Physics. You work it out.

Identifying Organelles I

A Level

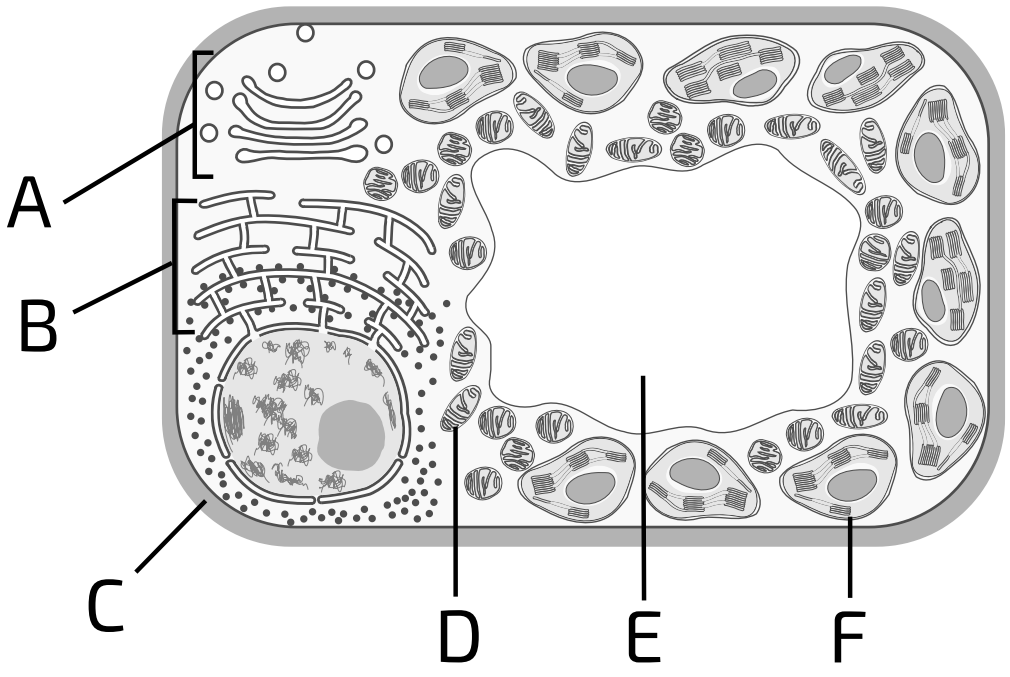

Figure 1: A diagram of a cell.

Part A Name the cell

What kind of cell is shown above?

- Bacterial cell
- Animal cell
- Plant cell

Part B Name the organelle

Match the letter to the organelle/structure.

Letter	Organelle
A	
B	
C	
D	
E	
F	

Items:

centriole **vacuole** **chloroplast** **Golgi apparatus** **endoplasmic reticulum** **flagellum** **mitochondrion** **cell wall**

Part C Structure C

What is structure C made of?

- peptidoglycan
- cellulose
- chitin
- chlorophyll
- phospholipids

Part D Organelle E

What is the name of the membrane that surrounds organelle E?

- inner membrane
- tonoplast
- cell membrane
- cisternae
- capsule

Part E Organelle F

What is the primary role of organelle F?

- keeps the cell turgid
- aerobic respiration
- photosynthesis
- digestion of ingested material

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Identifying Organelles II

A Level

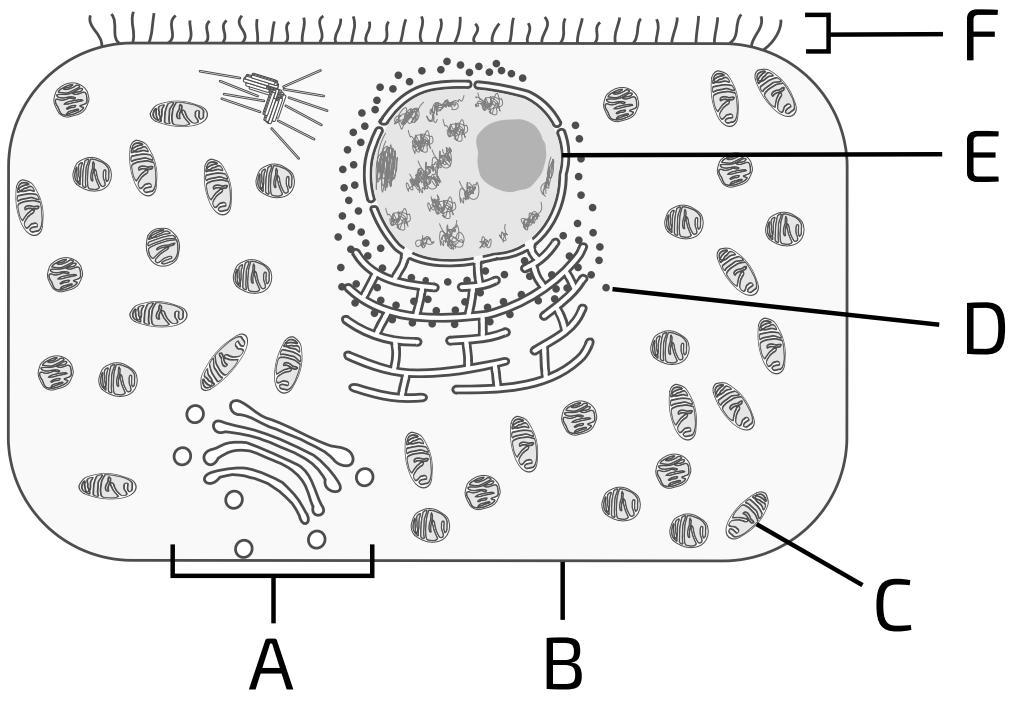

Figure 1: A diagram of a cell.

Part A Name the cell

What kind of cell is shown above?

- Plant cell
- Bacterial cell
- Animal cell

Part B Name the organelle

Match the letter to the organelle/structure.

Letter	Organelle
A	
B	
C	
D	
E	
F	

Items:

cell membrane **cilia** **nucleoid** **Golgi apparatus** **mitochondrion** **nucleus** **ribosome** **plasmid** **vacuole**

Part C Organelle A

What are the names of the structures that organelle A is made of?

- cisternae and vesicles
- cristae and vacuoles
- cristae and vesicles
- centrioles and vesicles
- centrioles and vacuoles
- cisternae and vacuoles

Part D Organelle C

What is the primary role of organelle C?

- photosynthesis
- aerobic respiration
- anaerobic respiration
- digestion of ingested material

Part E Structure F

What is the primary role of structure F?

- movement of chromosomes during mitosis/meiosis
- movement of fluid along the tissue that the cell is part of
- movement of organelles around the cell
- movement of the cell through the surrounding fluid

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STEM SMART Biology Week 14 - Revision - Cell Structure

Identifying Organelles III

A Level

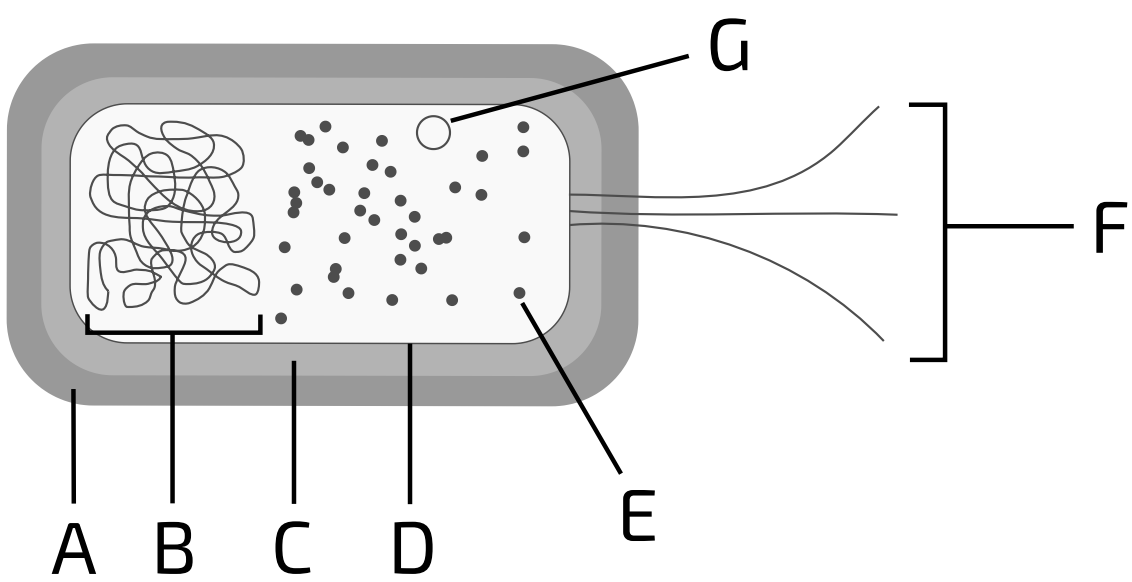

Figure 1: A diagram of a cell.

Part A Name the cell

What kind of cell is shown above?

- Bacterial cell
- Plant cell
- Animal cell

Part B Name the organelle

Match the letter to the organelle/structure.

Letter	Organelle/structure
A	
B	
C	
D	
E	
F	
G	

Items:

capsule | ribosome | cilia | cell membrane | chloroplast | nucleus | flagella | cell wall | plasmid | nucleoid

Part C Structure C

What is structure C made of?

- phospholipids
- cellulose
- chitin
- peptidoglycan

Part D Organelle E

What is the primary function of organelle E?

- post-translational modification of proteins
- DNA replication
- translation
- transcription

Part E Structure F

What is the primary role of F?

- movement of organelles around the cell
- movement of the cell
- movement of fluid along the tissue that the cell is part of
- cell contraction

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Organelles Overview

A Level

P P P

Part A Organelle functions I

The table below lists some organelles/cell structures. Match the organelle/cell structure to the function.

Organelle	Function
	where DNA is contained, replicated and transcribed
	where aerobic respiration takes place
	regulates transport of substances into/out of the cell
	where photosynthesis takes place
	where lipids and carbohydrates are synthesised and stored
	where translation takes place

Items:

smooth endoplasmic reticulum **nucleus** **mitochondria** **chloroplasts** **ribosomes** **cell membrane**

Part B Organelle functions II

The table below lists some organelles/cell structures. Match the function to the organelle/cell structure.

Organelle	Function
	contain and transport digestive enzymes
	modifies proteins that will be secreted from the cell
	provides protection and support to the cell
	organises the spindle fibres during cell division
	stores sugars and amino acids, and helps keep the cell turgid
	enables the cell to move through its environment
	move fluid along the tissue

Items:

Golgi apparatus **flagellum** **centrosome** **central vacuole** **lysosomes** **cilia** **cell wall**

Part C Single membranes

Which of the following are bound by a single-membrane?

- [ ] nucleus
- [ ] endoplasmic reticulum
- [ ] ribosome
- [ ] Golgi apparatus
- [ ] vesicle
- [ ] mitochondrion
- [ ] chloroplast
- [ ] a eukaryotic cell
- [ ] nucleoid

Part D Double membranes

Which of the following are bound by a double membrane?

- [ ] nucleus
- [ ] endoplasmic reticulum
- [ ] ribosome
- [ ] Golgi apparatus
- [ ] vesicle
- [ ] mitochondrion
- [ ] chloroplast
- [ ] a eukaryotic cell
- [ ] nucleoid

Part E Non-membrane-bound organelles

Which of the following are not bound by a membrane?

- [ ] nucleus
- [ ] endoplasmic reticulum
- [ ] ribosome
- [ ] Golgi apparatus
- [ ] vesicle
- [ ] mitochondrion
- [ ] chloroplast
- [ ] a eukaryotic cell
- [ ] nucleoid

Question elements adapted with permission from OCR A Level January 2003, Biology Foundation Paper, Question 1b. Other question elements created for isaacphysics.org by Lewis Thomson.

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Matching micrographs to microscopes

A Level

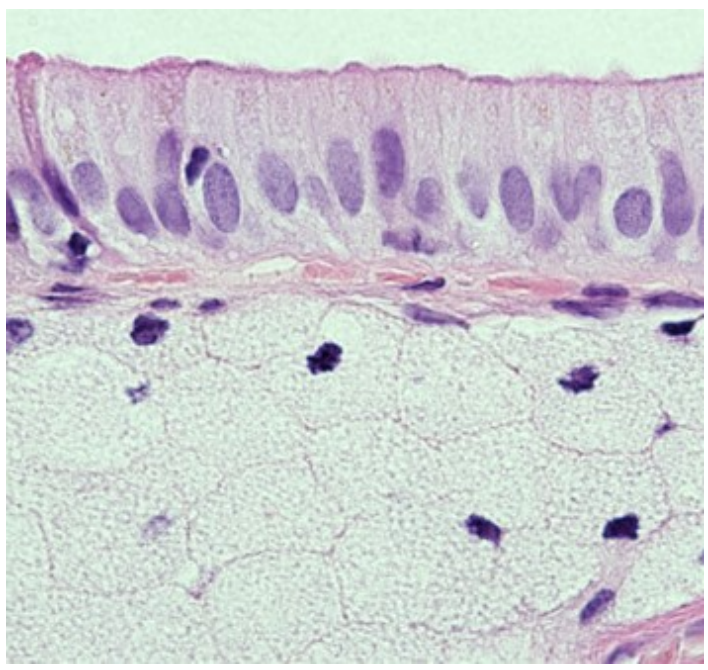

Figure 1: Microscope image (micrograph) of a section of the human gallbladder wall. The top part of the image shows a layer of epithelial cells, with nuclei stained purple.

Image by William Karkow (Public Domain). CIL: 34859.

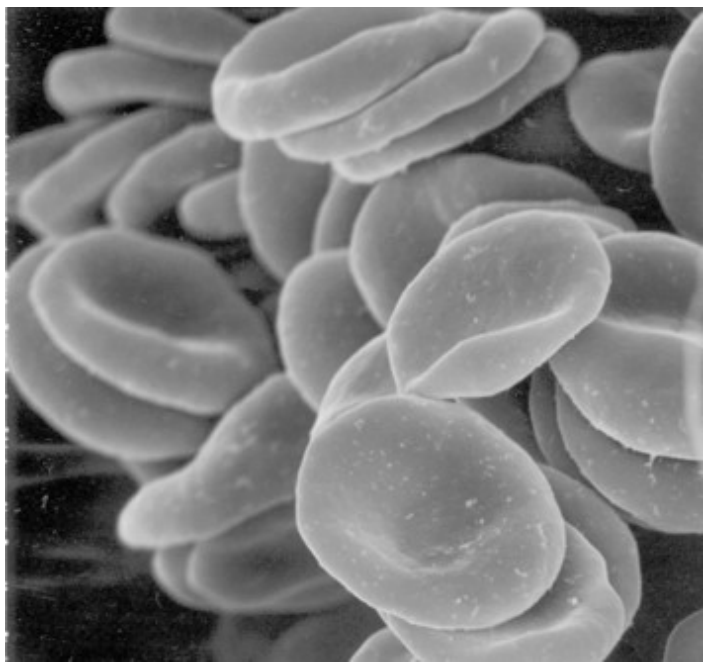

Figure 2: Microscope image (micrograph) of human red blood cells.

Image by Tina Carvalho (Public Domain). CIL: 221.

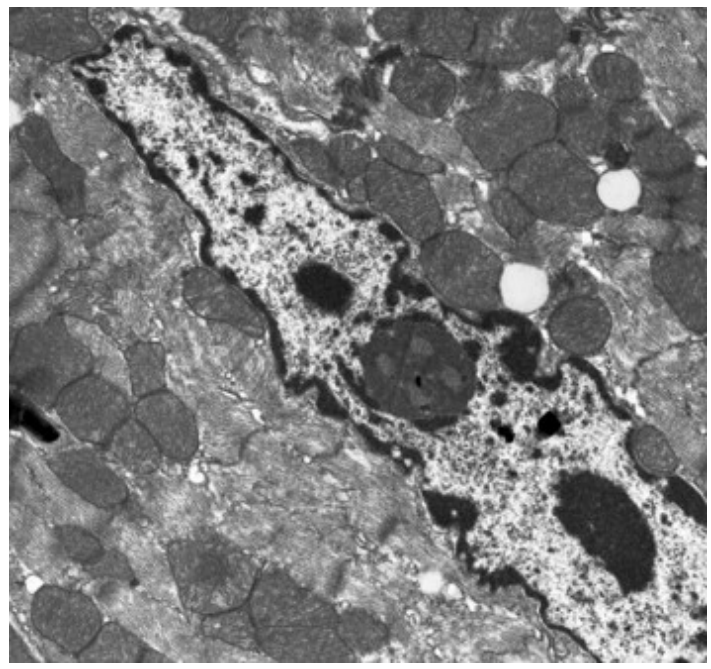

Figure 3: Microscope image (micrograph) of a mouse cardiac cell. The large membrane-bound structure which stretches from top-left to bottom-right is the nucleus, and the nucleolus is visible in the centre of this.

Image by Dee Lauzon, Sue Lancelle, and Marian Rice (Public Domain). CIL: 39755.

Part A Light microscope

Which figure above shows an image taken with a light microscope?

- Figure 1
- Figure 2
- Figure 3

Part B Transmission electron microscope (TEM)

Which figure above shows an image taken with a transmission electron microscope (TEM)?

- Figure 1
- Figure 2
- Figure 3

Part C Scanning electron microscope (SEM)

Which figure above shows an image taken with a scanning electron microscope (SEM)?

- Figure 1
- Figure 2
- Figure 3

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Gameboard:

STEM SMART Biology Week 14 - Revision - Cell Structure

Liver Cells and White Blood Cells

A Level

C C C

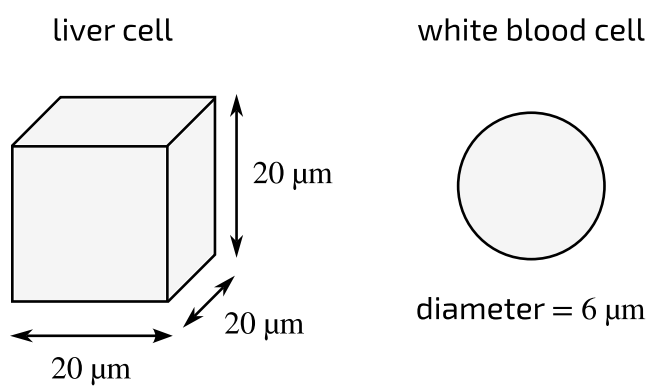

Figure 1: A schematic of two healthy adult human cells: a liver cell (approximately cube-shaped) and a white blood cell (approximately sphere-shaped). The cells are not dividing.
The cells are not shown to scale.

Part A Liver cell mitochondrial volume

A study estimates that mitochondria account for 12% of the volume of each type of cell. Using this estimate, calculate the volume that mitochondria occupy in an adult liver cell.

Give your answer to 2 significant figures.

Part B White blood cell mitochondrial volume

A study estimates that mitochondria account for 12% of the volume of each type of cell. Using this estimate, calculate the volume that mitochondria occupy in an adult white blood cell.

The volume of a sphere is given by $\frac{4}{3}\pi r^3$, where r is the radius.

Give your answer to 2 significant figures.

Part C Cell statements

Which of the following statements are correct? Select all that apply.

- [ ] The larger number of mitochondria in the liver cell will produce more lactic acid than those in the white blood cell.
- [ ] The liver cell is larger and so will contain a greater mass of nuclear DNA than the white blood cell.
- [ ] The white blood cell will contain a greater mass of nuclear DNA than a fully differentiated red blood cell.
- [ ] None of the above statements are true.

Adapted with permission from NSAA 2020 Section 2 Q52