B1 L4 Challenge worksheet: Magnification and cell size

Name: _____ Class: _____

A. A ribosome in an electron micrograph [5]

An electron micrograph shows a ribosome. Help: online screens 3, 6, 7 and 11
Its image is 5 mm across. The magnification is × 200 000.

(a) Calculate the real width of the ribosome in nanometres (nm). 1 mm = 1000 µm and 1 µm = 1000 nm. [3]

_____ nm

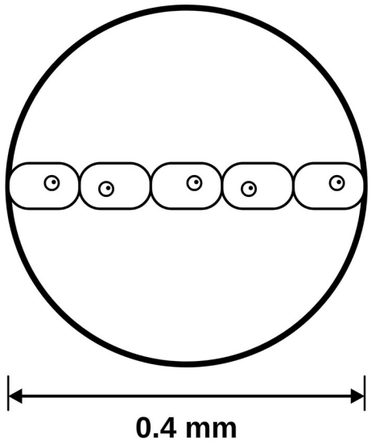
(b) Write the real width of the ribosome in metres, in standard form. [2]

_____ m

B. Estimating from the field of view Help: online screens 3 and 10 [5]

At × 400, the field of view of a microscope is 0.4 mm across.
A student sees a chain of 5 algal cells that just reaches across the field of view.

(a) Estimate the length of one algal cell in µm. [2]



_____ µm

(b) At × 100, the field of view is 1.6 mm across. Estimate how many of these algal cells would fit across it. [2]

_____ cells

(c) Suggest why your answer to (a) is an estimate, not an exact size. [1]

_____

_____

B1 L4 Challenge worksheet: Magnification and cell size

Name: _____ Class: _____

C. Comparing sizes

Help: online screens 3 and 11 [5]

The table shows the sizes of four structures.

Structure	Size
plant cell	0.1 mm
nucleus	10 µm
mitochondrion	1×10^{-6} m
virus	100 nm

(a) Write the four structures in order of size. Start with the largest. [2]

largest ➡ ➡ ➡ smallest

(b) How many orders of magnitude bigger is the plant cell than the mitochondrion? [1]

_____

(c) A student says: ‘The plant cell is 1000 times bigger than the virus.’ Is the student right? Show your working. [2]

D. Extended response

Help: online screens 4, 6, 7 and 9 [6]

A student has a printed micrograph of cheek cells. It has a scale bar labelled 20 µm, but no magnification is given. Describe how the student can find the real width of one cheek cell and the magnification of the micrograph. [6]

In your answer, say what to measure, which calculations to do and which units to use.