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0610/22

May/June 2013

1 hour 15 minutes

No Additional Materials are required.

DO **NOT** WRITE IN ANY BARCODES.

The number of marks is given in brackets [] at the end of each question or part question.



[Turn over

- 1 Scientists found four new animal species living in the sea.

Features of the animals are described in Table 1.1.

Table 1.1

animal	description	group
A	body covered by hard exoskeleton more than five pairs of jointed limbs	
B	soft segmented body no obvious limbs present	
C	body covered in small scales gill slits and gills present	
D	scaly body two pairs of legs	

Identify the group to which each animal belongs.

Write your answers in Table 1.1.

[4]

[Total: 4]

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- 2 (a) (i) State **three** uses of water in the human body.

1
 2
 3 [3]

- (ii) In the human body, the amounts of different substances, such as water, remain within narrow limits.

Name the term used to describe the maintenance of a constant internal environment.

..... [1]

- (b) Fig. 2.1 shows the water gains and losses in a human over 24 hours.

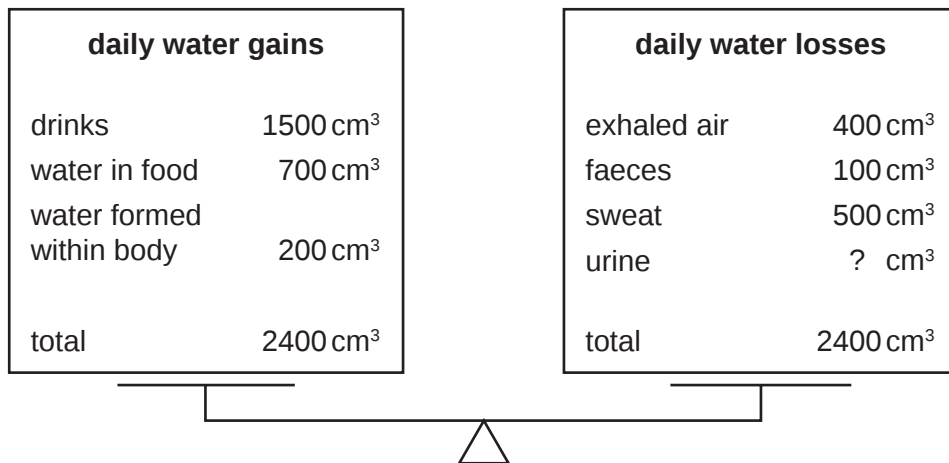


Fig. 2.1

- (i) Fig. 2.1 shows that water is formed within the body.

Name a reaction in the body that produces water.

..... [1]

- (ii) Use Fig. 2.1 to calculate the volume of water the person must lose in their urine over the 24 hours to keep the volume of water in the body constant.

volume of water lost in urinecm³ [1]

- (c) (i) The kidney excretes excess water.

State **three** other processes that occur in the kidney.

1

.....

2

.....

3

..... [3]

- (ii) On a very hot day the volume of water lost as sweat may increase.

Suggest how increased sweating could affect the urine a person produces.

.....

.....

.....

..... [2]

[Total: 11]

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Question 3 begins on page 6.

3 Cystic fibrosis is an inherited disorder.

People with this disorder produce mucus that is very thick and sticky.

This mucus can block many passages in the body including the bronchi and bronchioles.

(a) Suggest why people with cystic fibrosis often have lung infections.

.....

.....

.....

.....

.....

..... [3]

(b) Cystic fibrosis is controlled by a recessive allele.

What is meant by the term *recessive allele*?

.....

..... [1]

(c) Use **F** to represent the allele for normal mucus and **f** to represent the allele for very thick mucus, that causes cystic fibrosis.**(i)** State the genotypes of a person with cystic fibrosis.

..... [1]

(ii) Two parents with normal mucus have a child with cystic fibrosis.

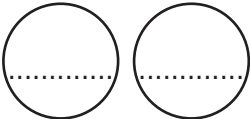
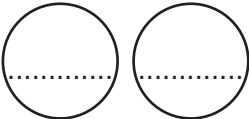
State the genotype of the parents.

..... [1]

(iii) These parents have another child.

Complete the genetic diagram to show the possibility that this child will also have cystic fibrosis.

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parental phenotypes	normal mucus	×	normal mucus
parental genotypes		×	
gametes		+	
offspring genotypes			
offspring phenotypes			
possibility of a child having cystic fibrosis			

[4]

[Total: 10]

4 Explain the meaning of each of the terms and give one example of each.

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(a) non-renewable material

.....

.....

.....

.....

.....

example [3]

(b) sewage

.....

.....

example [2]

[Total: 5]

- 5 Fig. 5.1 shows a section through the human female reproductive system and other structures.

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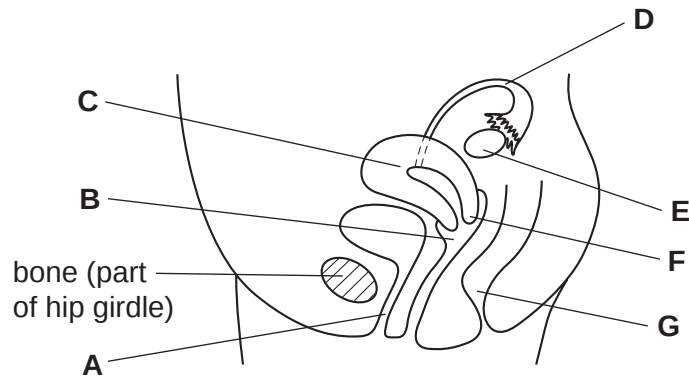


Fig. 5.1

In Table 5.1, write the letter from Fig. 5.1 which labels the structure that carries out each function.

One has been completed for you.

Table 5.1

function	letter
produces egg cells	E
where sperm are deposited during intercourse	
ring of muscle that relaxes to allow the baby to be born	
where implantation takes place	
where fertilisation takes place	

[4]

[Total: 4]

- 6 (a) (i) Fig. 6.1 shows the outline of the young stem of a eudicotyledonous (dicotyledonous) plant.

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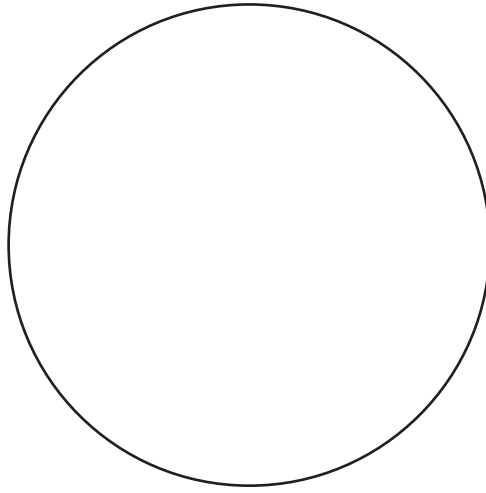


Fig. 6.1

On Fig. 6.1, draw and label the position of the phloem and xylem in the stem. [2]

- (ii) Name a substance that is transported in the phloem.

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

- (b) Describe the pathway taken by water from the soil to a leaf.

.....
.....
.....
.....
.....
..... [3]

[Total: 6]

7 (a) (i) Fig. 7.1 shows a simple reflex arc.

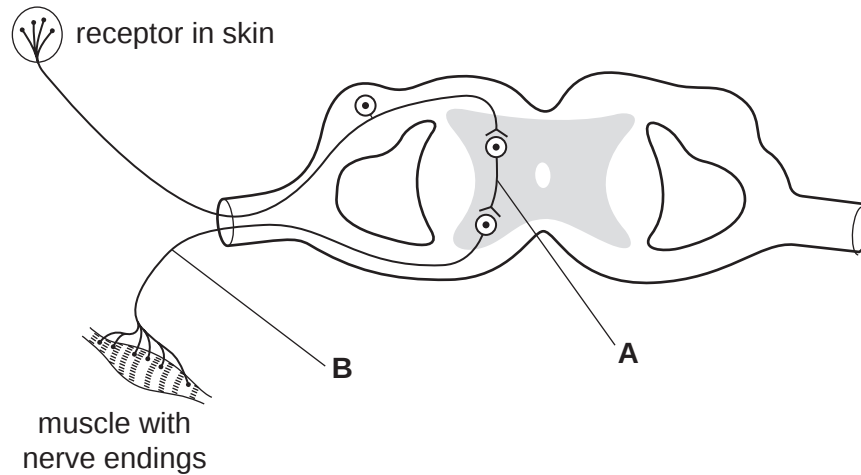


Fig. 7.1

Name the cells labelled **A** and **B** as shown on Fig. 7.1.

A

B [2]

(ii) State **two** features of a reflex action.

1

.....

2

..... [2]

(b) State what is meant by an *effector*.

.....

..... [1]

(c) Fig. 7.2 shows the muscles and bones around the elbow joint.

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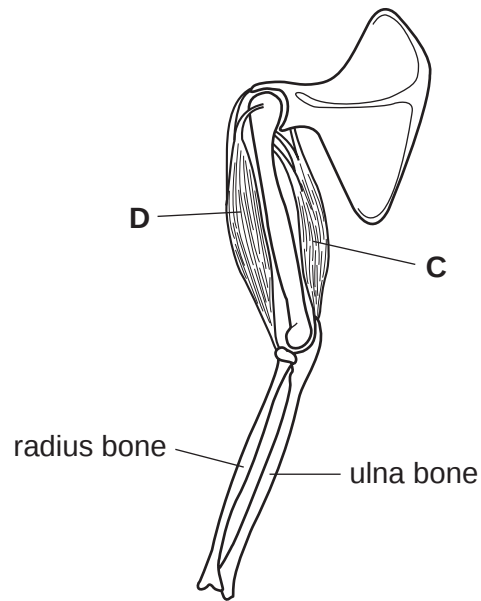


Fig. 7.2

(i) Name the structures labelled **C** and **D** as shown on Fig. 7.2.

C

D [2]

(ii) A nerve impulse stimulates muscle **D** to contract.

Describe what will happen to the muscles and bones of the arm.

.....

 [2]

[Total: 9]

Question 8 begins on page 14.

8 The metabolism of an organism involves many processes that need energy.

(a) Complete the word equation for aerobic respiration.

glucose + oxygen $\longrightarrow$ + + energy

[2]

(b) The rate of metabolism can be calculated and it is called the metabolic rate.

Fig. 8.1 shows changes in pulse rate as metabolic rate increases during exercise.

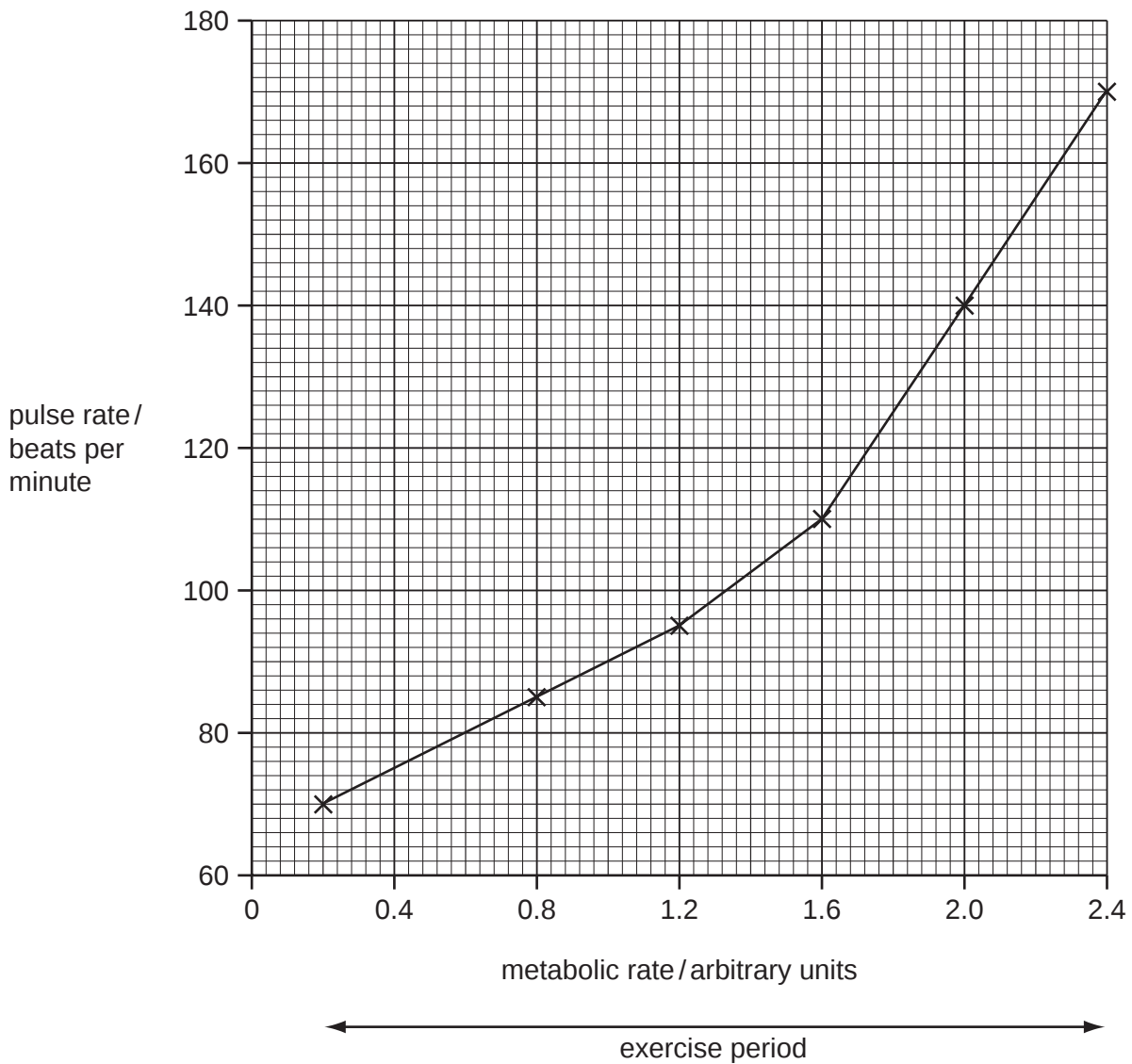


Fig. 8.1

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Fig. 8.2 shows changes in the output of blood from the heart (stroke volume) as metabolic rate increases during exercise.

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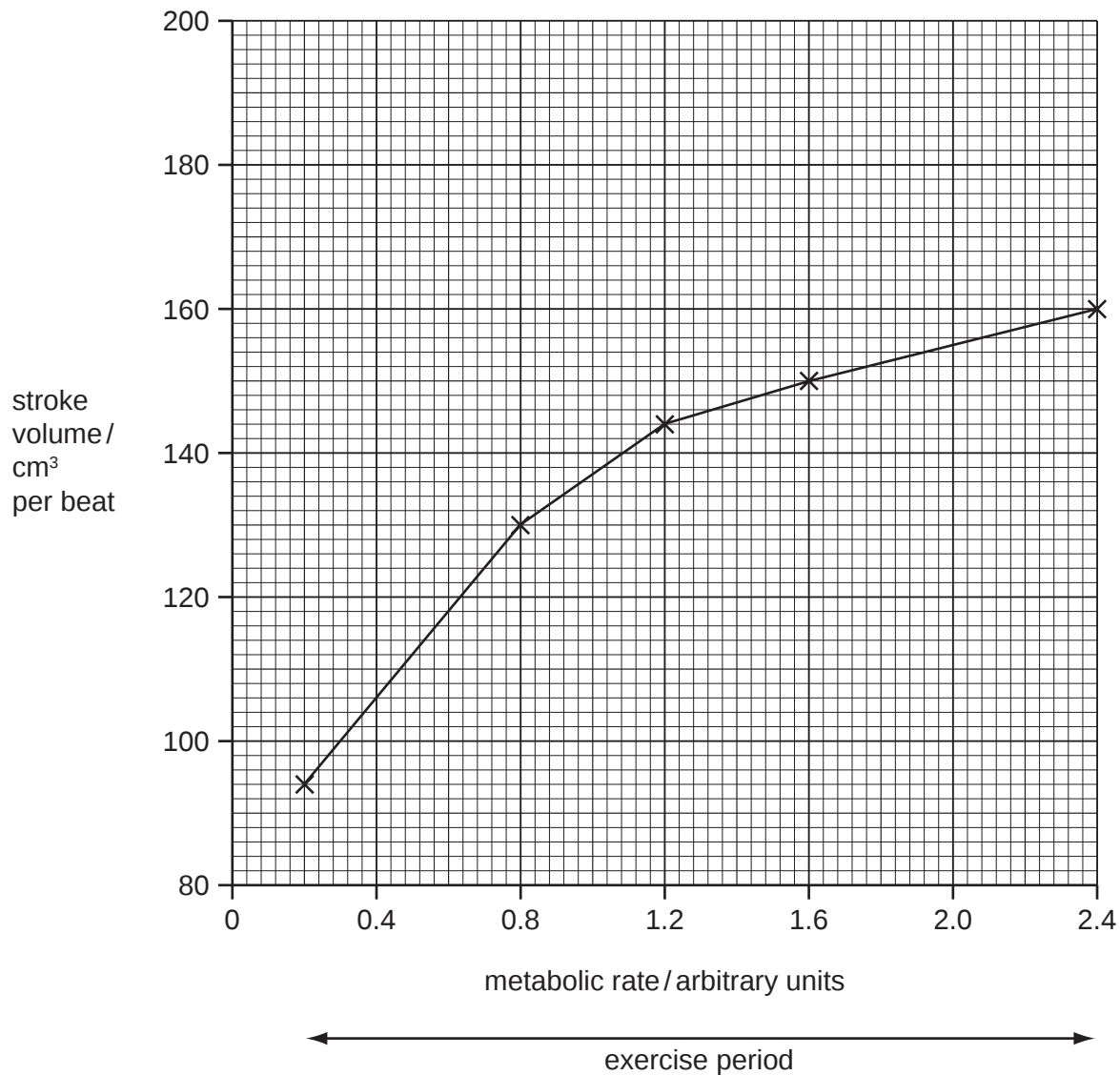


Fig. 8.2

- (i) Use Fig. 8.1 to state the metabolic rate before exercise started.

.....arbitrary units [1]

- (ii) Use Fig. 8.1 and Fig. 8.2 to state what the stroke volume was when the pulse rate had increased to 110 beats per minute.

.....cm³ per beat [1]

(c) (i) Explain why pulse rate increased during exercise.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest what happens to the pulse rate when exercise is finished.

.....

.....

.....

..... [2]

(d) Suggest **one** way in which the output of the heart (stroke volume) can be increased.

.....

..... [1]

[Total: 10]

9 Fig. 9.1 shows a potato plant.

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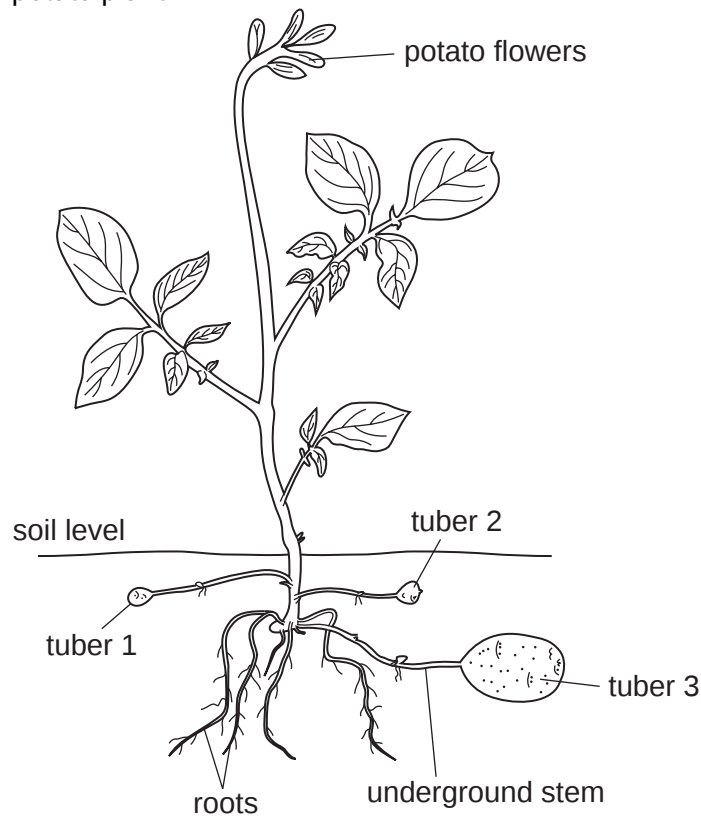


Fig. 9.1

As the plant grows, buds on the underground stem grow into side shoots.
The ends of these shoots swell to form tubers.
The tubers can grow into new plants.

(a) (i) Which type of nuclear division will occur at the end of a shoot as a tuber develops?

..... [1]

(ii) The three tubers, shown in Fig. 9.1, are each grown to form separate plants.
They all show the same characteristics as the parent plant.

Explain why this happens.

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

- (iii) After two months the three new plants were different sizes.

Suggest **two** reasons why the plants were different.

1

.....

2

..... [2]

- (b) The potato plant has purple flowers that are usually insect-pollinated. After pollination the seeds formed can grow into new plants.

- (i) Explain why these plants may show features different from the parent plants.

.....

.....

.....

.....

.....

..... [3]

- (ii) A scientist has two varieties of potato.

One variety has disease resistance and the other variety grows well in dry soil.

Suggest how the scientist could produce a new variety with both of these characteristics.

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

Question 10 begins on page 20.

10 (a) Define the term *ecosystem*.

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.....

.....

.....

..... [2]

(b) Fig. 10.1 shows the food web of a heather moor ecosystem in Scotland.

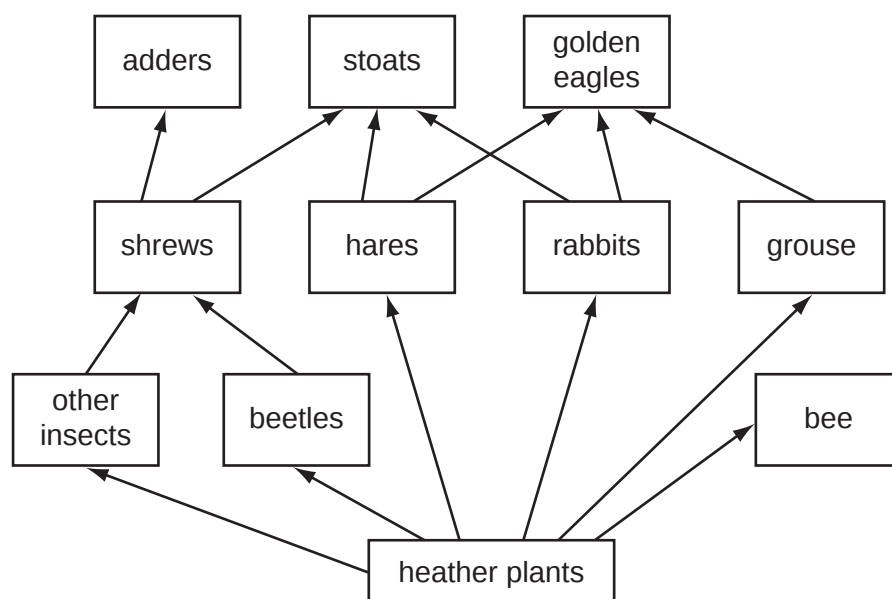


Fig. 10.1

(i) State the source of energy for all the organisms in this food web.

..... [1]

(ii) Name the producer in this food web.

..... [1]

(c) Use the boxes to form a food chain with four organisms shown in Fig. 10.1.

Use arrows to show the flow of energy through the food chain.

[3]

- (d) In one year, a large number of young grouse died before they matured.

Suggest how this would affect the numbers of hares and shrews in this food web.

(i) hares

.....

.....

..... [2]

(ii) shrews

.....

.....

..... [2]

[Total: 11]

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