1 **(a** Table 1.1 shows some features of the five groups of vertebrates.

Complete Table 1.1 to compare the five groups of vertebrates using a tick (✓) to indicate if the group shows the feature, or a cross (✗) if not.

The first row has been completed for you.

Table 1.1

group of vertebrates	scaly skin	external ear (pinna)	feathers	glands
birds	✓	✗	✓	✗
bony fish				
amphibians				
reptiles				
mammals				

[4]

Fig. 1.1 shows a southern cassowary, *Casuarius casuarius*, which is a large bird that cannot fly. It lives in rainforests in northern Australia and southern New Guinea.

The cassowary feeds on fruits and helps to disperse seeds for many tree species, such as the cassowary plum.

Fig. 1.1

(b) Suggest why the cassowary can digest the **fruit** but not the **seeds** of rainforest trees.

.....

.....

..... [2]

(c) Describe **one** method of seed dispersal that does **not** require animals.

.....

.....

.....

.....

..... [2]

(d) State **two** environmental conditions that seeds require so that they can germinate.

1. .....

2. ..... [2]

(e) Cassowaries are an endangered species. Many are killed on the roads and development threatens their rainforest habitat.

Cassowaries, as with many other rainforest species, cannot survive in small nature reserves.

Suggest why species, such as cassowaries, cannot survive in small nature reserves.

.....

.....

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.....

.....

..... [3]

[Total: 13]

2 Crabs are classified, along with prawns, shrimps and lobsters, as crustaceans. Most crabs live in the sea, although some live in freshwater and there are a few land-dwelling crabs.

Fig. 1.1 shows the structure of a typical crab.

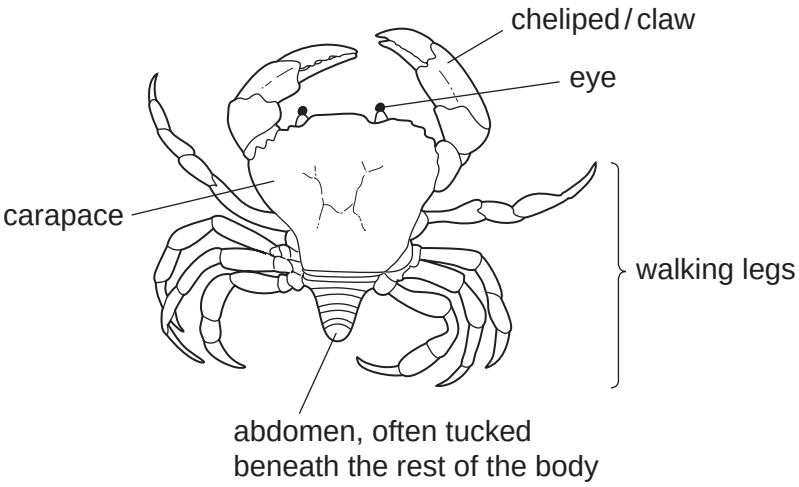
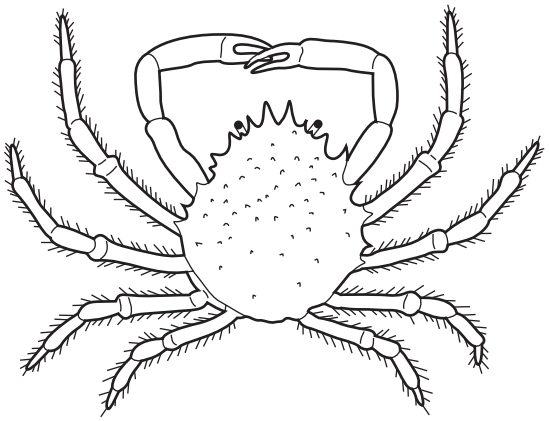


Fig. 1.1

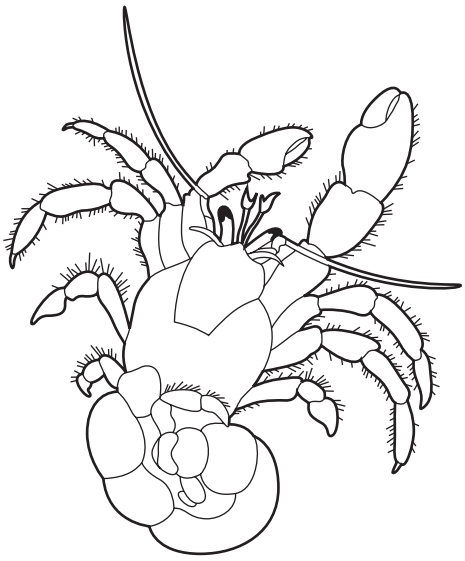
(a) State the group of animals that includes crustaceans, insects, arachnids and myriapods.

.....[1]

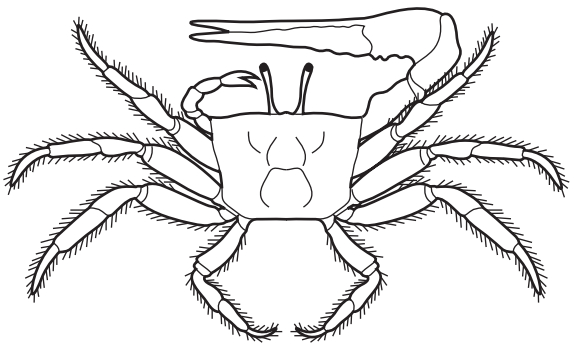
Fig. 1.2 shows four different species of crab.



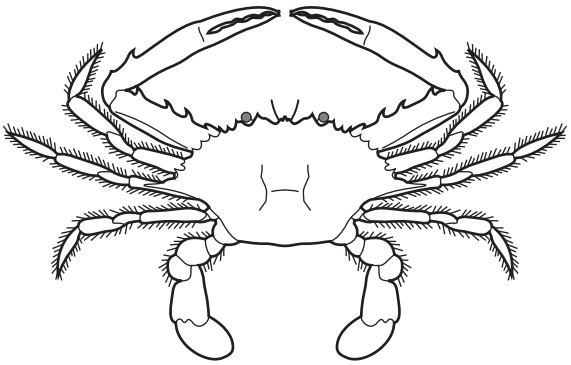
A spiny spider crab
Maia squinado



B hairy hermit crab
Pagurus hirsutiusculus



C West African fiddler crab
Uca tangeri



D sand crab
Portunus pelagicus

Fig. 1.2

(b) Biologists use dichotomous keys to identify different species.

Use Fig. 1.1 and Fig. 1.2 to state **one visible** feature of each species of crab **A**, **B**, **C** and **D**, that could be used in a dichotomous key to identify crabs.

A .....

.....

B .....

.....

C .....

.....

D .....

..... [4]

(c) Crabs show variation in many features.

(i) State **one** feature of crabs that shows **continuous variation**.

..... [1]

(ii) Describe how you would measure variation in the feature you have given in **(i)**.

.....

..... [1]

(d) Crabs produce huge numbers of offspring, but their populations remain fairly constant from year to year.

Explain why.

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..... [3]

(e) Emergency medical packs contain bandages made from chitosan.

Chitosan comes from the exoskeleton of crustaceans and has a positive charge to attract red blood cells. It helps blood clot quickly and also has antibacterial properties.

Explain the benefits of using bandages made from chitosan.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 13]

3 Arachnids, crustaceans, insects and myriapods are all classified as arthropods.

Scorpions, such as *Heterometrus swammerdami* shown in Fig. 1.1, are arachnids.

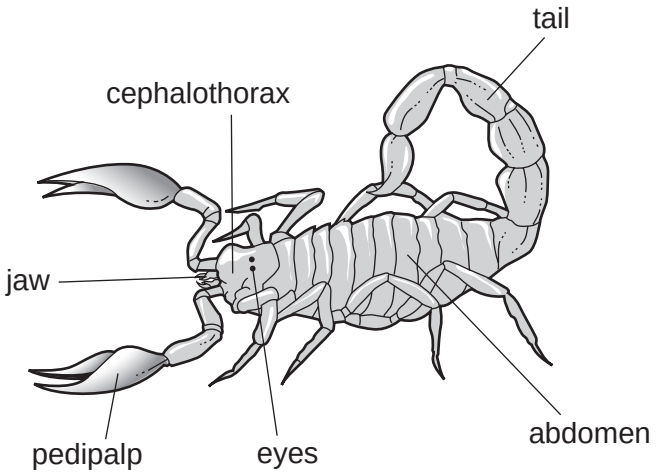

Fig. 1.1

(a) State **three** features, shown by *H. swammerdami* and **visible** in Fig. 1.1, that arachnids share with other arthropods.

1 .....

2 .....

3 ..... [3]

(b) Fig. 1.2 shows seven species of arachnid.

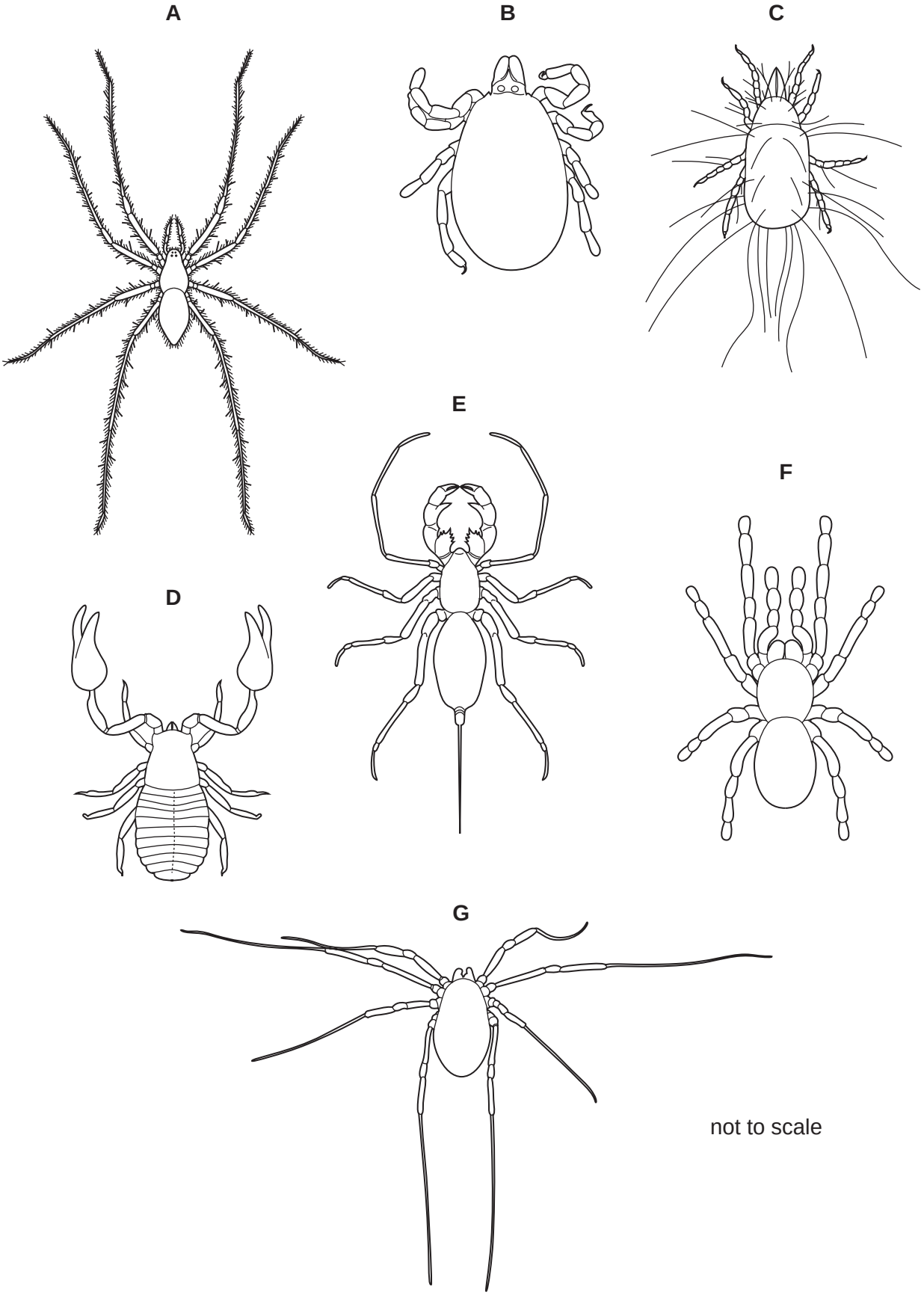

Fig. 1.2

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)	Abdomen with a tail	*Abaliella dicranotarsalis*	**E**
(b)	Abdomen without a tail	go to 2	
2 (a)	Legs much longer than abdomen and cephalothorax	go to 3	
(b)	Legs not much longer than abdomen and cephalothorax	go to 4	
3 (a)	Hairs on the legs	*Tegenaria domestica*	
(b)	No hairs on the legs	*Odielus spinosus*	
4 (a)	Cephalothorax or abdomen segmented	*Chelifer tuberculatus*	
(b)	Cephalothorax and abdomen not segmented	go to 5	
5 (a)	Abdomen and cephalothorax about the same size	*Poecilotheria regalis*	
(b)	Abdomen larger than cephalothorax	go to 6	
6 (a)	Body covered in long hairs	*Tyroglyphus longior*	
(b)	Body not covered in hairs	*Ixodes hexagonus*	

[4]

[Total: 7]

4 Fig. 6.1 shows three different insects.

Vespula flavopilosa
insect 1

Vespula rufa
insect 2

Callicera rufa
insect 3

Fig. 6.1

(a) Insects 1 and 2 are more closely related to each other than to insect 3.

(i) Explain how the binomial names indicate that insects 1 and 2 are more closely related.

.....

.....

.....

..... [2]

(ii) Explain how the appearance of the three insects suggests that insects 1 and 2 are more closely related.

.....

.....

.....

..... [2]

Vespula flavopilosa gives a painful sting. The insect shown in Fig. 6.2 is very similar in appearance to *Vespula flavopilosa* but does not give a sting.

Chrysotoxum cautum

Fig. 6.2

(b) *Chrysotoxum cautum* is very similar in appearance to *Vespula flavopilosa*. Explain how this is an advantage.

.....

.....

.....

..... [2]

(c) It is thought that *Chrysotoxum cautum* evolved from an insect that did not have any stripes.

Suggest how these insects became striped.

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..... [5]

[Total: 11]

5 Fig. 1.1 shows a vertical section through a flower of soybean, *Glycine max*, following self-pollination. Fig. 1.2 shows part of the section at a higher magnification.

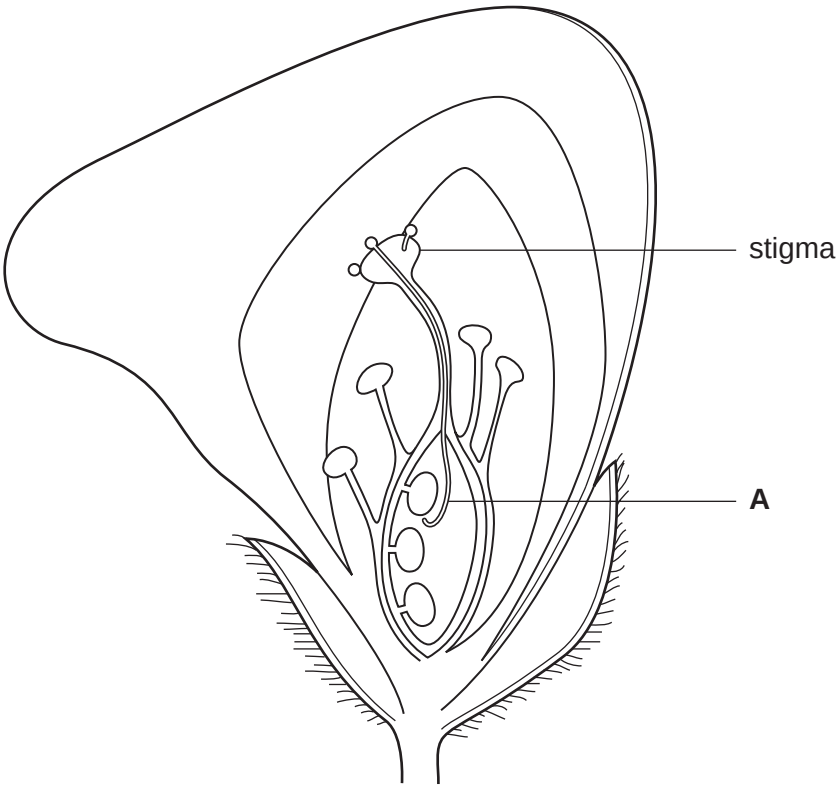

Fig. 1.1

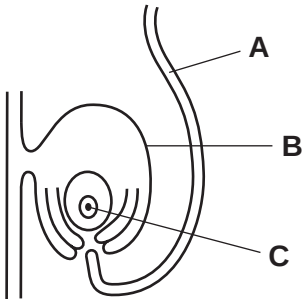

Fig. 1.2

(a) Name the parts labelled **A** to **C** shown in Figs. 1.1 and 1.2.

A .....

B .....

C ..... [3]

(ii) Describe what happens to the structures shown in Figs. 1.1 and 1.2 to bring about fertilisation. You may refer to the structures labelled **A** to **C** by their letters if you wish.

.....

.....

.....

.....

.....

..... [3]

(iii) Explain the advantages **and** disadvantages of self-pollination for flowering plants, such as soybean.

advantages .....

.....

.....

.....

disadvantages .....

.....

.....

.....

..... [4]

(b) Soybean is a dicotyledonous plant.

(i) Name the genus to which the soybean belongs.

..... [1]

(ii) State two features which are **only** found in dicotyledonous plants.

1. .....

2. ..... [2]

[Total: 13]