Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

FINAL EXAMINATION

1 NOVEMBER 2018

GREENBURY SECONDARY SCHOOL

GRADE 10
PAPER ONE

MARKS: 150

TIME: 2½ hour

N.B. This question paper consists of 15 pages including this page.

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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts 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

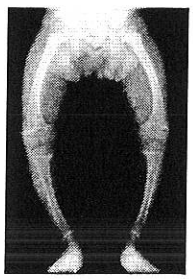
1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.5) in your ANSWER BOOK, for example 1.1.6 D.

1.1.1 The large hole underneath the skull of a human, through which the spinal cord leaves, is the ...

A axis
B orbit
C foramen magnum
D zygomatic arch

1.1.2 The picture below shows a symptom of a nutritional disorder. What is the name of this disorder and the cause of it?

A Night blindness – shortage of vitamin A
B Beri-beri – shortage of vitamin B
C Anaemia – shortage of vitamin C
D Rickets – shortage of vitamin D

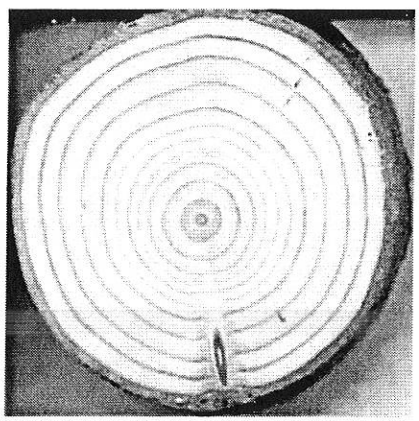


1.1.3 Which is a plastid in storage organs of plant cells?

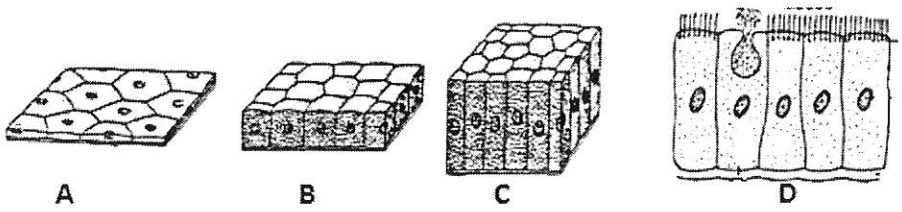
A centrosome
B ribosome
C ER
D leucoplast

1.1.4 What is the age of the stem in the photograph below?

A 6 years
B 12 years
C 18 years
D 24 years



1.1.5 Which of the following epithelial tissues can be scraped from the inside lining of the mouth?



(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 The ability of an organism to resist a specific infection by producing antibodies to fight the disease

1.2.2 A large sac-like structure with sap found in a plant cell

1.2.3 Unstriated involuntary muscle type

1.2.4 Undifferentiated tissue in the root tip that is protected by root cap

1.2.5 Layer of tissue in the root that contains the casparian strip

1.2.6 Molecule in the cell that carry hereditary characteristics

1.2.7 Cells of cartilage connective tissue

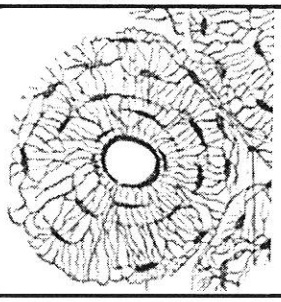
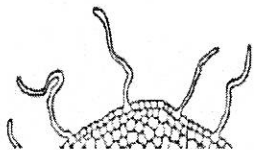
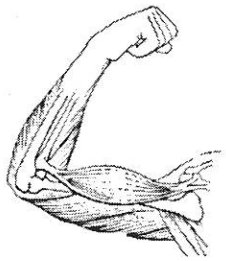
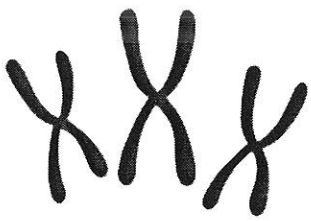
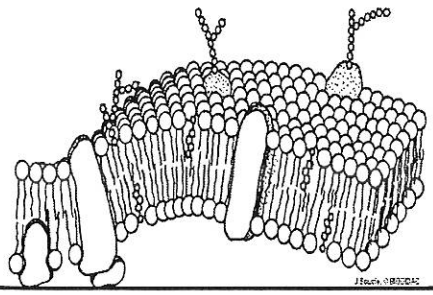
1.2.8 Blood cells responsible for producing antibodies

1.2.9 Plant tissue with thickened corners that provide mechanical support

1.2.10 A solution of weakened 'germs' which stimulate the formation of antibodies

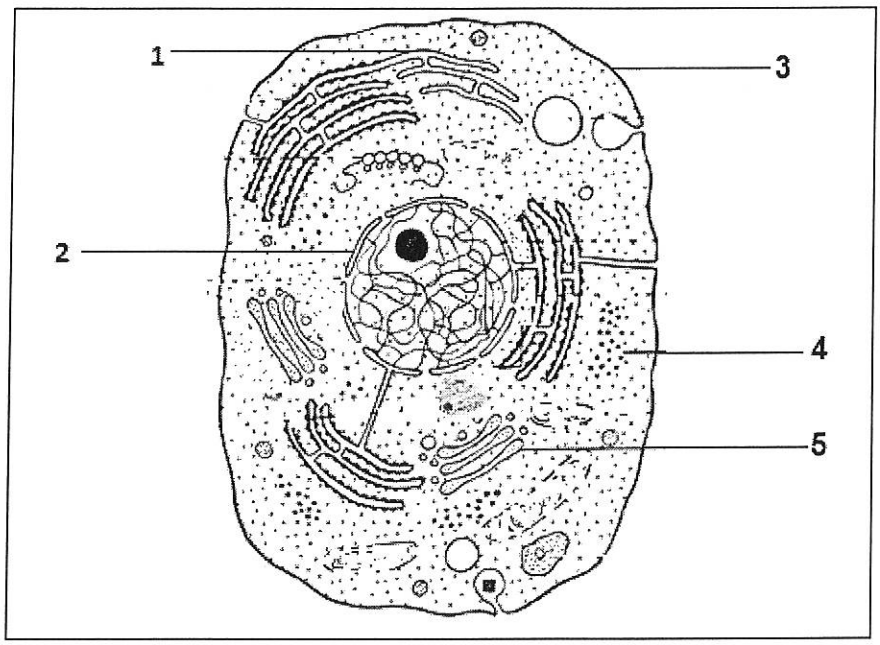
(10 x 1) **(10)**

1.3 Indicate whether each of the descriptions 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 	A: L/S of long bone B: Haversian system of bone
1.3.2 	A: Epidermis of leaf B: Epidermis of root
1.3.3 	A: Biceps relaxed B: Triceps contracted
1.3.4 	A: Three chromosomes B: Six chromatids
1.3.5 	A: Fluid mosaic model B: Plasmalemma

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

1.4 The following diagram represent a type of cell.



1.4.1 Animal cells are different from plant cells in various ways.

(a) Is this a plant or an animal cell? (1)

(b) Give ONE visible reason for your answer in QUESTION 1.4.1a. (1)

1.4.2 State the NUMBER and NAME of the part ...

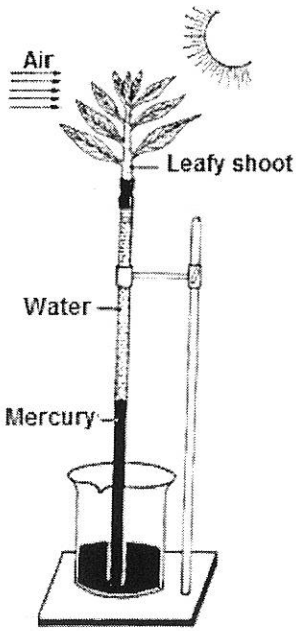
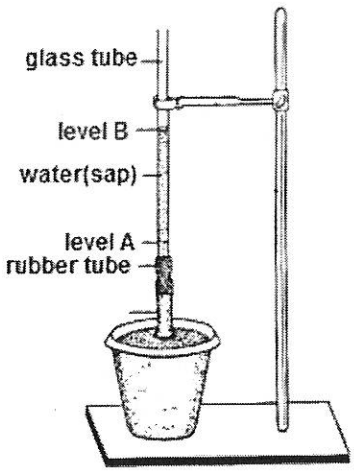
(a) that is the site of protein synthesis. (2)

(b) encloses the nucleus. (2)

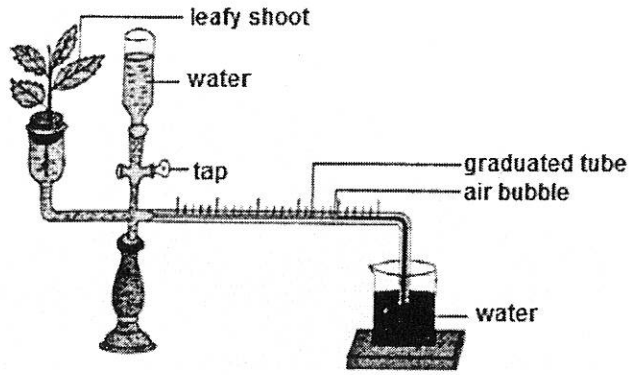
1.4.3 What evidence in the diagram indicates that this cell may be found in a glandular organ of the body? (2)

1.4.4 Explain the consequence to the cell if it was placed in a strong salt solution. (2)
(10)

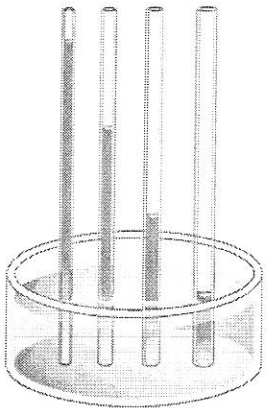
1.5 Match the investigation in COLUMN I with the AIMS of the experimentsin COLUMN II, by writing only the LETTER next to the question numbers 1.5.1 to 1.5.5.

COLUMN I	COLUMN 11
1.5.1 	A. To determine the factors affecting the rate of transpiration B. To demonstrate the suction force of transpiration C. To investigate diffusion D. To demonstrate root pressure E. To determine the path of water through the plant F. To demonstrate capillarity
1.5.2 	
1.5.3 see next page	

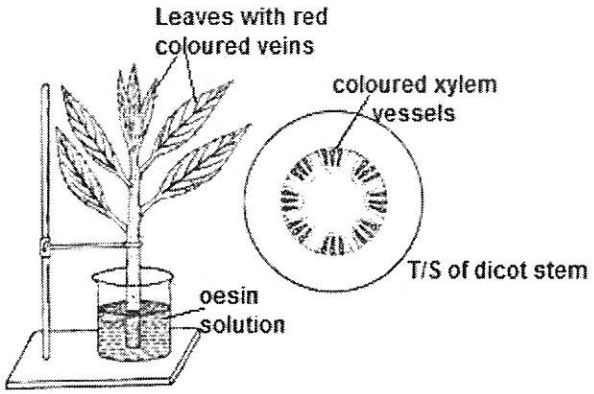
1.5.3



1.5.4



1.5.5

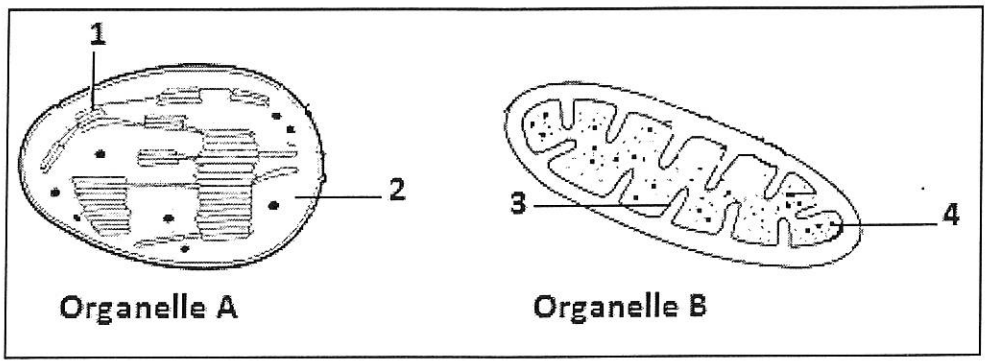


(5 x 2) **(10)**

TOTAL SECTION A: 50

SECTION B
QUESTION 2

2.1 The diagrams below represents TWO cellular organelles.



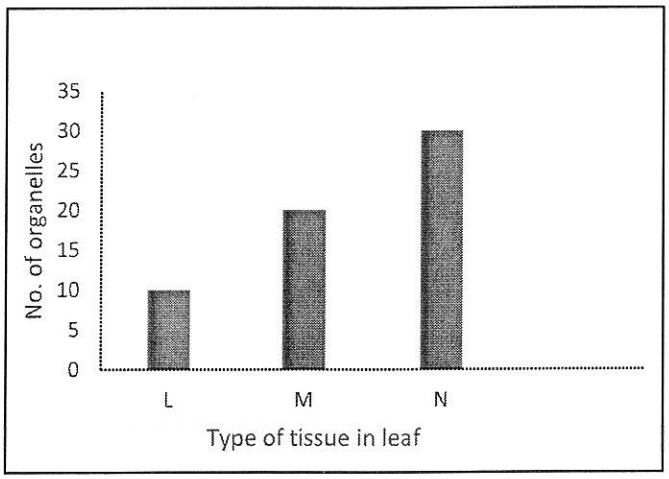
2.1.1 Identify the organelle and state the metabolic process that occurs in each:
(a) Organelle **A**
(b) Organelle **B** (4)

2.1.2 Provide labels for the parts marked **1**, **2**, **3** and **4**. (4)

2.1.3 a) Which organelle, (**A** or **B**), is found in both plant and animal cells? (1)

b) State the reason why this organelle is needed in both types of cells. (1)

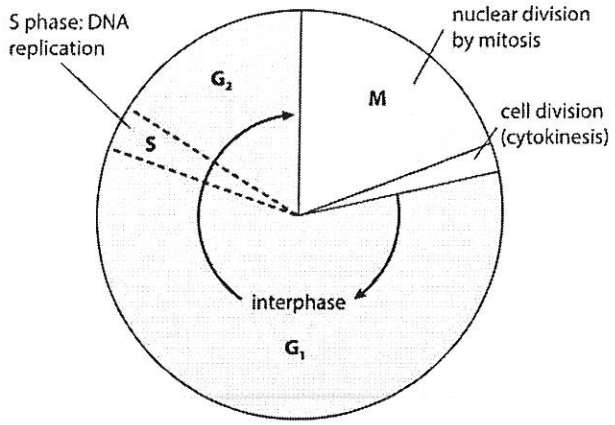
2.1.4 The graph below is based on organelle A.



(a) Name the leaf tissue that **M** and **N** represents, respectively. (2)

(b) Tissue **L** is found on the epidermis. What is the main role of these cells in the epidermis? (1)
(12)

2.2 The PIE CHART below shows the CELL CYCLE of an animal cell.

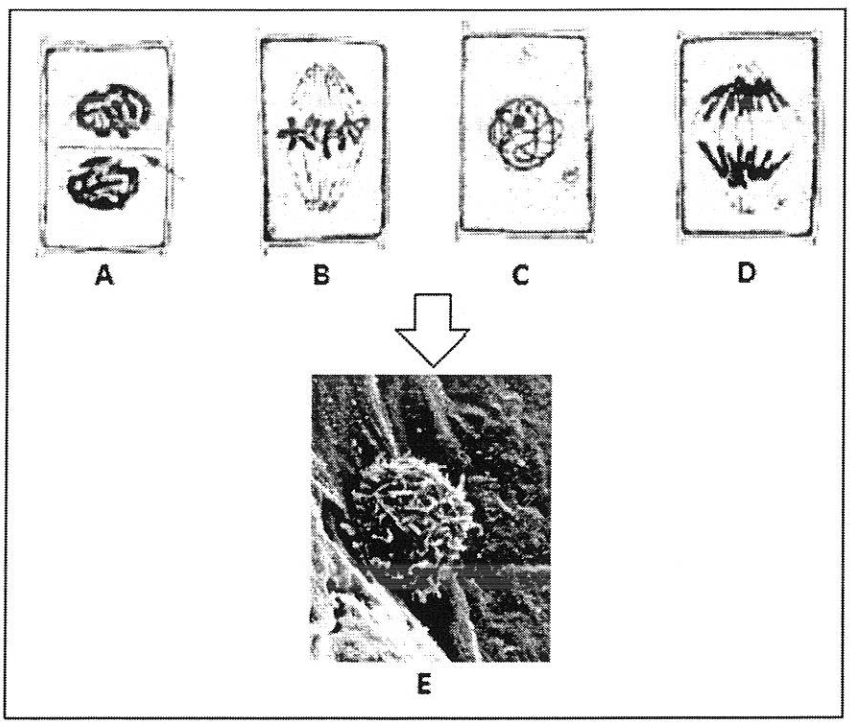


2.2.1 Name the longest stage in the cell cycle. (1)

2.2.2 Explain the significance of DNA replication in the cell cycle (2)

2.2.3 Calculate the percentage of time taken for cell division in the cell cycle. (hint: you will need a protractor) (3) **(6)**

2.3 The micrographs below depict plant cells undergoing a process. Refer to the next page for the questions set on it.



2.3.1 Provide the term for:
a) the process made up of micrographs **A** to **D**.
b) the phase shown in micrograph **B**. (2)

2.3.2 List the micrographs **A** to **D** in the correct sequence in which they would occur in the process you named in QUESTION 2.3.1a. (2)

2.3.3 Describe what is occurring within the cell in the phase shown in micrograph **D**. (4)

2.3.4 If the process shown in micrographs **A** to **D** become uncontrolled in the breast of a female, the structure shown in diagram **E** is the result.

What treatment would you recommend? Provide ONE reason for your answer. (2)
(10)

2.4 A survey was conducted on 2000 people based on the following question:

"*Do you favour or oppose medical research using embryonic stem cells*?"

The following results were recorded:

Opinion	Number of people
Strongly favour	680
Somewhat favour	480
Somewhat oppose	220
Strongly oppose	360
Don't know	260

2.4.1 Draw a BAR GRAPH to represent the above results. (6)

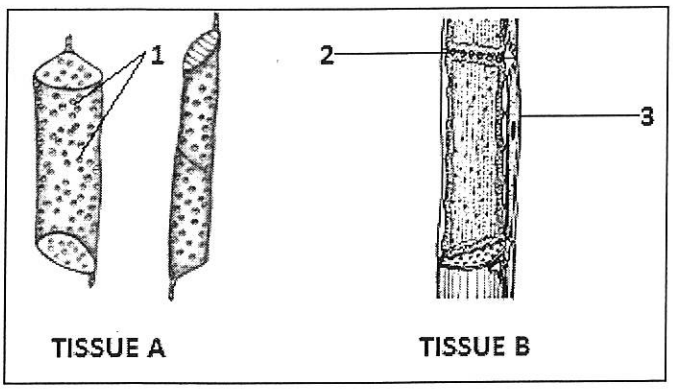
2.4.2 What can be done to ensure that the results are more reliable? (1)

2.4.3 Stem cells are used in the process of cloning.

a) State TWO arguments for cloning.
b) State TWO arguments against cloning (4)
(11)
[40]

QUESTION 3

3.1 The diagrams below represents plant tissue that play a role in transport.



3.1.1 Identify tissue **A.** (1)

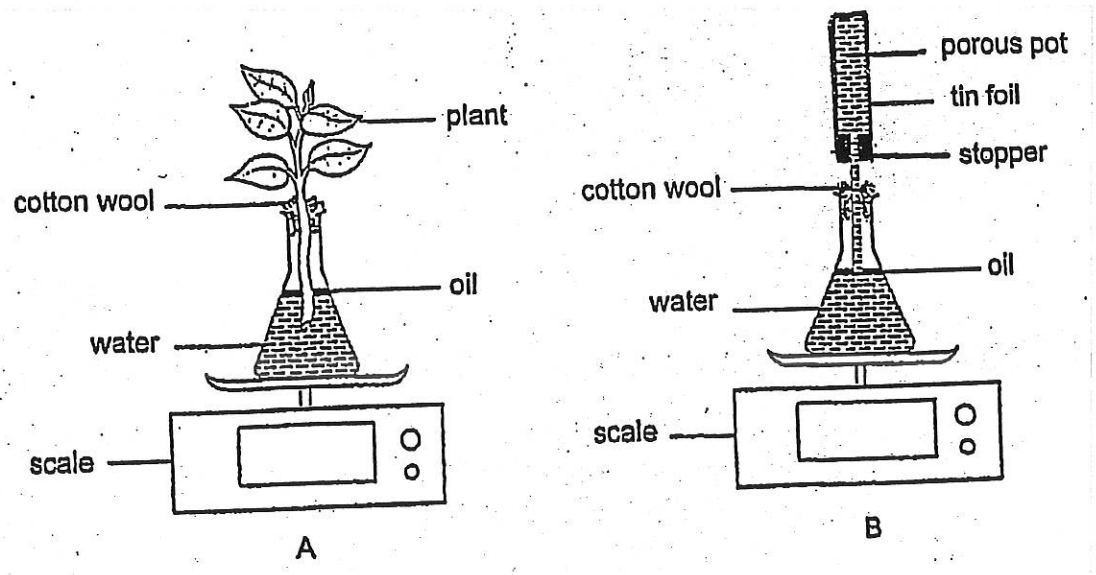
3.1.2 Provide labels for:
a) part marked **2**, and
b) cell marked **3**. (2)

3.1.3 State the other function of the tissue **A**. (1)

3.1.4 Tabulate TWO structural differences between tissue **A** and tissue **B.** (5)

3.1.5 Explain the role of the structures marked **1,** in diagram **A.** (2)
(11)

3.2 The rate of the loss of water from the leaves can be measured by determining the mass of the plant at one-hour intervals. An investigation was done to determine the effect of light intensity on the rate of water loss. The apparatus illustrated was used for the investigation.



The procedure was as follows:

- Apparatus A was used to measure the rate of water loss from the leaves at several light intensities.
- Apparatus B was used to measure water loss through a porous pot during the same period.
- At each light intensity the apparatus was left for 15 minutes before starting the measurement.
- The water loss was calculated and recorded in the dark at four different light intensities.
- The results are recorded in the table below:

Light intensities (kilolux)	Loss of water (g/hour)	
	Apparatus A	Apparatus B
0	1	0
10	15	0
20	20	0
30	22	0
40	22	0

3.2.1 Name the process by which the plant loses water as vapour in apparatus A. (1)

3.2.2 Why is it necessary to cut the stem under water? (1)

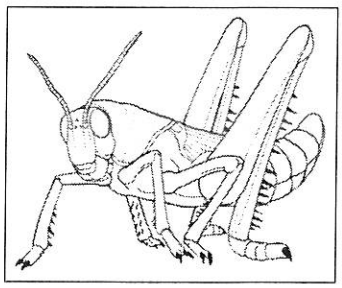
3.2.3 How do the results in apparatus B allow you to conclude that other environmental conditions remained unchanged during the investigation? (1)

3.2.4 Describe the relationship between water loss and light intensity as observed in the plant. (2)

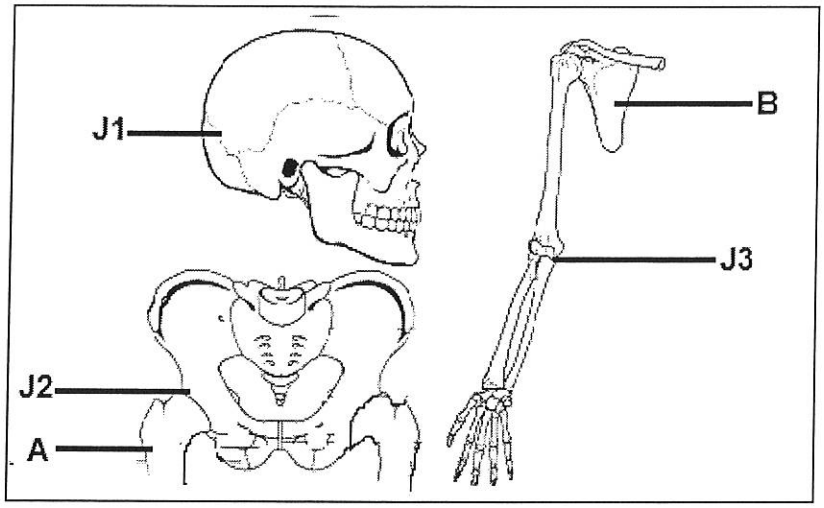
3.2.5 At which light intensity would you expect the stomata to be fully opened? (1)

3.2.6 State TWO features of plant leaf that help reduce the process mentioned in QUESTION 3.2.1. (2)
(8)

3.3 The diagram below and in the next page represent two different types of skeleton. Study them and answer the questions which follow.



SKELETON X



SKELETON Y

3.3.1 Identify the bones labelled **A** and **B**, respectively. (2)

3.3.2 The parts labelled **J1, J2** and **J3** indicate three joints.

(a) Name the synovial joints at **J2** and **J3**, respectively. (2)

(b) **J1** is different from the other two joints. State clearly how they are different. (2)

3.3.3 Mention ONE advantage and ONE disadvantage each of the types of skeleton **X** and **Y**. (4)
(10)

3.4 During a race, representing South Africa in the Olympic Games, an athlete suffered injury to the ligament of his right knee. As a result, he was not allowed to participate in competitions for the next six weeks. During this time he was only paid one third of his monthly income.

3.4.1 Explain the role of a ligament in the skeleton. (2)

3.4.2 Explain ONE reason why you think the decision to only pay a part of the monthly income, is strategy on behalf of this sports association. (2)

3.4.3 After six weeks the athlete found that the knee injury was permanent. He had surgery to fit in an artificial knee, which could perform better than his original knee.

Explain why he must reveal this information to the officials before he participates in further races. (2)

3.4.4 Draw and label a synovial joint , to show the position of ligaments. (5)
(11)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Thousands of chemical reactions take place in living cells. Cells produce specific biological catalysts to make these chemical reactions to occur at a suitable rate for the survival of organisms. These catalysts are enzymes.

Discuss the composition of enzymes, how they work (their specificity), their sensitivity and their uses in everyday life. (17)
(3)
(20)

Content:
Synthesis:

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

TOTAL SECTION C: 20
GRAND TOTAL: 150

Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES
FINAL EXAMINATION
MEMORANDUM – NOVEMBER 2018

SECONDARY SCHOOL

GRADE 10
PAPER ONE

MARKS: 150

This memorandum consists of 9 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for, but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required, but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks.

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the national memo discussion meeting.

14. **If only the letter is asked for, but only the name is given (and vice versa)**
    Do not credit.

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately.

16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. **Caption**
    All illustrations (diagrams, graphs, tables, etc.) must have a caption.

SECTION A

QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	D✓✓		
	1.1.3	D✓✓		
	1.1.4	B✓✓		
	1.1.5	A✓✓		
			(5 x 2)	**(10)**
1.2	1.2.1	immunity✓		
	1.2.2	vacuole✓		
	1.2.3	smooth✓muscle		
	1.2.4	meristematic✓		
	1.2.5	endodermis✓		
	1.2.6	DNA✓		
	1.2.7	chondrocytes✓		
	1.2.8	White blood cells✓/leucocytes		
	1.2.9	collenchyma✓		
	1.2.10	vaccine✓	(10 x 1)	**(10)**
1.3	1.3.1	B only✓✓		
	1.3.2	B only✓✓		
	1.3.3	None✓✓		
	1.3.4	Both✓✓		
	1.3.5	Both✓✓	(5 x 2)	**(10)**
1.4	1.4.1	a) Animal cell✓		(1)
		b) -surrounded by a cell membrane only✓ / -centrosome/centriole present/ -irregular shape/ -small vacuoles		(1)
	1.4.2	a) 4✓ – ribosome✓		
		b) 2✓ – nuclear membrane✓		(4)
	1.4.3	Presence of golgi bodies✓✓		(2)
	1.4.4	-it will lose water by osmosis✓ -and dehydrate✓		(2) **(10)**
1.5	1.5.1	B✓✓		
	1.5.2	D✓✓		
	1.5.3	A✓✓		
	1.5.4	F✓✓		
	1.5.5	E✓✓		
			(5 x 2)	**(10)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 a) chloroplast✓– photosynthesis✓
b) mitochondrion✓ – cellular respiration✓ (4)

2.1.2 1 – granum✓/lamella/thylakoid
2 – stroma✓
3 – crista✓
4 – ribosome✓ (4)

2.1.3 a) Organelle B✓ (1)
b) to provide energy for cells✓ (1)

2.1.4 a) M – spongy mesophyll✓ (2)
N - palisade mesophyll✓
(1)
b) open and close the stoma✓ **(13)**

2.2 2.2.1 interphase✓ (1)

2.2.2 -to duplicate the DNA✓
-for mitosis✓/for cell division (2)
OR
-to ensure that there is enough genetic material✓
-for both✓ daughter cells
(3)

2.2.3 $\frac{78^0}{360^0}$ ✓ x 100✓ **(6)**
= 20,27%✓/20%

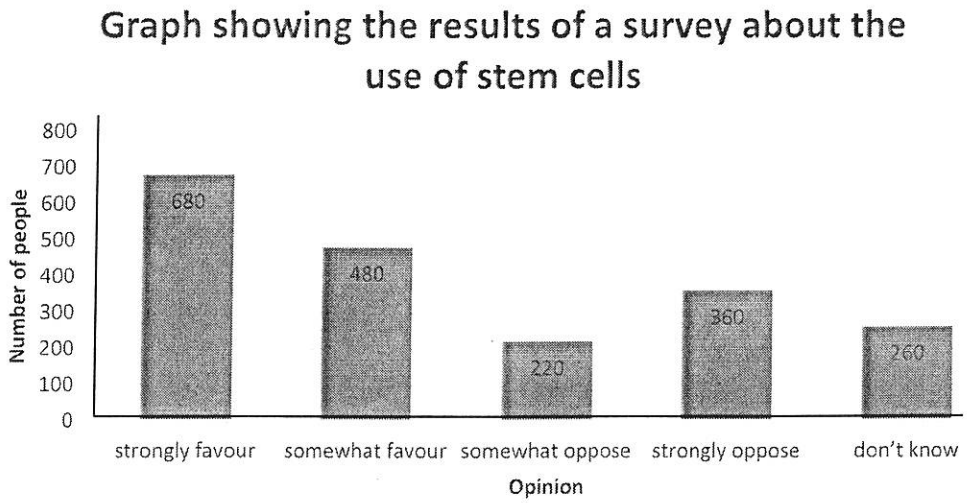
2.3 2.3.1 a) mitosis✓
b) metaphase✓ (2)

2.3.2 C B D A✓✓ **(no part marks)** (2)

2.3.3 -spindle fibres/threads contract✓
-chromatids pulled apart✓/daughter chromosomes moving to poles
-centromere splits✓/divides
-cell plate forms at the equator✓/cytokinesis begins (4)

2.3.4 Chemotherapy✓/radiation – to kill✓ the cancerous cells,
OR (2)
Surgery – to remove✓ the cancerous cells
(any 1x2)
(10)

2.4 2.4.1



Title of graph	1
Type of graph	1
Labels for X and Y axes	1
Scale for X and Y axes, width of bars, spaces between bars	1
Plotting bars	2 - all bars correct 1 – one to four bars correct

(6)

2.4.2 increase the sample surveyed✓/ use more than 2000 people (1)

2.4.3 a) - extend life capabilities✓
- replace damaged organs/tissues✓
- solve fertility problems
- increase organisms with desired charcteristics (2)

b) - expensive/only the rich can afford✓
- playing God/ethical issues✓
- uncertain about the survival of the clone
- decrease gene diversity/ and its cosequences (2)

(11)

[40]

QUESTION 3

3.1 3.1.1 Xylem ✓ (1)

3.1.2 a) sieve plate✓
b) companion cell✓ (2)

3.1.3 strength/support✓
✓ (1)

3.1.4

Tissue A/xylem	**Tissue B/phloem**
dead✓	Living✓
Thickened/lignified walls✓	Thin walled✓
Pits on walls	Plasmodesmata on walls
Cross-walls absent or perforated	Sieve plates as cross walls
No supporting cell	Companion cells

1 + any (2x2) (5)

3.1.5 - Pits are cavities in the lignified walls✓of xylem tissue
- that assist in transporting water laterally✓ (2)
(11)

3.2 3.2.1 Transpiration ✓ (1)

3.2.2 To prevent the entry of air into the xylem✓ which will hinder the movement of water. (1)

3.2.3 The reading remained the same✓ /zero for **apparatus B** at all light intensities (1)

3.2.4 As the light intensity increases, the amount of water lost also increases, up to a point/optimum light intensity and then remains constant. ✓✓ (2)

3.2.5 30 t0 40 kilolux✓ (1)

3.2.6 - cuticle✓
- leaf hairs ✓/trichomes
- few stomata on dorsal side✓ **(mark first TWO only)** (2)
(8)

3.3 3.3.1 A – femur✓
B – scapular✓ (2)

3.3.2 a)J1 – ball and socket ✓
J2 – hinge joint✓

b) -J1 is an immovable /fixed joint✓ (2)
-while the other two are freely movable✓joints

3.3.3

	Skeleton X	Skeleton Y
Advantage	-protection from predators✓ /injury/dehydration	- allows flexibility during movement✓ - protect delicate internal organs - grows as the animal grows
Disadvantage	-Restricted growth✓ -animal must moult	-skin and muscles not ✓ protected -takes log time to heal after injury/restricts movement when skeleton damaged

(2)

(4)
(10)

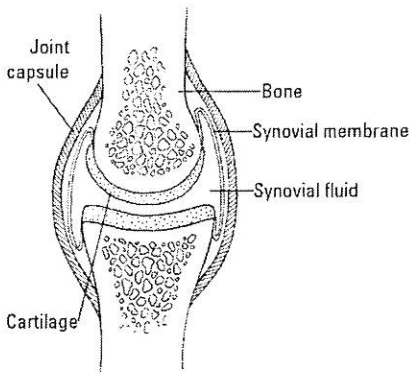
3.4 3.4.1 -It is a connective tissue✓
-to join bone to bone✓ (2)

3.4.2 -To prevent/control athlete✓
-from taking advantage of the situation✓

3.4.3 -officials need to decide whether he can participate or not✓
-so that he is not advantaged to other players✓ (2)

3.4.4

caption 1
Correct/neat drawing 1
Labels 3



Synovial joint

(2)

(5)
(11)

[40]

SECTION C

QUESTION 4

Composition of enzymes

- Organic✓ compound
- Protein✓ in nature
- Contain the elements carbon, hydrogen, oxygen✓ and nitrogen✓
- Monomers are amino acids✓ (3)

Enzyme specificity/how enzymes work

- Enzymes are very specific✓ with regards to the substrate they work on/reaction they catalyse
- Shape/structure of the enzyme✓ fits exactly with a particular substrate✓
- the substrate makes contact with the active site✓ of the enzyme
- like a 'lock and key'✓
- forming an enzyme -substrate complex✓
- the substrate then changes✓/ breaks down or builds up
- forming products✓
- the enzyme is not used up✓/not changed in the reaction
- the enzyme can be re-used✓ for another reaction (7)

Enzyme sensitivity

- Enzymes are sensitive to pH changes✓
- Enzymes are sensitive to temperature changes✓
- Enzymes denature✓/lose their shape and function
- at high temperature and in extreme pH✓
- Enzymes are inactive✓ at low temperature✓ (5)

Use of enzymes in everyday life

- Enzymes are used in washing powders,✓
- in beer making,✓
- in production of leather, ✓
- in production of fruit juices, ✓
- in the manufacture of baby foods, ✓
- in the rubber industry,
- in the dairy industry, ✓
- in baking✓ (2)

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
Only information related to composition, specificity, sensitivity, and everyday uses of ENZYMES are discussed.	Information on composition, specificity, sensitivity and everyday uses of ENZYMES are discussed in a logical manner.	- 2/3 enzyme composition - 4/6 on enzyme specificity - 3/5 on enzyme sensitivity - 2/2 on uses of enzymes
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150