

Summer Preparation Work for A-Level Biology

Welcome to Biology at Comberton Sixth Form

The 4 activities in the transition pack are designed to give you practice in some of the core knowledge and skills needed for A level biology. You are expected to complete all of these tasks and *bring them to your first lesson in September*.

Task A- Magnification & maths skills

Print out this document A4 size and complete the questions.

Maths for Biology- Magnification

Task B- Keyword cards on Cells and Nucleic cards and multiple-choice questions.

These are attached. You must print off each keyword card set, stick the meanings pages to the keyword's pages, so they are back to back. These words need to be memorised. Then complete the **multiple-choice questions**. Use the keywords to help.

Take a look at these videos that cover some of this content:

<https://www.youtube.com/watch?v=URUJD5NEXC8>

<https://www.youtube.com/watch?v=zwibgNGe4aY>

Task C- Independent research task

Hopefully you will be able to take a trip to a museum, zoo or other place of biological interest locally or further afield. Be prepared to share your experience in a biology lesson, with photos/leaflets and a summary paragraph. Cambridge has many possibilities. E.g., The Cambridge University Museum of Zoology/ local zoos/ Sites of Special Scientific interest.

Task D – Head Start on Biology booklet

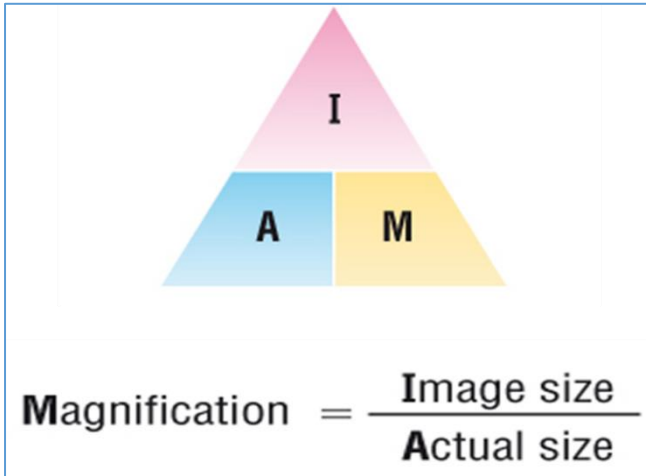
Read the instructions at the start and complete the tasks.

Other

For safety reasons all students studying a science A level will need a lab coat and goggles. Lab coats with studs (not buttons) can be purchased from Amazon.

If you want to find out more about the course visit <http://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf> for A level Biology.

Task A Maths for Biology- Magnification



Step 1)

Measure the image size using a ruler in millimetres (mm)

Step 2)

Convert the millimetres (mm) into micrometres (μm)

Step 3)

Divide your answer by the actual size

Question 1

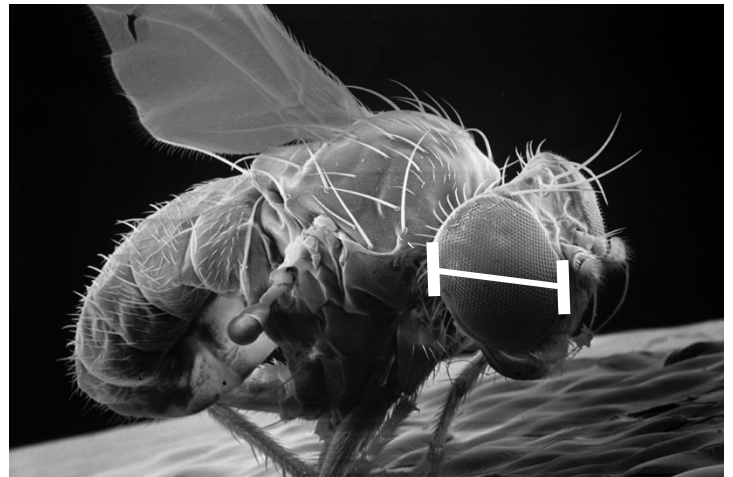
This is a fly. Its actual eye size is $1,000\mu\text{m}$.
What is the magnification?

- 1) Length of eye is _____ mm
- 2) _____ mm x1000 = _____ μm
- 3) Image size = _____ μm
- 4) Magnification = Image \div Actual

Magnification = _____ $\mu\text{m} \div$ _____ μm

Magnification = _____

The picture shows the eye magnified (zoomed in) by _____ times.

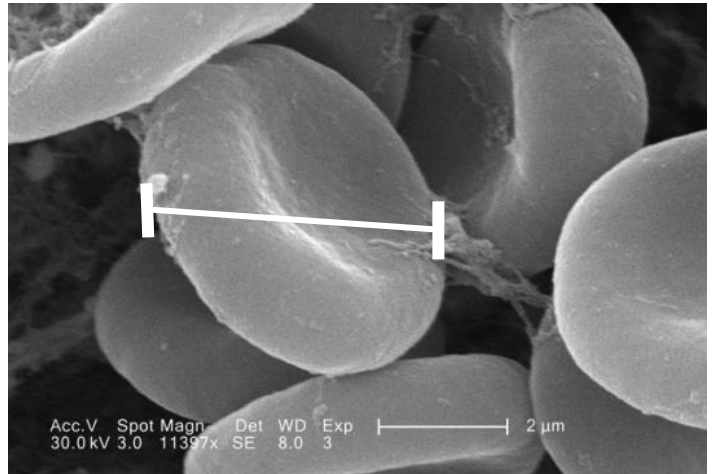


Question 2

This is a red blood cell. Its actual size is $300\mu\text{m}$. What is the magnification?

- 1) Length of cell is _____ mm
- 2) _____ mm $\times 1000 =$ _____ μm
- 3) Image size = _____ μm
- 4) Magnification = Image \div Actual
 Magnification = _____ $\mu\text{m} \div$ _____ μm
 Magnification = _____

The picture shows the cell magnified (zoomed in) by _____ times.



Question 3

This is an insect. Its wings are $2,500\mu\text{m}$. What is the magnification?

- 1) Length of wing is _____ mm
- 2) _____ mm $\times 1000 =$ _____ μm
- 3) Image size = _____ μm
- 4) Magnification = Image \div Actual
 Magnification = _____ $\mu\text{m} \div$ _____ μm
 Magnification = _____

The picture shows the wing magnified (zoomed in) by _____ times.

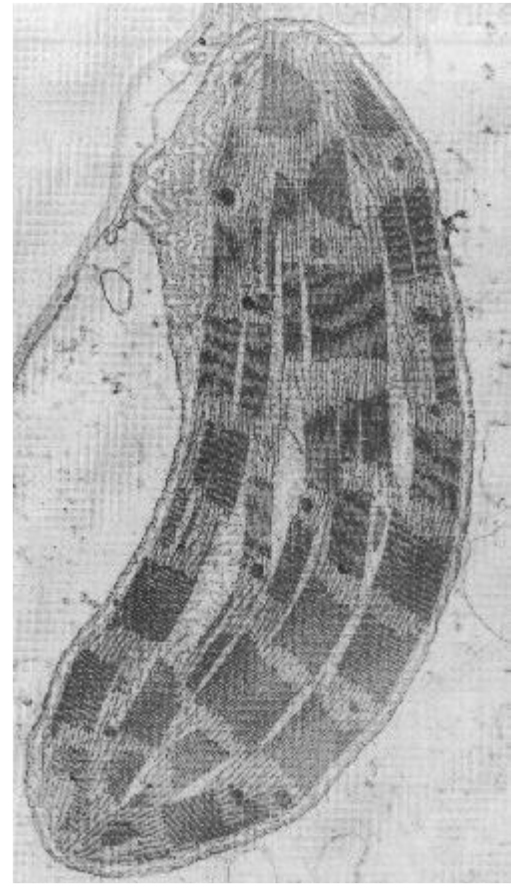


Question 4

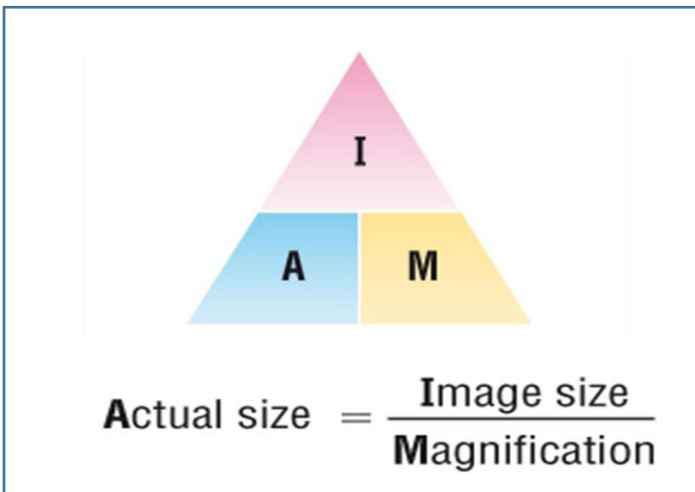
If the actual length of this chloroplast is $10\ \mu\text{m}$, what is the

magnification?

Show your working...



Actual Size



Step 1)

Measure the image size using a ruler in millimetres (mm)

Step 2)

Convert the millimetres (mm) into micrometres (μm)

Step 3)

Divide your answer by the magnification

Question 1

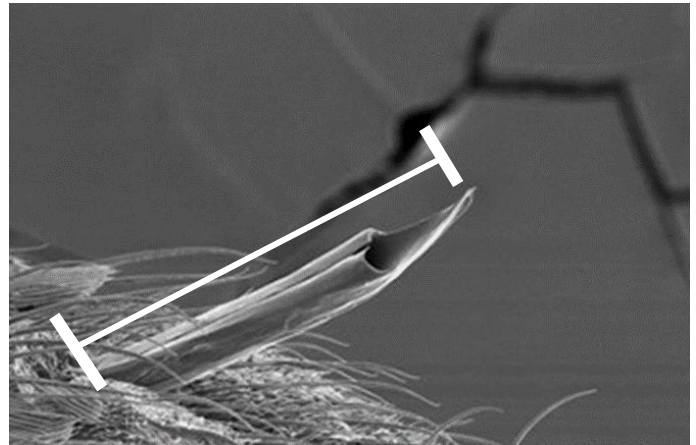
This is a mosquito stinger. The magnification is x4. What is the actual size?

- 1) Length of stinger is _____ mm
- 2) _____ mm x1000 = _____ μm
- 3) Image size = _____ μm
- 4) Actual size = Image \div Magnification

Actual size = _____ $\mu\text{m} \div$ _____

Actual size = _____

The actual size of this stinger is _____ μm . We can see it because it has been magnified.



Question 2

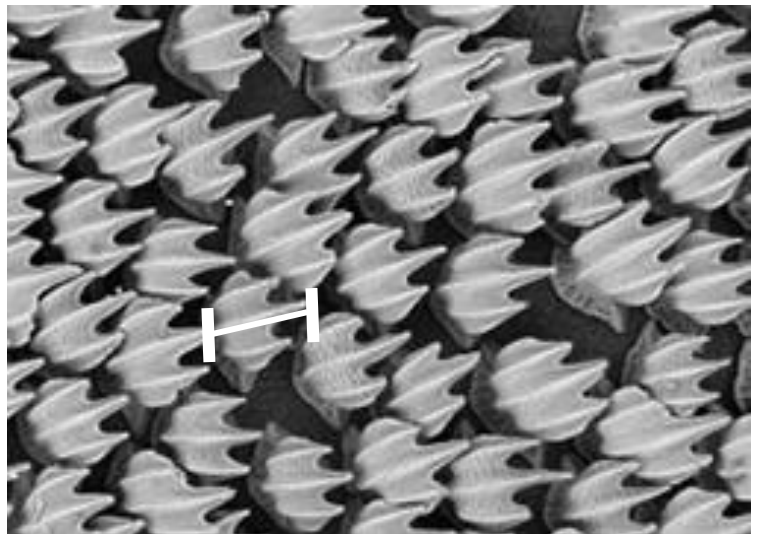
This is shark skin. It is made of teeth. The magnification is x50. What is the actual size of 1 tooth?

- 1) Length of tooth is _____ mm
- 2) _____ mm x1000 = _____ μm
- 3) Image size = _____ μm
- 4) Actual size = Image \div Magnification

Actual size = _____ $\mu\text{m} \div$ _____

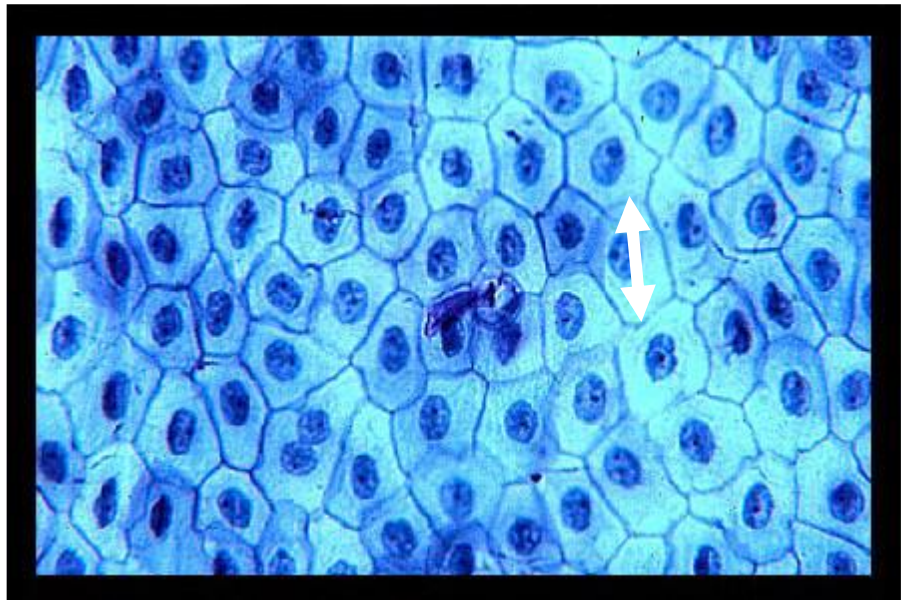
Actual size = _____

The actual size of this tooth is _____ μm . We can see it because it has been magnified.



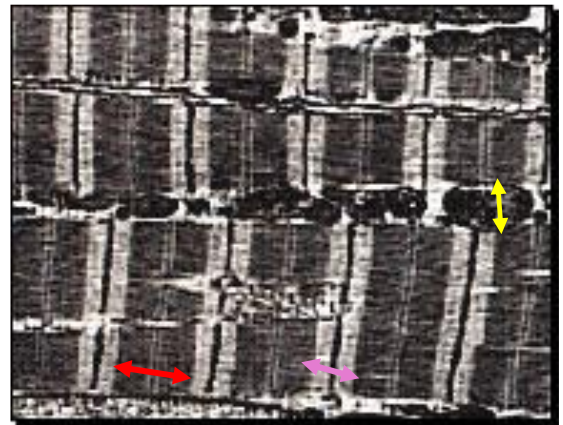
Question 3

If the magnification is $\times 100$
 What is the actual length of
 one of these epithelial cells?
Show your working....



Question 4

If the magnification is $\times 600$, what is the
actual width of:
 a) the **white stripe** of the muscle fibre?
 b) the **dark stripe** of the muscle fibre?
 c) a **mitochondrion**?



Math Skills

Numbers and units

A key criterion for success in biological maths lies in the use of correct units.

The units scientists use are from the *Système Internationale* – the SI units. In biology, the most used SI base units are:

Length (m), (cm), (mm), (μm)

Mass (g),

Time (s), (ms)

Moles of substance (mol).

Biologists also use SI derived units, such as volume cm^3 or dm^3 , degree Celsius ($^{\circ}\text{C}$), concentration mol dm^{-3}

Units of length	Abbreviation	Number of metres	
kilometre	km	1000 m	10^3 m
metre	m	m	m
decimetre	dm	1/10 m	10^{-1} m
centimetre	cm	1/100 m	10^{-2} m
millimetre	mm	1/1000 m	10^{-3} m
micrometre	μm	1/1000000 m	10^{-6} m
nanometre	nm	1/1000000000 m	10^{-9} m

Practice questions

1. HIV is a virus with a diameter of between 9.0×10^{-8} m and 1.20×10^{-7} m. Write this range in nanometres. [2]

2. A student measures the heights of a number of different plants. List these in order from smallest to largest:

22.003 cm 22.25 cm 12.901 cm 12.03 cm 22 cm [5]

3. Change the following values to standard form.

a 3060 kJ b 140 000 kg c 0.000 18 m d 0.000 004 m [4]

4. Give the following as decimals.

a 10^6 b 4.7×10^9 c 1.2×10^{12} d 7.96×10^{-4} [4]

5. The average mass of oxygen produced by an oak tree is 11800 g per year. Give this mass in standard form and quote your answer to 2 significant figures. [2]