Using a light microscope

Biology required practical | AQA Combined Science 8464 and AQA GCSE Biology 8461 | 14 questions, 36 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ / 36

Aim: To prepare a slide of plant cells, observe them with a light microscope, and use magnification to work out the real size of the cells.

Equipment: light microscope with x4, x10 and x40 objective lenses; glass microscope slide and coverslip; onion; forceps; scalpel or small knife; iodine solution in a dropping bottle; mounted needle; paper towel; ruler marked in mm (or an eyepiece graticule); pencil and plain paper for a drawing.

Results

Kofi set up a digital microscope at a total magnification of x400 and displayed the image of onion skin cells on a screen. He measured the length and width of five cells on the screen with a ruler.

Cell	Length of image in mm	Width of image in mm
A	113	27
B	97	23
C	126	31
D	104	25
E	118	29

Questions

1 Give **two** reasons why only a very thin layer of onion skin is used on the slide. (2 marks)

2 Kofi lowered the coverslip onto the slide slowly, holding it at an angle.

a. What problem does this prevent?

b. Why is iodine solution added to the onion cells? (2 marks)

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3 Kofi wants to compare the sizes of his five cells fairly. Give **two** things he must keep the same when measuring each cell.

(2 marks)

4 Describe how to bring the onion cells into focus, starting with the slide clipped onto the stage.

(3 marks)

5 Give **one** hazard in this practical and explain how the risk from it can be reduced.

(2 marks)

6 The microscope had an eyepiece lens of x10 and Kofi used an objective lens of x40. Calculate the total magnification.

(1 mark)

7 Use the table and the magnification of x400 to calculate the real length of cell C in micrometres (μm).

1 mm = 1000 μm. Show your working.

(3 marks)

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8 Calculate the mean real length of the five cells in micrometres (μm). Show your working. (3 marks)

9 **Higher tier**

The real length of cell D is 260 μm. Give this length in metres, in standard form.

1 m = 1 000 000 μm. (2 marks)

10 In a textbook photograph of a cheek cell, a scale bar 25 mm long is labelled 50 μm. Calculate the magnification of the photograph. (2 marks)

11 **Higher tier**

Leila uses a different method to estimate cell size. At x400 the circle of light she can see (the field of view) is 0.45 mm across. Exactly three onion cells, lying end to end, fit across the middle of the field of view.

Estimate the length of one cell in μm. Show your working. (3 marks)

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12 Kofi measured the cells on the screen with a ruler marked in mm.

a. Explain why he measured five cells rather than one.

b. Suggest a better way of measuring the cells and say why it is better.

(3 marks)

13 **Higher tier**

Kofi could see the nucleus of each cell but could not see any ribosomes, even when he increased the magnification. Explain why.

(2 marks)

14 Plan an investigation to find out whether a leaf has more stomata on its upper surface or on its lower surface.

You should use a light microscope. Clear nail varnish can be painted onto a leaf, left to dry and peeled off with clear sticky tape to give a thin copy of the leaf surface.

(6 marks)

End of questions | Total 36 marks | The answers sheet has the full method as revision notes.

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