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— **TUITION** —

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BIOLOGY

FOUNDATIONS IN BIOLOGY

Level & Board	OCR (A-LEVEL)
TOPIC:	CELL STRUCTURE
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	9
TOTAL MARKS	/22

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Cell Structure - 1

1.

Which statement (s) below is/are true?

Statement 1: Microtubules are part of the '9 + 2' formation in bacterial flagella.

Statement 2: Microtubules can be prevented from functioning by a respiratory inhibitor.

Statement 3: Microtubules are involved in moving chromosomes from the equator to the poles of the cell during mitosis. (1)

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

2.

(a) Out of the following, which one best characterizes an organelle without a membrane? (1)

A contains cristae

B modifies and packages proteins

- C contains digestive enzymes
- D is made of rRNA and protein

3.

(a) Which of the structures A through D below is present in both eukaryotes and prokaryotes? (1)

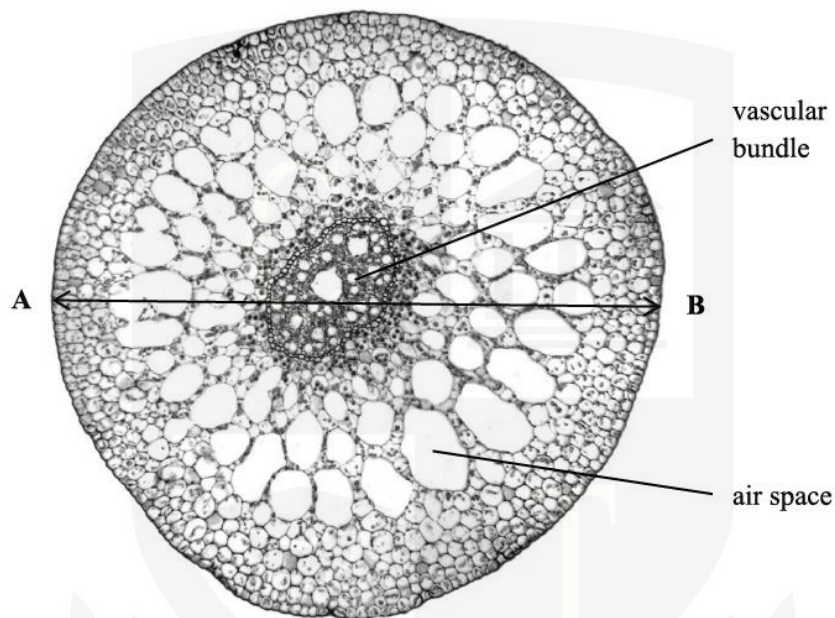
- A a cell wall made of peptidoglycan
- B circular genomic DNA
- C a nucleus surrounded by a nuclear membrane
- D ribosomes

4.

(a) Which of the following occurs in a cell's nucleus, A through D? (1)

- A synthesis of enzymes
- B synthesis of RNA
- C modification of polypeptides
- D synthesis of carbohydrates

5. An x 10 objective lens is used to observe a transverse segment of a typical pondweed's stem in Fig. 22.1. Below the stem, part of a graticule is visible. The graticule has markings spaced 0.1 mm apart.



A high-power objective lens was to be used to see phloem cells in a transverse section for the student.

Two phloem tissue diagrams are displayed in Fig. 22.2.

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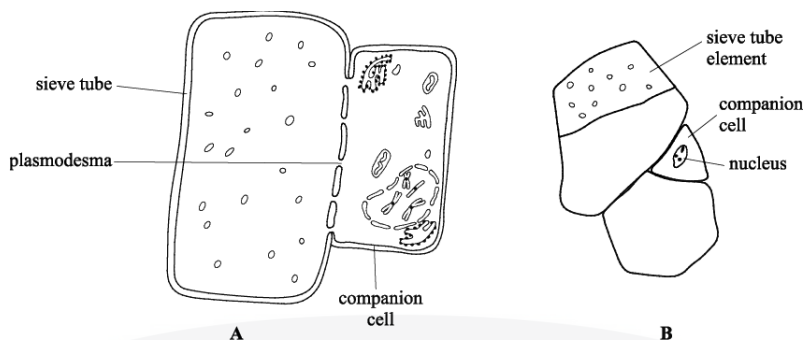


Fig. 22.2

(a) Which diagram best captures the content that the student could see? Use two distinct diagram characteristics to support your decision. **(2)**

(b) Explain what a microscope's resolution means. **(2)**

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A stained slide was used to illustrate the diagrams in Fig. 22.2.

A list of stains and the cell characteristic that can be stained is displayed in Table 22.1.

Stain	Cell feature stained
Nile blue	nuclei
eosin	cytoplasm
Sudan red	cell membrane
iodine	starch

Table 22.1

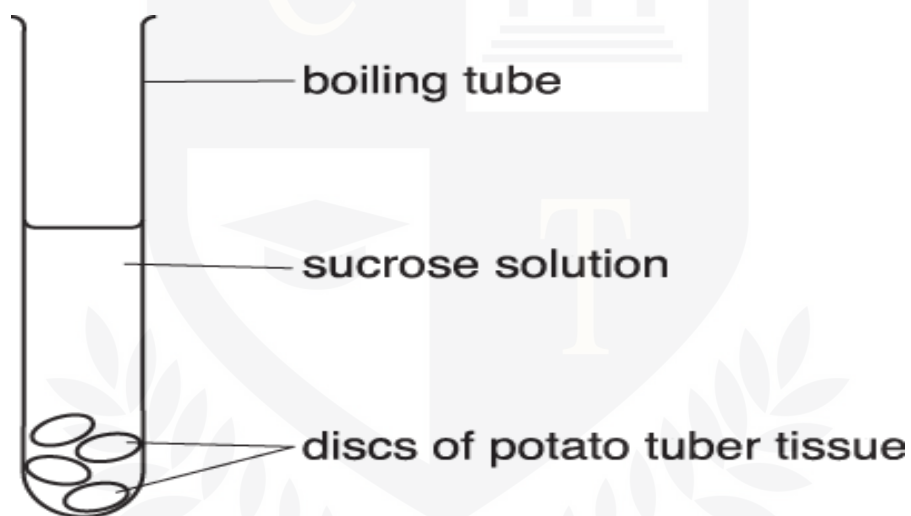
(c) What kind of stain did the student apply? Give an explanation for your response. (2)

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6.

A portion of the equipment utilized in an experiment examining the water potential in potato tuber tissue is depicted in the picture.



For four hours, the discs were submerged in boiling tubes filled with varying concentrations of sucrose solutions.

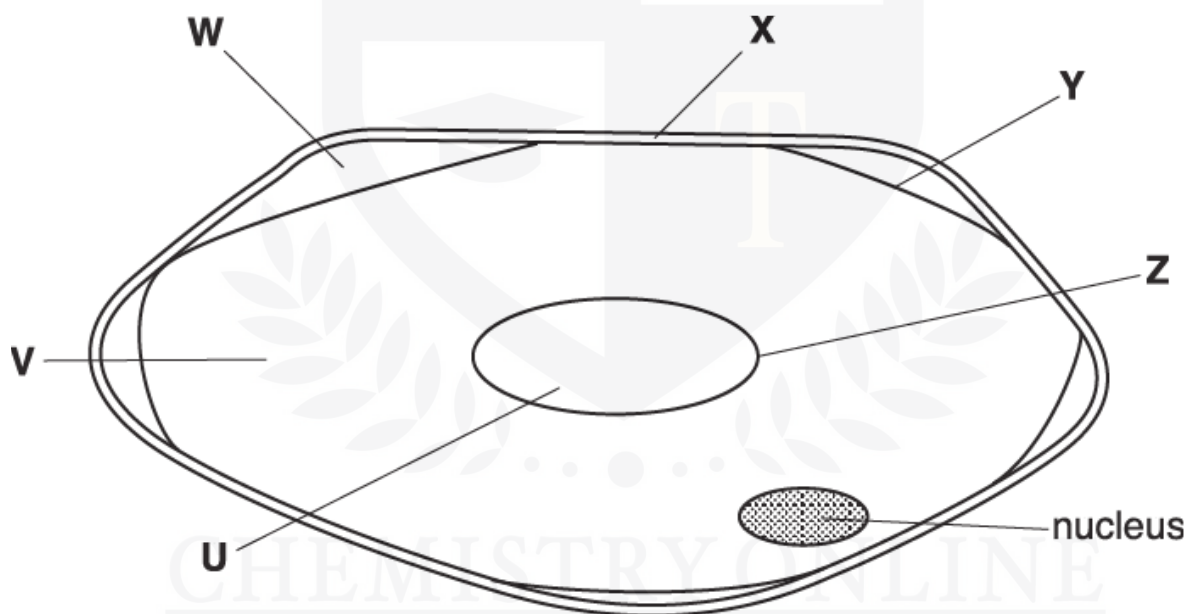
Next, the mass change percentage was computed.

The table displays the outcomes.

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Concentration of sucrose solution (mol dm ⁻³)	Change in mass of potato discs (%)
0.00	+18.00
0.10	+12.50
0.20	+2.50
0.30	- 3.00
0.40	- 8.00
0.45	-11.50

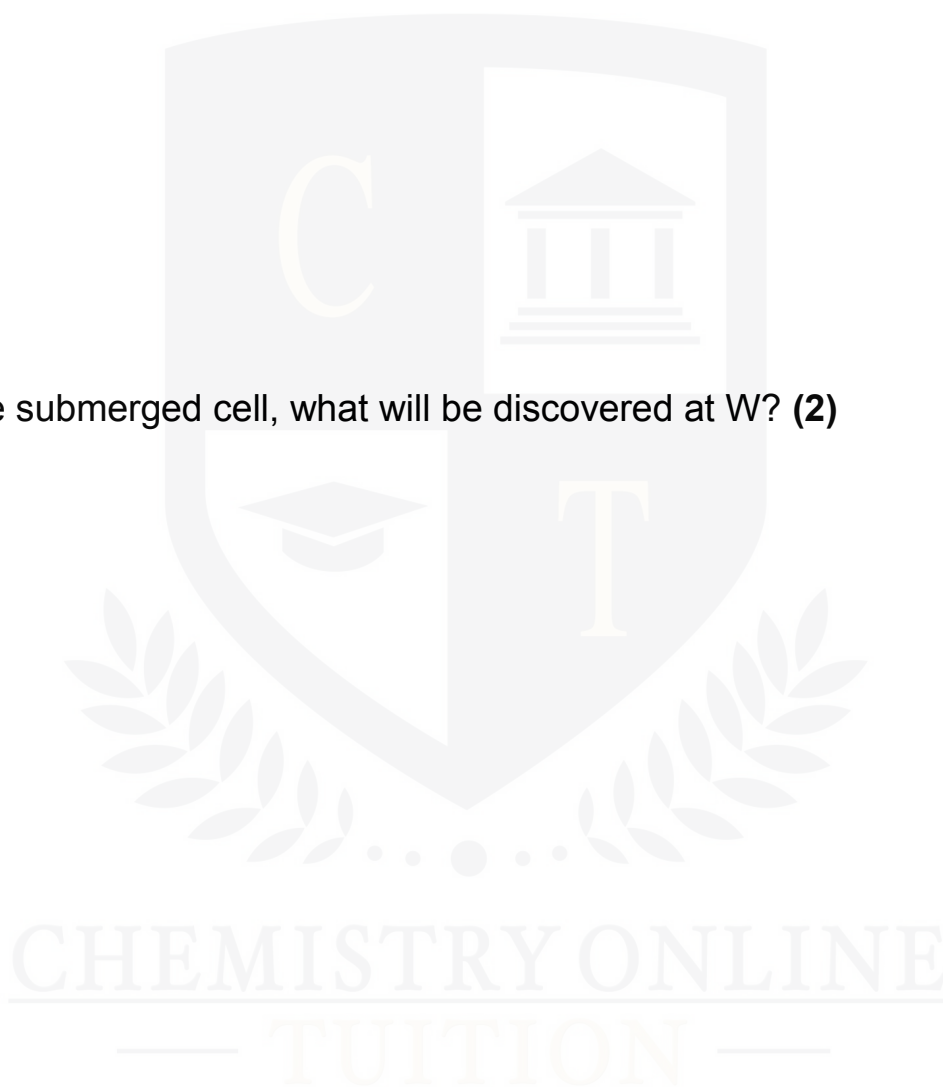
A schematic of a potato tuber disc cell submerged in 0.45 mol dm⁻³ sucrose solution is depicted in the picture.



(a) Determine which areas of the cell have the labels X, Y, and Z. (3)

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(b) In the submerged cell, what will be discovered at W? **(2)**



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7.

One theory about the evolution of organelles is the endosymbiotic theory. This idea claims that the mitochondria and chloroplasts found in eukaryotic

cells were originally free-living microorganisms that were absorbed into a bigger cell.

The following list describes a number of properties of mitochondria and chloroplasts.

(a) Mark the three statements that support the endosymbiotic idea with a checkmark (✓). **(1)**

A Mitochondria contain ribosomes that are smaller than those found in the cell cytoplasm

B chloroplasts contain chlorophyll and other photosynthetic pigments

C Mitochondria are a similar size to bacteria

D The inner membrane of a mitochondrion is folded to form cristae

E Chloroplasts contain many disc-shaped membranes called thylakoids

F Chloroplasts have their own circular DNA

8.

Allium cepa, the onion plant, is cultivated for food all across the world.

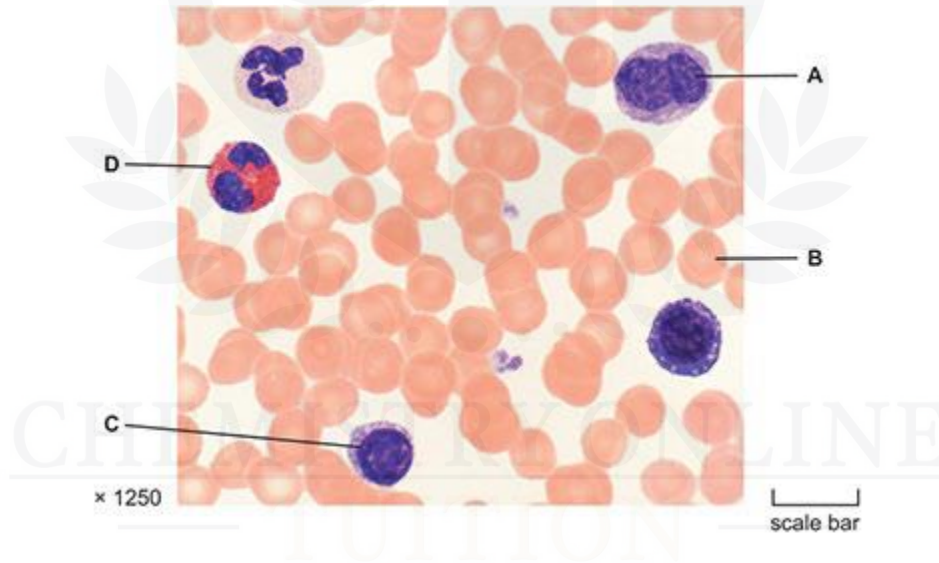
Statements regarding an onion's root cells can be found in the table below.

(a) Indicate if the statements in the table are true or false by placing ticks (✓) in the corresponding boxes. **(2)**

Statement about onion root cells	True	False
contain chloroplasts		
contain mitochondria		
contain 70S ribosomes in the cytoplasm		
have pili		
have cellulose cell walls		

9.

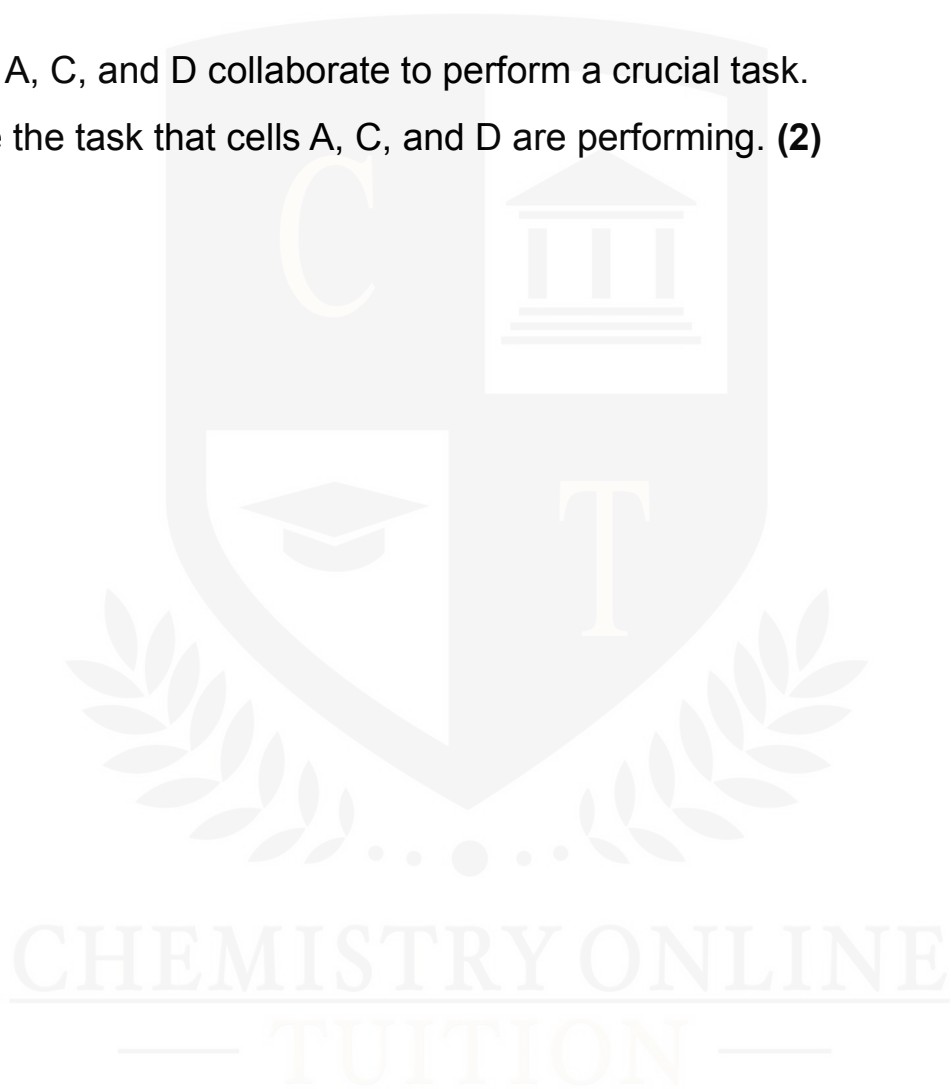
Please refer to Fig. 2, a photomicrograph of a mammalian blood smear, in Insert H020/02, Depth in Biology, June 2019.



(a) Give name to the B-labeled cell. (2)

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(b) Cells A, C, and D collaborate to perform a crucial task.
Describe the task that cells A, C, and D are performing. **(2)**



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