

A level biology transition pack

Year 11 → Year 12



We look forward to welcoming you in September!

Cells and microscopes – GCSE recap

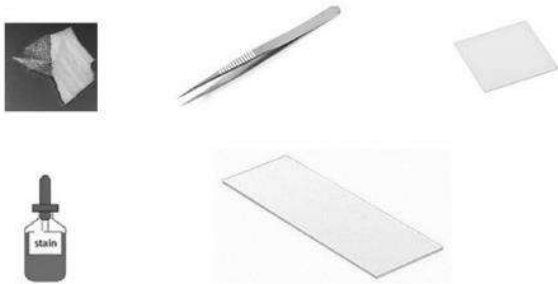


Figure 4

Describe how this equipment could be used to prepare a slide of onion cells to view under a microscope.

(3)

[illegible]

A student cut a piece of onion and placed it on a microscope slide.

The student then placed this slide on the stage of a light microscope and looked through the eyepiece.

No cells could be seen in the piece of onion.

Explain **two** ways this method could be improved to see details of the onion cells.

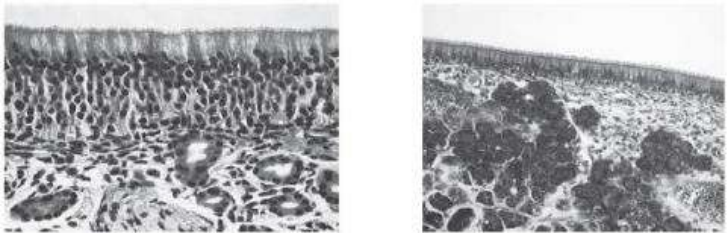
(4)

1

2

The development of electron microscopes has increased our understanding of cells and their features.

Figure 8 shows two images of ciliated epithelium, one taken using a light microscope and one using an electron microscope.



Light microscope

Electron microscope

(Science photolibrary Epithelium C022/2228 ©Steve Gschmeissner/Science Photolibrary)

Figure 8

Explain how the electron microscope image helps us to understand more about ciliated epithelium.

(3)

[illegible]

Explain **one** advantage of using an electron microscope to observe plant cells.

(2)

.....

.....

.....

.....

Lymphocytes are white blood cells that produce large amounts of protein.

(i) Which organelle is needed to produce large amounts of protein?

- ☐ **A** ribosome
- ☐ **B** vacuole
- ☐ **C** chloroplast
- ☐ **D** flagellum

A small lymphocyte has a diameter of 10 μm (micrometres).

A microscope magnifies this lymphocyte 400 times.

(ii) Calculate the diameter of the image of the lymphocyte seen using this microscope.

image size μm

(iii) How many micrometres are in 1 mm (millimetre)?

- ☐ **A** 10
- ☐ **B** 100
- ☐ **C** 1 000
- ☐ **D** 10 000

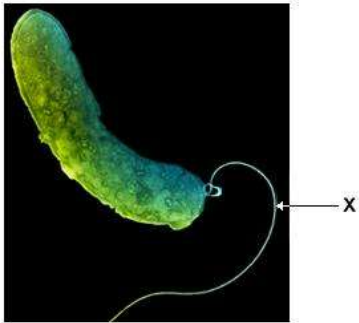
Enzymes and biological molecules – GCSE recap

Complete the table

Polymer	Monomer	Enzyme that digests the polymer
Protein		
	Fatty acids and glycerol	
Starch		

Now let's try some A level standard questions – you may have to do some research!

- (a) The figure below is an image of a bacterium obtained using a scanning electron microscope.



Name the structure labelled X.

(1)

The resolution of an image obtained using an electron microscope is higher than the resolution of an image obtained using an optical microscope.

Explain why.

(1)

A student determined the size of a cell structure from a photograph obtained using a microscope.

He used a ruler and a calculator and gave the answer in μm

Describe how the student determined the size of the structure.

(2)

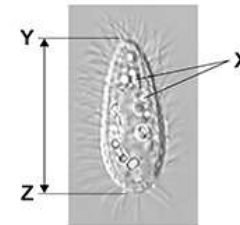
Name **two** structures found in **all** bacteria that are **not** found in plant cells.

1 _____

2 _____

(2)

Uronema marinum is a single-celled eukaryotic organism. The diagram below is a photograph of *U. marinum* taken through an optical microscope.



- (a) Explain why it is not possible to determine the identity of the structures labelled X using an optical microscope.

(2)

Question Number	Answer	Mark
	A description linking three from: • use forceps to {pick up / peel} a (thin layer of) onion (cells) (1) • place (onion cells) onto microscope slide (1) • add a drop of stain / named stain (1) • place coverslip on top (of onion) (1) • lower coverslip slowly / at an angle (1)	(3) AO1 2

Question number	Answer	Mark
	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (2 marks): • higher magnification can be used (1) • so the cilia are more visible (1) • and the sub-cellular structures are visible (1)	(3)

Question Number	Answer	Mark
	One advantage explained: • higher resolution (1) • so more detail seen/higher magnification can be used (1) or • higher magnification (1) • so more detail seen (1)	(2) AO 1 1

Question Number	Answer	Mark
(i)	A ribosomes The only correct answer is A <i>B is not correct because vacuoles, although important in secreting the proteins do not produce them.</i> <i>C is not correct because lymphocytes do not contain chloroplasts</i> <i>D is not correct because lymphocytes do not have flagella</i>	(1) AO2 1

Question Number	Answer	Additional guidance	Mark
(ii)	10 x 400 (1) 4000 (µm)	award full marks for correct answer with no working	(2) AO2 2

Question Number	Answer	Mark
(iii)	C 1000 The only correct answer is C <i>A is not correct because there are 1000 µm in 1 mm</i> <i>B is not correct because there are 1000 µm in 1 mm</i> <i>D is not correct because there are 1000 µm in 1 mm</i>	(1) AO1 1

(a) Flagellum/flagella;

(c) Shorter wavelength between electrons;

OR

Longer wavelength in light rays;

Accept 'of electrons' OR 'of electron beam' for 'between electrons'

Reject Electron microscope has a shorter wavelength

Reject Light microscope has a longer wavelength

(d) Mark in pairs: 1 **and** 2 **OR** 3 **and** 4

1. Measure (length of structure) **and** divide by magnification;

Accept correct equation making reference to a measurement

2. Correct conversion from measured length to μm , either

$\times 10\,000$ from cm

OR

$\times 1000$ from mm;

3. Measure (length of structure) **and** divide by (image) length of scale bar;

4. Multiply by actual length of scale bar;

1

(e) 1. Circular DNA (molecule in cytoplasm);

2. Murein cell wall

OR

Peptidoglycan cell wall

OR

Glycoprotein cell wall;

3. Smaller/70S ribosomes in cytoplasm;

2 max

1

(a) 1. Resolution (too) low;

2. Because wavelength of light is (too) long;

2

Notice how the terminology is a lot more details than GCSE!

2

Task 2: Practical skills in year 12

You will complete an enzymes practical and an osmosis required practical in the first module of year 12.

To prepare for this, watch the following videos and answer the following questions **for each practical**

Enzymes: https://www.youtube.com/watch?v=A8Ts4V_osvo

Osmosis: <https://www.youtube.com/watch?v=k1O9jBHgsxs>

1. What is the independent variable?
2. What is the dependent variable?
3. Name 3 control variables
4. State a suitable control for the investigation (remember a control experiment is NOT the same as a variable!)
5. Suggest an improvement to the method
6. List 3 safety precautions taken during this practical

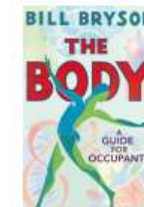
Fancy a bit
of extra
reading?

Check out some of these amazing biology books to keep you busy!



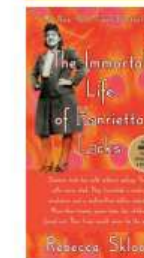
This is going to hurt by Adam Kay

A real life diary kept by a junior doctor during his training years. Lots of highs and lows and insight into how it really is to train as a doctor!
Both me and Mrs Forster have read this and LOVED it!!!



The Body by Bill Bryson

This book explores your amazing body and gives you facts about your organs, how we survive and how absolutely mind blowing your body actually is!



The Immortal Life of Henrietta Lacks by Rebeca Skloot

This is the story of how a poor woman used her cancer cells to make the first immortalised human cell line. The book tells of her struggles and strengths as she made one of the greatest medical contributions ever!



Dr Franklin's Island by Ann Halam

A fiction book which sees 3 teenagers end up stranded on an island where there is a large research facility. The teenagers are captured and imprisoned by Dr Franklin, who performs transgenic experiments on them!