

1 Cell structure – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
microscope	显微镜	_____	_____	_____
light microscope	光学显微镜	_____	_____	_____
electron microscope	电子显微镜	_____	_____	_____
resolution	分辨率	_____	_____	_____
Magnification	放大倍数	_____	_____	_____
eukaryotic cells	真核细胞	_____	_____	_____
nucleus	细胞核	_____	_____	_____
organelles	细胞器	_____	_____	_____
cytoplasm	细胞质	_____	_____	_____
mitochondria	线粒体	_____	_____	_____
respiration	呼吸作用	_____	_____	_____
ribosomes	核糖体	_____	_____	_____
proteins	蛋白质	_____	_____	_____

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).

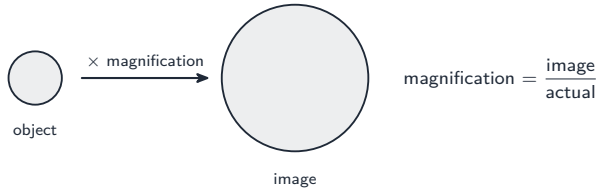
At AS we look more closely: how we **measure** cells, and the tiny **organelles** inside them.

New ideas

■ 1 Studying cells: magnification and resolution

A **microscope** 显微镜 makes a bigger image. A **light microscope** 光学显微镜 uses light; an **electron microscope** 电子显微镜 uses electrons, giving far higher **resolution** 分辨率 (the smallest distance at which two points still look separate).

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

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


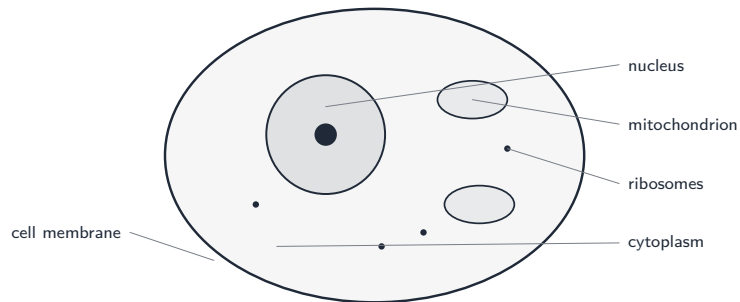
Worked example. An image is 25 mm across at magnification 5000: actual size = $\frac{25}{5000} = 0.005 \text{ mm} = 5 \mu\text{m}$.

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** 真核细胞: their DNA is held inside a **nucleus** 细胞核. The cell is full of tiny **organelles** 细胞器 floating in the jelly-like **cytoplasm** 细胞质. Key ones:

- the **nucleus** holds the DNA and controls the cell;
- **mitochondria** 线粒体 carry out **respiration** 呼吸作用 to release energy (as ATP);
- **ribosomes** 核糖体 join amino acids to make **proteins** 蛋白质.



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]