education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES

COMMON TEST

JUNE 2018

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 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. Do 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 may use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided 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 1.1.8) in the ANSWER BOOK, for example 1.1.9 D.

1.1.1 Which ONE of the following is a meristematic tissue?

A Epidermis
B Cambium
C Parenchyma
D Sclerenchyma

1.1.2 In which phase does DNA replication take place?

A Metaphase
B Prophase
C Telophase
D Interphase

1.1.3 Striated muscle tissue is found ...

A in the walls of the heart.
B in voluntary muscles.
C lining the blood vessels.
D lining the intestine walls.

1.1.4 The foramen magnum is found at the base of the ...

A upper limb.
B lower limb.
C vertebral column.
D skull.

1.1.5 Which ONE of the following compounds is normally found in the cell wall of a plant cell?

A Fat
B Cellulose
C Glucose
D Amino acid

1.1.6 Below is a list of tissues.

(i) Squamous
(ii) Ciliated columnar
(iii) Muscle

Which ONE of the following most likely represents the order of tissues containing the highest to the lowest number of mitochondria?

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

QUESTIONS 1.1.7 AND 1.1.8 REFER TO THE FOLLOWING INVESTIGATION ON PULSE RATE.

An investigation was conducted to determine the effect of exercise on pulse rate.

The procedure was as follows:

- One person was used
- The investigation was done on 3 days
- On each of these 3 days:

  - The person followed the same diet
  - The person exercised for 10 minutes
  - The pulse was recorded 5 minutes before exercise and 5 minutes after exercise
  - Averages were calculated for the three days

1.1.7 Which ONE of the following increased the reliability of the investigation?

A Exercising for 10 minutes
B Using one person in the investigation
C Using an average of 3 readings
D Keeping the diet the same for all 3 days

1.1.8 Which ONE of the following will be a suitable hypothesis for the above investigation?

A To determine the effect of exercise on pulse rate
B Exercise will increase the pulse rate
C Exercise caused an increase in the pulse rate
D To determine the effect of diet on pulse rate

(8 x 2) **(16)**

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 Part of the skeleton made up of the skull, vertebral column, ribs and sternum

1.2.2 The triangular bone that forms the shoulder blade

1.2.3 An organelle within the cell where proteins are synthesised

1.2.4 The part of the skull that contains and protects the brain

1.2.5 A type of involuntary muscle found only in the heart

1.2.6 The muscles found between the ribs of a mammal

1.2.7 The first vertebra that connects the neck to the skull

1.2.8 A group of cells that have more or less the same structure and perform the same function

1.2.9 A structure that joins chromatids together

1.2.10 A process during which identical copies of DNA is formed

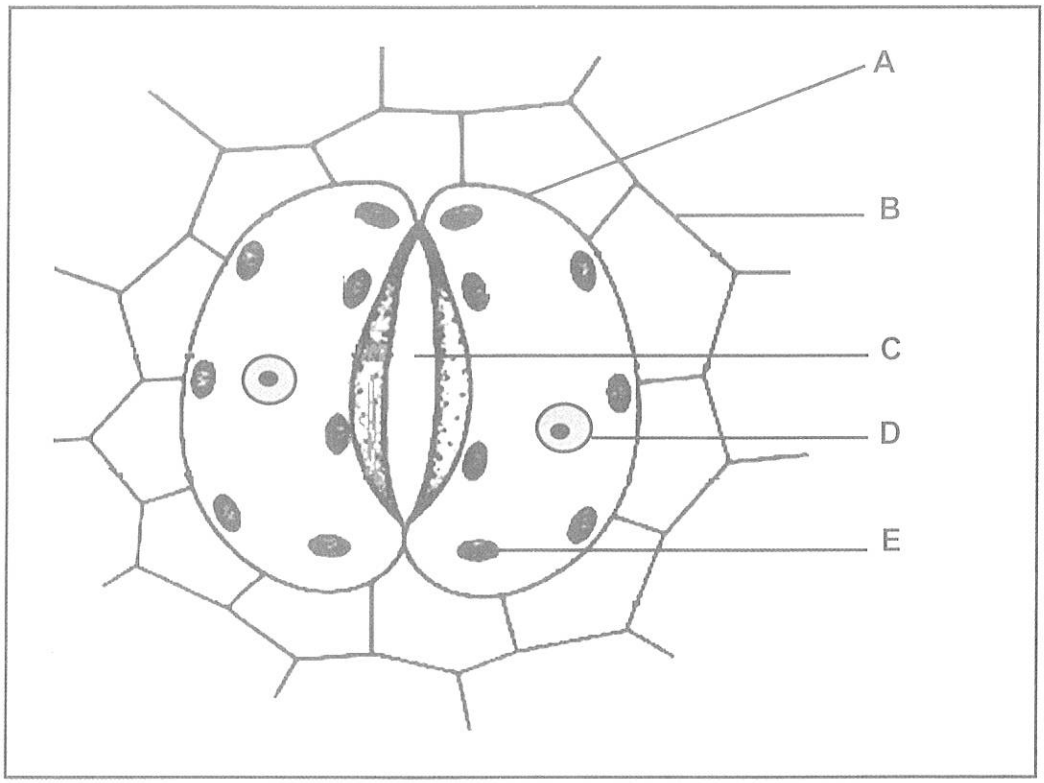
(10 x 1) **(10)**

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 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	A bone of the pectoral girdle	A Pubis B Scapula
1.3.2	A moveable joint	A Hinge B Gliding
1.3.3	Joins bone to bone	A Ligaments B Tendons

(3 x 2) **(6)**

1.4 Study the diagram below.



Give the LETTER and the NAME of the:

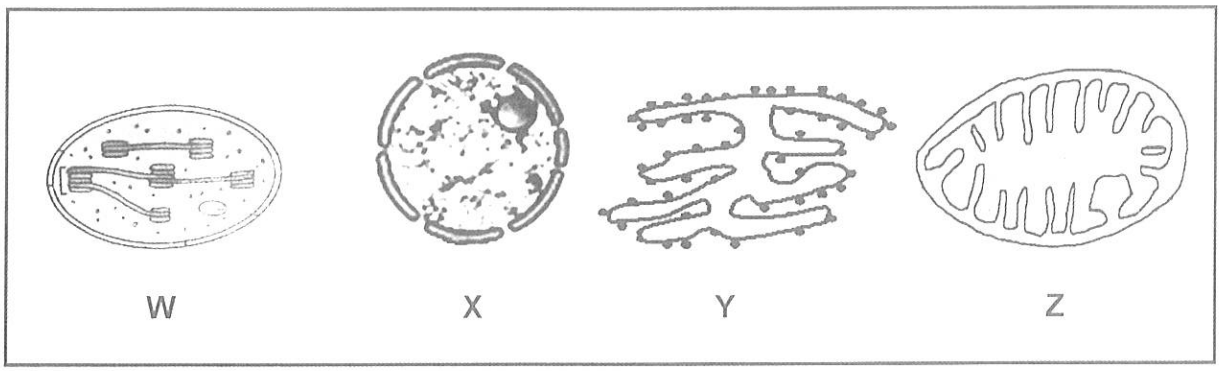
1.4.1 Specialised cell in which photosynthesis takes place (2)

1.4.2 Part through which transpiration takes place (2)

1.4.3 Organelle that contains chlorophyll (2)

(6)

1.5 Diagrams **W**, **X**, **Y** and **Z** below represent different cell organelles.



Give the LETTER and the NAME of the organelle that:

1.5.1 Contains cristae (2)

1.5.2 Controls cell activities (2)

1.5.3 Act as a communication system (2)

1.5.4 Is a plastid (2)
(8)

1.6 Write down the correct name of the **phase of mitosis** during which:

1.6.1 Cytokinesis is completed (1)

1.6.2 The chromatin network unwinds (1)

1.6.3 The chromatids are pulled towards opposite poles (1)

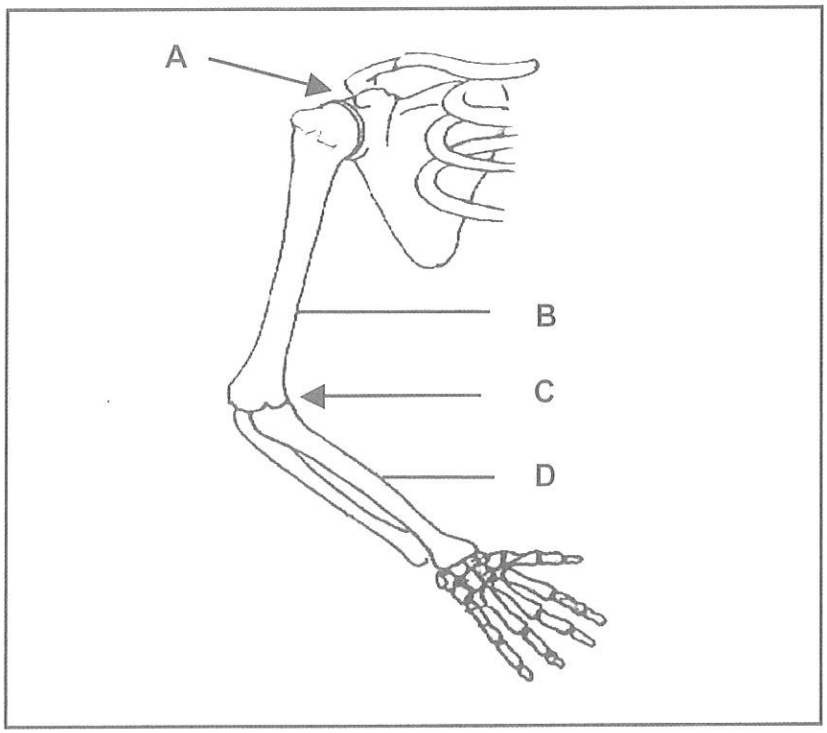
1.6.4 The chromosomes are arranged at the equator (1)
(4)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the pectoral girdle.



2.1.1 Identify:

(a) The type of joint at **A** (1)

(b) Bone **B** (1)

2.1.2 Different types of muscles are found on either side of bone **B**.

Explain how these muscles work together to allow for movement of the arm. (3)

2.1.3 Ligaments join bone **B** to bone **D**.

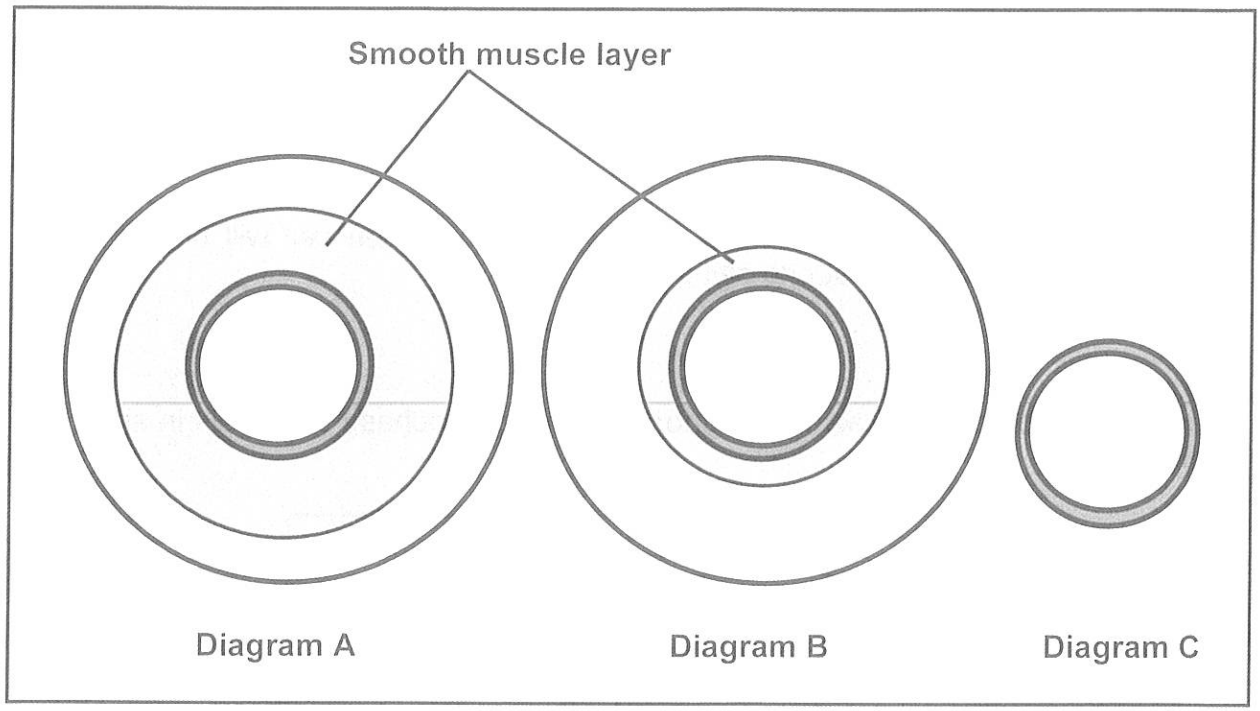
Explain why you would expect ligaments to be made of yellow elastic tissue rather than white fibrous tissue. (3)

2.1.4 Name the disease that affects the joint at **C** when the cartilage breaks down. (1)

2.1.5 Describe the disease that you mentioned in Question 2.1.4. (2)

2.1.6 Name the mineral that may cause osteoporosis if it is in short supply. (1)
(12)

2.2 Diagrams **A**, **B** and **C** below represent three types of blood vessels.



2.2.1 Identify the type of blood vessel in:

(a) Diagram **B** (1)

(b) Diagram **C** (1)

2.2.2 Explain why the blood vessel in Diagram **A** has a thicker smooth muscle layer. (2)

2.2.3 Explain ONE structural adaptation of the blood vessel in Diagram **C**. (2)

2.2.4 Tabulate TWO differences between the composition of blood in the pulmonary artery and in the pulmonary vein. (5)
(11)

2.3 Explain TWO structural adaptations of ciliated columnar epithelial cells for its function. **(4)**

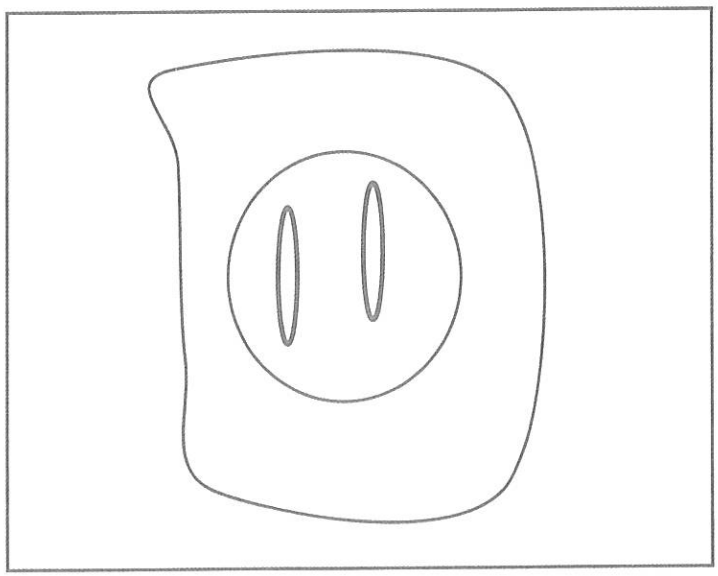
2.4 An onion cell was placed in a beaker containing a strong salt solution. It was noticed that after a few hours, the size of the vacuole was reduced.

2.4.1 Describe the process that is responsible for the decrease in the size of the vacuole. (4)

2.4.2 Explain how active transport/absorption differs from the process described in Question 2.4.1. (2)

2.4.3 Give ONE reason why the cell wall of the onion cell will not be affected by the strong salt solution. (1)
(7)

2.5 The diagram below represents a cell formed during telophase of mitosis in an animal.



2.5.1 Draw a labelled diagram to show the cell above during metaphase of mitosis. (5)

2.5.2 How many chromosomes were present in the original cell which gave rise to the cell represented in the diagram above? (1)
(6)
[40]

QUESTION 3

3.1 Study the extract and the table below.

VEGETABLES THAT CONTAIN PROTEINS AND CARBOHYDRATES

Beans and other legumes are such good sources of proteins that you can count them toward either your recommended protein servings or your recommended vegetable servings.

Different types of beans and legumes such as a cup of canned navy beans, a cup of canned great northern beans and other legumes with at least 15 grams of proteins per cup include chickpeas, kidney beans and black beans.

The table below shows the protein and the carbohydrate content in different vegetables.

VEGETABLE TYPE	PROTEINS (g)	CARBOHYDRATES (g)
Canned navy beans	19	33,6
Canned northern beans	17	55,1
Chickpeas	15	0,0
Kidney beans	15	0,0

3.1.1 Which TWO bean types in the extract other than northern beans, consist of proteins? (2)

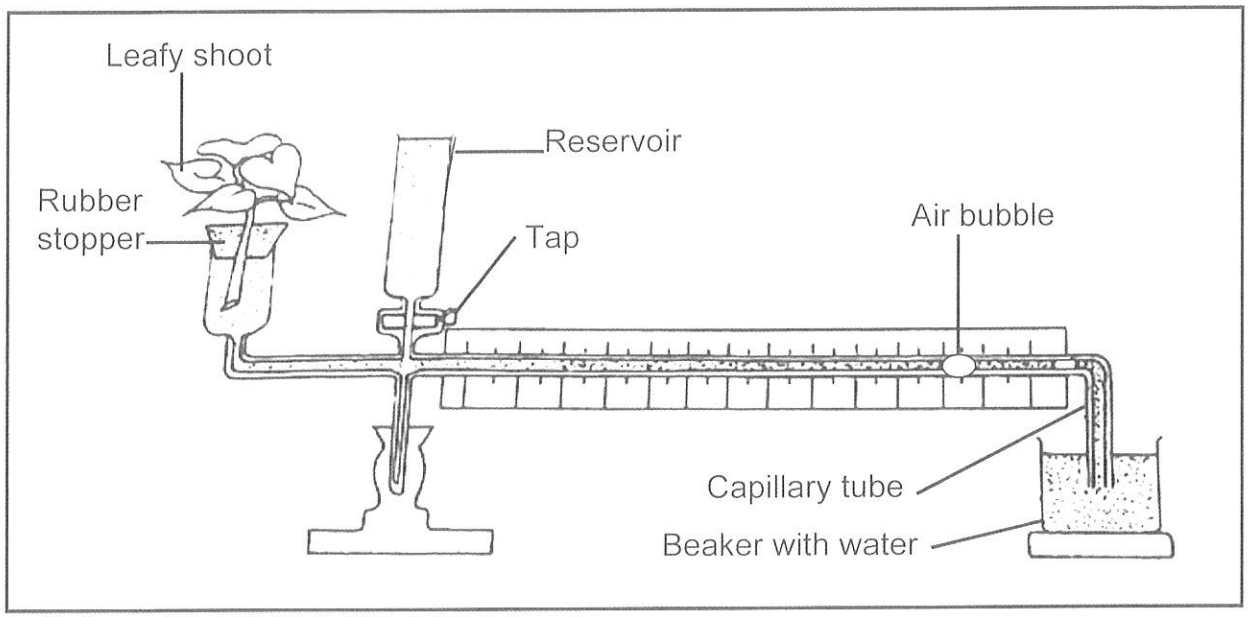
3.1.2 Which vegetable type will be highly recommended for a patient lacking energy? (1)

3.1.3 Give a reason for your answer in Question 3.1.2. (1)

3.1.4 Determine the ratio of protein : carbohydrate in navy beans. Round of your answer to two decimal places. (2)

3.1.5 Draw a bar graph to represent the protein content in the different vegetables. (6)
(12)

3.2 A group of Grade 10 learners set up the apparatus shown below to investigate the effect of temperature on the rate of transpiration. This investigation was done three times.



3.2.1 Identify the apparatus shown above. (1)

3.2.2 For this investigation identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.2.3 Explain why the leafy shoot should be cut underwater. (2)

3.2.4 Explain the purpose of the air bubble. (2)

3.2.5 What is the purpose of the water in the reservoir? (1)

3.2.6 State ONE way in which the Grade 10 learners ensured the reliability of this investigation. (1)

3.2.7 State TWO factors that should be kept constant in this investigation. (2)
(11)

3.3 The diagrams below represent plant tissues.

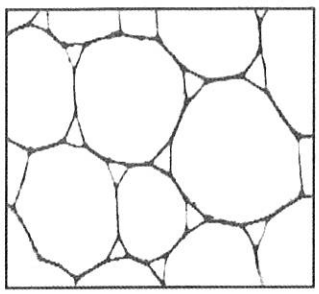


Diagram I

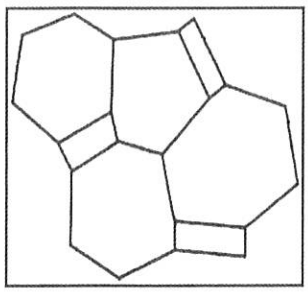


Diagram II

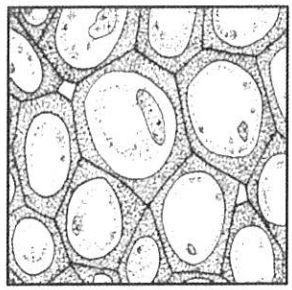


Diagram III

3.3.1 Identify the tissue in:

(a) Diagram **I** (1)

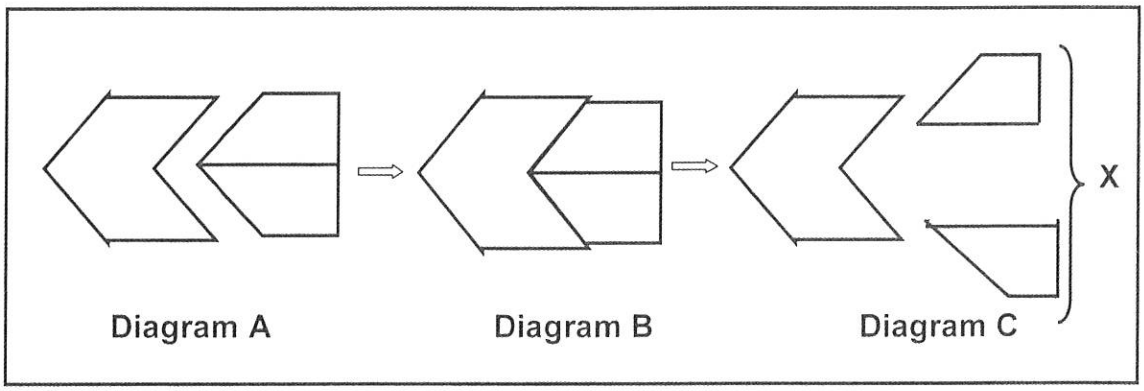
(b) Diagram **III** (1)

3.3.2 Explain ONE consequence if the holes of the sieve plates in the tissue in Diagram **II** become blocked. (2)

3.3.3 Explain TWO structural adaptations of the cells in the tissue in Diagram **I**. (4)

3.3.4 Explain ONE structural adaptation of the cells in the tissue in Diagram **III**. (2)
(10)

3.4 Diagrams **A**, **B** and **C** below represent a property of enzymes.



3.4.1 Which property of enzyme is illustrated in the diagram above? (1)

3.4.2 Identify:

(a) Diagram **B** (1)

(b) Part **X** (1)

3.4.3 State TWO properties of enzymes other than the one represented by the diagram above. (2)

3.4.4 Give TWO ways in which enzymes are biologically important in industry. (2)
(7)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Essential substances must be transported to all parts of a plant or animal.

Describe the absorption of water by a root hair of a plant and how this water moves laterally across the root to the xylem. Also describe the events of the cardiac cycle that moves blood containing oxygen and glucose through the human body.

Content: (17)
Synthesis: (3)
(20)

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

TOTAL SECTION C: 20

GRAND TOTAL: 150

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES

JUNE 2018 COMMON TEST

MEMORANDUM

MARKS: 150

This memorandum consists of 7 pages.

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	D✓✓		
	1.1.3	B✓✓/A		
	1.1.4	D✓✓		
	1.1.5	B✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	B✓✓		
			(8 x 2)	**(16)**
1.2	1.2.1	Axial✓skeleton		
	1.2.2	Scapula✓		
	1.2.3	Ribosome✓		
	1.2.4	Cranium✓		
	1.2.5	Cardiac✓muscle		
	1.2.6	Intercostal✓muscles/skeletal muscle		
	1.2.7	Atlas✓		
	1.2.8	Tissue✓		
	1.2.9	Centromere✓		
	1.2.10	Replication✓		
			(10 x 1)	**(10)**
1.3	1.3.1	B only✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	A only✓✓		
			(3 x 2)	**(6)**
1.4	1.4.1	A✓ Guard cell✓		(2)
	1.4.2	C✓ Stoma✓ /Stomata		(2)
	1.4.3	E✓ Chloroplast✓		(2)
				(6)
1.5	1.5.1	Z✓ Mitochondrion✓		(2)
	1.5.2	X✓ Nucleus✓		(2)
	1.5.3	Y✓ Endoplasmic reticulum✓		(2)
	1.5.4	W✓Chloroplast✓		(2)
				(8)
1.6	1.6.1	Telophase✓		(1)
	1.6.2	Prophase✓		(1)
	1.6.3	Anaphase✓		(1)
	1.6.4	Metaphase✓		(1)
				(4)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) Ball and socket✓ joint /zygnoid (1)

(b) Humerus✓ (1)

2.1.2 - They work antagonistically✓
- When one contracts✓
- the other relaxes✓ (3)

2.1.3 - Yellow elastic tissue enables ligaments to stretch✓ movement at joint
- allowing bones to move in different directions✓/flexibility at joint
- White fibrous tissue has non-elastic fibres✓
- which make it unable to stretch✓ Any (3)

2.1.4 Arthritis✓ (1)

2.1.5 - Bones rub together✓ /fracture /cartilage breakdown
- causing pain/and inflammation✓ /discomfort (2)

2.1.6 Calcium✓ (1)
(12)

2.2 2.2.1 (a) Vein✓ (1)
(b) Capillary✓ (1)

2.2.2 - To withstand the high pressure✓
- created by the pumping of the heart✓ (2)

2.2.3 - Single layer of cells✓ for easy diffusion of substances
- to allow oxygen and nutrients to diffuse into the tissues✓/CO_2 and excretory waste to diffuse from the tissues (2)

2.2.4

Pulmonary artery	Pulmonary vein
Low concentration of oxygen✓	High concentration of oxygen✓
High concentration of carbon dioxide✓	Low concentration of carbon dioxide✓
High concentration of glucose✓	Low concentration of glucose✓
Low concentration of metabolic waste✓	High concentration of metabolic waste✓

deoxygenated — oxygenated

Table (1) and (Any 2 x 2) (5)
(11)

2.3 - They have goblet cells✓
- secreting mucus to trap dust✓

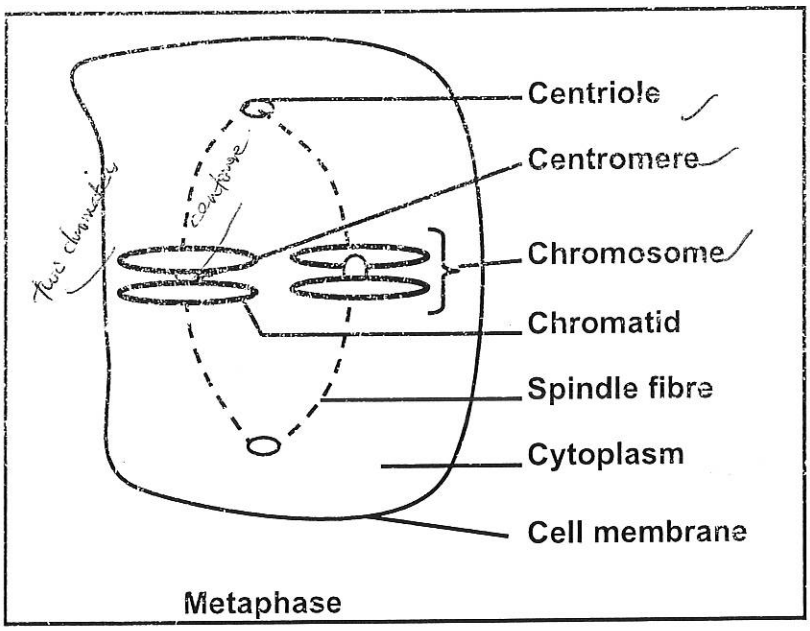
- Have cilia✓
- which beat to remove dust✓ / moving substances (2 x 2) **(4)**

2.4 2.4.1 movement of H2O from a region of high water potential across a DPM ✓
- Water molecules moved from the onion cell✓
- where there was a higher concentration of water✓ / high water potential
- to the strong salt solution in the beaker✓
- across a differentially permeable membrane✓ (4)

2.4.2 - Substances move against a concentration gradient✓
- using energy✓ / low to high conc. (2)

2.4.3 Cell wall is rigid✓ (1)
(7)

2.5 2.5.1



MARK ALLOCATION FOR DIAGRAM

2 chromosomes represented each with 2 chromatids) (**N**)	1
Chromosomes in middle (**C**)	1
Any THREE correct labels	3
Total	**5**

(5)

2.5.2 2✓ (1)
(6)
[40]

QUESTION 3

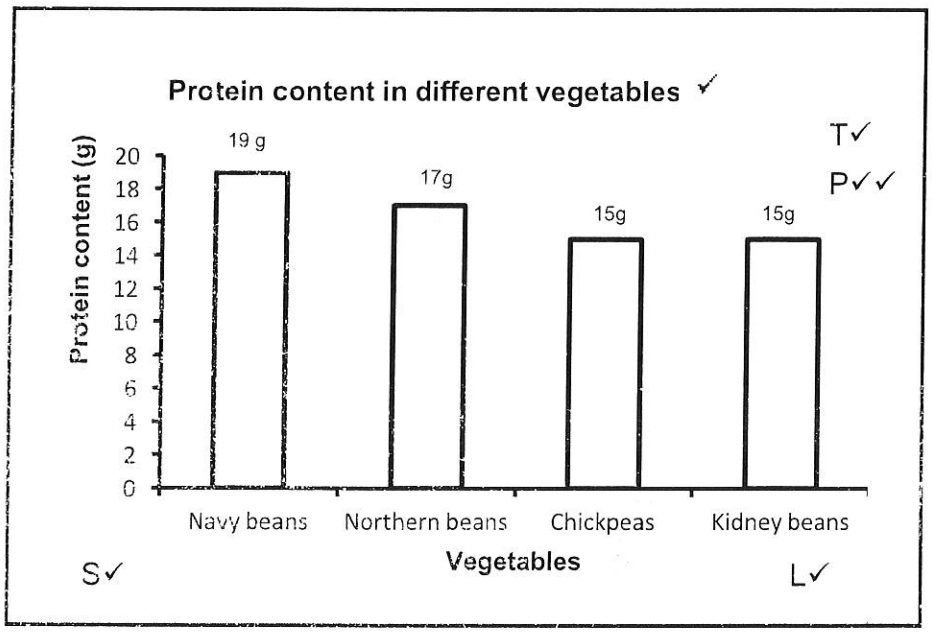
3.1 3.1.1 - Navy beans✓
- Kidney beans✓
- Black beans✓ Any (2)

3.1.2 Northern beans✓ (1)

3.1.3 Has most carbohydrates✓ (1)

3.1.4 1:1,77✓✓ (2)

3.1.5



Mark allocation of the graph

Criteria	Marks
Bar graph drawn (**T**)	1
Title of graph (including both variables)	1
Correct scale for X-axis (equal width and spacing of the bars) **and** Y-axis (**S**)	1
Correct label and unit for X-axis and Y-axis (**L**)	1
Plotting of the bars (**P**)	0: No bars plotted correctly 1: 1 to 3 bars plotted correctly 2: All 4 bars plotted correctly

(6)
(12)

3.2	3.2.1	Potometer✓		(1)
	3.2.2	(a) Temperature✓ (b) Rate of transpiration✓		(1) (1)
	3.2.3	- To prevent air from entering✓ - and blocking the xylem vessels✓		(2)
	3.2.4	- To measure the rate of absorption✓ used as a marker ✓ - which indicates the rate of transpiration✓ To show movement of H_2O ✓		(2)
	3.2.5	To move the air bubble back✓		(1)
	3.2.6	They did the investigation three times✓/repeated the investigation		(1)
	3.2.7	- Same apparatus✓/potometer - Same light intensity✓/wind/humidity Heat - Same person✓ to conduct investigation **(Mark first TWO only)**	Any	(2) **(11)**
3.3	3.3.1	(a) Parenchyma✓ (b) Collenchyma✓		(1) (1)
	3.3.2	- No movement of food from one cell to the other✓ - and no food from leaves to other plant parts✓		(2)
	3.3.3	- Has thin cell wall✓ for easy osmosis allowing movement of water and mineral salts✓ - Has large vacuole✓ to store water✓ - Has large intercellular air space✓ ~~for~~ osmosis / diffusion to allow gaseous exchange✓ **(Mark first TWO only)**	Any	(4)
	3.3.4	- Has thick cell wall✓ thickened cornes - for strength and support✓		(2) **(10)**
3.4	3.4.1	Enzymes work on a specific substrate only✓/ enzymes are specific		(1)
	3.4.2	(a) Enzyme-substrate complex✓ (b) Products✓		(1) (1)
	3.4.3	- Enzymes are sensitive to temperature✓change - Enzymes are sensitive to pH✓change		(2)
	3.4.4	- Tenderising meat✓ - Removing hair✓ producing leather from hide - Making beer✓/wine/ vinegar/ chocolates/ syrups / Yoghurt making baby food. - Washing powders✓ **(Mark first TWO only)**	Any	(2) **(7)** **[40]**

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Absorption and lateral movement of water to the xylem

- The water potential of the soil solution is higher✓
- than that of the cell sap✓of the root hair.
- Water moves from the soil solution by the process of osmosis✓
- through the cell wall✓
- and the differentially permeable cell membrane✓
- and the cytoplasm✓
- into the vacuole✓ of root hair
- The water potential of root hair increases✓
- and is higher than that of the adjacent cortical cells✓
- Water diffuses along a water potential gradient✓
- via intercellular air spaces✓
- or internally along the cell walls✓
- of the cortical cells✓
- through the endodermis✓/into the xylem

(Any 9) (9)

Cardiac cycle that moves blood containing oxygen

- **Atrial systole**✓/both atria contract at the same time
- The tricuspid and bicuspid valves open✓
- Blood flows from the atria into the ventricles✓
- **Ventricular systole**✓/both ventricles contract at the same time
- Both semi-lunar valves open✓
- Blood is forced from the right ventricle into the pulmonary artery✓
- and from the left ventricle into the aorta✓
- **General diastole**✓/heart relaxes
- Tricuspid and bicuspid valves open✓
- Blood enters the right atrium from the inferior and superior vena cava✓
- and blood enters the left atrium from the pulmonary vein✓

(Any 8) ~~(8)~~
Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logic sequence	Comprehensive
All information provided is relevant to the question	Ideas arranged in a logical cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All the information provided is relevant to the: - Absorption and lateral movement of water to the xylem - Cardiac cycle (oxygen) There is no irrelevant information	All the information regarding the: - Absorption and lateral movement of water to the xylem - Cardiac cycle (oxygen) Is arranged in a logical manner	At least the following points should be included: - Absorption and lateral movement of water to the xylem **(7/11)** - Cardiac cycle (oxygen)**(4/6)**
1 mark	**1 mark**	**1 mark**

TOTAL SECTION C: 20
GRAND TOTAL: 150

