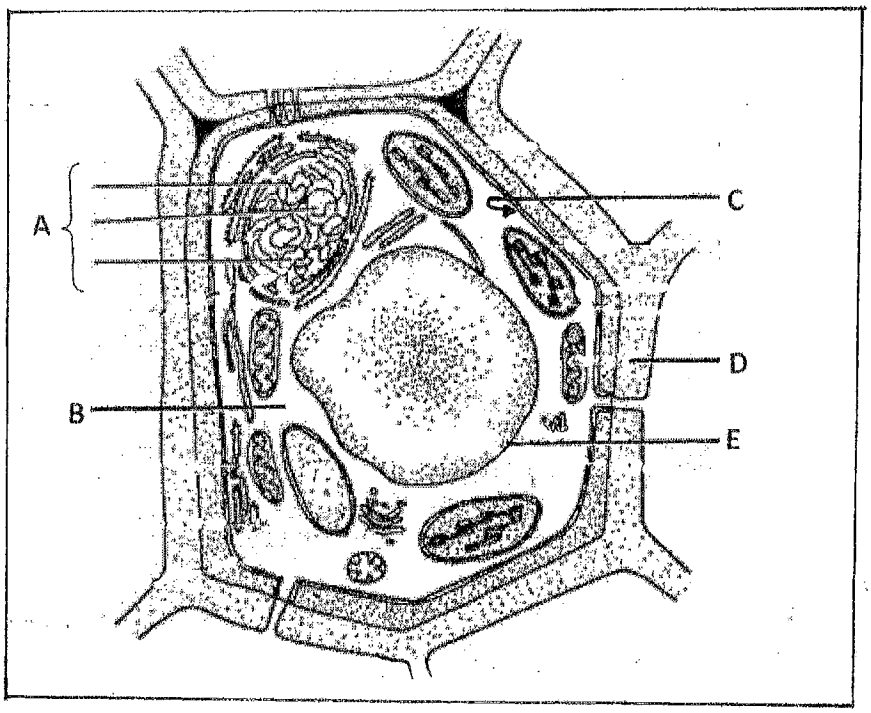


Diagram 1

p.t.o Diagram 2 .....

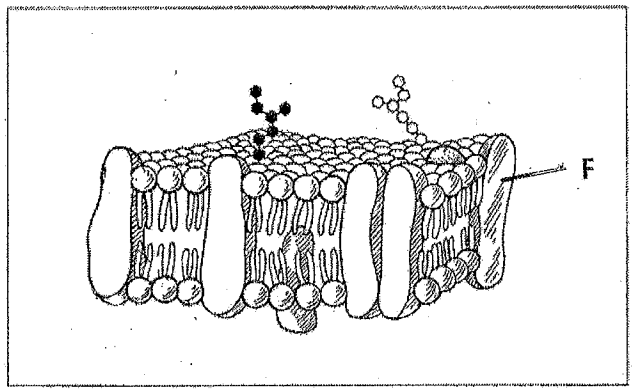


Diagram 2

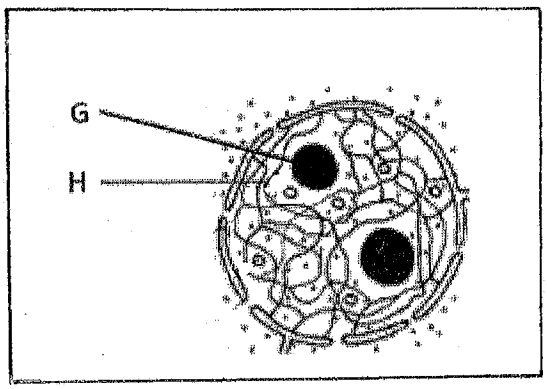


Diagram 3

2.1.1 Identify if the cell in Diagram 1 is a plant or an animal cell?
Give a reason for your answer. (2)

2.1.2 Give the **LETTER** of the label in Diagram 1 which corresponds to:
a) Diagram 2
b) Diagram 3 (2)

2.1.3 Provide labels for structures marked B, F and G. (3)

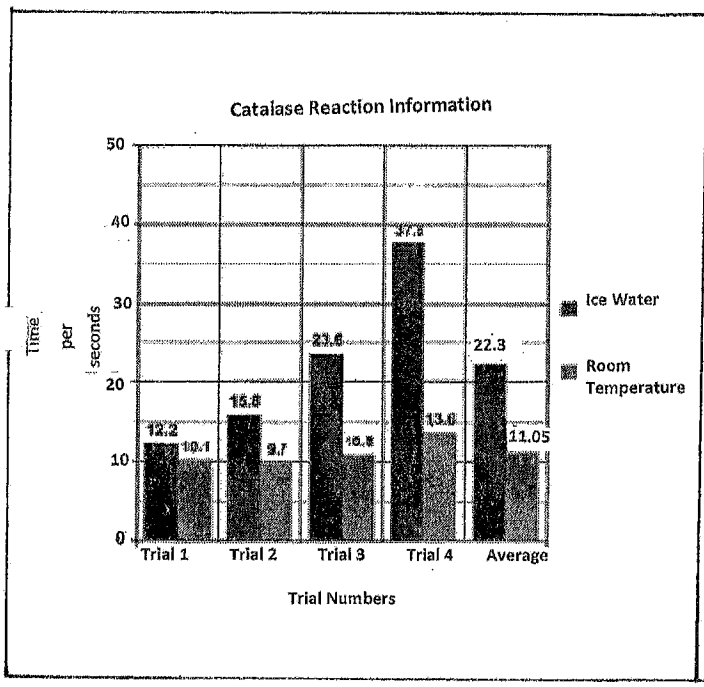
2.1.4 Mention TWO functions of part marked H. (2)

2.1.5 State ONE difference each, between part labelled D and the part represented by Diagram 2, with regards to their:
a) Structure, and
b) Function. (4)
(13)

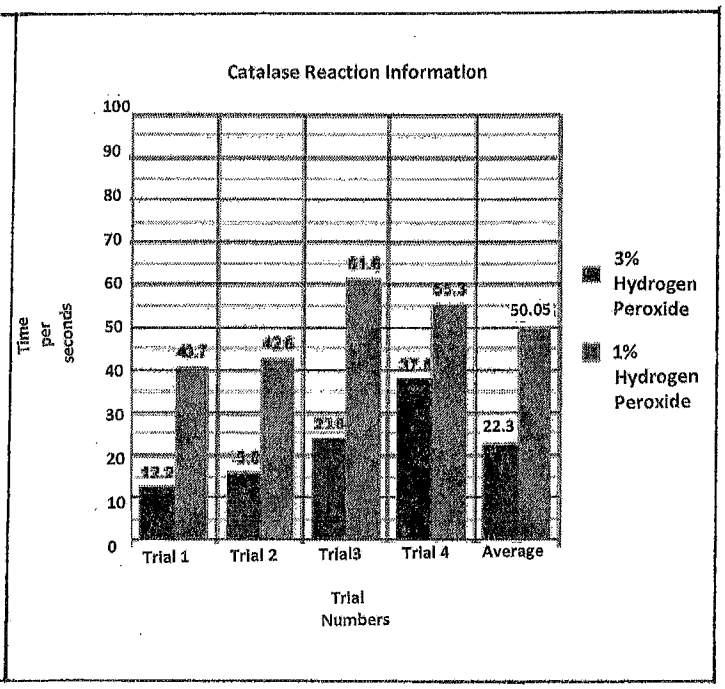
p.t.o 2.2 In an .....

2.2 In an investigation to determine the factors affecting the reaction rate of the enzyme catalase, pieces of paper were soaked in liver pulp and then put in hydrogen peroxide. Then, using a stop watch, the time of the rate it took for the catalase enzyme to start reacting, was recorded.

The results of the **TWO experiments** are shown in the bar graphs below. Study the graphs carefully, then answer the questions set on it.



Experiment 1



Experiment 2

2.2.1 Name the substrate involved in the reactions of these experiments. (1)

2.2.2 What is the purpose of soaking the pieces of paper in liver? (1)

2.2.3 State the AIM of this investigation. (1)

2.2.4 Name the TWO factors about enzymes that the scientist was investigating. (2)

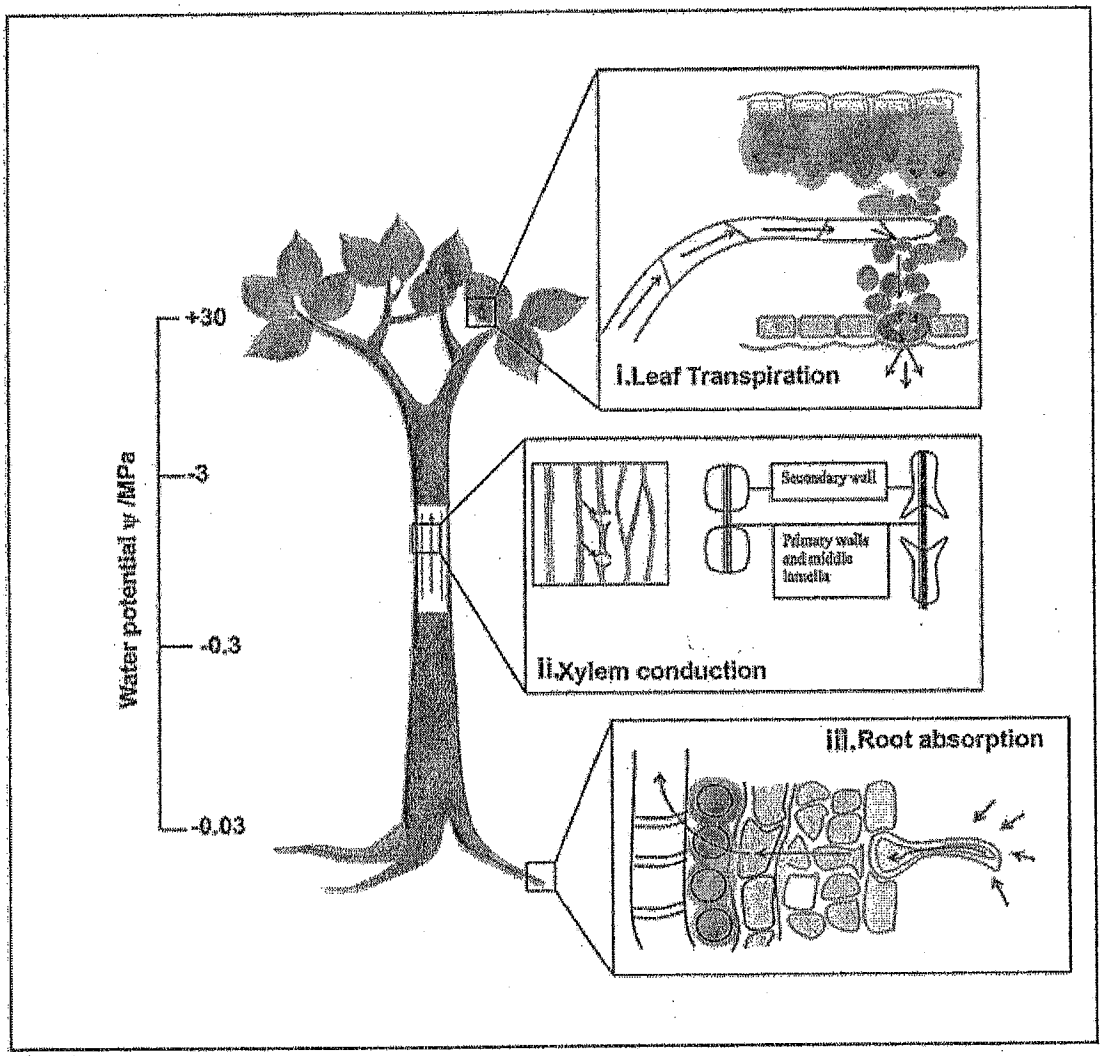
2.2.5 Explain why FOUR trials were carried out, for each experiment. (2)

2.2.6 Draw a table and record the AVERAGES of the findings in the investigation from both graphs. (5)

2.2.7 State the TWO conclusions from the investigation. (2)
(14)

p.t.o 2.3 The .....

2.3 The diagram below shows the organs and tissues involved in transporting water up the tree. Study it and then answer the questions set.



2.3.1 Name the THREE forces that are responsible for the upward movement of water in the tree. (3)

2.3.2 Describe the MAIN force of the three forces mentioned in Question 2.3.1. (5)

2.3.3 Mention and explain the TWO forces in the xylem tissue, at (ii) in the diagram, that ensures that the water columns do not break as it goes up the stem. (4)

2.3.4 The arrow in the C/S of the root (iii, in diagram), shows the direction of the water towards the stele, which goes through the parencyma cells of the cortex. Is this a MINOR or a MAJOR pathway? (1)

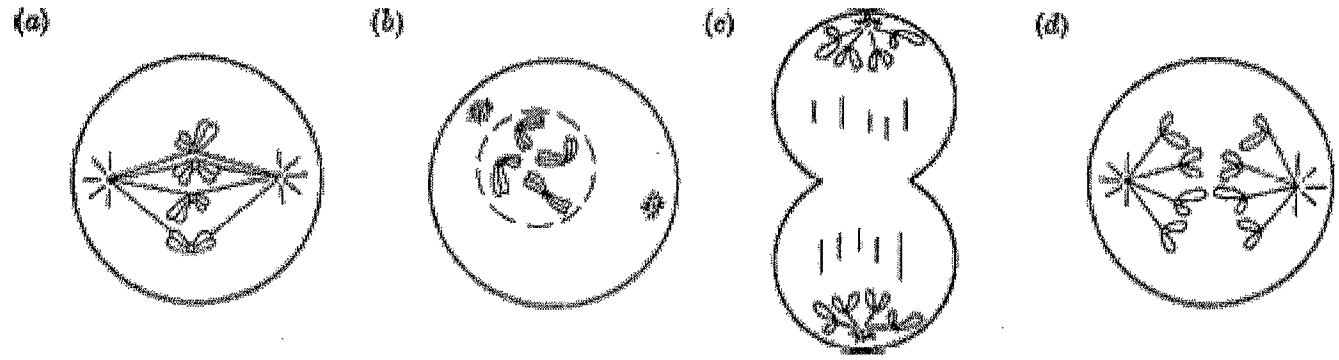
(13)

[40]

p.t.o Question Three .....

QUESTION THREE

3.1 The diagrams below represents the FOUR phases of MITOSIS in an animal cell. Study the diagrams then answer the questions.



3.1.1 Arrange the phases in order. (Write ONLY the letters of the diagrams) (1)

3.1.2 Name the phase at (b) and describe it. (5)

3.1.3 State how many:
(a) chromosomes are in the original cell.
(b) chromosomes are in each of the daughter cells.
(c) cells will form at the end of this process. (3)
(9)

3.2 Read the information below before answering the questions.

STEM CELLS

Stem cells have the potential to treat many diseases such as diabetes and Parkinson's. These diseases are caused by the death or malfunction of particular cells

One potential treatment uses adult stem cells from patient's own bone marrow to treat damaged heart cells. Stage II trials have been carried out, mostly on subjects who were already seriously ill. A report which analysed the results of such trials concluded; "a few deaths followed the introduction of the stem cells into the heart; and the therapy was even marginally successful in treating the disease". It also admits that no one really understands the mechanisms involved.

Desperate patients are willing to join the trials despite the low success rate. Some people are travelling to other countries for such treatments. Many other clinical trials find it hard to enrol enough patients.

For many conditions adult stem cells are not suitable and researchers are hoping to use embryonic stem cells from a 6 day old developing embryo.

p.t.o 3.2.1 What .....

3.2.1 What is meant by stem cells? (2)

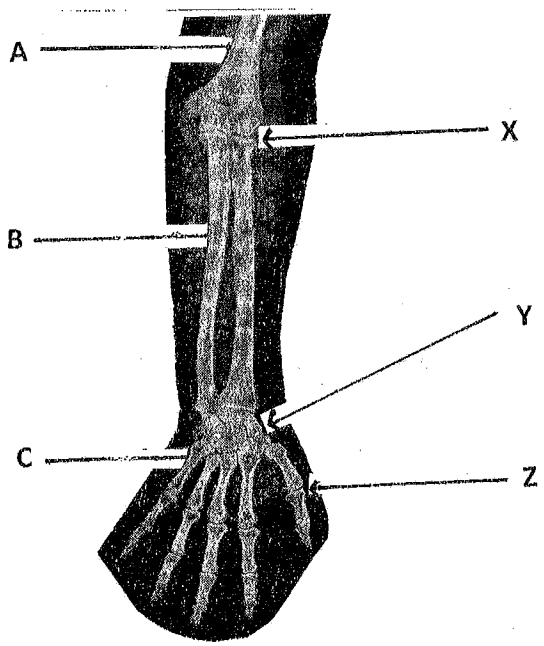
3.2.2 Suggest TWO reasons why these stem cell trials are so popular. (2)

3.2.3 There are ethical guidelines that cover clinical trials. MentionTWO ways researchers ensure that these trials meet such guidelines. (2)

3.2.4 What is the difference between adult stem cells and embryonic stem cells? (2)

3.2.5 What is the main source of embryo to provide stem cells for this research? (1)
(9)

3.3 The diagram below shows an X-Ray of a hand. Answer the questions set on it.



3.3.1 Provide labels for A, B and C. (3)

3.3.2 Name the synovial joint at X, Y and Z. (3)

3.3.3 Draw and label a typical synovial joint. (5)
(11)

p.t.o 3.4 The .....

3.4 The diagrams below are on skeletal muscle tissue. Study the relationship between the diagrams and then answer the questions.

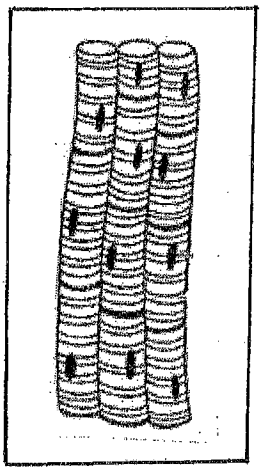


Diagram M

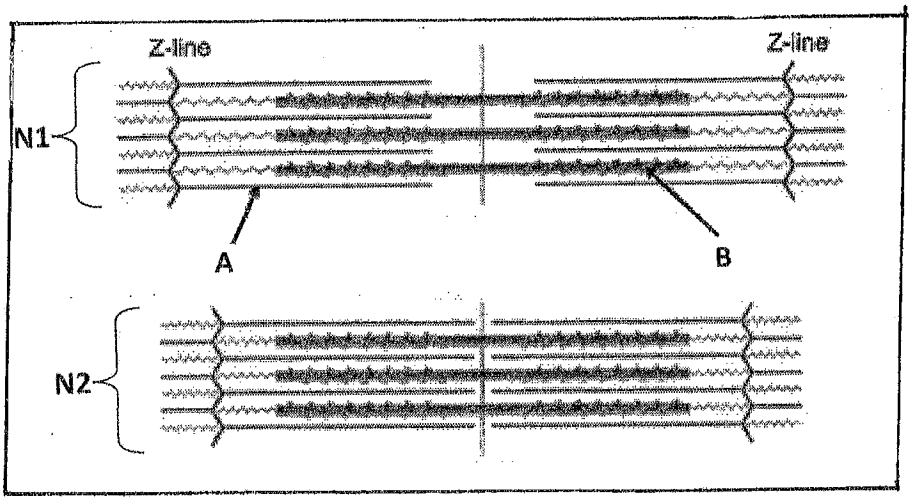


Diagram N

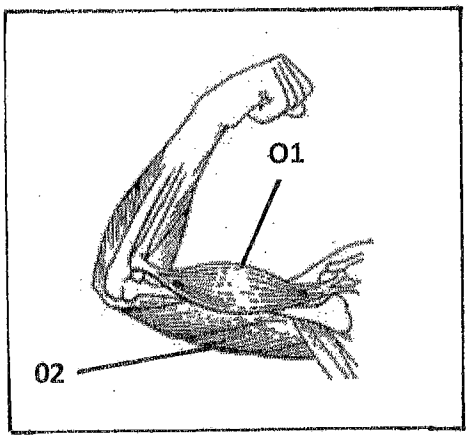


Diagram O

3.4.1 Tabulate TWO structural differences between skeletal muscles and smooth muscles (5)

3.4.2 Provide labels for A and B. (2)

3.4.3 State the relationship between diagrams M and O. (2)

3.4.4 Match the diagrams of N1 and N2 with the diagrams of O1 and O2, to show your understanding of how muscles work. (2)

(11)

[40]

TOTAL SECTION B: 80

p.t.o Section C ...

SECTION C

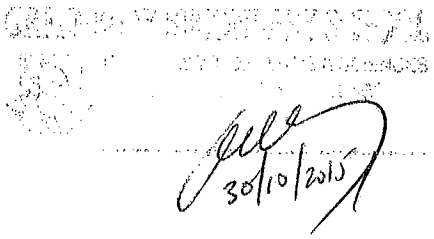
QUESTION FOUR: ESSAY

4. Tissues are structured in ways that are suitable for the functions they perform at the specific locations in the organism.

   Discuss how the following tissues are structurally adapted for their functions.

4.1 Endodermis in the root
4.2 Leaf epidermis of xerophytic plants
4.3 Red blood corpuscles in human
4.4 Ciliated epithelium in the nasal passages in human

Content:	17
Synthesis:	3
Total:	20



The end

FINAL EXAMS - 2015
LIFE SCIENCES P1 – GR 10
MEMORANDUM

Section A
Question One

1.1.1 B ✓✓
1.1.2 A ✓✓
1.1.3 C ✓✓
1.1.4 B ✓✓
1.1.5 D ✓✓
1.1.6 D ✓✓
1.1.7 A ✓✓
1.1.8 A ✓✓
1.1.9 D ✓✓ **(18)**

1.2.1 dendrites ✓
1.2.2 chondrocytes ✓
1.2.3 lacuna ✓
1.2.4 chromoplastids ✓
1.2.5 centrioles ✓
1.2.6 hydrostatic✓
1.2.7 foramen magnum ✓
1.2.8 cervical ✓
1.2.9 leaf ✓ **(9)**

1.3.1 Both✓✓
1.3.2 A only✓✓
1.3.3 B only ✓✓
1.3.4 A only✓✓
1.3.5 Both✓✓ **(10)**

1.4.1 D✓ – calcium✓
1.4.2 A✓ – Vit D✓
1.4.3 B✓ – Vit A✓
1.4.4 C✓ – Vit C✓ **(8)**

1.5.1 nitrates✓, phosphates✓
1.5.2 eutrophication✓
1.5.3 photosynthesis✓
1.5.4 decrease oxygen levels✓ **(5)**

TOTAL Sect A = 50

SECTION B
QUESTION TWO

2.1.1 Plant cell✓ cell wall present✓/ large vacuole/ regular shape (2)

2.1.2 a) C✓
b) A✓ (2)

2.1.3 B – cytoplasm/cytosol✓
F - protein✓
G - nucleolus✓ (3)

2.1.4 * responsible for the structure/functioning of cells✓
* carries/transfers hereditary characteristics✓ (2)

2.1.5

	D	Diagram 2
a) **Structural difference**	Cellulose✓/rigid/non-living/plasmodesmata	Protein and phospholipid molecules✓/ flexible/living/ pores
b) **Functional difference**	Permeable✓	Differentially/selectively/semi permeable✓ (4)

(13)

2.2.1 hydrogen peroxide✓ (1)

2.2.2 liver contains the catalase enzymes✓/to obtain the catalase enzyme (1)

2.2.3 To determine the factors affecting the reaction rate of the enzyme catalase. ✓ (1)

2.2.4 * the effect of temperature on the reaction rate of enzyme✓
* the effect of concentration of the enzyme on the reaction rate of enzyme✓ (2)

2.2.5 to increase the sample✓, and find the average✓, for reliable results. ✓ (any 2)

2.2.6 Table showing the average time taken for two factors that affect the reaction rate of enzyme catalase ✓

✓	✓	**Rate of reaction(seconds)** ✓
Temperature	Ice water	22.3
	Room temperature	11.05
Concentration of Hydrogen peroxide	3 %	22.3
	1 %	50.05

✓ (5)

2.2.7 * the reaction rate of catalase enzyme is higher at room temp that in ice water✓
* the reaction rate of catalase enzyme is higher in 3 % hydrogen peroxide than 1 %.✓ (2)
(14)

2.3.1 root pressure✓, capillarity✓, transpiration pull✓ (3)

2.3.2 Transpiration pull:

- transpiration occurs✓ and water escapes from the leaves via stomata✓
- water is drawn from the mesophyll cells✓
- which in turn receives water from the xylem tissue✓
- a diffusion pressure gradient exists✓ between the xylem tissue and the air outside the stomata✓
- a water column extends from leaf xylem down to the root✓
- as transpiration occurs/water escapes from leaves, pressure gradients causes it to be replaced ultimately from the root system✓✓ (any 5)

2.3.3 * cohesive force ✓– attractive force between water molecules✓
* adhesive force✓ – attractive force between water and xylem tissue walls✓ (4)

2.3.4 minor pathway✓ (1)
(13) **[40]**

QUESTION THREE

3.1.1 b, a, d, c✓ (1)

3.1.2 Prophase✓*
- chromatin network visible as chromosomes✓
- spindle fibres form ✓between centrioles
- centrioles move apart✓
- nuclear membrane disappear✓
- nucleolus disappear✓ (*1 compulsory + any other 4)

3.1.3 a) 4✓
b) 4✓
c) 2✓ (3)

(9)

3.2.1 non-specialised cell✓/ cell that can give rise to different cell types (1)

3.2.2 *role of media hype✓/ wide publicity for stem cells
*no other treatment✓/already very ill/ desperate for a cure (2)

3.2.3 * full information given on the risks✓
* no false promises given✓
* informed consent from patients✓
* right to withdraw✓ (any 2)

3.2.4 - embryonic stem cells can develop into any cell type in body ✓/ totally indifferent
- adult stem cell can only develop into limited range of cell types✓/ adult is already partially differentiated (2)

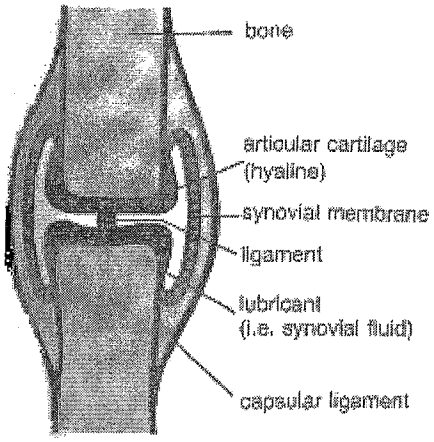
3.2.5 surplus in-vitro –fertilization embryos✓ / IVF (1)

(9)

3.3.1 A – humerus✓
B – ulna✓
C - Metacarpal✓ (3)

3.3.2 X – hinge✓
Y - gliding✓
Z - hinge✓ (3)

3.3.3



A typical synovial joint

✓caption
✓neat, correct drawing
✓✓✓labels (5)

(11)

3.4.1 ✓

Skeletal muscle	Smooth muscle/muscle in artery
• cylindrical in shape✓ • nucleus in periphery✓/surface of cell fibre • striated/striped✓ • in bundles✓	• spindle shaped✓ • central nucleus✓ • unstriped/unstriated✓ • in sheets✓

3.4.2 A- actin✓
B - myosin✓ (2)

3.4.3 - M are individual muscle fibres✓ of the whole muscle O✓ (2)

3.4.4 - N1 matches with O2✓
- N2 matches with O1✓ (2)

(11)

[40]

Ps

SECTION C
QUESTION FOUR – ESSAY

4.1 **Endodermis**

- casparian strip✓ channel/ direct the water✓ into the root xylem✓
- the position of the casparian strip / positioned opposite phloem✓ prevent water from passing through✓
- passage cells✓ are thin walled✓
- allow water to pass through✓ into the stele✓ (any 4)

4.2 **Leaf epidermis of xerophytic plants**

- thickened cuticle✓ to reduce transpiration✓
- hairs on leaf✓ reflect sunlight✓ and reduce transpiration
- sunken stomata✓ to trap moisture ✓and reduce transpiration
- transparent cuticle✓ and epidermal cells✓ to allow light to enter the chlorophyll Containing cells / mesophyll cells✓
- fewer stomata✓ to reduce transpiration✓
- thicker epidermis / many layers ✓to reduce transpiration✓ (any 3 x 2 = 6)

4.3 **Red blood corpuscles in human**

- bi concave ✓to increase the surface area✓
- flexible✓ to allow it to change its shape✓/become oval as it squeezes through very tiny capillaries✓
- contain haemoglobin✓ to carry oxygen/carbon dioxide (2 x 2 = 4)

4.4 **Ciliated epithelium in the nasal passages in human**

- goblet cells ✓ secrete mucus✓ to trap dust/germs✓
- cilia✓ /hair like structures on their free ends, sweep✓ out dust/ germs
- mucus ✓ moistens the air✓ as it passes to prevent alveoli cells from drying up✓(any 3)

Synthesis:

All information **relevant** to structural adaptations	1
Aspects discussed show structure followed by **logical** reasoning	1
All 4 parts answered, at least ONE structural adaptations mentioned and explained, in each.	1

17 + 3 = **20**

P6