

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 numbers (1.1.1 to 1.1.6) on your FOLIO PAPER, e.g. 1.1.7 D.

QUESTIONS 1.1.1 AND 1.1.2 ARE BASED ON THE FOLLOWING IMAGES SHOWING DEFICIENCY DISEASES.



Deficiency disease 1



bleeding gums

Deficiency disease 2

- 1.1.1 Deficiency disease **1** may be caused by a lack of ... in the diet.
- A only calcium
 - B only vitamin D
 - C magnesium and vitamin D
 - D calcium and/or vitamin D
- 1.1.2 Food sources that have a high concentration of the vitamin required to correct deficiency disease **2** are ...
- A tomatoes, lemons, strawberries and oranges.
 - B liver, egg yolk and milk.
 - C brown rice, whole grain bread and legumes.
 - D fish, red meat and seeds.
- 1.1.3 Which one of the following is not a function of mitosis?
- A Asexual reproduction in single-celled organisms.
 - B Maintains a constant chromosome number.
 - C Produces gametes (sperm cells and egg cells).
 - D Allows for growth and repair of tissues.

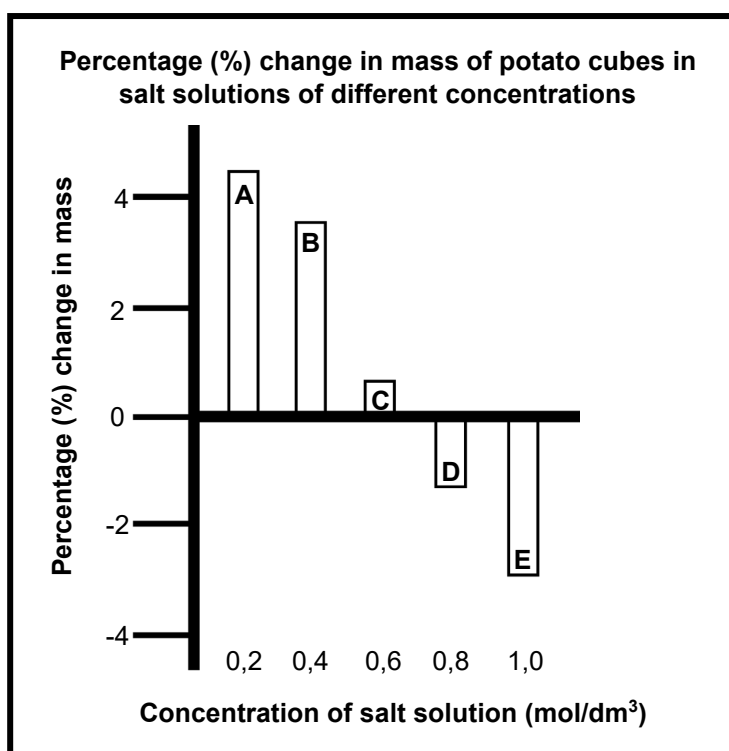
1.1.4 Which one of the following is a correct description of a process involving the transport of molecules?

- A Diffusion is used to transport molecules against the concentration gradient.
- B Active transport is used to obtain molecules in a low concentration environment.
- C In active transport substances move along the concentration gradient.
- D Diffusion uses energy to transport molecules into cells.

QUESTIONS 1.1.5 AND 1.1.6 ARE BASED ON THE FOLLOWING INVESTIGATION ON OSMOSIS.

- A potato was cut into five cubes (**A** to **E**).
- Each cube was weighed before the experiment and then placed into five salt solutions with different concentrations.
- After fifteen minutes each cube was removed, wiped dry and weighed again.

The results are shown in the graph below.



1.1.5 A conclusion that can be made from the graph is ...

- A the higher the concentration of the salt solution, the more osmosis occurs.
- B the higher the concentration of the salt solution, the more water is extracted from the potato cube by osmosis.
- C the higher the concentration of the salt solution, the more water enters the potato cube by osmosis.
- D the lower the concentration of the salt solution, the less osmosis occurs.

1.1.6 A factor that should be kept constant during the investigation is ...

- A the size of the potato cubes.
- B the concentration of the salt solutions.
- C the percentage change in mass of each potato cube.
- D the number of potato cubes.

(6 x 2) **(12)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.4) on your FOLIO PAPER.

1.2.1 The set of lenses with different magnifications that are attached to the nose piece of a microscope.

1.2.2 Cancer treatment that uses chemicals to target and kill fast growing cells.

1.2.3 The inorganic molecule that is essential for chemical reactions to occur.

1.2.4 The type of tumour that spreads between cells and damages tissues around it.

(4 x 1) **(4)**

1.3 Indicate whether each of the descriptions in COLUMN I apply 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 numbers (1.3.1 to 1.3.2) on your FOLIO PAPER.

COLUMN I	COLUMN II
1.3.1 A type of vacuole	A: Lysosome B: Leucoplast
1.3.2 Function of proteins	A: Insulation B: Transport of O ₂ and CO ₂

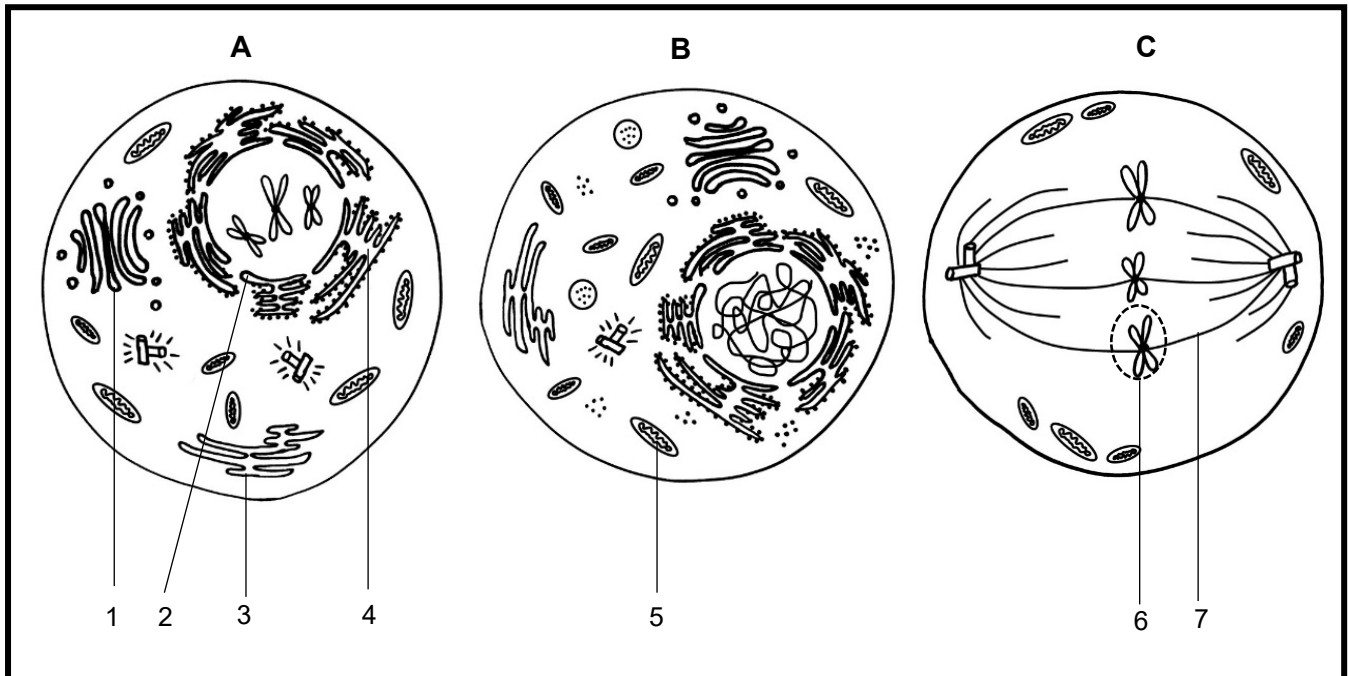
(2 x 2) **(4)**

TOTAL SECTION A: [20]

SECTION B

QUESTION 2

2.1 The diagrams (**A**, **B** and **C**) below show the same animal cell in different phases of the cell cycle.



2.1.1 Identify:

(a) organelles **1** and **5** (2)

(b) structures **6** and **7** (2)

2.1.2 Name any TWO organelles which are present in plant cells, but are absent in this animal cell. (2)

2.1.3 Name the phase of mitosis represented by diagram **A**. (1)

2.1.4 Give ONE visible reason for your answer in QUESTION 2.1.3. (1)

2.1.5 Arrange the diagrams (**A**, **B** and **C**) in the correct order as the phases would progress during the cell cycle. (1)

2.1.6 Describe ONE visible, structural difference between structure **2** and organelle **4**. (2)

2.1.7 Describe ONE functional difference between organelles **3** and **4**. (2)

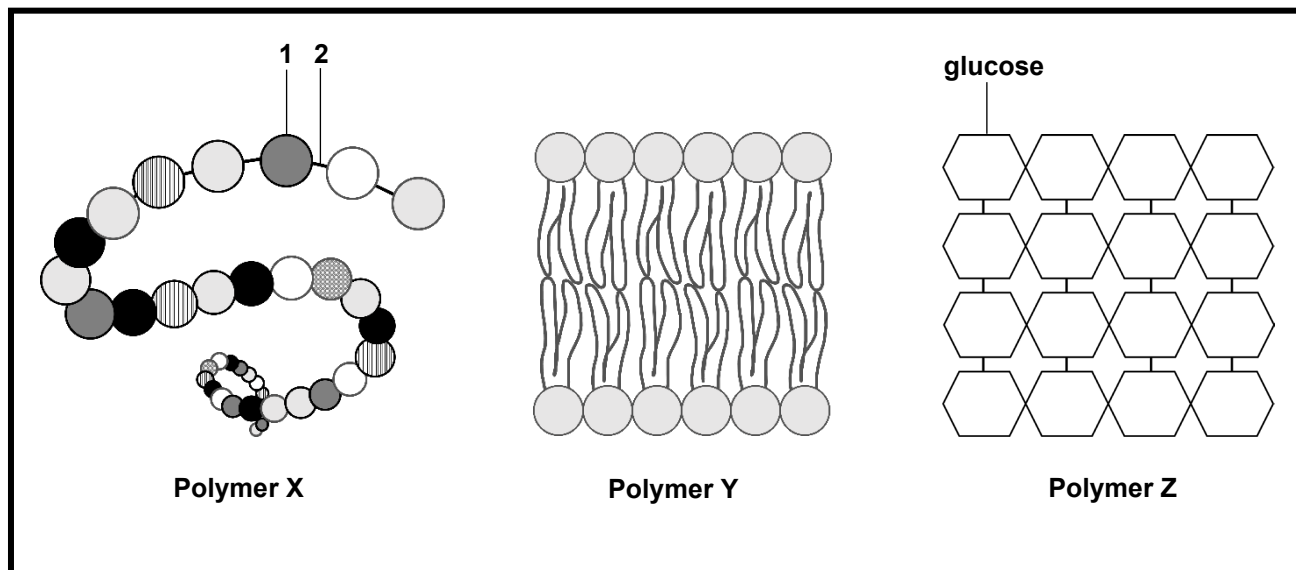
2.1.8 Discuss the events during the phase(s) of mitosis that would follow the one in diagram **C** up to the formation of two, identical daughter cells for this specific animal cell. (7)

(20)

TOTAL QUESTION 2: [20]

QUESTION 3

- 3.1 The diagrams below show shortened sections of the polymers (**X**, **Y** and **Z**) of three different biological molecules.



- 3.1.1 Which polymer (**X**, **Y** or **Z**) represents:

- (a) a polysaccharide (1)
- (b) a substance that will turn Biuret reagent purple (1)
- (c) the polymer that forms the double layer of cell membranes (1)

- 3.1.2 Identify:

- (a) the monomer numbered **1** (1)
- (b) the type of bond numbered **2** (1)

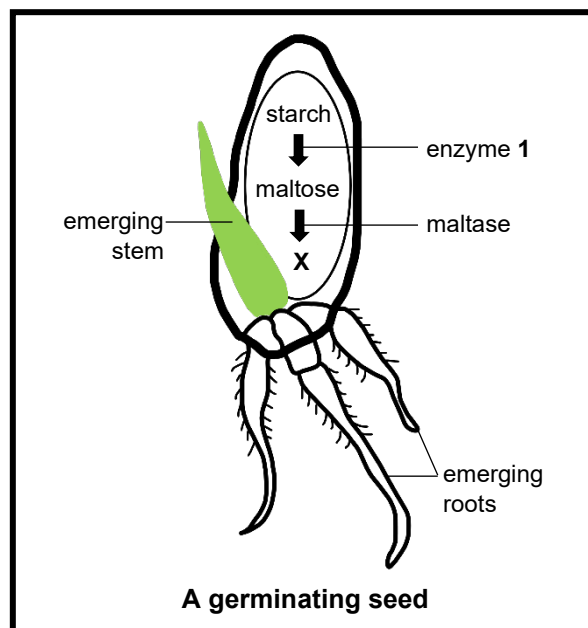
- 3.1.3 An unknown substance **Q**, known to contain carbon (C), hydrogen (H) and oxygen (O) only, was crushed and mixed with water. Food tests were performed and the following results were obtained:

- A – Iodine solution produced a negative result.
- B – Millon's reagent produced a negative result.
- C – An ether test produced a positive result.
- D – A test with Benedict's solution produced a negative result.

- (a) State the colour of a negative Benedict's test. (1)
- (b) Explain why test **B** was unnecessary. (3)
- (c) Which type of polymer (**X**, **Y** or **Z**) represents substance **Q**? (1)

(10)

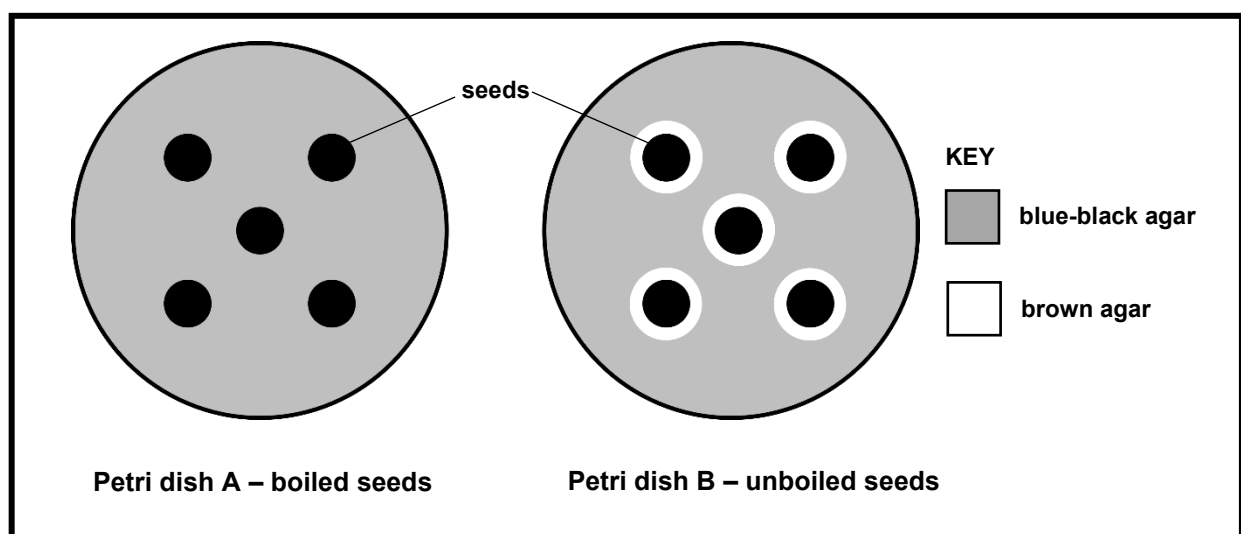
- 3.2 The seeds of plants contain lots of stored starch. Seeds only start to germinate after heavy rainfall. Enzymes inside the seeds become active and start to break down the stored starch. Once a sapling with its own leaves and roots is established it can photosynthesise to produce its own food.



A learner conducted an experiment to investigate the enzyme action in bean seeds. She soaked 10 bean seeds in water for 24 hours, after which the experiment proceeded as follows:

- Two petri dishes, **A** and **B**, were prepared with 20 ml starch-rich agar jelly.
- 5 of the seeds were boiled for 3 minutes and then placed in petri dish **A**.
- The remaining 5 unboiled seeds were placed in petri dish **B**.
- After 3 days the seeds were removed, and each petri dish was flooded with iodine solution.

The results for the experiment are shown below.



- 3.2.1 Name the type of biological molecule that enzymes would be classified as. (1)
- 3.2.2 Identify enzyme **1** that can be found inside germinating seeds. (1)
- 3.2.3 The seeds in petri dish **A** were first boiled for 3 minutes. Explain what would happen to the enzymes inside the seeds. (2)
- 3.2.4 State TWO ways in which the learner ensured the validity of the investigation. (2)
- 3.2.5 Identify the organic product **X** which can be found in the brown areas around the unboiled seeds. (1)
- 3.2.6 Explain how the enzyme action illustrated in this investigation would benefit a germinating seed. (3)
- (10)**

TOTAL QUESTION 3: [20]

TOTAL SECTION B: [40]

SUM TOTAL: [60]

SECTION A

QUESTION 1

- 1.1.1 D✓✓
- 1.1.2 A✓✓
- 1.1.3 C✓✓
- 1.1.4 B✓✓
- 1.1.5 B✓✓
- 1.1.6 A✓✓

(6 x 2) **(12)**

- 1.2.1 objective✓ lenses
- 1.2.2 chemotherapy✓
- 1.2.3 water✓
- 1.2.4 malignant✓ tumour

(4 x 1) **(4)**

- 1.3.1 A only ✓✓
- 1.3.2 B only ✓✓

(2 x 2) **(4)**

TOTAL SECTION A: [20]

SECTION B

QUESTION 2

2.1.1

- (a) 1 – golgi body✓
5 – mitochondrion✓ (2)

- (b) 6 – chromosome✓
7 – spindle fibre✓ (2)

- 2.1.2 – chloroplast✓
– cell wall✓
– large/central vacuole✓
– leucoplast✓
– chromoplast✓

(mark only the first two) (any 2)

- 2.1.3 prophase✓ (early) (1)

- 2.1.4 – individual chromosomes visible✓/chromatin network has condensed into chromosomes
– centrioles have duplicated✓/moving towards the poles/centrosome has split
(mark only the first one) (any 1)

- 2.1.5 B → A → C✓ (1)

- 2.1.6 2 (nuclear membrane) does not have ribosomes✓
4 (RER) has ribosomes✓ (2)

- 2.1.7 3 (SER) is involved in the processing/packaging/transport of lipids✓
4 (RER) is involved in the synthesis of proteins✓ (2)

- 2.1.8 – during anaphase✓
– the centromeres/chromosomes will split✓
– spindle fibres shorten✓
– so that chromatids/sister chromatids separate/move to opposite poles✓
– during telophase✓
– daughter/unreplicated chromosomes✓ are grouped at the poles
– nuclear membrane/nucleus reforms✓
– cytokinesis/cytoplasm divides / invagination/cleavage furrow forms✓
– two, identical daughter cells with **three chromosomes each**✓* are formed

(compulsory 1* + any 6) (7)

TOTAL QUESTION 2: [20]

QUESTION 3

3.1.1

- (a) Z✓ (1)
- (b) X✓ (1)
- (c) Y✓ (1)

3.1.2

- (a) amino acid✓ (1)
- (b) peptide✓ bond (1)

3.1.3

- (a) blue✓ (1)
 - (b)
 - test B/Millon's reagent tests for proteins✓
 - substance Q only contains C, H and O✓
 - proteins contain N/other elements✓
 - substance Q cannot be a protein (3)
 - (c) Y✓ (1)
- (10)**

3.2.1 proteins✓ (1)

3.2.2 amylase✓ (1)

3.2.3 – boiling increases the temperature above the optimum temperature✓ of the enzymes
– enzymes would denature✓/ lose their shape
– and lose their function✓ (any 2)

3.2.4 The same:

- number of bean seeds in each petri dish✓
 - time/24 hours to soak✓
 - time/3 minutes to boil✓
 - volume/20 ml of starch-rich agar jelly✓
 - number of days/3 days before iodine was added✓
- (mark only the first two)** (any 2)

3.2.5 glucose✓ (1)

3.2.6 – it releases stored starch✓
– as glucose✓
– that can be used for respiration✓/production of energy
– to grow✓ roots/leaves

(any 3)
(10)

TOTAL QUESTION 3: [20]

TOTAL SECTION B: [40]

SUM TOTAL: [60]