TEMASEK JUNIOR COLLEGE
PRELIMINARY EXAMINATION

PAPER 4 ANSWER

1 Antibiotics act on bacteria by killing the bacteria or preventing their growth.

Their effectiveness can be tested by setting a model. In this model, an acid represents the antibiotic solution and the blue stain in the agar block represents the bacteria.

You are to investigate the effect of the antibiotic solution on 'killing the bacteria'. This is shown by the colour of the stain changing from blue to yellow as the end-point.

You are required to:

- prepare different concentrations of antibiotic solution, **A**, using serial dilution.
- record the time taken to reach the end-point (yellow) for each of the concentrations of **A**.
- record the time taken to reach the end-point for an unknown concentration of antibiotic solution **X**.
- use the results to estimate the concentration of antibiotic in **X**.

You are provided with:

Labelled	Contents	Hazard level	Volume / cm^3
X	Unknown concentration of an antibiotic solution	Irritant	30.0
A	1% antibiotic solution	Irritant	50.0
W	Distilled water	None	100.0
B	Agar block containing a blue stain	None	-

You are advised to wear suitable eye protection. If antibiotic solution comes into contact with your skin, wash off with cold water.

(a) You are required to make a serial dilution of the **1% antibiotic solution**, ***(IV)*** **A**, which reduces the concentration **by half** between each successive dilution.

You need to prepare 40.0 cm^3 of each concentration. Note: Refer to Fig. 1.1 for the clue.

Fig. 1.1 shows the first two beakers you will use to make your serial dilution.

(i) Complete Fig. 1.1 by drawing as many extra beakers as you need for your serial dilution.

Interpreting the meaning of the statements

1. **"You will need to prepare 20.0 cm^3 of (named) solution to use."** (This means the FINAL volume. Refer to Fig. 1.1.)
2. **You need to prepare 40.0cm^3 of each solution. Some of this will be used to make the next solution.** (This means the volume is NOT the final volume.)

For each beaker:

- state, under the beaker, the **volume** and **concentration** of the antibiotic solution available for use in the investigation.
- use one arrow, with a label above the beaker, to show the **volume** and **concentration** of antibiotic solution added to prepare the concentration.
- use another arrow, with a label above the beaker, to show the **volume** of **W** added to prepare the concentration.

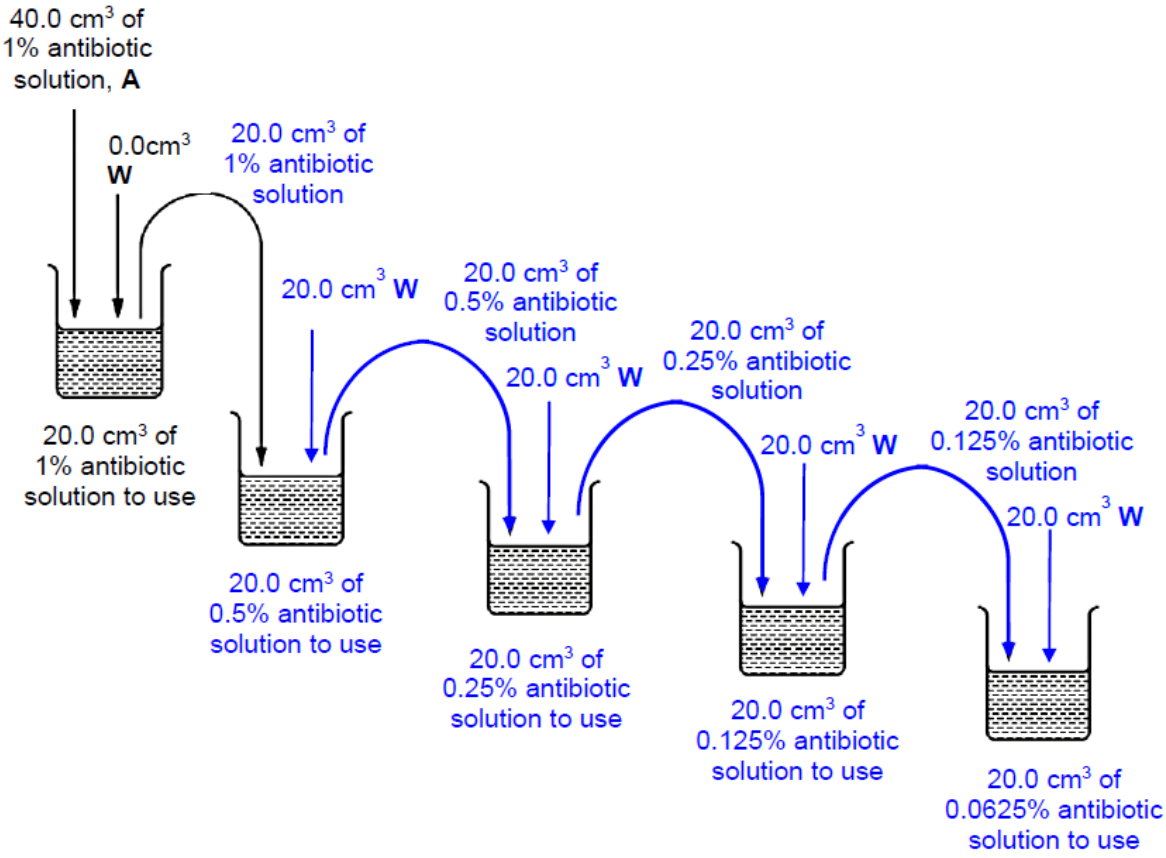


Fig. 1.1

[3]

Mark scheme:

1. **Correct concentrations of 0.5%, 0.25%, 0.125%, 0.0625%**

2. **Shows transfer of 20.0 cm^3 of 1% to next dilution + 20.0 cm^3 transferred from 2nd to 3rd beaker, and from 3rd to 4th beaker and from 4th to 5th beaker.**
   Reject if units not provided.

3. **Adds 20.0 cm^3 of water to each beaker.**
   Reject if units not provided.

   Max 2 if precision is incorrect.

Feedback:

- **Most candidates did well for this question. Only a few candidates did not consider the precision of the apparatus (10mL syringe) for the volume of solution or water.**

Proceed as follows:

1. Prepare the concentrations of **A** as shown in **(a)(i)**.

2. Label a beaker as **X** and put 20.0 cm^3 of **X** into this beaker.

You will need to cut the agar block, **B**, into smaller pieces as shown in Fig. 1.2.

To avoid staining your skin, minimise touching the agar with your bare hands. You may use the blunt forceps and paper towels to handle the agar.

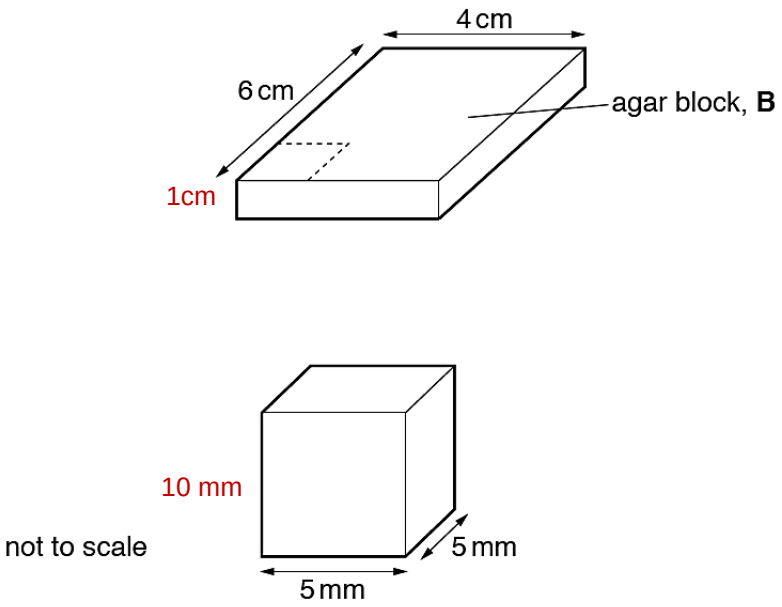


Fig. 1.2

3. Place the agar block, **B**, onto a white tile and cut into identical pieces, each 5 mm x 5 mm as shown in Fig. 1.2. You do not need to adjust the height.

4. **(ii)** Calculate the total surface area of one agar piece.

   Show all the steps in your calculation, including the appropriate units.

Height of agar piece = 1 cm = 10 mm

Total surface area of one agar piece = (4 x 10 mm x 5 mm) + (2 x 5 mm x 5 mm) [1]
= 200 mm^2 + 50 mm^2
= 250 mm^2 [1]

[2]

Mark scheme:
Working shown [1 mark]
Correct with appropriate units (mm^2) [1 mark]

Feedback:

- **Not all candidates realize that there were 4 identical sides (10 mm x 5 mm) and 2 identical top and base surface of the agar block (5 mm x 5 mm).**

- **A few candidates also mixed up the units for volume (mm^3) and surface area (mm^2).**

5. Put one piece of agar into each beaker containing the each concentration of **A** prepared in step 1 and start timing.

6. Gently stir the contents of each beaker at regular intervals.

7. Record in **(a)(iii)** the **time taken for the pieces of agar to reach the end-point**. ***(DV)***

   Note that the colour of the agar may change from blue to green and then to yellow

   If any piece of agar has not changed to yellow after 240 s, **stop timing** and record as 'more than 240'.

   (iii) Record your results for the known concentrations of antibiotic solution.

Concentration of antibiotic / %	Time taken for the pieces of agar to reach the end point / s
1	
0.5	
0.25	
0.125	
0.0625	

Mark scheme:

1. **Table drawn + heading: percentage concentration of antibiotic or concentration of antibiotic / %**
2. **Heading: time / s**
3. **Records results for at least 4 concentrations**
4. **Correct trend of results (i.e. the highest concentration of antibiotic recorded as the shortest time for colour change) + for at least 3 concentrations**
5. **Precision: whole number**

[5]

Feedback:

- **Generally well done.**
- **A few candidates included units in the body of the table. Units should only be in the column headings of the table.**

8. Put one piece of agar into the beaker labelled **X** and start timing.

   (iv) Record the time taken for the piece of agar in **X** to reach the end-point.

time taken …….... [1]

Mark scheme:

Acceptable range is candidate's experimental time between 1% and 0.25% antibiotics + appropriate time in whole no. Reject if unit is not provided

(v) Use your results in **(a)(iii)** and **(a)(iv)** to estimate the concentration of antibiotic solution in **X**.

…… [1]

Correct estimation in accordance with recorded time.

Feedback:

- **Some candidates provided precise concentration when they could simply mention that the concentration of X is within a range. E.g. The concentration of X is between 0.5% and 1%.**

(vi) Identify **one** significant source of error in this investigation.

……

……

……[1]

(vii) Describe how this source of error could be minimised by the modification of the procedure.

……

……

……[1]

Any one

	Source of error	Modification
1.	**Difficulty in judging colour change / ref to subjectivity in interpreting end-point.**	**Either one:** **Allow one agar piece to reach end-point (yellow). Use this colour as a reference to decide how the end-point looks like.** **Use a video camera to film the progress of colour change to determine the end-point more accurately.** **Reject use of colorimeter because it cannot accurately measure the time required for colour change.**
2.	**Temperature was not maintained throughout the experiment.**	**Conduct the experiment in a thermostatically controlled water bath.**
3.	**Difficulty in cutting to the required dimension / ensuring 5 mm x 5 mm dimension agar piece using ruler and knife.** **This results in agar pieces having unequal surface area.**	**Use a cork borer to create discs of equal dimension.**
4.	**Too few known concentrations of antibiotics were tested for the accurate determination of the concentration of antibiotics X.**	**If the end-point for X is determined to be between 0.5% and 1%, test on more concentrations of antibiotic solution (e.g. 0.6%, 0.7%, 0.8%, 0.9%).** **Note to student: Answer in context of your experimental data.**

AVP

Feedback:

- **Colorimeter was a common incorrect answer. Colorimeter cannot be used for a time-course experiment (experiment whereby the time for an end-point is measured).**

(b) This procedure investigated the effect of the concentration of the antibiotic solution on its diffusion into stained agar blocks.

A student who carried out this investigation hypothesised that the **surface area** of the agar does **not** have any effect on the rate of diffusion of antibiotic solution into the agar.

(i) Explain whether you will support or reject this hypothesis. [1]

Reject. [1/2]
Increase in surface area will increase the speed of diffusion and result in faster end-point.

Feedback:
- **All candidates rejected the hypothesis although a few candidates were not precise enough to gain credit for the 2nd point.**

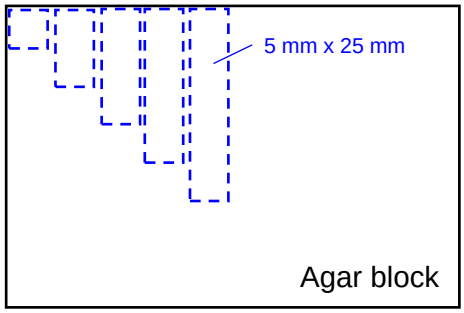
(ii) Describe how you will modify this procedure to support your answer to **(b)(i)** with confidence.

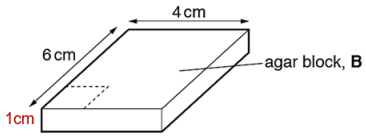
You are to assume that the same piece of agar block, **B**, is provided. [5]

Mark scheme:

1. **For the independent variable, prepare 5 agar blocks of different dimensions. [1/2]**
   (Only accept: 5 or more)

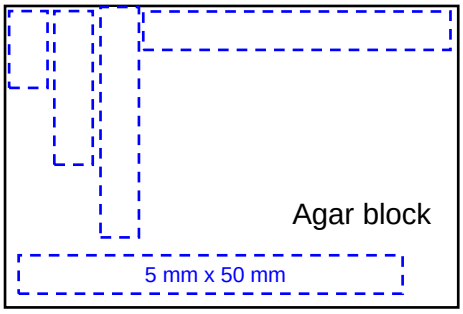
5 mm x 5 mm
5 mm x 10 mm
5 mm x 15 mm
5 mm x 20 mm
5 mm x 25 mm





OR

5 mm x 10 mm
5 mm x 20 mm
5 mm x 30 mm
5 mm x 40 mm
5 mm x 50 mm



Reject larger dimension due to constraint in the size of the agar block provided.

2. **State dimensions [1/2] Reject dimensions that are too small (e.g. less than 5mm) to prepare using the scalpel and ruler or if height exceeds 10mm.**
   (Accept: if dimensions are shown in table)

3. **Standardize antibiotic concentration (e.g. 1%). [1/2]**

4. **Other than step 3, carry out same procedure / experiment for the agar pieces of different dimensions and record the time taken to reach end point. [1/2]**

5. **Repeat the entire experiment and calculate the average. [1/2] (Accept if point 5 is not provided but shown in table)**

6. Calculate the rate of diffusion as 1/time in s^{-1} [1/2] (Accept: if shown in table)

Provide a suitable format for the recording of result in the space below.

Dimension of agar cube / mm	Total surface area / mm^2	Time taken for the pieces of agar to reach the end point / s			Rate of diffusion / s^{-1}
5 x 10	400	Reading 1	Reading 2	Average	
5 x 20	700				
5 x 30	1000				
5 x 40	1300				
5 x 50	1600				

7. Table drawn with independent variable (either dimension or total surface area) column heading and dependent variable (time taken to reach end-point). [1]

8. Headings with appropriate units [1]

9. Calculated total surface area [1/2]

Feedback:

- **Most candidates did well for this question although some candidates provided excessive information (e.g. improvements, explanation, etc).**
- **Several candidates mixed up units (e.g. mm^2 vs mm^3) while describing surface area.**

(c) A scientist carried out an experiment to investigate whether a chemical, **C**, extracted from a plant species, was able to inhibit the reproduction of bacteria.

The scientist prepared 5 Petri dishes containing agar (agar plates) which had each been inoculated with a different type of **pathogenic** bacterium.

A filter paper disc, soaked in chemical **C**, was put onto each agar plate. Chemical **C** diffused from the filter paper disc into the agar. The agar plates were incubated at 25°C to allow the bacteria in the agar to reproduce.

A clear zone, called a zone of inhibition, is observed around the filter paper disc if the chemical is effective at preventing bacteria from reproducing, as shown in Fig. 1.3.

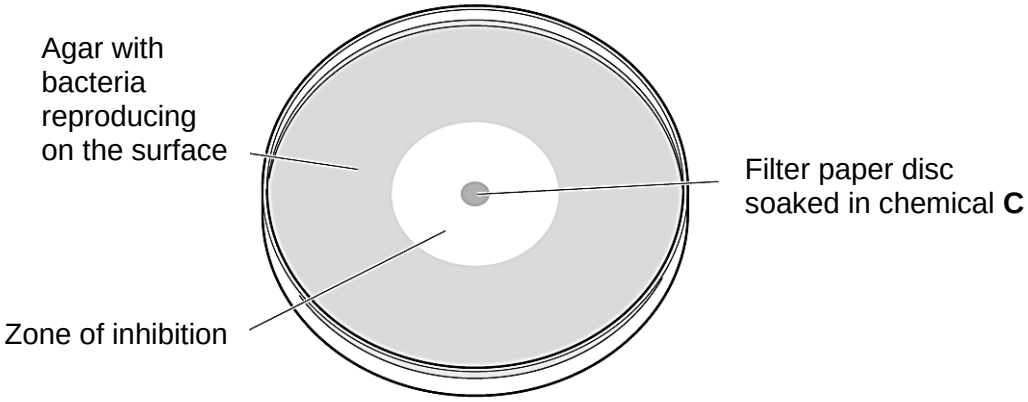


Fig. 1.3

(i) State one potential safety risk of this experiment and **outline** how the risk may be minimised. [1]

Any one

1. **Bacteria may be harmful / cause disease**
   (A: increase risk of infection / dangerous if in contact with skin / pose a threat / trigger immune system / spread easily / contagious / contaminant)
   (R: Bacteria is pathogenic / is an irritant / can enter our body [without explaining harmful effects])
2. **Wear gloves when handling the bacteria / AVP**
   (A: Cover petri dish with lid as much as possible)
   (R: Dispose agar with bacteria properly)

1. **Chemical C is an irritant / toxic**
   (A: corrosive, damage skin, harmful to scientists)
   (R: Chemical C is irritating)
2. **Wear gloves when handling the chemical.**
   (A: Wear safety goggles to protect eyes from chemical C)
   (R: Ensure all exposed skin is covered) → With what?

(R: Agar is an irritant to skin)

(ii) Suggest a suitable control for this experiment. [1]

1. **Soak a filter paper with distilled water instead of chemical C. [1/2]**
   (R: replace pathogenic bacterium with dead bacterium / distilled water, no bacterium, boiled and cooled bacterium)
   (R: dry filter paper)

You are investigating the **effect of chemical C on different types of bacteria**. Therefore, your control needs to remove chemical C instead of bacteria.
If you remove different types of bacteria, you are investigating the effect of different types of bacteria on chemical C.

2. **Repeat the experiment with same procedure to show that the zone of inhibition is due to the effect of chemical C. [1/2]**
   (A: same conditions, same experiment)
   [Best way would be to state that you repeat the experiment under same procedure and conditions using freshly prepared samples]

Note: Do not use the term “similar procedures”. “Similar” doesn’t have the same idea as “same”.

The scientist measured the diameter of the zone of inhibition produced in the agar for each of the 5 different types of pathogenic bacterium.

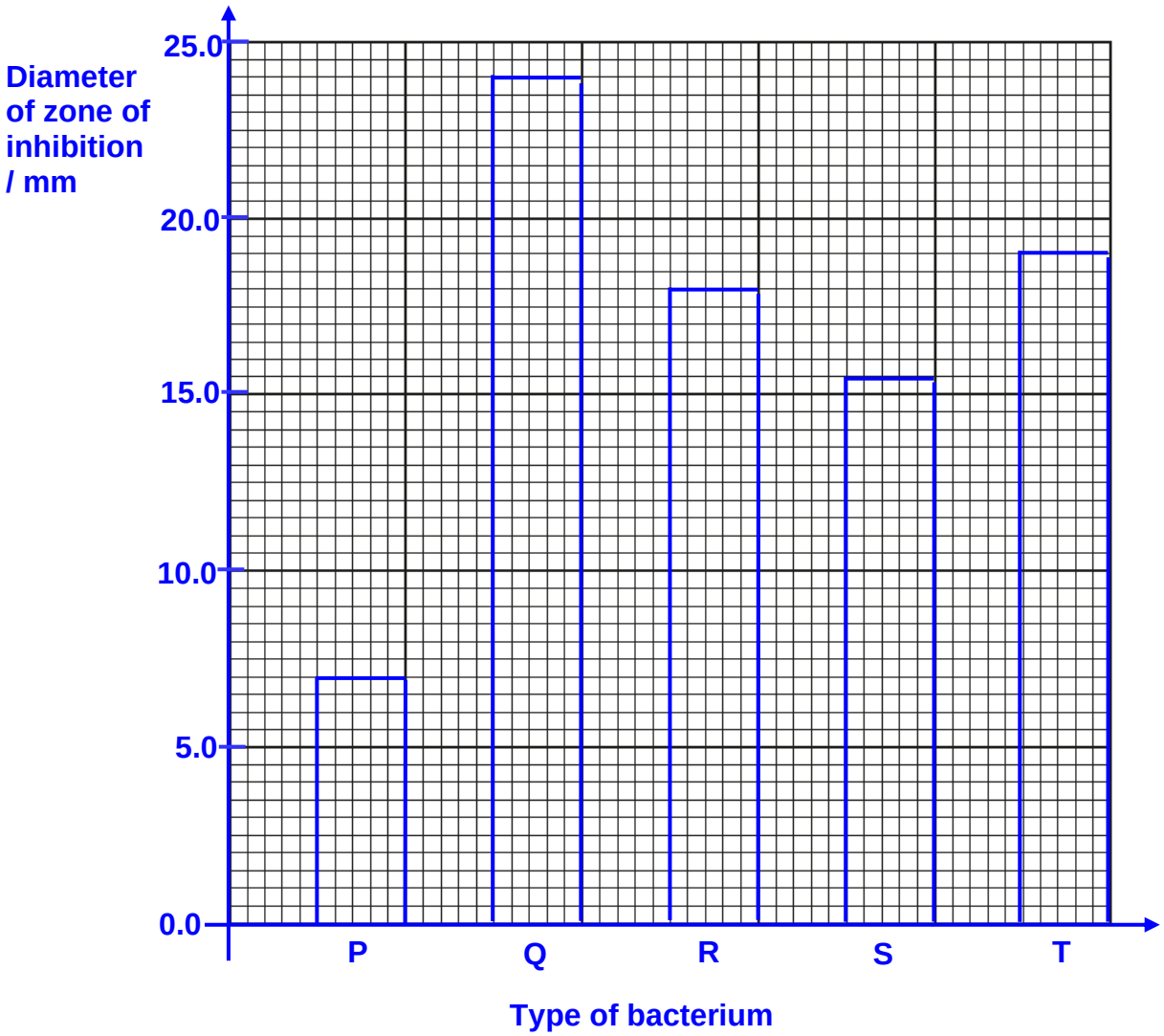
The results are shown in Table 1.1.

Table 1.1

Type of bacterium	Diameter of zone of inhibition / mm
P	7.0
Q	24.0
R	18.0
S	15.5
T	19.0

(iii) Draw a bar chart of the data in Table 1.1.

Use a sharp pencil for drawing bar charts. [4]



Mark scheme:

1. **Scale:**
   - **(*x*-axis) even width of bars**
   - **(scale on *y*-axis) label every 10 squares + origin (0.0) + graph start from zero + scale plotted above highest plotted value (25.0 must be shown)**
   - **y-axis value not to 1 d.p. (-0.5m)**
   - **Axis lines must be present**
   - **Scale markers must be present**

2. **Plotted points:**
   - **Correct plotting of five bars**
   - **Bars in order of table**
   - **Equal spacing between bars**
     (R: no spacing between bars)

3. **Axes**
   - **(x-axis) Type of bacterium**
   - **(y-axis) Diameter of zone of inhibition / mm**

4. **Bars:**
   - **Five separate bars**
   - **Bars drawn with even lines**
     (R: lines not on grid lines)
   - **Labelled appropriately**
     (R: If labels not under bar graphs)

Reject: if shading of bars

(iv) The scientist studied the results in Table 1.1 and decided to study the type of bacteria **most affected** by chemical **C**.

State the type of bacterium which was most affected by chemical **C**. Give a reason for your answer.

Bacteria Q [1/2]
Reason: It has the largest diameter of zone of inhibition (A: 24.0 mm) [1/2]
(R: larger)

[Total: 27]

2 Some plant cells, for example in roots, store starch as grains.

Fig. 2.1 shows some different shapes of starch grains and patterns on the surface of the starch grains.

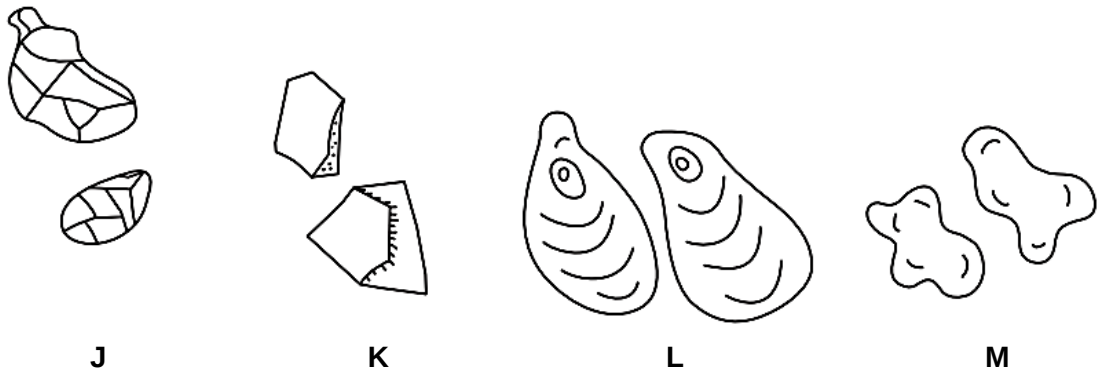


Fig. 2.1

You are required to:

- observe and draw the starch grains from potato cells
- observe the effect of iodine stain on starch grains.

You are provided with a piece of peeled potato tuber in a dish, labelled **T**; distilled water, labelled **W**; and iodine solution labelled **iodine solution**.

1. Put one **clean and dry** microscope slide on a piece of black card with a paper towel underneath as shown in Fig. 2.2.

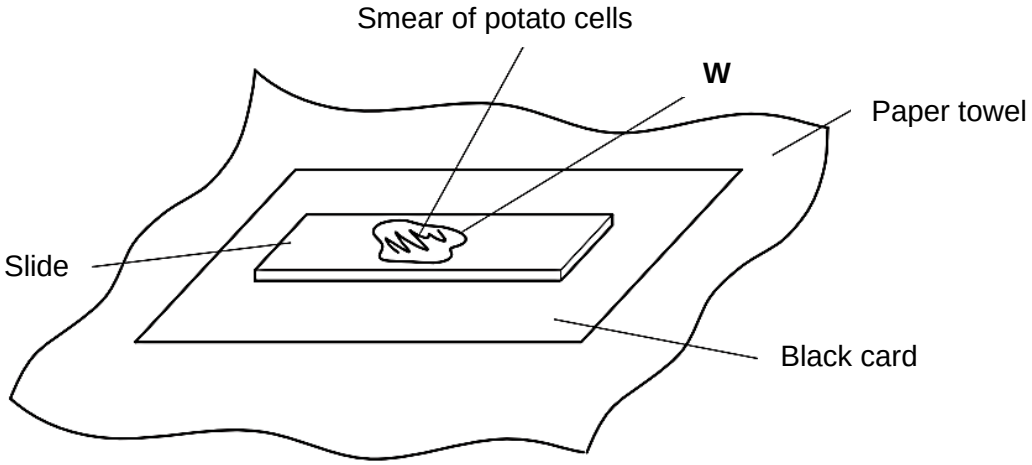


Fig. 2.2

2. Using a sharp blade or scalpel, cut the piece of potato to show a fresh surface.

3. Scrape the fresh surface of the piece of potato to remove a small quantity of tissue.

4. Put this tissue onto the slide and use the flat surface of the blade to squash this tissue.

5. Use forceps to remove any larger bits of tissue so that a smear of cells can be seen on the slide.

6. Put a few drops of **W** onto the smear of cells.

7. Cover the cells with a coverslip and use a paper towel to remove any excess liquid that is outside the coverslip.

8. View the slide to observe the starch grains using the microscope. Select an area of starch grains on the slide.

You may need to reduce the amount of light entering the microscope to observe cells clearly.

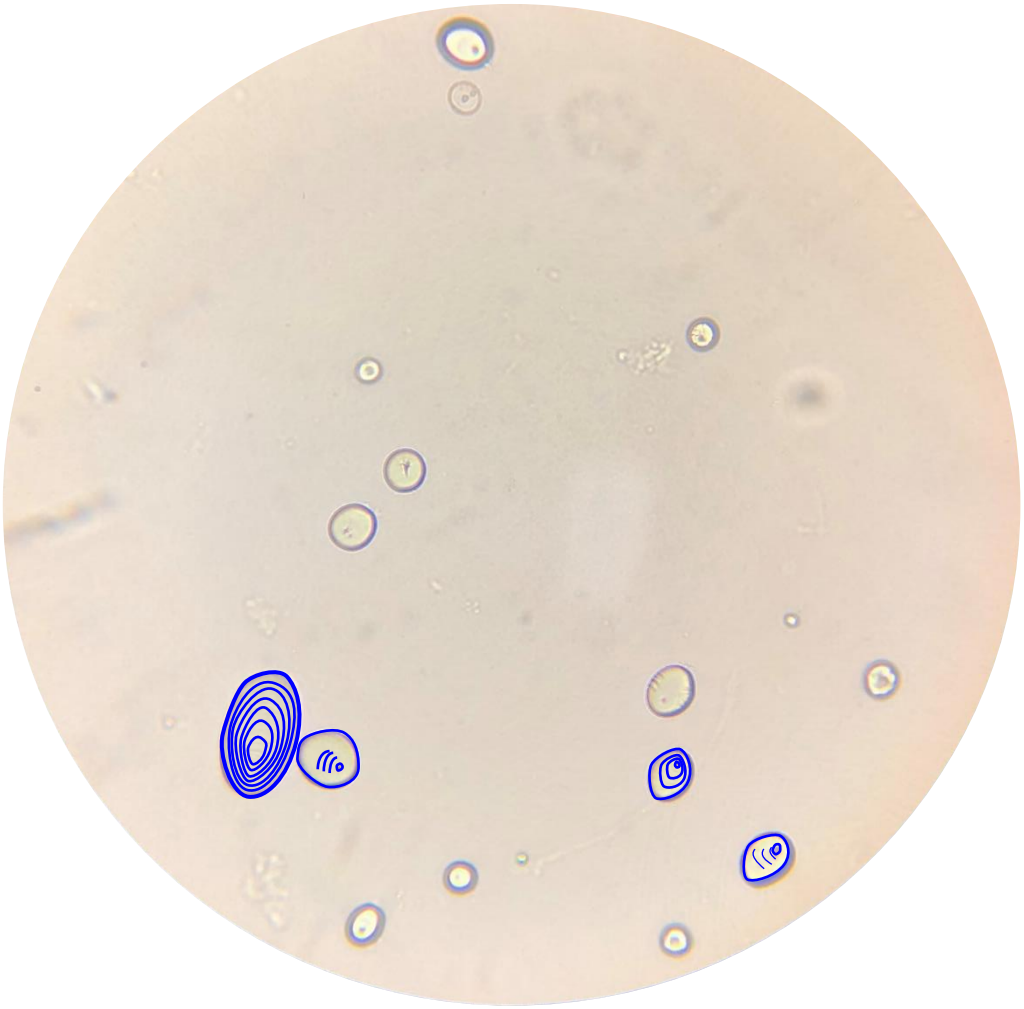
You must adjust the fine focus to observe the patterns in the starch grains.

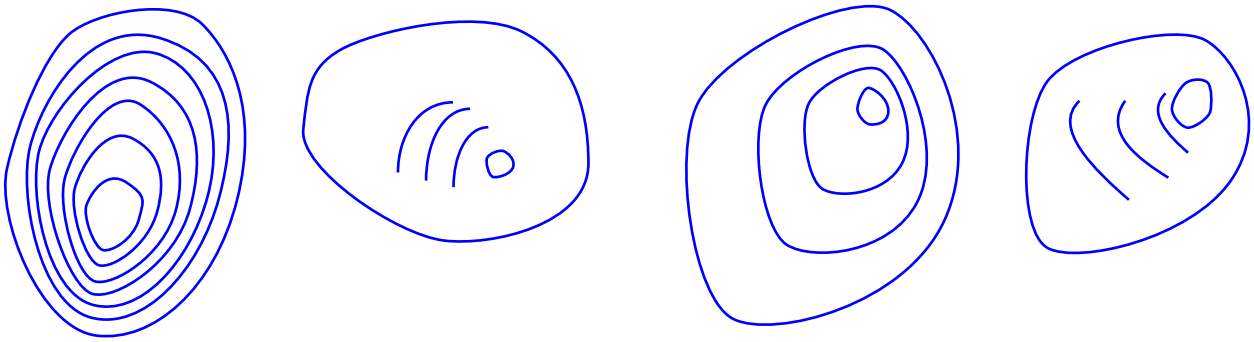
You are required to use a sharp pencil for drawings.

(a) Select 4 starch grains which show the different sizes and features of the grains.

(i) Make a large drawing of these 4 starch grains.

M 1	**1. minimum size of at least 30mm across largest starch grain** **AND** **2. clear, sharp, continuous lines** (R: Faded lines, lines jutting out, feathery lines, starch grains joined together, starch grains overlapping)
M 2	**1. draws only 4 whole starch grains** (R: starch grains drawn in a cell) **AND** **2. no shading** **AND** **3. draws a single line around each grain** (R: double line, presence of a "wall")
M 3	**1. shows correct shape (oval)** **AND** **2. shows different sizes**
M 4	**shows correct pattern of lines inside at least 3 starch grains**





[4]

(ii) Use Fig. 2.1 to suggest which of the starch grains, **J**, **K**, **L** or **M** matches some of the grains observed on the slide.

answer **L** [1]

9. Remove the slide from the microscope and place it on a paper towel.

You will now add **iodine solution** to the water on the slide without removing the coverslip.

10. Put a drop of **iodine solution** onto the slide so that the drop touches the edge of the coverslip. Wait a few seconds while the **iodine solution** moves under the coverslip. Use the paper towel to remove any excess liquid from the top of the coverslip.

11. Immediately use the microscope to observe the starch grains where there is **iodine solution** on the slide.

(iii) Suggest why using **iodine solution** as a stain may lead to inaccurate recording of the features of starch grains. [1]

- **The iodine stains the starch grains blue-black,**
  (A: dark blue)
  (R: appears dark, black, stains cells blue black, iodine turns blue black)
- **thus the observation of the patterns may not be visible.**
  (R: cannot determine size)
  Note: Point 2 is not awarded if point 1 is totally incorrect (e.g. iodine breaks down starch grains)

A student calibrated the eyepiece graticule in a light microscope using a stage micrometer scale.

The calibration was:

length of 1 eyepiece graticule unit = 16 μm

The student used the microscope to observe and draw three starch grains to the same scale. The student drew a line across the length of each drawing of a starch grain. The student's drawings are shown in Fig. 2.3.

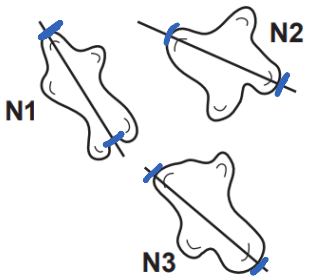


Fig. 2.3

(iv) Find the mean **image** length of the three starch grains drawn by the student, along the lines shown in Fig. 2.3.

Show all the steps in your working and use appropriate units.

Length of N1 = 17mm
Length of N2 = 16mm
Length of N3 = 18mm
(A: ±1mm)

Length of N1 + N2 + N3 = 17mm + 16mm + 18mm
= 51mm

Mean image length = $\frac{51mm}{3}$
= 17mm

measures and records the length of three starch grains using the lines N1, N2 and N3 + units [1]

shows the addition of these 3 lengths + shows division by 3 [1]

(Incorrect units: -1m)
(If length of N1, N2 and N3 is not shown, and length of starch grains is incorrect in working: 0m)
(If length of N1, N2 and N3 is not shown, and length of starch grains is correct in working but in cm: 0.5m)
(If length of N1, N2 and N3 is shown, but length + units incorrect: max 0.5m)

mean image length …….. [2]

(v) When viewed using the microscope, the student found that starch grain **N1** measured 4 eyepiece graticule units along the position of the line drawn in Fig. 2.3.

Use this information and your answer to **(a)(iv)** to calculate the mean **actual** length of the three starch grains in Fig. 2.3.

Show all the steps in your working and use appropriate units.

Actual length of N1 = 4 x 16μm
= 64μm

Magnification = $\frac{Image\ size}{Actual\ Image}$
= $\frac{17000}{64}$
= 265.625X

Mean actual length = $\frac{17000}{265.625X}$
= 64μm

correct actual length of N1 = 64 μm [1]

uses answer to (a)(iv) + shows how to calculate mean actual length of the 3 starch grains [1]

Wrong units: -0.5m

mean actual length ..... [2]

(b) You are provided with two samples of plant material.

A leaf in a vial, labelled **L**.

The same piece of peeled potato tuber in a dish provided earlier, labelled **T**.

1. Place a leaf onto a tile.
2. Discard any large veins and chop the rest of the leaf finely with a scalpel.
3. Put into a mortar and add a few drops of **W**.
4. Grind with a pestle for 1 minute to produce a green leaf extract (can still be known as **L**).
5. Label four slides, two with **L** and two with **T**.
6. Using a pipette, place one drop of **L** on each of the two slides labelled **L**.
7. Add one drop of **iodine solution** to one of the slides labelled **L**.
8. Using a sharp blade or scalpel, cut the potato piece to show a fresh surface.
9. Carefully scrape off some potato cells from the fresh surface and smear them onto the middle of each of the two slides labelled **T**.
10. Add one drop of **iodine solution** to one of the slides labelled **T**.
11. Add a coverslip to each slide and use a paper towel to absorb the excess liquid.

12. Use your microscope to search each slide carefully and record the observations of the cells you can find.

(i) Prepare the space below and record all your observations.

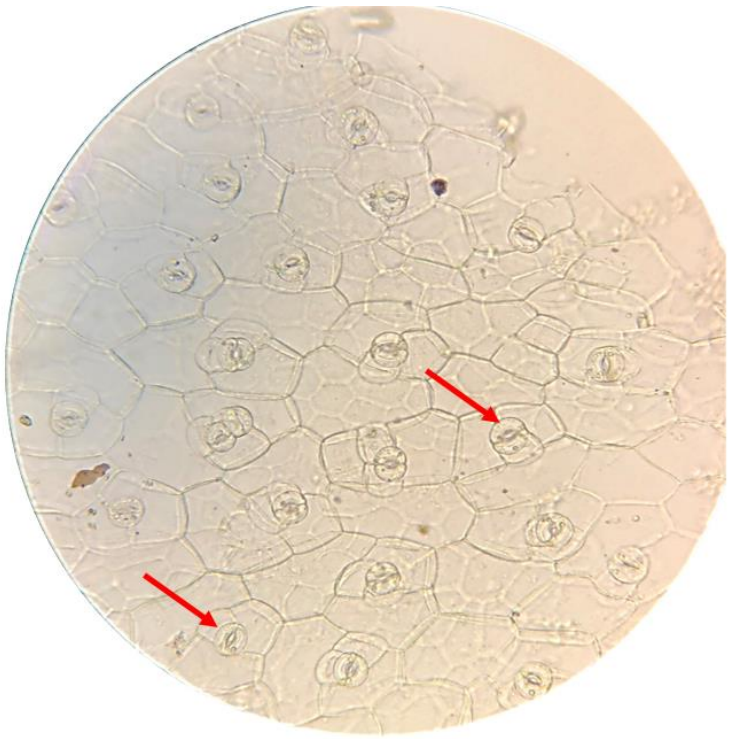
sample	observations
L stained	**presence of epidermal cells / guard cells**
L unstained	**presence of epidermal cells / guard cells**
T stained	**presence of dark blue starch grains inside potato cells**
T unstained	**absence of dark blue starch grains inside potato cells**

M 1	**1. table with suitable column headings** **AND** **2. table space divided into 4 with lines**
M 2	**1. records clearly leaf stained / L stained + leaf unstained / L unstained** **AND** **2. records clearly potato stained / T stained + potato unstained / T unstained**
M 3	**1. records at least 1 different type of cells observed for leaf samples**
M 4	**1. records presence of dark blue + starch grains + inside cells** **Reject blue / black cells**

[4]

Feedback:

1. **Many candidates did not manage to observe either epidermal cells or guard cells under the microscope. Some even recorded inaccurate observations of starch grains being found in such leaf samples.**



(ii) Explain your observations. [2]

1. **Iodine staining shows the presence of starch.**

2. **There is no / few starch present when the leaf samples were stained with iodine but potato samples stained with iodine revealed presence of more starch.**

Feedback:

1. **Some candidates were not aware of the preceding question requirement and the focus was on the iodine test and its results.**

(c) Fig. 2.4 is a photomicrograph of a transverse section of a plant root containing starch grains. The section has been stained with iodine solution.

You are not expected to be familiar with this specimen.

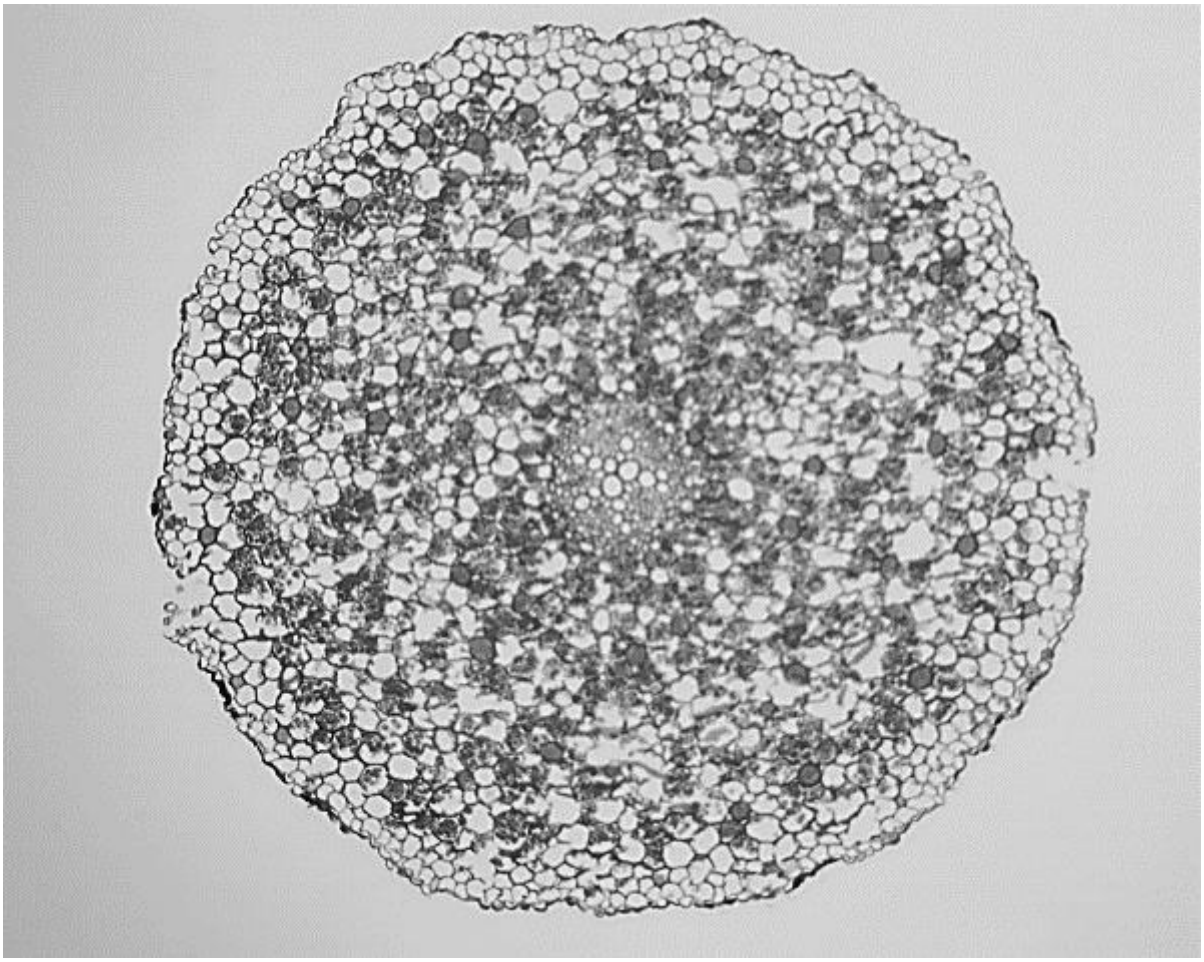


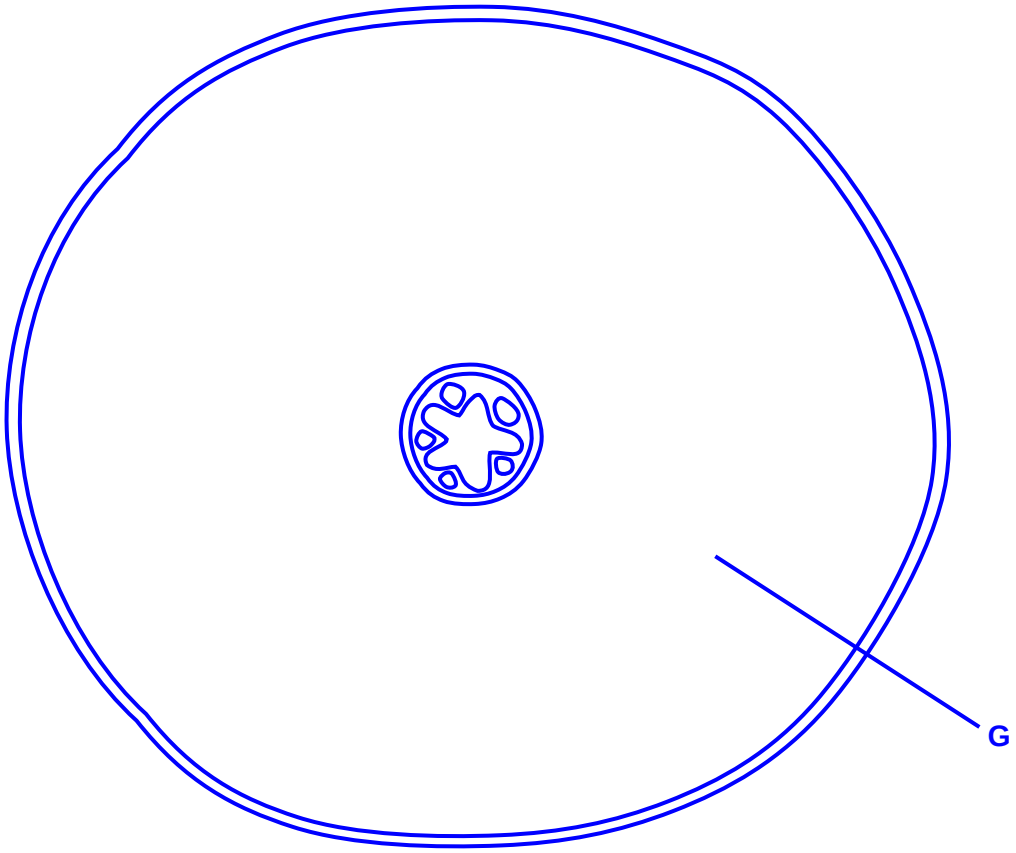
Fig. 2.4

Use a sharp pencil for drawing.

You are expected to draw the correct shapes and proportions of the different tissues.

Draw a large plan diagram of the transverse section of the whole root shown in Fig. 2.4.

Use one ruled label line and label, with the letter **G**, the tissue that possibly contains most of the starch grains.



M 1	**1. minimum size of at least 100mm** **AND** **2. clear, sharp, continuous lines** **AND** **3. no shading**	**Reject** - **if drawn over the print of question** - **feathery lines** - **overlaps or gaps**
M 2	**1. no cells drawn** **AND** **2. the whole root drawn** **AND** **3. shows at least 3 layers of tissue** **AND** **4. epidermis drawn with two lines lesser than 2mm**	
M 3	**1. shows correct proportion of the stele to the diameter of the root** **AND** **2. shows correct proportion of vascular tissues and other tissues in the root**	***stele: central region of the root where vascular tissues are located***
M 4	**shows subdivision of vascular tissue (xylem and phloem)**	
M 5	**label line and label G to identify the tissue (cortex)**	

[5]

(d) Fig. 2.5 is a photomicrograph of a stained transverse section through a root of a different type of plant.

You are not expected to be familiar with this specimen.

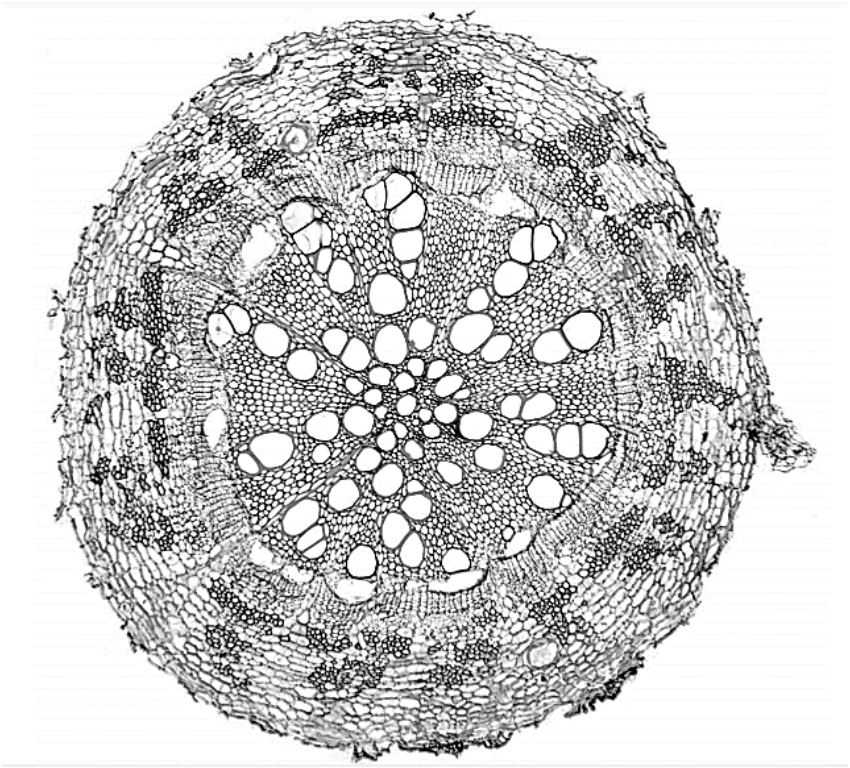


Fig. 2.5

Fig. 2.6 is a photomicrograph of the same root section that is shown in Fig. 2.4.

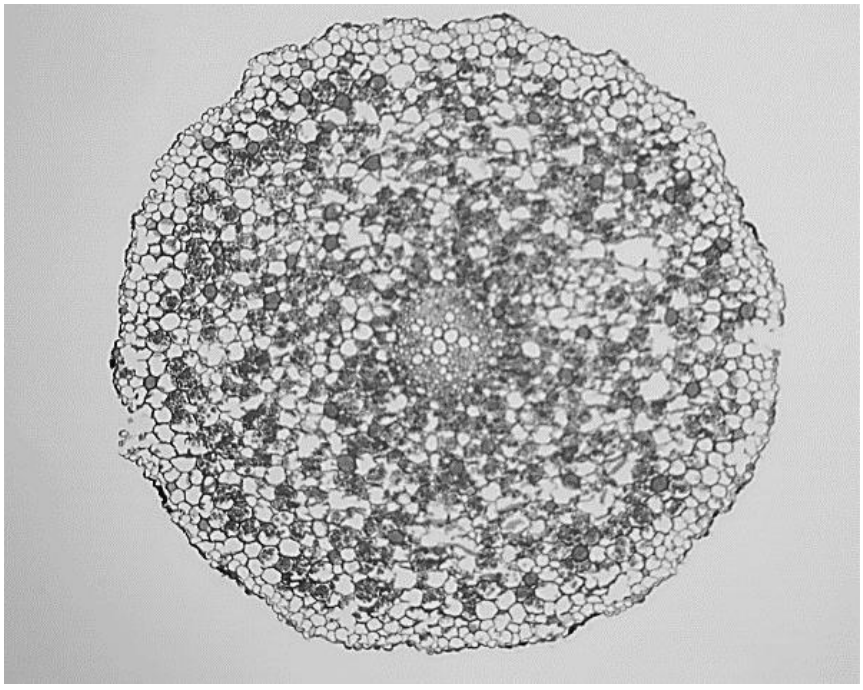


Fig. 2.6

Prepare an appropriate table so that it is suitable for you to record the observable differences between the root in Fig. 2.5 and the root in Fig. 2.6. Record the observable differences, other than differences in colour, in your table.

feature	root in Fig. 2.5	root in Fig. 2.6
proportion of root occupied by vascular tissue	larger	smaller
proportion of root occupied by cortex	smaller	larger
presence of starch grains	absent / few	present / more
number of layers of tissue	more	fewer
shape of cortex cells	rectangular / longer / flatter / elongated	circular / oval / round

M 1	1. organises comparison into a table with 3 columns AND 2. first column for feature / point of comparison AND 3. records only differences
M 2	one correct difference
M 3	another correct difference

[3]

Feedback:

1. **Candidates were generally familiar with root specimens and could provide accurate terminologies such as xylem vessels. Others were able to extract prior information provided in the preceding questions and indicated starch grains as an observation.**

2. **Some candidates need to remember the format of any comparison table. The first column is always the feature of comparison.**

3. **Some candidates were unsure of the correct terminologies to use and were vague when giving their comparison points. They should always recall the few typical terminologies used to describe parts of any plant specimens (e.g. stems, roots, leaves).**

(e) Another student investigated the hydrolysis of starch by amylase.

The student decided to use a semi-quantitative method to measure the products. These products are reducing sugars.

Suggest how the student would use a semi-quantitative method to measure the concentration of reducing sugars produced. [4]

1. **Prepare five different known concentrations of reducing sugars, e.g. 2%, 4%, 6%, 8% and 10%.**
2. **Using syringes, add equal volume of Benedict's solution into equal volume of known reducing sugar samples.**
3. **Obtain known colour standards.**
4. **Compare the colours of unknown samples against the colour standards to estimate the concentration of reducing sugars produced.**

Also accept: time taken to first colour change

Feedback:

1. **Some candidates were unsure what a semi-quantitative method involving Benedict's test entails. They need to remember that a glucose (colour) standard is required for colour comparison of unknown samples.**

2. **Many candidates were still recording Benedict's test observations as 'brick red precipitate'. They need to note that during a Benedict's test, once the mixture was stirred, the precipitate could not be observed. They are actually observing the colour of the mixture instead.**

[Total: 28]