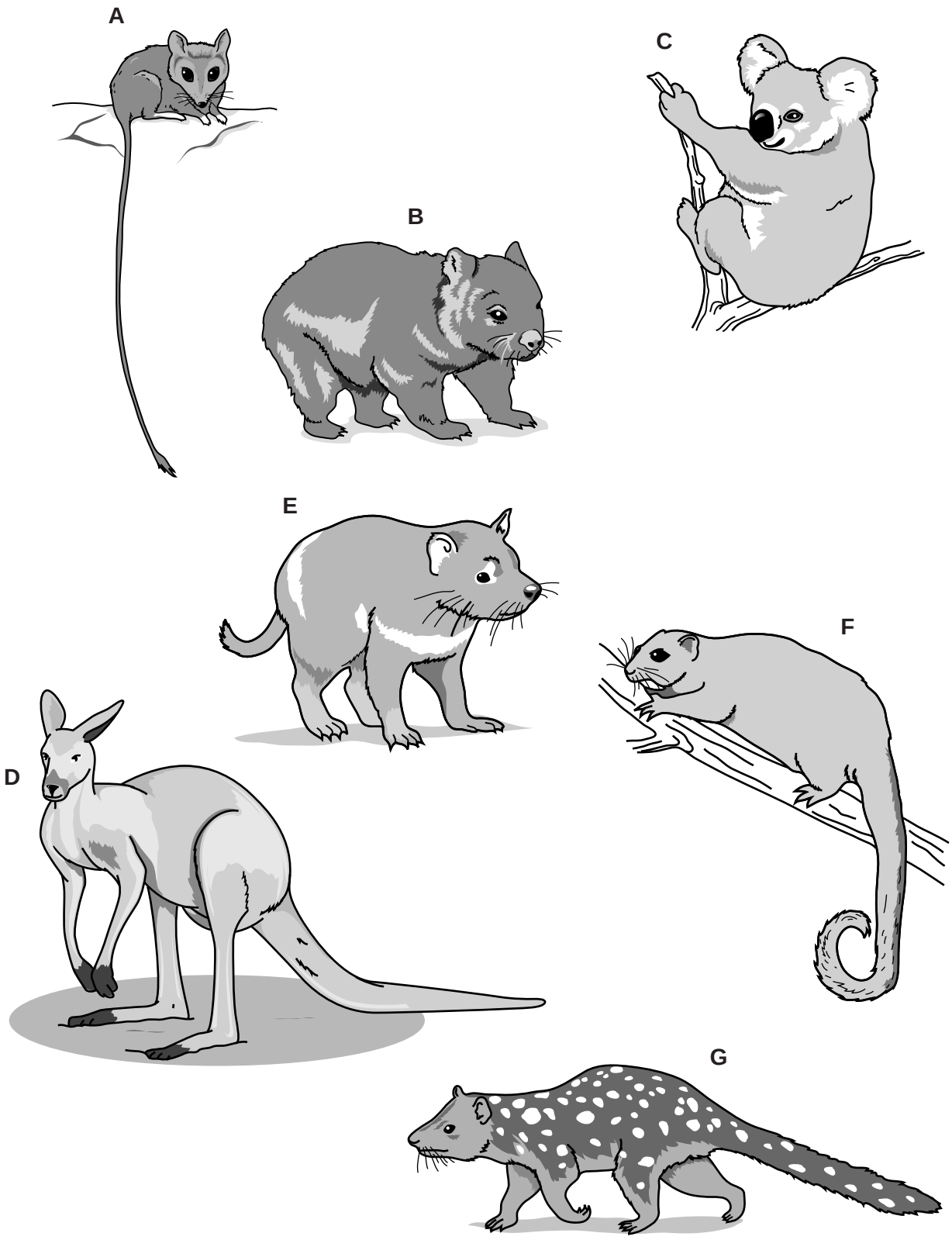
1 Fig. 1.1 shows seven marsupial mammals.



not drawn to scale

Fig. 1.1

(a) (i) State **one** visible feature that could be used to identify the marsupials in Fig. 1.1 as mammals.

.....[1]

(ii) Use the key to identify each species. Write the letter of each species (**A** to **G**) in the correct box beside the key. One has been done for you.

key

1 (a)	tail visible	go to 2	
(b)	no tail visible	go to 3	
2 (a)	back feet at least twice as long as front feet	go to 4	
(b)	back feet and front feet of similar length	go to 5	
3 (a)	large ears relative to the size of the head	*Phascolarctos cinereus*	
(b)	small ears relative to the size of the head	*Vombatus ursinus*	
4 (a)	tail at least twice as long as body	*Sminthopsis longicaudata*	
(b)	tail less than twice as long as body	*Macropus rufus*	
5 (a)	uniform body colouring	*Paljara tirarense*	
(b)	markings on body	go to 6	
6 (a)	white band across back and chest	*Sarcophilus harrisii*	
(b)	no white band across back and chest	*Dasyurus maculatus*	**G**

[3]

(b) Sexual reproduction occurs in all mammals. A zygote is formed from the fertilisation of a male gamete and a female gamete.

(i) Name the process that results in the formation of haploid gametes.

.....[1]

(ii) Explain the importance of sexual reproduction in mammals.

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.....[3]

(c) Marsupials differ from other mammals by giving birth to relatively undeveloped offspring. Female humans have a placenta and therefore give birth to more developed offspring.

(i) Describe the role of the placenta in humans.

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.....[4]

(ii) In humans, the placenta is connected to the amniotic sac which contains amniotic fluid.

State **two** functions of the amniotic fluid.

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.....

.....

.....[2]

[Total: 14]

2 Molluscs are important animals in many aquatic and terrestrial ecosystems.

Fig. 1.1 shows four species of mollusc that live in the sea.

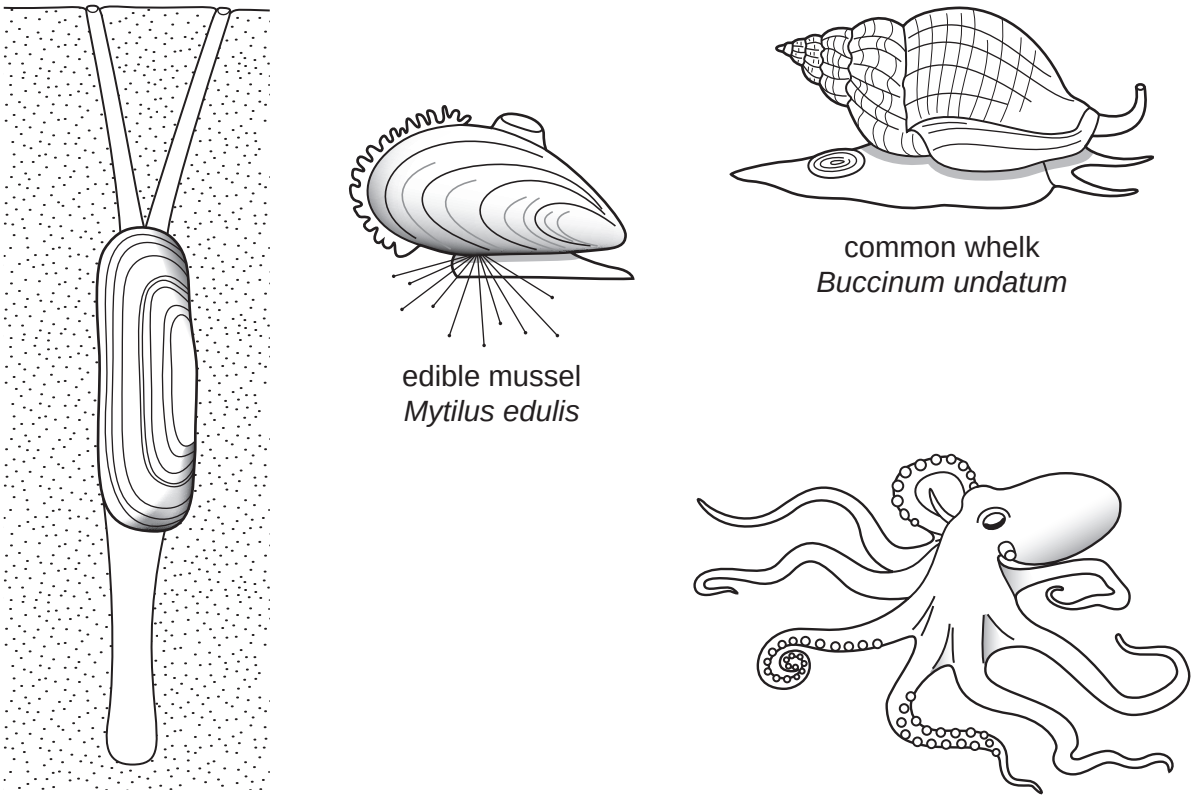

Fig. 1.1

(a) State **two** features shown by all mollusc species.

1 .....

2 ..... [2]

(b) State **two** features, **visible in Fig. 1.1**, in which the octopus differs from the other three molluscs.

1 .....

2 ..... [2]

(c) The edible mussel, *Mytilus edulis*, is attached to rocks that are exposed to the air at low tide.

Use Fig. 1.1 to suggest how an edible mussel is adapted to attach to rocks and survive when exposed to the air.

.....

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.....

..... [2]

(d) The zebra mussel, *Dreissena polymorpha*, is a freshwater mussel that originates from rivers in southern Russia.

The mussel was introduced into the Great Lakes of North America and has increased in huge numbers with serious effects on the food webs of the lakes.

Explain why an introduced species, such as the zebra mussel, can have serious effects on the populations of the species that are already living in the area.

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..... [3]

(e) The freshwater mussel, *Pletholophus swinhoei*, was used in a project to monitor water pollution by chemical waste in northern Vietnam.

This was done by regularly counting the number of mussels in the river.

Suggest the advantages of using freshwater mussels to monitor the pollution of water instead of carrying out chemical analysis of the water.

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..... [2]

(f) Non-biodegradable plastics are a serious problem in many aquatic ecosystems.

Explain the harm that non-biodegradable plastics may cause to organisms in aquatic ecosystems.

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..... [3]

[Total: 14]

3 Fig. 1.1 shows a flowering shoot of tiger lily, *Lilium tigrinum*.

Fig. 1.1

(a) State the name of the genus of the tiger lily.

.....[1]

(b) Name the parts labelled **A** to **D**.

A .....

B .....

C .....

D .....[4]

(c) The tiger lily plant is a monocotyledon.

List two features, **visible in Fig. 1.1**, that show it is a monocotyledon.

1 .....

2 ..... [2]

(d) The tiger lily in Fig. 1.1 reproduces sexually.

Plants reproduce sexually and asexually.

Complete Table 1.1 to show the advantages and disadvantages of asexual and sexual reproduction to a flowering plant species.

Table 1.1

type of reproduction in flowering plants	advantages	dis
asexual		
sexual		

[4]

[Total: 11]

4 Reed warblers are small birds that migrate over long distances between western Africa and northern Europe.

Fig. 5.1 shows a reed warbler, *Acrocephalus scirpaceus*.

Fig. 5.1

(a) State three characteristic features of birds that are visible in Fig. 5.1.

1 .....

2 .....

3 ..... [3]

A study was carried out in Sweden into the effects of natural selection on wing length in reed warblers.

The wings of young reed warblers reach their maximum length a few days after leaving the nest.

At this age the wing length in millimetres of each bird was recorded. Each bird was identified by putting a small ring around one of its legs.

When the birds were caught in net traps as adults, the information on the rings was used to identify specific birds and their ages.

The length of time between ringing and trapping was recorded for each bird that was identified before it was released.

The mean age at trapping was calculated for birds with each wing length.

The results are shown in Table 5.1.

Table 5.1

wing length at ringing / mm	number of birds trapped	mean age at trapping / days
63 or less	24	253
64	72	256
65	1	297
66	1	346
67	1	349
68	1	270
69	66	237
70 or more	23	199
	total = 771	

(b) (i) Explain why wing length is an example of continuous variation.

.....

.....

.....

..... [2]

(ii) Suggest a feature of reed warblers, **other than wing length**, that shows continuous variation.

..... [1]

(c) The researchers concluded that reed warblers with a wing length of 66-67 mm had the best chance of survival.

(i) Describe the evidence from Table 5.1 that supports this conclusion.

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..... [4]

(ii) The researchers also suggested that more evidence was needed to make this conclusion.

Suggest what other evidence would show that birds with wings 66-67 mm in length have the best chance of survival.

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..... [3]

(d) Scientists have discovered that genes are responsible for wing length in reed warblers. The most common length of wing has been 66-67 mm for many generations of these birds.

Explain how natural selection may be responsible for maintaining the mean wing length of reed warblers at 66-67 mm.

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..... [4]

[Total: 17]