



**Shenley Brook End Sixth Form
Summer transition tasks for Biology**

Due date Monday 16 September 2024

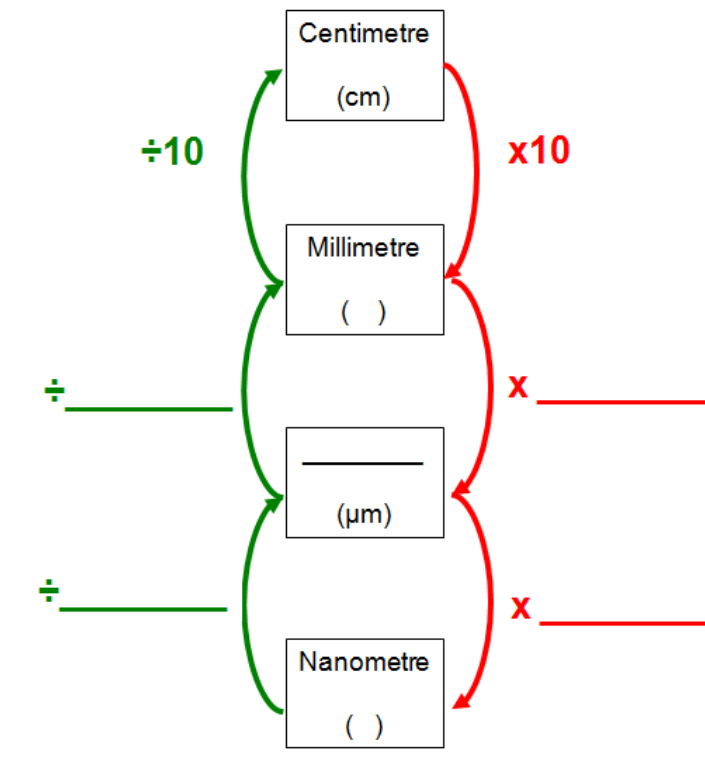


Name :

This summer task will be due on 16th September, please hand into your biology teacher.

To aid your transition to A level biology. Please watch the following videos ([Microscopy: Magnification, Resolution & Types of Microscopes | A-level Biology | OCR, AQA, Edexcel - YouTube](#); [Eukaryotic Cell Structure & Organelles | A-level Biology | OCR, AQA, Edexcel - YouTube](#); [AQA A Level Biology: Cell Organelles - YouTube](#)) and then complete the following tasks. It should take no longer than 7 hours. **Units of measurement**

- 1) Complete the diagram below to show: names of the units of measurement, unit symbols, mathematical operations for converting between units.



- 2) Complete the table below to show the corresponding value nanometres, micrometres and millimetres for the measurements given in each row. The first row has been completed for you. Ensure that your answers use the correct unit symbols.

<u>Nanometre</u>	<u>Micrometre</u>	<u>Millimetre</u>
5	0.005	0.000005
1		
	1	
		1
	3	
7		
		0.5

- 3) When studying cells structure using a microscope the smallest unit of measurement commonly used to describe findings is the nanometre. Explain why.

Magnification and Resolution

1) Define the following terms:

Magnification:

Resolution:

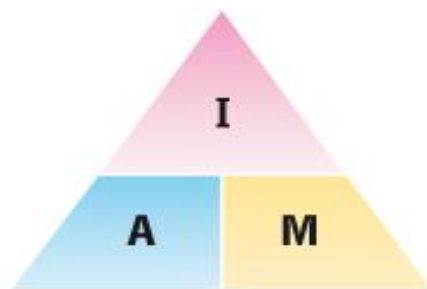
2) Visible light has a wavelength of 400-700 nm. Calculate the best resolution achievable with a light microscope? Show your working out:

3) If the electron gun produces an electron beam with 2 nm wavelength, what is the best resolution achievable?

Calculating total Magnification of a compound light microscope

Eyepiece Magnification	Objective Magnification	Overall Magnification
X10	X4	
X10	X10	
X10	X40	
X10	X100	

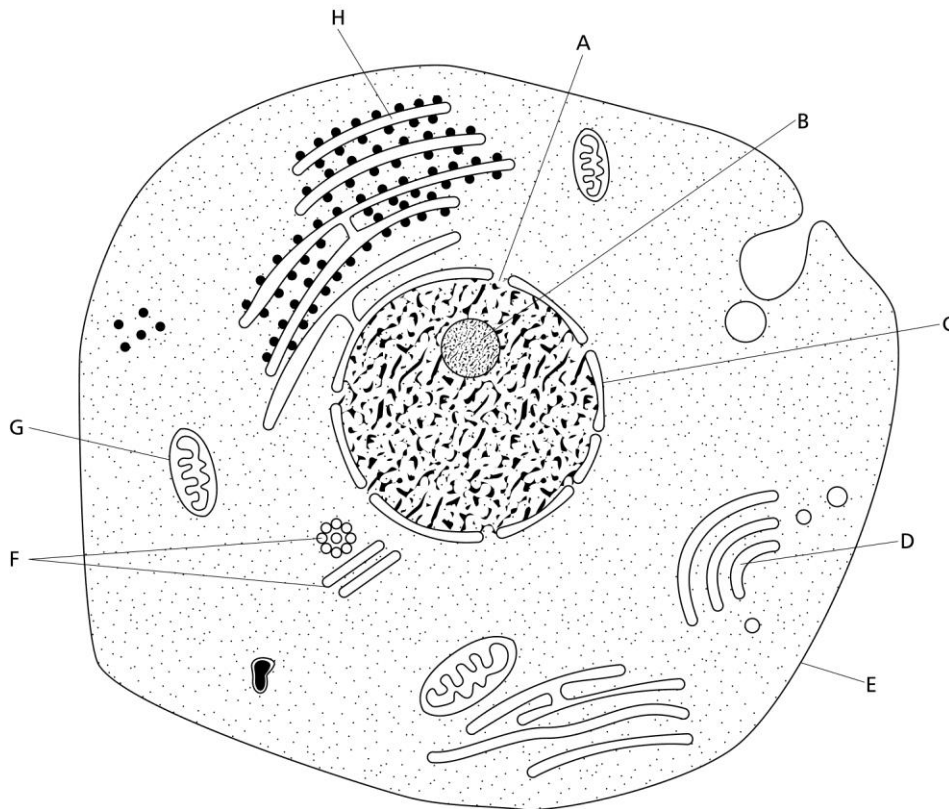
Calculating Cell Magnification from images



$$\text{Actual size} = \frac{\text{Image size}}{\text{Magnification}}$$

$$\text{Magnification} = \frac{\text{Image size}}{\text{Actual size}}$$

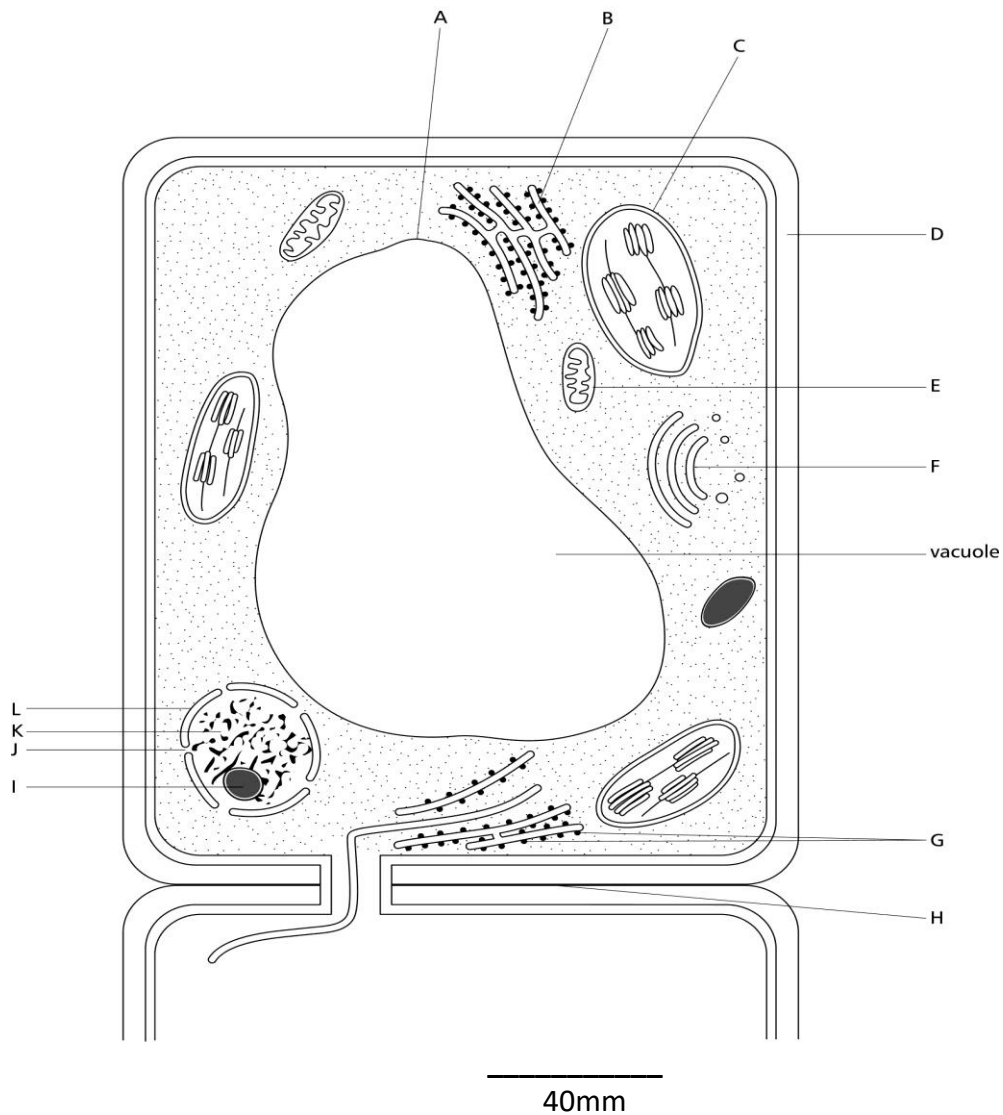
The diagram below shows the general structure of an animal cell as seen under an electron microscope.



5μm

- 1) Calculate the magnification factor of the diagram
- 2) Calculate the length of structure G. What is it?
- 3) Calculate the diameter of structure B. What is it?
- 4) Calculate the diameter of the nucleus
- 5) Calculate the diameter of the cell at its widest point

The diagram below shows the general structure of a plant cell when viewed under an electron microscope.



- 1) Calculate the magnification factor of the diagram
- 2) Calculate the thickness of the cellulose cell wall.
- 3) Calculate the length of the cell.
- 4) Calculate the length of structure C. What is it?
- 5) Calculate the length of the vacuole.

Types of microscope

Feature	Light Microscope	Transmission electron microscope (TEM)	Scanning electron microscope (SEM)
Source of image			
How is the beam focused			
Maximum effective magnification			
Maximum resolution			
Can a live specimen be used?			
Section or external view of the specimen			
Cost			
Can the image be viewed directly			
Is staining of the specimen required?			

- 1) Why is the maximum effective magnification of a light microscope said to be 1500x when it is possible to produce higher magnifications with improved lenses?
- 2) Use a named example to explain the need for staining when using a light microscope.
- 3) State a possible disadvantage of staining a specimen for observation when using a light microscope
- 4) State 2 advantages of using electron microscopes to study cells over a light microscope.
- 5) State 2 disadvantages of using electron microscopes to study cells.
- 6) Describe with reference to the role of staining how the transmission electron microscope differs from a scanning electron microscope?
- 7) Explain why a vacuum necessary in an electron microscope?

Resources

Lots of excellent videos on all aspects of Science and Maths (+lots of other subjects!)

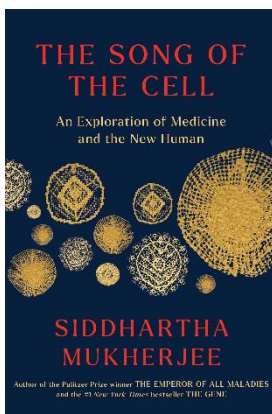
[CrashCourse - YouTube](#)

Biology

[A Level Biology Revision | AQA, OCR, Edexcel And CIE Biology](#)

[AQA A-Level Biology | Primrose Kitten](#)

Additional Suggested Reading

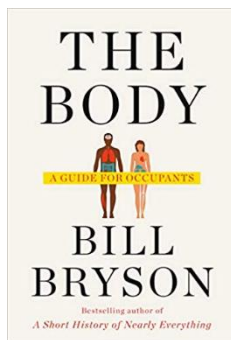


The song of the cell - Mukherjee begins this magnificent story in the late 1600s, when a distinguished English polymath, Robert Hooke, and an eccentric Dutch cloth-merchant, Antonie van Leeuwenhoek looked down their handmade microscopes. What they saw introduced a radical concept that swept through biology and medicine, touching virtually every aspect of the two sciences, and altering both forever. It was the fact that complex living organisms are assemblages of tiny, self-contained, self-regulating units. Our organs, our physiology, our selves—hearts, blood, brains—are built from these compartments.

Hooke christened them “ cells. ”

The discovery of cells—and the reframing of the human body as a cellular ecosystem—announced the birth of a new kind of medicine based on the therapeutic manipulations of cells. A hip fracture, a cardiac arrest, Alzheimer’s dementia, AIDS, pneumonia, lung cancer, kidney failure, arthritis, COVID pneumonia—all could be reconceived as the results of cells, or systems of cells, functioning abnormally. And all could be perceived as loci of cellular therapies.

Filled with writing so vivid, lucid, and suspenseful that complex science becomes thrilling, *The Song of the Cell* tells the story of how scientists discovered cells, began to understand them, and are now using that knowledge to create new humans. Told in six parts, and laced with Mukherjee’s own experience as a researcher, a doctor, and a prolific reader, *The Song of the Cell* is both panoramic and intimate—a masterpiece on what it means to be human.



The Body: A Guide for Occupants is a brilliant, often very funny attempt to understand the miracle of our physical and neurological make up. Bill Bryson achieves the seemingly impossible by making the science of our world both understandable and entertaining to millions of people around the globe.

Now he turns his attention inwards to explore the human body, how it functions and its remarkable ability to heal itself. Full of extraordinary facts and astonishing stories.

**Submission Date (for students)
Monday 16 September**