

1 Cell structure – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)
microscope	
light microscope	
electron microscope	
resolution	
Magnification	
eukaryotic cells	
nucleus	
organelles	
cytoplasm	
mitochondria	
respiration	
ribosomes	
proteins	

Recall

At IGCSE you saw plant and animal cells and used a microscope. Bring this with you:

- a cell is the basic unit of life, far too small to see with your eyes;
- plant and animal cells share many parts (membrane, cytoplasm, nucleus).

At AS we look more closely: how we **measure** cells, and the tiny **organelles** inside them.

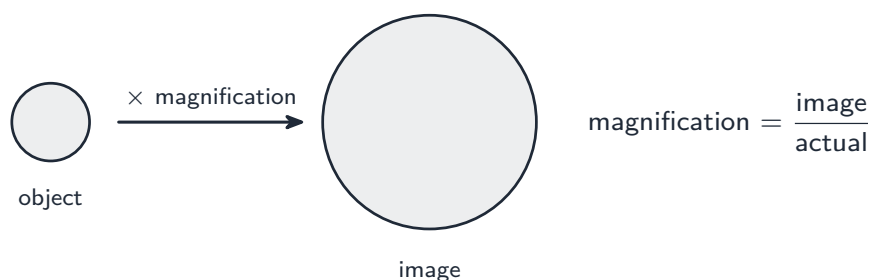
New ideas

■ 1 Studying cells: magnification and resolution

A **microscope** makes a bigger image. A **light microscope** uses light; an **electron microscope** uses electrons, giving far higher **resolution** (the smallest distance at which two points still look separate).

Magnification is how many times bigger the image is than the real object:

$$\text{magnification} = \frac{\text{image size}}{\text{actual size}}.$$



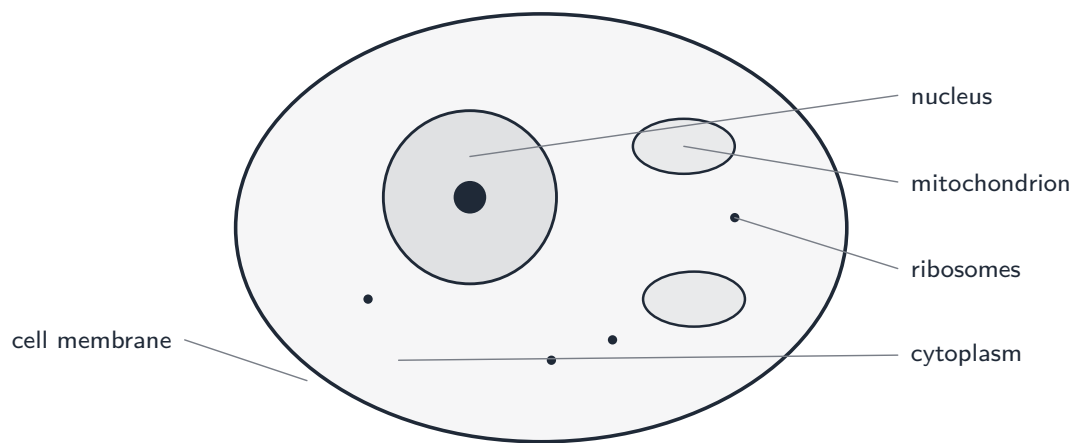
Worked example. An image is 25 mm across at magnification 5000: actual size = $\frac{25}{5000} = 0.005 \text{ mm} = 5 \text{ } \mu\text{m}$.

Micro-check. An image is 40 mm at magnification 2000. Find the actual size in mm. [1]

■ 2 Eukaryotic cells and their organelles

Plant and animal cells are **eukaryotic cells**: their DNA is held inside a **nucleus**. The cell is full of tiny **organelles** floating in the jelly-like **cytoplasm**. Key ones:

- the **nucleus** holds the DNA and controls the cell;
- **mitochondria** carry out **respiration** to release energy (as ATP);
- **ribosomes** join amino acids to make **proteins**.



Micro-check. Which organelle carries out **respiration**?

[1]

Watch out: magnification and resolution are not the same – magnification just enlarges the image, while resolution sets the *real* limit on detail. A light microscope cannot resolve tiny organelles (like ribosomes) however much you magnify.

Practice

1.1 An image of a cell is 30 mm long at magnification 1500. Find the actual length in mm.

[2]

1.2 State the difference between **magnification** and **resolution**.

[2]

1.3 State the function of (a) the nucleus, (b) mitochondria, (c) ribosomes.

[3]

1.4 State what is meant by a **eukaryotic** cell.

[1]

1.5 State which type of microscope (light or electron) gives the higher resolution, and why. [2]

1.6 Challenge. A student magnifies a light-microscope image of a cell more and more, but the ribosomes still look like a blur. Explain why, using the idea of resolution. [2]
