# Characteristics & Classification of Living Organisms

**(b) (i)** A giant rat was discovered in a natural rainforest on Vangunu Island. Scientists wanted to determine if it was a new species.

Explain how scientists can use tissue samples to classify this rat.

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.....

..... [2]

**(ii)** Giant rats eat coconuts.

Coconuts are grown as a monoculture for human consumption.

Suggest how monocultures of crop plants can result in the extinction of some animals.

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.....

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..... [3]





[Total: 12]

**1 (a)** State **three** uses of energy in the human body.



1 .....

2 .....

3 .....

[3]



**(d)** Sexual reproduction requires energy.

State **three** uses of energy in organisms **other than in reproduction**.

1 .....

2 .....

3 .....

[3]

**5** Ciliates are classified in the kingdom Protoctist. Bacteria are classified in the kingdom Prokaryote.

**(a)** State **two structural** features that distinguish the cells of a protoctist from a prokaryote.

1 .....

.....

2 .....

.....

[2]



**(b)** Fig. 5.1 shows five species of ciliate that are found in sewage treatment works.

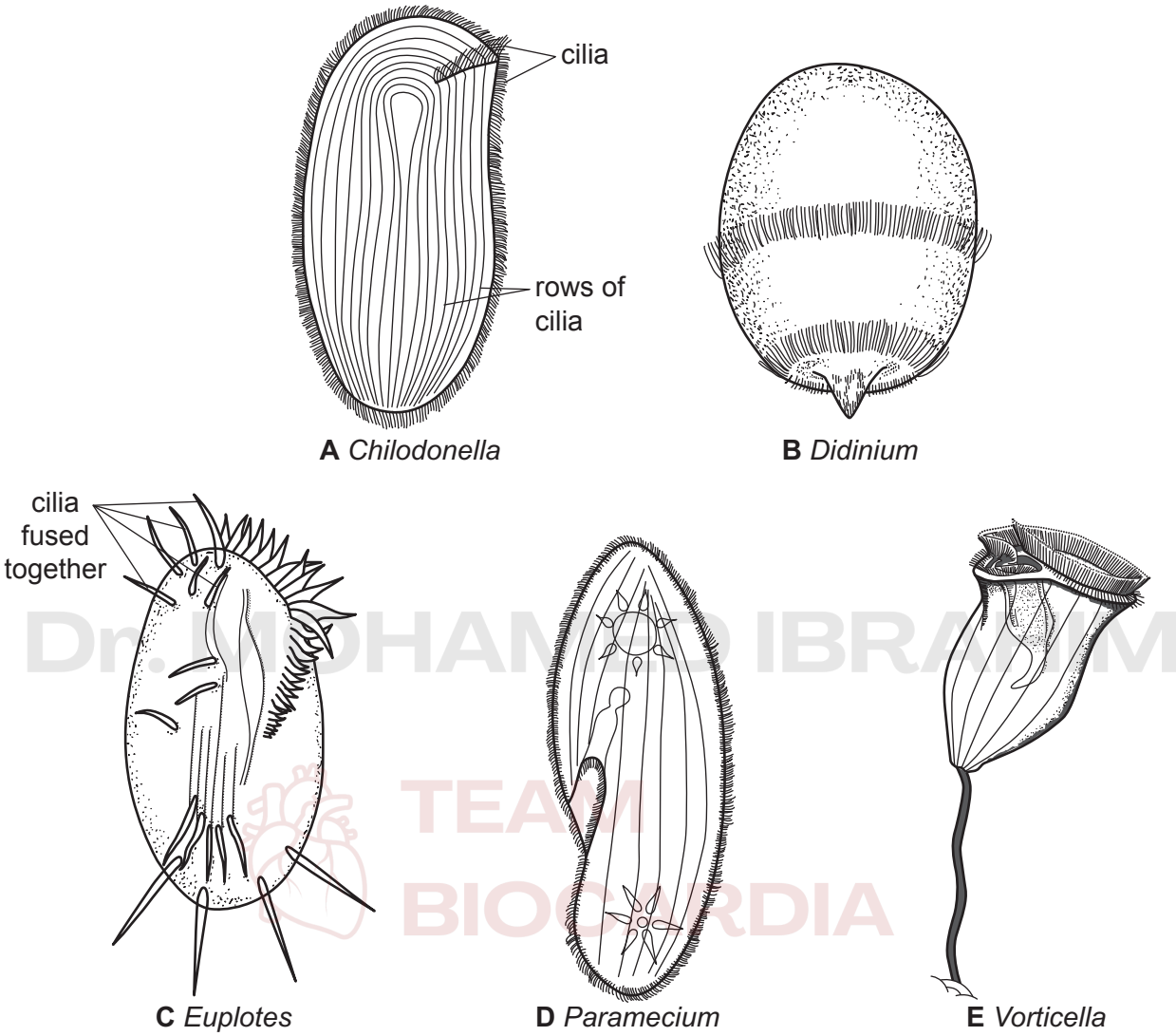



**Fig. 5.1**

Fig. 5.2 is a dichotomous key to identify the ciliates shown in Fig. 5.1.

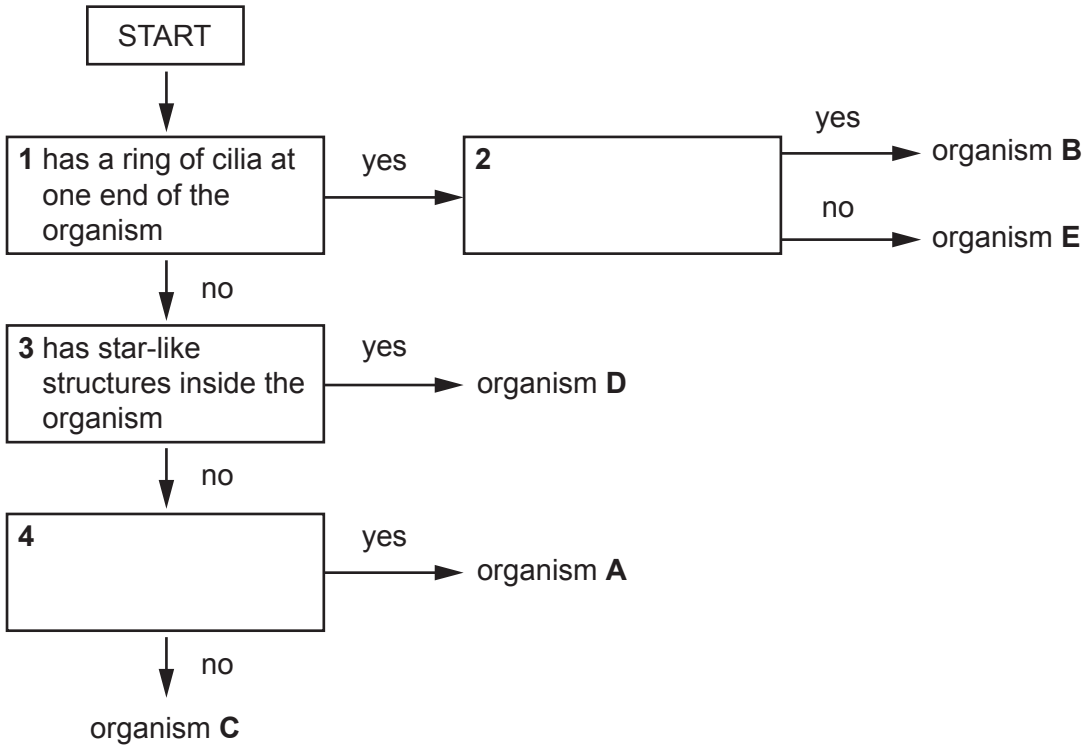



**Fig. 5.2**

Complete the key in Fig. 5.2 by writing suitable statements:

- for box 2 to distinguish species **B** and **E**
- for box 4 to distinguish species **A** and **C**.

text for box 2 .....

.....

.....

text for box 4 .....

.....

.....

[2]

**(c)** *Didinium* is a predatory ciliate. A video recording was made of one *Didinium* feeding on a *Paramecium*. Fig. 5.3 shows a sequence of still photographs taken from the video.

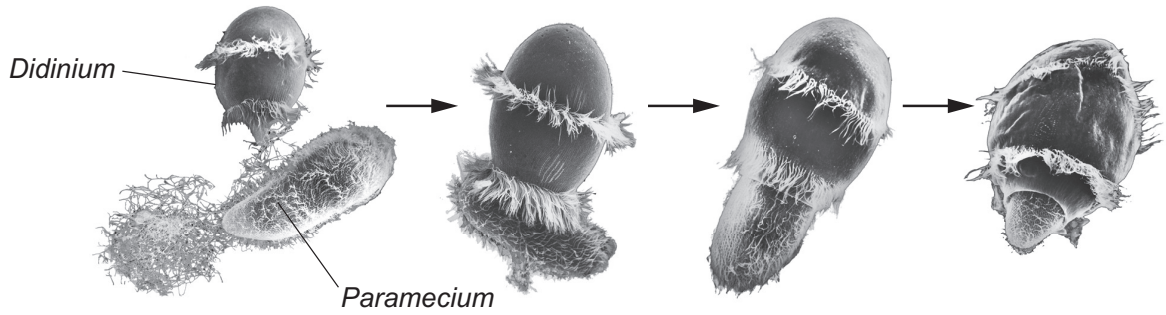



**Fig. 5.3**

Complete the table by putting a tick (✓) by each characteristic of life that can be seen in the still photographs from the video in Fig. 5.3.

| | | | |
|---|---|---|---|
| excretion | | nutrition | |
| growth | | reproduction | |
| movement | | respiration | |

[1]



**1** **(a)** The ant mimic jumping spider, *Myrmarachne formicaria*, is shown in Fig. 1.1.

The common name of this species describes its behaviour. t is an arachnid that tricks its prey because it looks like the insects that it eats.



**Fig. 1.1**

**(i)** Suggest which trophic level in a food chain *M. formicaria* could belong to.

..... [1]

**(ii)** State the genus of the spider shown in Fig. 1.1.

..... [1]

**(iii)** Some keys use paired choices of features to identify species such as the ant mimic jumping spider.

State the name of this type of key.

..... [1]

**(b)** Spiders are classified as arachnids. Arachnids are one of the main groups of arthropods.

Fig. 1.2 shows diagrams of six arthropods, four of which are arachnids.

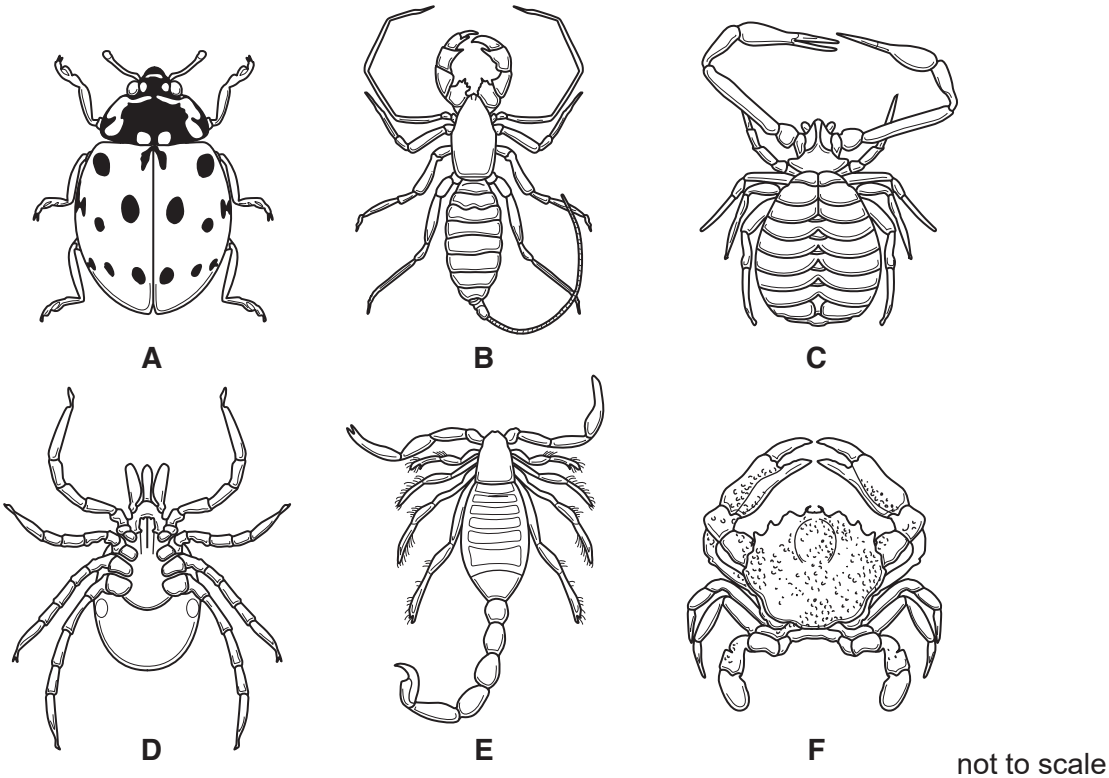



**Fig. 1.2**

**(i)** State **two** common features of all the arthropods, visible in Fig. 1.2.

1 .....

2 ..... [2]



**(ii)** State **two** common features of all arachnids that can be used to distinguish them from other arthropods.

1 .....

2 ..... [2]



**(iii)** State the letters of the **four** arachnids shown in Fig. 1.2.

..... [2]

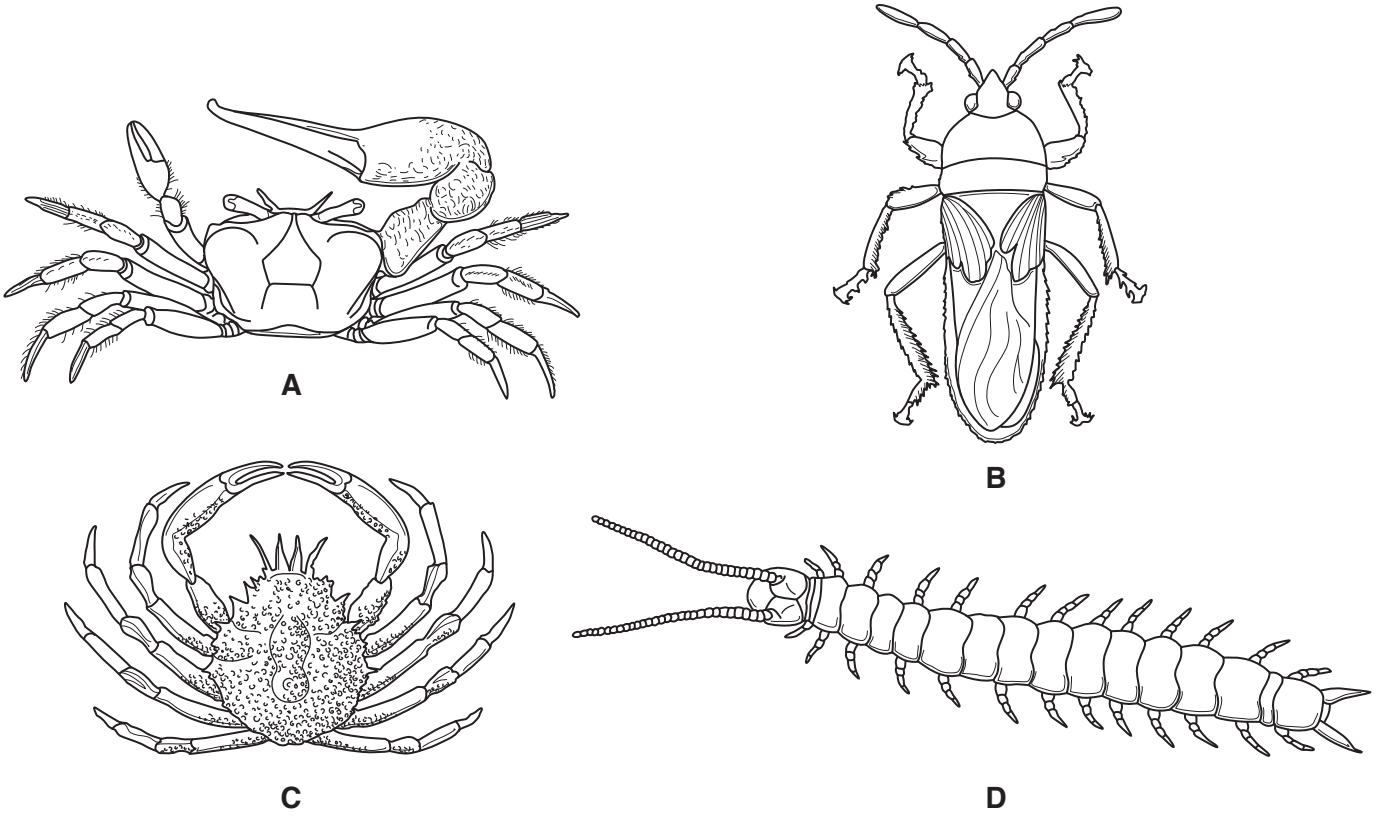
**(c)** The features shown in Fig. 1.2 are morphological features. Many traditional methods of classification used morphology.

State the name of one **other** type of feature that can also be used in classification.

..... [1]

[Total 10]

**1** **(a)** Fig. 1.1 shows four arthropods.




not to scale

**Fig. 1.1**

**(i)** State **two** features, visible in Fig. 1.1, that are common to all arthropods.

1 .....

2 .....

[2]

**(ii)** Fig. 1.2 is a dichotomous key for the arthropods shown in Fig. 1.1.

Complete Fig. 1.2 by writing suitable statements in:

- box **2** to identify species **B**
- box **3** to separate species **C** and **A**.

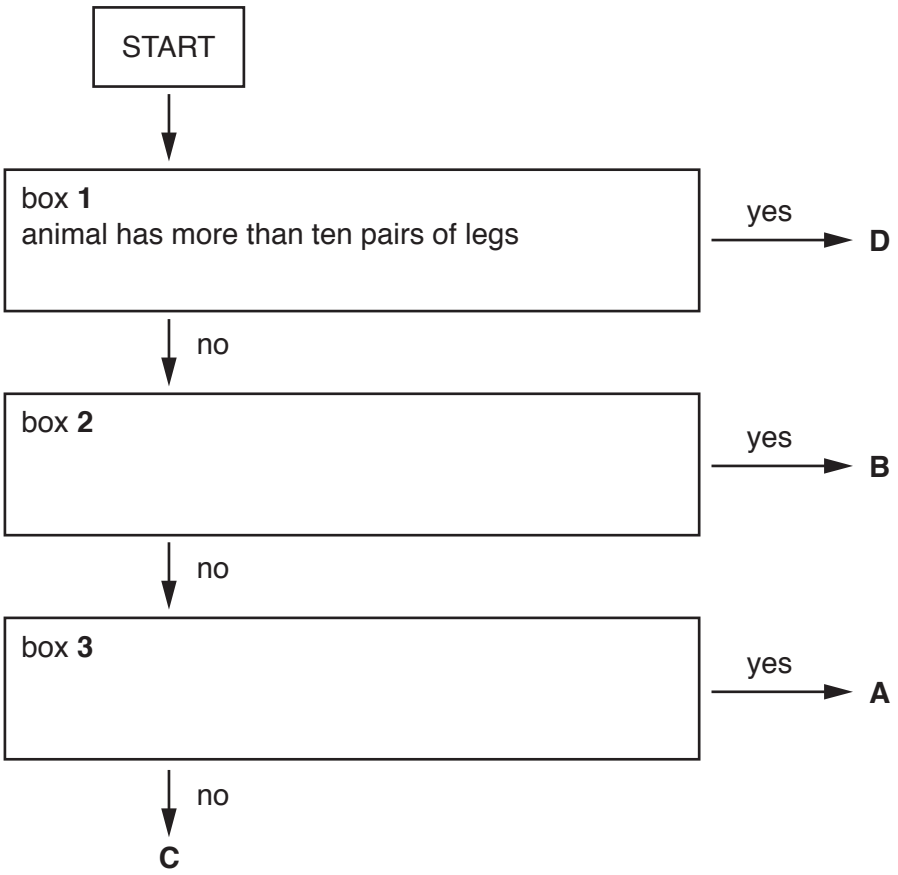





**Fig. 1.2**

[2]

**(b)** The Hawaiian happy-face spider, *Theridion grallator*, is found on several of the Hawaiian islands. Some of the spiders have a very distinctive pattern on their bodies as shown in Fig. 1.3.

**Fig. 1.3**

**(i)** State **one** feature, visible in Fig. 1.3, that identifies *T. grallator* as an arachnid.

..... [1]

**(ii)** Scientists think that the pattern on the bodies of the spiders is an adaptive feature.

Explain the term *adaptive feature* with reference to this pattern.

.....

.....

.....

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.....

.....

..... [3]

**(c)** A can be extracted from the webs of spiders. This A can be used to identify the species of spider that made the web, and the species of prey caught in the web.

xplain how A extracted from spider webs can be used to identify different species.

.....

.....

.....

.....

..... [2]



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**(e)** heat plants are monocotyledons.

State **one** feature of monocotyledons that can be used to distinguish them from dicotyledons.

..... [1]



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**(c)** Sickle-cell anaemia is most common in areas of the world where the infectious disease malaria is found.



Some species of the genus *Plasmodium* cause malaria in humans.

**(i)** Define the term *species*.



.....

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.....

.....

..... [2]

**1** All commercial breeds of sheep belong to the species *Ovis aries*.

**(a)** Define the term *species*.

.....

.....

.....

.....

..... [2]

The Merino is a breed of sheep that is farmed mainly for its wool. The wool is very thick and is made of lots of very thin hairs.

Fig. 1.1 shows a female Merino sheep with her newborn lamb.



**Fig. 1.1**

**(b)** The presence of hair is a feature that is only found in mammals.

State **two other** features that distinguish mammals from all other vertebrates.



1 .....

2 .....

[2]

**6** Fig. 6.1 shows the alapagos iguana, *Amblyrhynchus cristatus*.

**Fig. 6.1**

**(a) (i)** State **two** features that are used to classify animals, such as the alapagos iguana, as reptiles.

1 .....

2 .....
[2]

**(ii)** State **two** features that are present in plant cells that are **not** present in the cells of reptiles.

1 .....

2 .....
[2]

**2** Fig. 2.1 shows an Arctic wolf, *Canis lupus*. These wolves are one of the few mammals adapted to the extreme cold of the tundra in the Canadian Arctic and in Alaska.

**Fig. 2.1**

**(a) (i)** State **two** features, **visible** in Fig. 2.1, that identify Arctic wolves as mammals.

1 .....

2 .....

[2]



**(ii)** Arctic wolves show many adaptive features to a cold environment.

Explain what is meant by the term *adaptive feature*.

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.....

.....[3]

5 **(a)** State the balanced chemical equation for aerobic respiration.

.....[2]

**(b)** Students investigated the rate of respiration of crickets (a type of insect) using a carbon dioxide sensor and laptop as shown in Fig. 5.1. The sensor was fitted inside an airtight glass jar. The apparatus was set up in a room with a constant temperature of 17 °C.

**Fig. 5.1**

The students found that the concentration of carbon dioxide inside the jar increased by 50 ppm in 120 seconds.

Calculate the rate of carbon dioxide production as ppm per second.

Show your working and express your answer to two significant figures.



..... ppm $s^{-1}$ [1]



**(c)** After 10 minutes, the students opened the jar by removing the sensor. They left the jar open for 5 minutes but made sure that the crickets remained in the jar. They then replaced the sensor and took more readings for another 10 minutes.

State **and** explain one reason for opening the jar after 10 minutes.

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.....[2]

**(d)** uring the investigation the temperature inside the jar increased. The temperature outside the jar remained constant.

xplain why the temperature inside the jar increased.

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.....[2]

**(e)** esearchers in Chile also investigated the rate of respiration in crickets.

They investigated the effect of temperature and body mass on the rate of respiration. They measured the rate of oxygen consumption in crickets with different body masses, at different temperatures.

The researchers results are shown in Fig. 5.2.

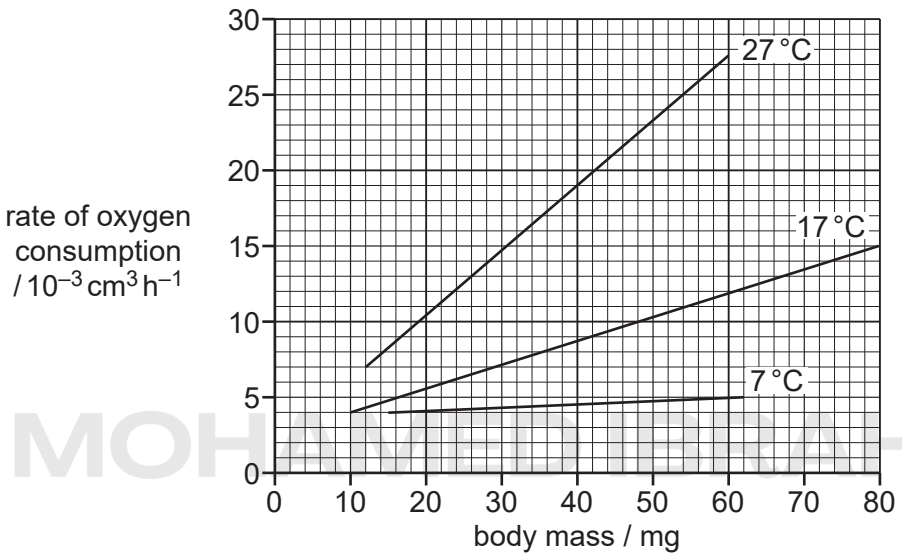


**Fig. 5.2**

State **two** conclusions that can be made from the data in Fig. 5.2 **and** support each conclusion with evidence from the graph.

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.....

.....[4]

5 **(a)** State the balanced chemical equation for aerobic respiration.

.....[2]

**(b)** Researchers in the Czech Republic investigated oxygen consumption in horses. They measured the oxygen consumption of the horses while they were exercising at four different paces: walking, trotting, cantering and galloping.

The results are shown in Fig. 5.1.

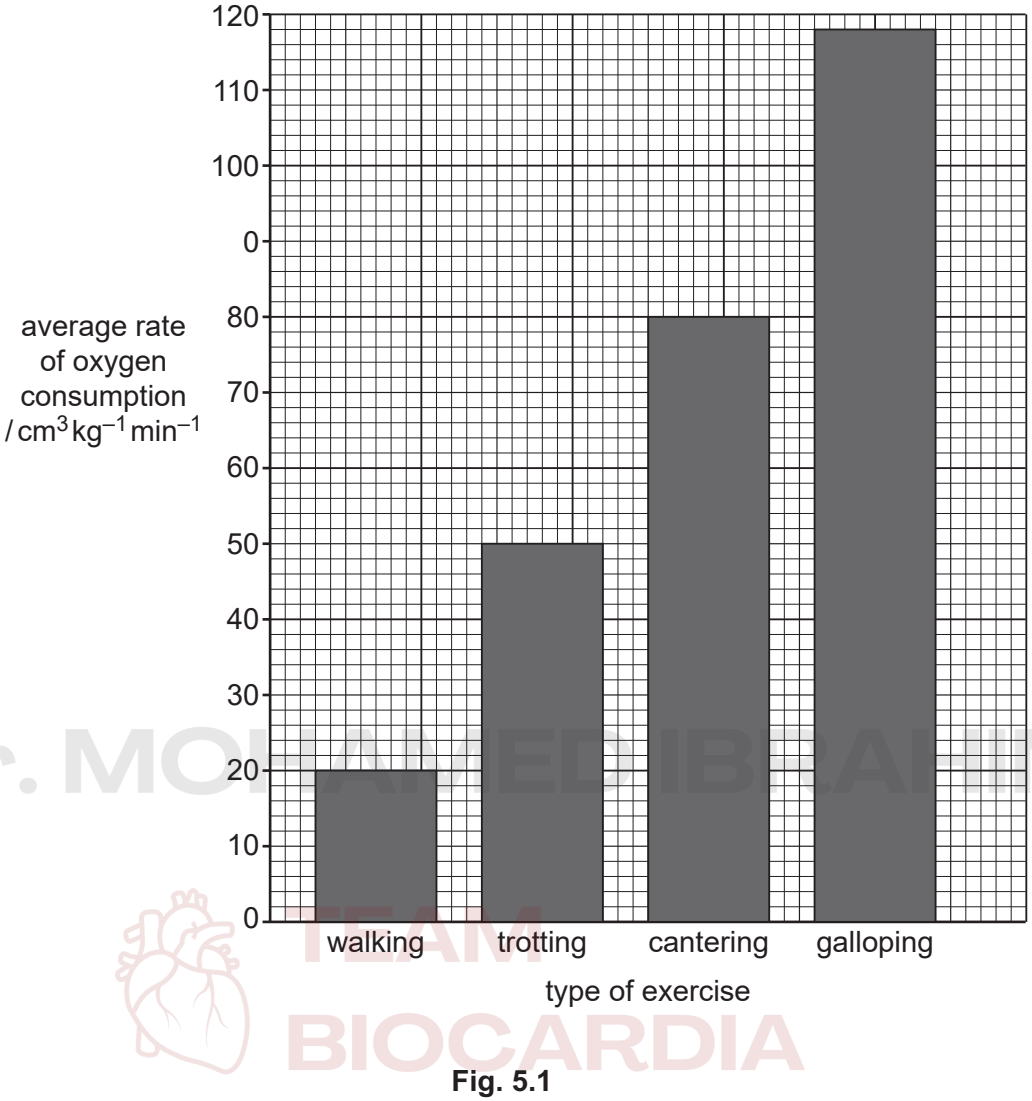


**Fig. 5.1**

Calculate the percentage increase in the average rate of oxygen consumption as the horses change from walking to trotting.

Show your working.

..... %
[2]

**(c)** The researchers also calculated the oxygen debt for each type of exercise.

They found that the horses developed a larger oxygen debt when they exercised by galloping and cantering rather than when they walked.

Explain why the horses developed an oxygen debt when they exercised.

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.....[3]

**(d)** Describe how the horses would recover from an oxygen debt when they stop exercising.

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.....[4]

[Total:11]

# Characteristics & Classification



**1** **(a)** **(i)** Fig. 1.1 is a branching key used to identify different species of bacteria.

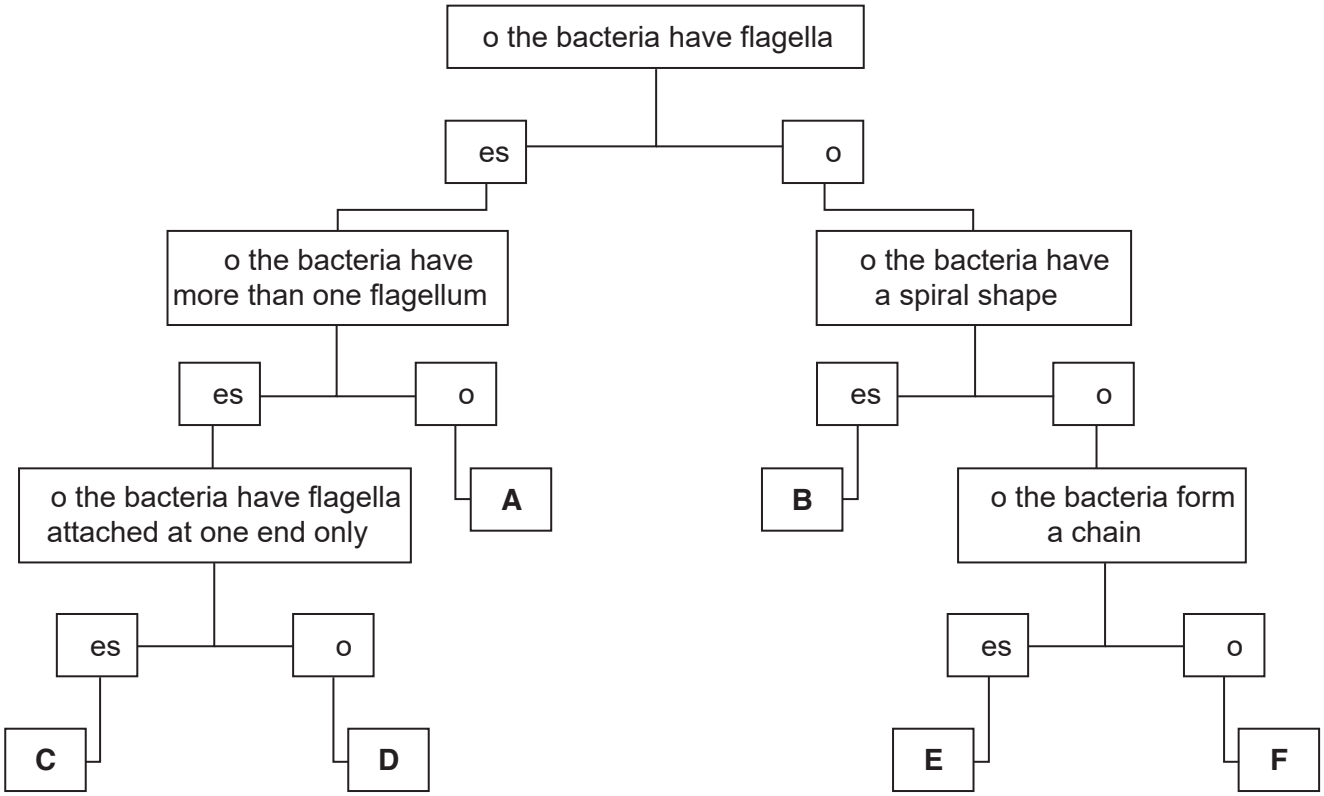


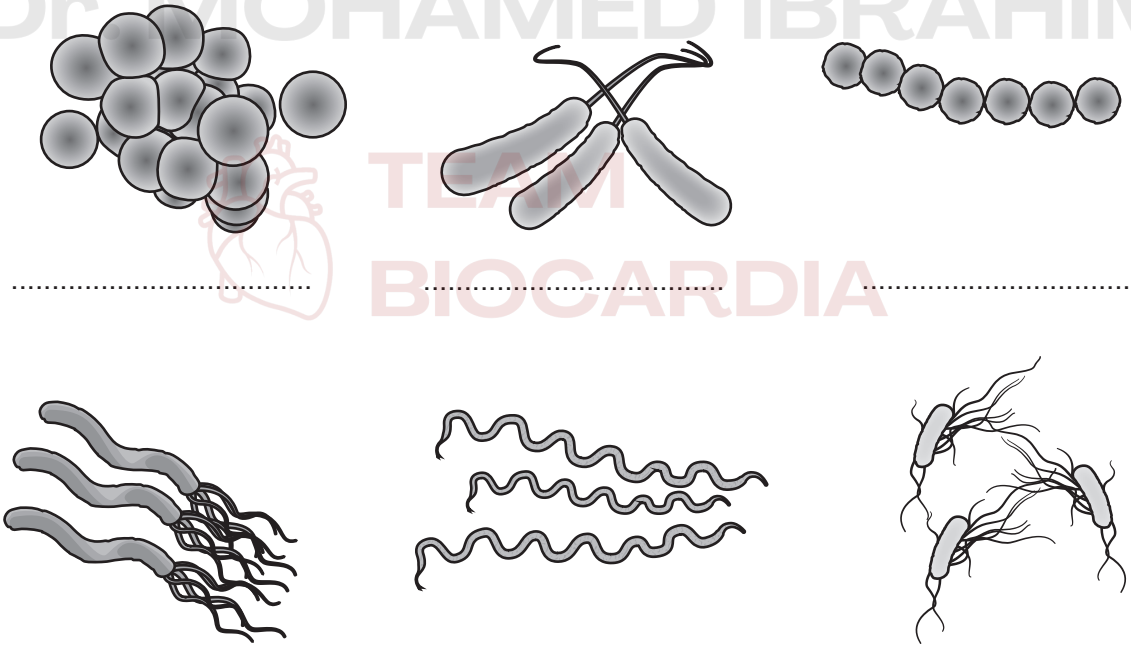

**Fig. 1.1**

Fig. 1.2 shows six different species of bacteria.

se the key to identify the six different species of bacteria.

rite the letters on the lines in Fig. 1.2.





..... ..... .....

..... ..... .....

[5]

**Fig. 1.2**