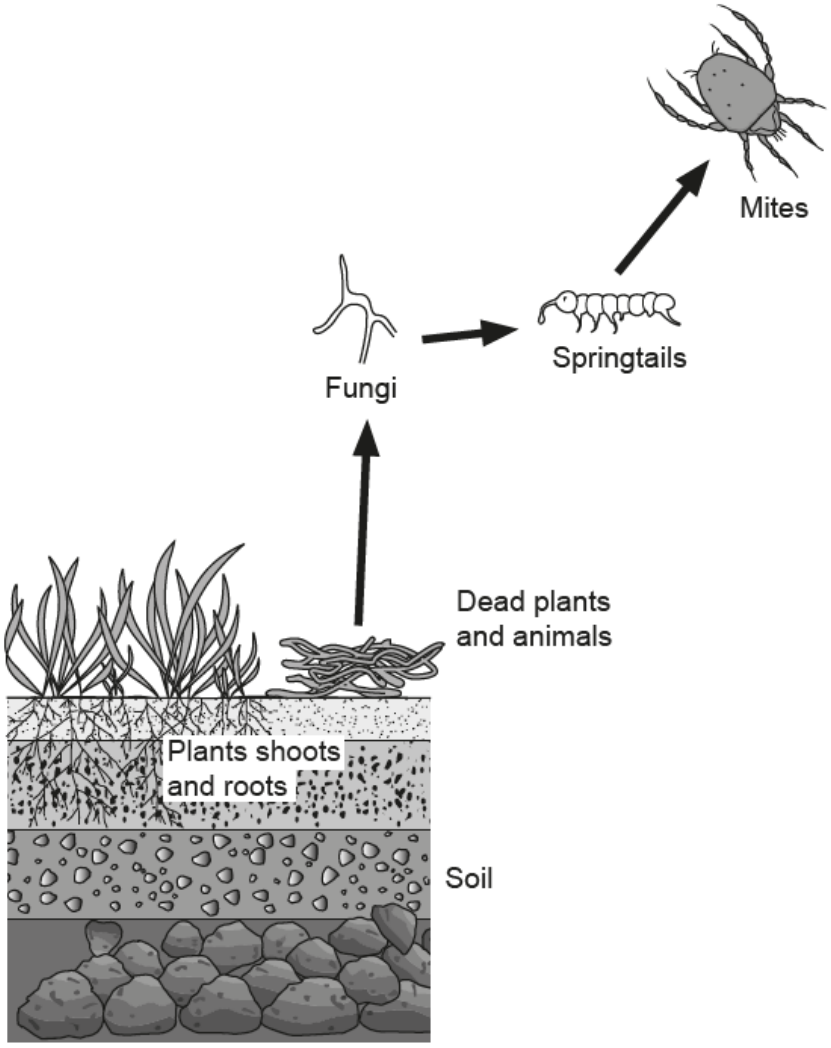
Using food and controlling growth – 2021/20 GCSE 21st Biology Combined Science B

1. Nov 2021/Paper_J260/01/No.5

The soil is an example of an ecosystem.

The diagram shows a food chain within this ecosystem.



(a) From the diagram, write down:

(i) A producer.

..... **[1]**

(ii) A consumer.

..... **[1]**

(iii) An abiotic component.

..... **[1]**

(b) Scientists use technical terms to describe different levels of organisation within an ecosystem.

Draw lines to connect each **technical term** to its correct **description**.

Technical term	Description
Ecosystem	All the species present.
Community	The number of individuals in a single species.
Population	All the species and all the abiotic components.

[2]

(c) A scientist put soil in six containers. They added:

- 60 springtails and 3 mites to three of the containers
- **and**
- 60 springtails and 15 mites to the other three containers.

After 8 weeks they counted the number of mites in each container. The table shows their results.

	Number of mites after 8 weeks			
Number of mites added	**Test 1**	**Test 2**	**Test 3**	**Mean**
3	8	7	9	
15	6	12	9	

(i) Calculate the mean number of mites after 8 weeks, when 15 mites were added.

Mean = ... **[2]**

(ii) When 3 mites were added the number of mites increased after 8 weeks.
When 15 mites were added the number of mites decreased after 8 weeks.

Explain why.

Use ideas about predators and prey in your answer.

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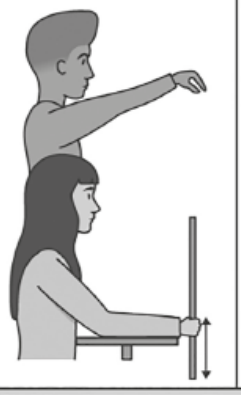
..... **[2]**

2. Nov 2021/Paper_J260/01/No.10

Amir and Nina are investigating the effects of caffeine on reaction time.
The diagram shows their method.

1. Measure drop distance before having caffeine.	2. Drink 200 ml caffeinated cola.	3. Repeat measurement of drop distance.
		

Describe how they could use a double-blind trial to improve their method and how they could collect more valid data.

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..... **[6]**

3. Nov 2021/Paper_J260/01/No.12

(a) A student is given a slide of a cross section of a plant stem. They clip the slide onto the stage of a light microscope and turn on the light.

Describe how they can focus the image to observe the xylem and phloem tissues.

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..... **[4]**

(b) Explain how the xylem is adapted to its function.

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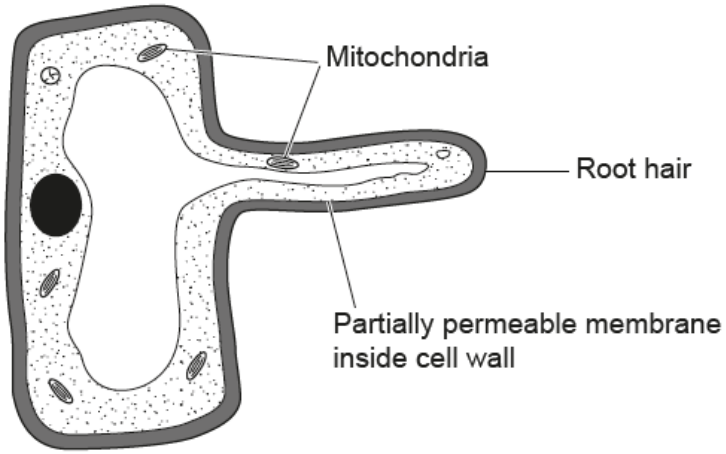
..... **[2]**

(c) The diagram shows the structure of a root hair cell.



(i) Explain how the '**root hair**' is adapted to its function.

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..... **[2]**

(ii) Explain why **mitochondria** are required for the uptake of some mineral ions by root hair cells.

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.....

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..... **[2]**

(d) Which statement about diffusion across the partially permeable membrane of root hair cells is correct?

Tick (✓) **one** box.

Both water and nitrate ions can diffuse through the partially permeable membrane. ☐

Nitrate ions can diffuse through the partially permeable membrane, but water ions cannot. ☐

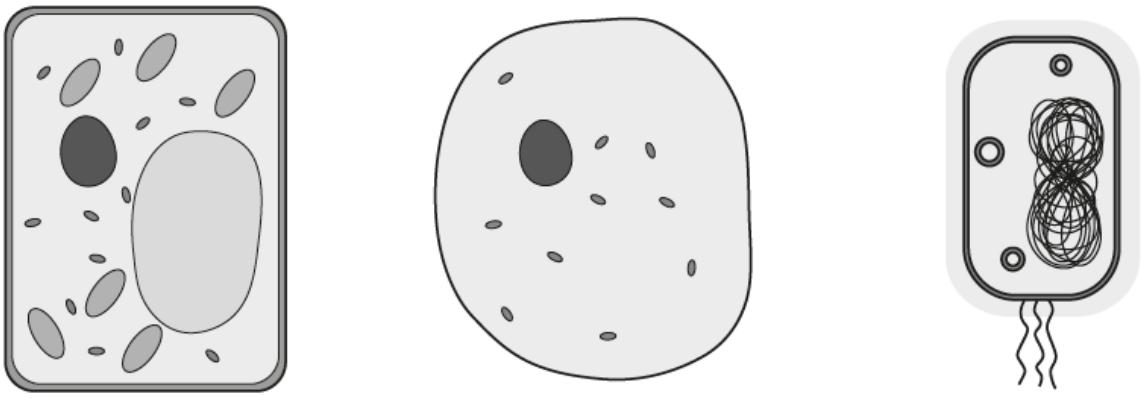
Both water and nitrate ions cannot diffuse through the partially permeable membrane. ☐

Water ions can diffuse through the partially permeable membrane, but nitrate ions cannot. ☐

[1]

4. Nov 2021/Paper_J260/04/No.1

(a) Sarah draws **three** different cells, cell A, cell B, and cell C, as shown in **Fig. 1.1.**



Cell A Cell B Cell C

Fig. 1.1

(i) What type of cell is **cell A**?

..... **[1]**

(ii) What is found in **all** three cells?

Tick (✓) **one** box.

Cell membrane	☐
Nucleus	☐
Mitochondria	☐
Chloroplast	☐

[1]

(iii) **Cell C** has a length of 0.0047 mm.

1 mm = 1000 μm.

Calculate the length of cell C in micrometres, μm.

Length = ... μm **[1]**

(b) Microscopes can be used to look at cells.

Complete the sentences about microscopes.

Use words from the list.

You can use each word once, more than once, or not at all.

focus	**light**	**resolution**	**neutron**
magnify	**depth**	**electron**	**power**

A microscope can be used to ..... parts of a cell that cannot be seen with the naked eye.

..... microscopes have a higher magnification and ..... than ..... microscopes, so they can be used to look at parts of a cell in more detail. **[4]**

(c) **Fig. 1.2** shows a light microscope.

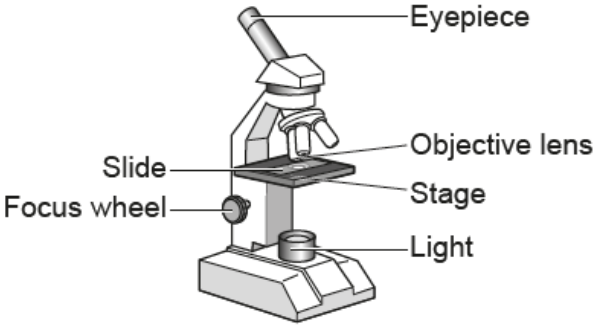


Fig. 1.2

(i) Sarah uses the microscope in **Fig. 1.2** to look at some cells.

The steps Sarah takes to look at some cells are listed below but are **not** in the correct order.

A Place the prepared slide on the microscope stage.

B Turn the focus wheel to make the image clear.

C Change the objective lens to a higher magnification.

D Prepare a microscope slide of the cells.

E Use the objective lens with the lowest magnification.

Write the **letters** in the boxes to show the correct order.

The first one has been done for you.

D				

[3]

5. Nov 2021/Paper_J260/05/No.2

(a) A student is given a slide of a cross section of a plant stem. They clip the slide onto the stage of a light microscope and turn on the light.

Describe how they can focus the image to observe the xylem and phloem tissues.

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(b) Explain how the xylem is adapted to its function.

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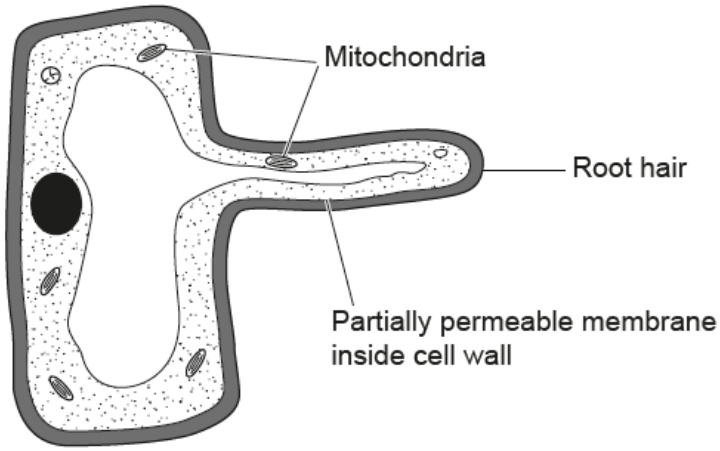
..... **[2]**

(c) The diagram shows the structure of a root hair cell.



(i) Explain how the '**root hair**' is adapted to its function.

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.....

..... **[2]**

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[1]