

GCSE Biology B (Twenty First Century Science)
J257/02 Depth in Biology (Foundation)

Question Set 7

1

A teacher shows a plant to three students, Ben, Ling and Kai.



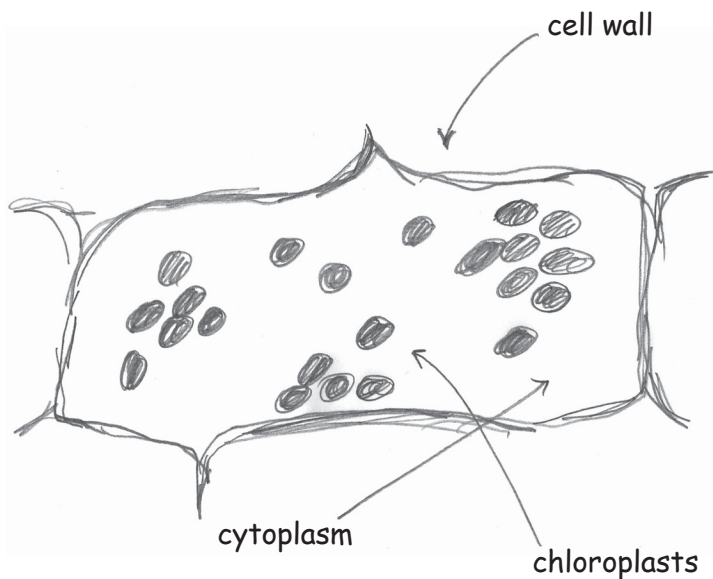
The teacher says it could be either a real living plant or a plastic plant.

She challenges the students to investigate whether the plant is real.

- (a) Ben takes a small piece of leaf from the plant. He places the piece of leaf on a microscope slide. He looks at the slide using a light microscope.

The piece of leaf appears to be made of cells.

Ben draws a scientific drawing of what he sees



Ben could draw a better scientific drawing **without** changing the slide or the microscope.

Describe **four** ways Ben could improve his scientific drawing.

[4]

- Add the magnification
- use a single straight line for the organelles
- remove shading of chloroplasts
- the arrow should be touching what they are labelling.

- (b) Ling knows that living plants store glucose as starch. She tests a leaf from the plant for starch. Here is her method.

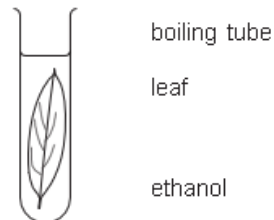
Step 1

Place the leaf in very hot water until it goes soft.



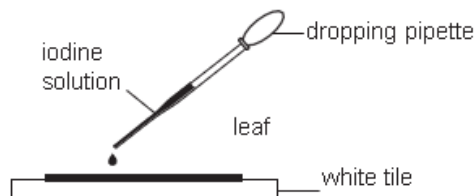
Step 2

Place the leaf in ethanol (HIGHLY FLAMMABLE) and heat until all the green colour has been removed from the leaf.



Step 3

Rinse the leaf with water, and then spread it out on a white tile and add a few drops of iodine solution.



- (i) Write down **two** hazards in Ling's method **and** suggest a way of reducing the risk from each hazard [4]

The hand can get scalded while trying to get the leaf out of the hot water thus use a tweezer.

Heating the ethanol like in step 2 could cause it to set alight as it is highly flammable. To avoid this, we should heat the test tube in a water bath.

[1]

- (ii) The colour change when iodine solution is added shows that the leaf contains starch.

Describe this colour change.

brown to blueblack

Kai decides to investigate how the plant responds to light.

He places the plant on a sunny windowsill and leaves it there until next week's lesson.

- (c) (i) Write a testable prediction that describes what will happen if the plant is real. [1]
 After the week in the window, the plant will have grown a few centimetres towards the light.

- (ii) Kai finds that the plant has grown towards the window.

Use ideas about plant hormones to explain how this has happened.

In the stem tip, the plant hormone auxin is produced.

[4]

Auxin controls the plant's growth by promoting cell division and causing elongation in plant cells. It responds to the direction of the light resulting in phototropism. More light is reached on one side of the tip (closer to the window). Hence, the auxin diffuses and becomes present on the shaded side at a greater concentration. This leads to unequal distribution of auxin. The plant cells on the darker side of the stems grow longer causing the plant to grow/bend towards the light.

[2]

- (c) The students conclude that the plant is a real living plant.

Use evidence from the students' investigations to support this conclusion.

The change in iodine solution colour shows the plant contains starch. So, the leaves must be photosynthesising, as the glucose produced is converted to starch. Also, the plant grew in height, which shows it is alive.

Total Marks for Question Set 7: 16