Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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**BIOLOGY** **0610/21**

Paper 2 Core **October/November 2014**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **20** printed pages.

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CAMBRIDGE International Examinations

**1** Fig. 1.1 shows a snake.
A snake is a living organism and so shows the characteristics of life.
The snake feeds by catching small animals such as mice and rats.

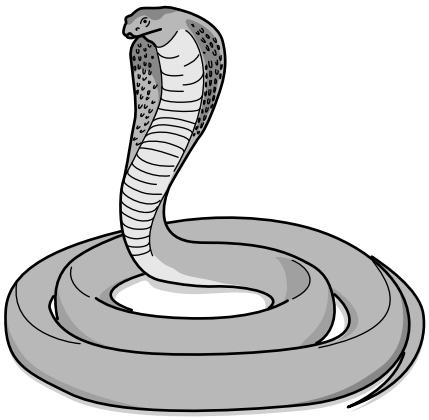

**Fig. 1.1**

**(a)** Complete Table 1.1 showing some of the characteristics of life for the snake.

View solution

**Table 1.1**

| characteristic of life | definition |
|---|---|
| nutrition | obtaining nutrients for energy, growth and repair |
| | removal from an organism of toxic materials, the waste products of metabolism or substances in excess of requirements |
| reproduction | |
| | a permanent increase in size and dry mass by an increase in cell number or cell size or both |

[3]

**(b)** The snake is a reptile.

View solution

State **one** way that a reptile differs from a fish.

.....[1]

**[Total: 4]**

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**2** **(a)** Fig. 2.1 shows a vertical section through a leaf.

View solution

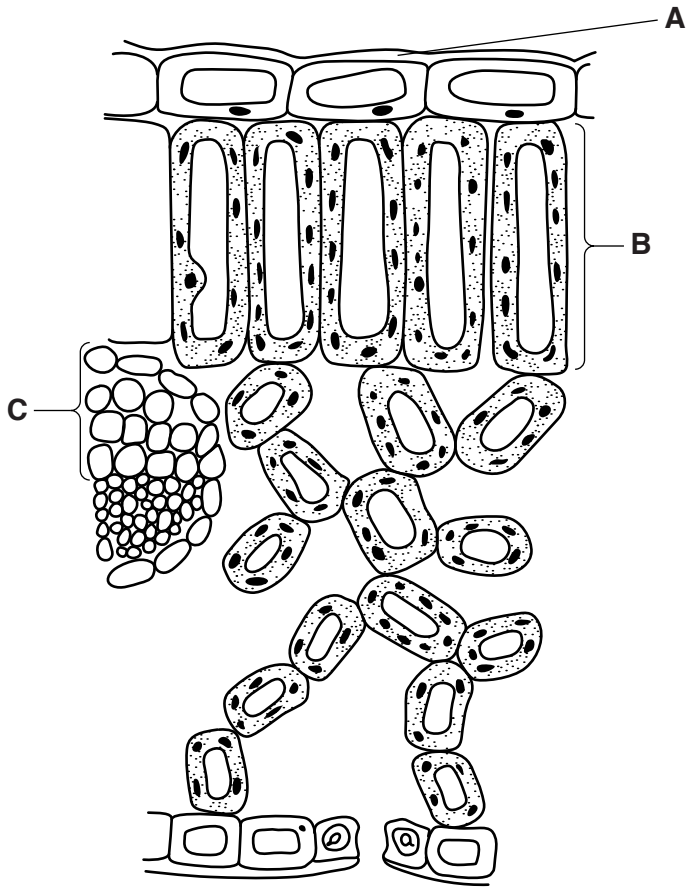


**Fig. 2.1**

Name the structures labelled **A**, **B** and **C**.

Write your answers in the spaces below.

**A** .....

**B** .....

**C** ..... [3]

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**(b)** Potato plants produce new potato tubers underground as part of the process of asexual reproduction.

Fig. 2.2 shows the amount of carbohydrate stored in the leaves and new tubers of potato plants, grown in a country in the northern hemisphere, between May and September.

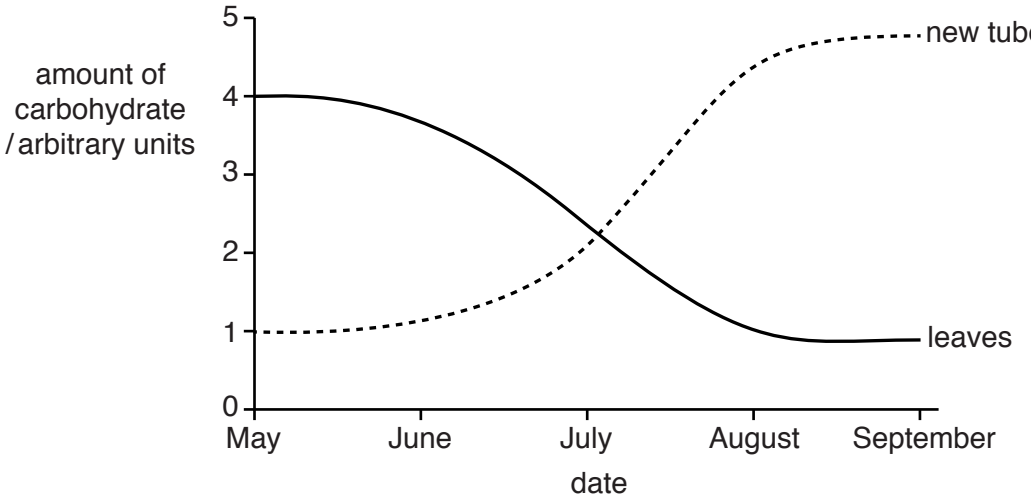


**Fig. 2.2**

**(i)** Compare the amount of carbohydrate in the leaves and new tubers in May and September. Give an explanation for the differences.
Use data from Fig. 2.2 in your answer.

**May**

difference .....

explanation .....

.....

**September**

difference .....

explanation .....

.....

[4]

**(ii)** State the form in which carbohydrate is stored in potato plants.

.....[1]

**(iii)** State **two** uses, other than storage, for the carbohydrate made by photosynthesis.

1 .....

2 .....
[2]

**[Total: 10]**

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**3** **(a)** Fig. 3.1 shows a piece of apparatus used to measure reaction time. As soon as the bulb lights up, the student being tested presses the switch. The reaction time, in seconds, is then displayed on the timer.

View solution

Ten students each have one attempt on the timer.

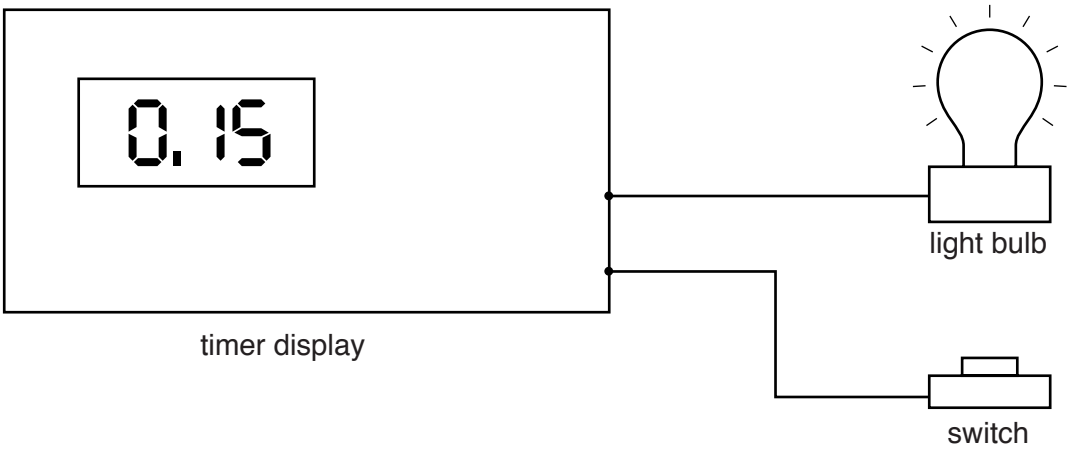


**Fig. 3.1**

The results of the investigation are shown in Fig. 3.2.

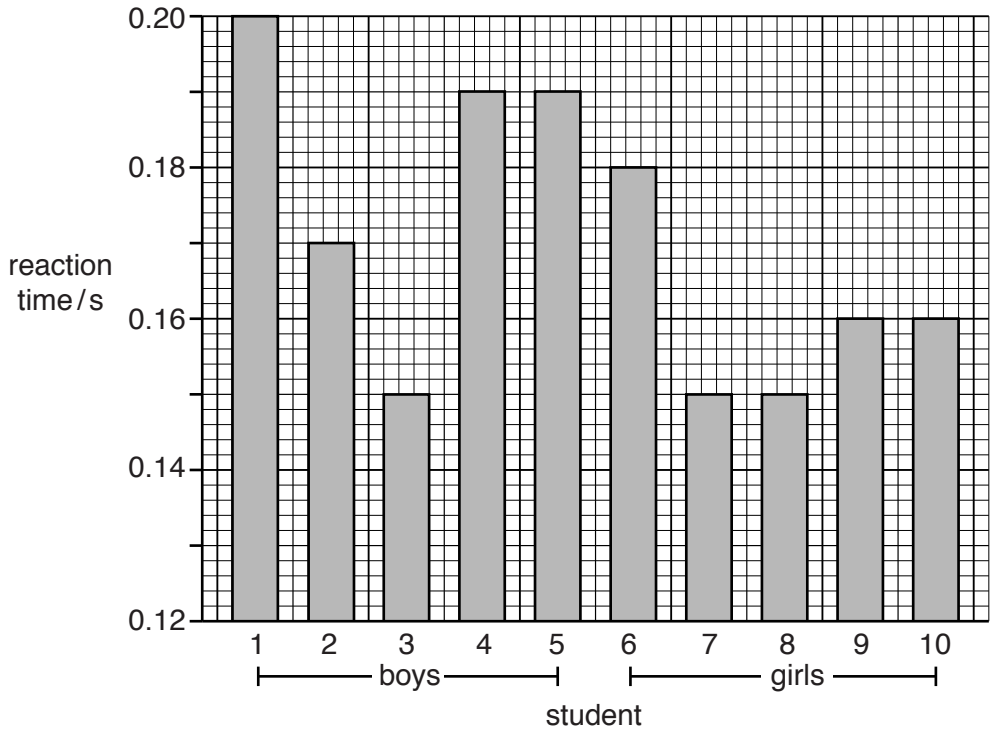


**Fig. 3.2**

The average reaction time for the boys is 0.18 s.

Calculate the average reaction time for the girls. Show your working.

average reaction time for the girls ..... s [2]

**(b)** Fig. 3.3 shows the pathway for a simple reflex action.

View solution

**(i)** Complete the diagram by writing the correct words in the boxes.

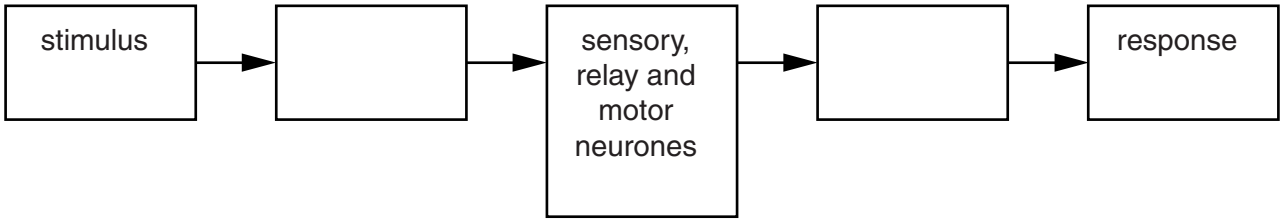


**Fig. 3.3**

[2]

**(ii)** Blinking is a reflex action. Fig. 3.4 shows what is happening as an eye blinks and then opens again.

View solution



**Fig. 3.4**

Suggest **one** reason why this reflex action is important to the body.

.....

.....[1]

**(c)** Heroin is a powerful drug.

View solution

**(i)** Describe what is meant by the term *drug*.

.....

.....

.....

.....[2]

**(ii)** Suggest how heroin could affect reaction time.

View solution

.....

.....[1]

**(iii)** There are many problems caused by people using heroin.

View solution

Describe **three** examples of these problems.

1 .....

.....

2 .....

.....

3 .....

.....[3]

**(d)** An antibiotic is an example of a drug that can be used as a medicine.

View solution

Describe how antibiotics are useful to the human body.

.....

.....[1]

**[Total: 12]**

**Question 4 begins on page 10.**

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**4** Fig. 4.1 shows the sex chromosomes in a fertilised human egg.

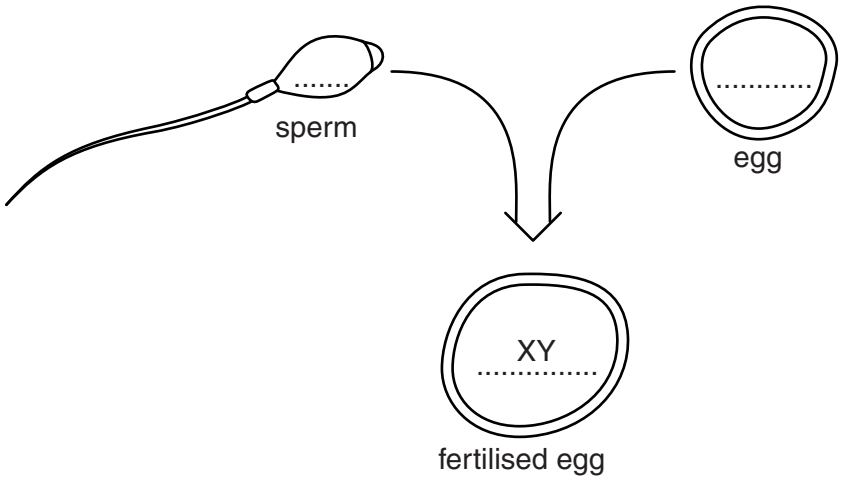


**Fig. 4.1**

View solution

**(a) (i)** Complete the diagram to show the sex chromosomes in the sperm and the egg. [1]

**(ii)** State the biological name for a fertilised egg.

View solution

.....[1]

**(b)** The fertilised egg develops into a baby.

Explain why there are approximately equal numbers of male and female babies in humans.

.....

.....

.....

.....

.....

.....[3]

View solution

**(c) (i)** Identical twins are formed when one sperm fertilises one egg, which then splits into two. Each of these then develops into an embryo.

View solution

Compare the alleles present in a pair of identical twins.

.....

.....[1]

**(ii)** Tony and Edward are identical twins.

View solution



Tony Edward

Table 4.1 gives some information about some characteristics of Tony and Edward.

**Table 4.1**

| characteristic | Tony | Edward |
|---|---|---|
| sex | male | male |
| height/cm | 161 | 162 |
| weight/kg | 55 | 58 |
| skin colour | pale | tanned |
| hair style | short hair | long hair |
| blood group | A | A |

State the **two** characteristics from Table 4.1 that are **only** controlled by genetic information.

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

**[Total: 8]**

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**5** Fig. 5.1 shows a section through a flower.

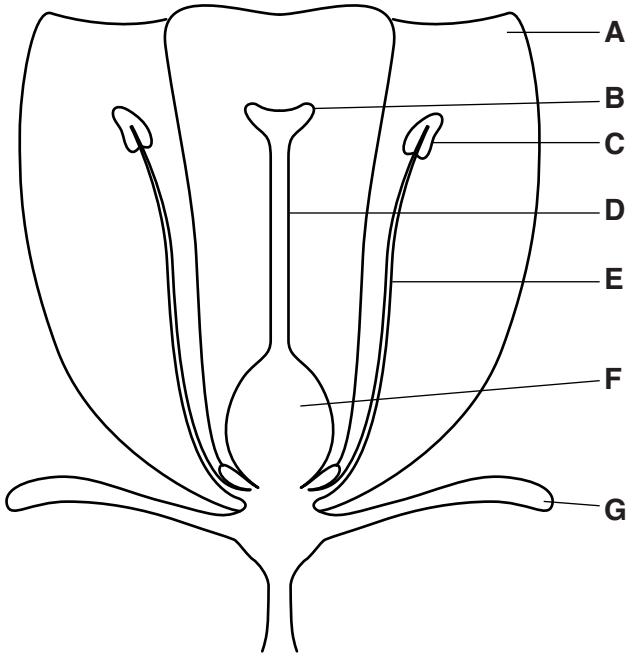


**Fig. 5.1**

View solution

**(a)** Table 5.1 describes the functions of some parts of the flower.

Complete the table using the label letters from Fig. 5.1.

You may use each letter once, more than once or not at all.

**Table 5.1**

| function | letter |
|---|---|
| protection of the flower when in bud | |
| place where pollen is produced | |
| site of fertilisation | |
| a suitable landing site for pollen | |
| attracts insects | |

[5]

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**(b)** Individual flowers of the same species can be different colours.

Fig. 5.2 is a genetic diagram which shows how colour is inherited for one particular species.

**R** represents the allele for red flower colour.

**r** represents the allele for white flower colour.

View solution

**(i)** Complete Fig. 5.2 using words from this list. Each word may be used once, more than once or not at all.

**dominant** **gametes** **genotypes** **heterozygous**

**homozygous** **phenotypes** **recessive**

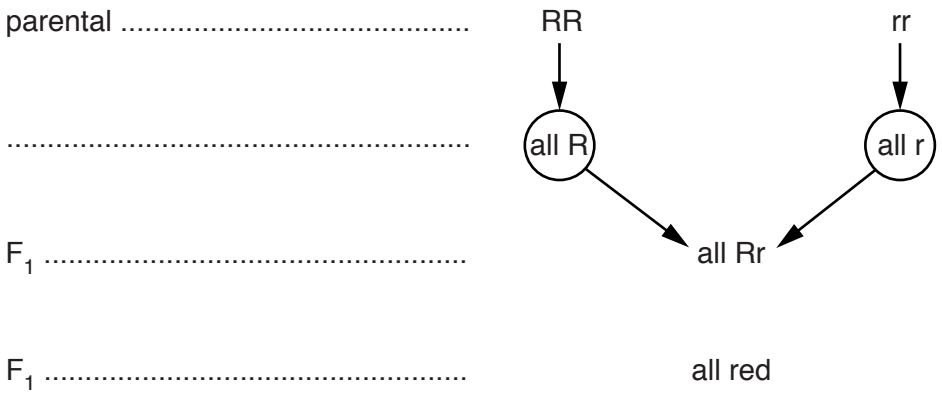


**Fig. 5.2**

[3]

**(ii)** The $F_1$ red flowers were pollinated with pollen from white flowers.

State the proportion of red to white flowers you would expect in the offspring from this cross.

.....[1]

**[Total: 9]**

View solution

**6** Fig. 6.1 shows the human digestive system.

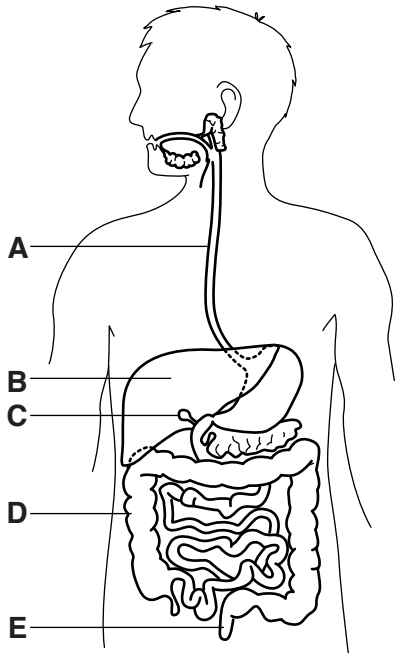


**Fig. 6.1**

**(a) (i)** State the letter of the organ that **makes** bile.

View solution

.....[1]

**(ii)** Name the organ that **stores** bile.

View solution

.....[1]

**(iii)** The bile duct can become blocked.

View solution

Explain why this causes problems with the digestion of fats.

.....

.....

.....

.....[2]

**(b)** Table 6.1 shows information about some parts of the human digestive system.

View solution

**Table 6.1**

| organ | pH of digestive juice | enzymes present in digestive juice |
|---|---|---|
| salivary gland | 7.5 | amylase |
| stomach | 2.0 | protease |
| small intestine | 8.5 | amylase<br>lipase<br>protease |

**(i)** Name **two** parts of the digestive system where amino acids could be produced by digestion.

1 .....

2 .....[2]

**(ii)** Suggest **two** reasons why starch is not digested in the stomach.

View solution

1 .....

2 .....[2]

**(c) (i)** The material entering the colon is liquid, but the faeces are usually much more solid.

View solution

State how this happens.

.....

.....[1]

**(ii)** Name the component of a balanced diet which is necessary for the correct formation of faeces.

.....[1]

**(iii)** Name a disorder which can result from a shortage of the component identified in **(c)(ii)**.

.....[1]

**[Total: 11]**

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**7** Fig. 7.1 shows part of a food web in a lake.

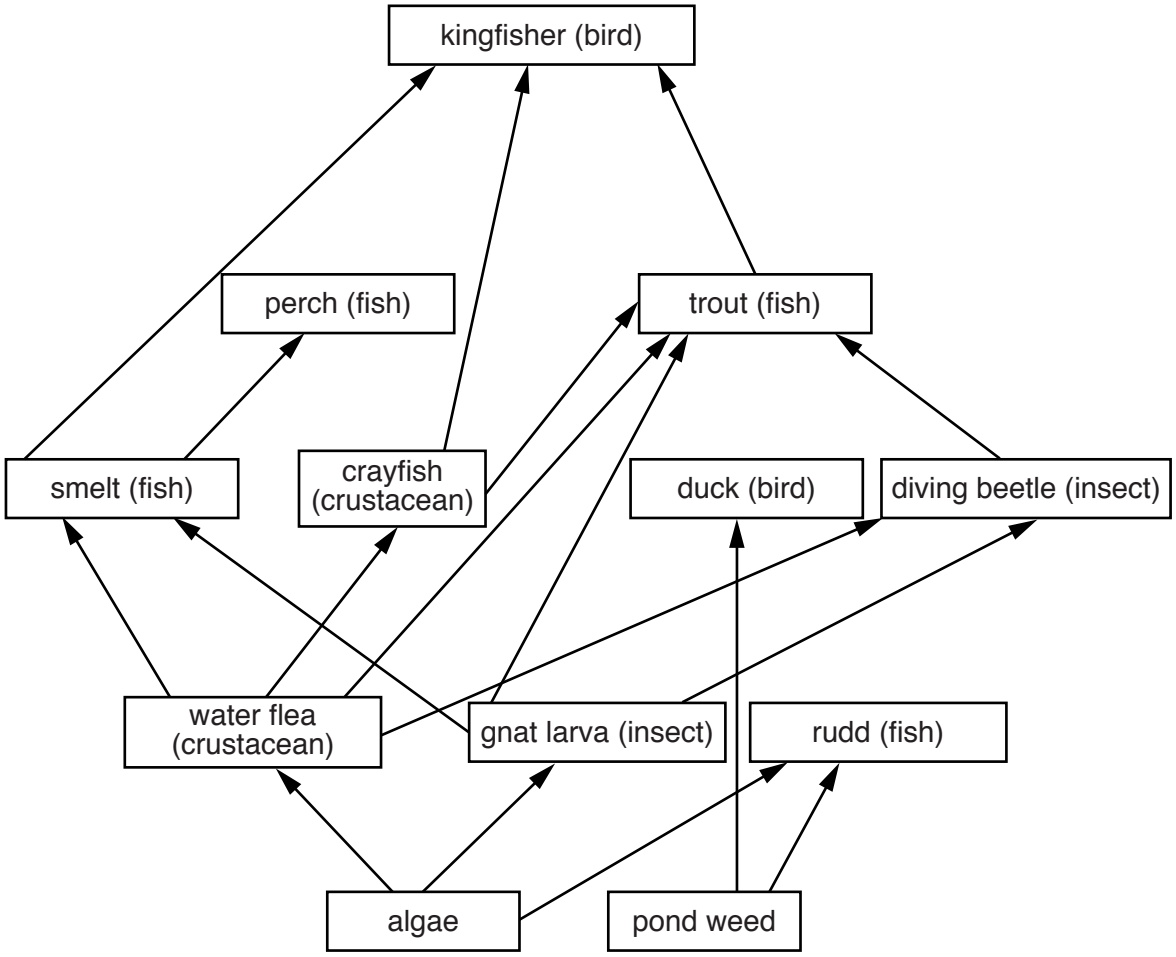


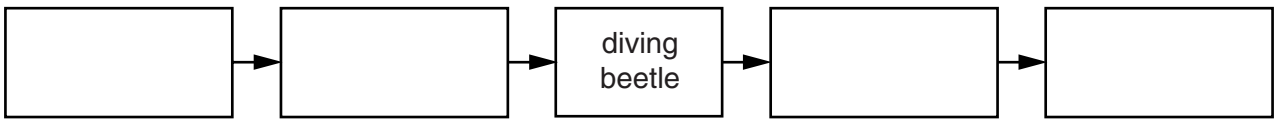

**Fig. 7.1**

**(a) (i)** Name **one** organism in this food web which can trap light energy to produce sugars.

View solution

.....[1]

**(ii)** Complete this food chain from this food web. Write the name of one organism in each box.




[2]

**(b)** There are farmers' fields around the lake.

View solution

Some of the farmers use insecticides on their crops.

Suggest why the farmers use insecticides.

.....

.....[1]

**(c)** Some of the insecticide washed into the lake.

View solution

**(i)** Trout were caught and when analysed, were shown to contain insecticides.

Use Fig. 7.1 to explain why insecticide was found in the trout.

.....

.....

.....

.....[2]

**(ii)** A high level of insecticide in birds has been linked to them laying eggs with very thin shells, which break easily.

The population of kingfishers in the food web decreased. When analysed, the kingfishers were shown to contain very high levels of insecticide.

Use Fig. 7.1 to explain the effect of high levels of insecticide in kingfishers on the population of trout.

.....

.....[1]

**(d)** Fertilisers were also washed into the lake.

View solution

A few weeks later large numbers of dead fish were found floating in the lake.

Explain how this addition of fertilisers caused the fish in the lake to die.

.....

.....

.....

.....

.....

.....

.....

.....[4]

**[Total: 11]**

**8** Fig. 8.1 shows the flow of energy through a food chain in a field. The figures refer to the quantity of energy being transferred, in kJ per $m^2$ per year.

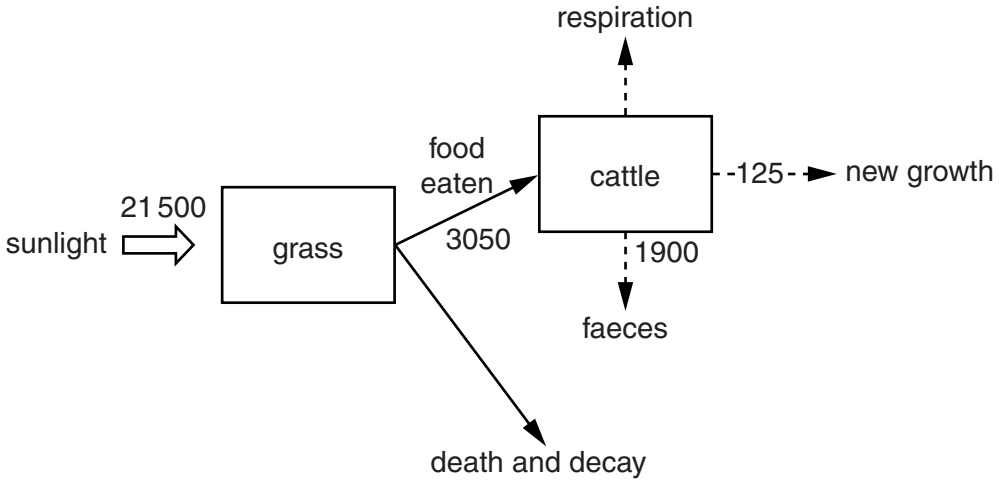



**Fig. 8.1**

View solution

**(a) (i)** Name **one** group of organisms which could decay the dead remains of the grass plants.

.....[1]

View solution

**(ii)** Decay is usually fastest in the early autumn.

Suggest **two** factors which could affect the rate of decay.

1 .....

2 .....[2]

**(b)** After the cattle have eaten the grass, much of the energy is released in respiration.

**(i)** Calculate how much energy is released by the cattle in respiration. Show your working.

View solution

..... kJ per $m^2$ per year [2]

View solution

**(ii)** State **two** uses of the energy released in respiration.

1 .....

2 .....[2]

**(c)** Cattle release methane into the atmosphere.

View solution

State **one** undesirable effect of methane on the environment.

.....[1]

**(d)** Land for rearing cattle is often provided by cutting down trees.

View solution

State **two** harmful effects to the environment of this deforestation.

1 .....

2 .....[2]

**[Total: 10]**

**9** Fig. 9.1 shows a sample of human blood.

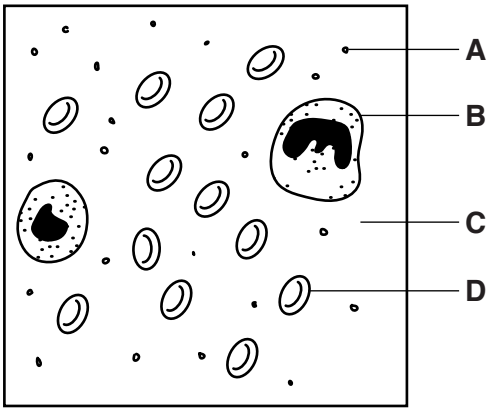



**Fig. 9.1**

View solution

**(a)** Table 9.1 states the functions of some parts of the blood.

Complete the table using the label letters from Fig. 9.1.

Use each letter only once.

**Table 9.1**

| function | letter |
|---|---|
| transports oxygen | |
| removes bacteria from the blood | |
| involved in blood clotting | |
| transports urea | |

[3]

**(b)** Name the blood vessel likely to carry the highest concentration of carbon dioxide. View solution

.....[1]

**(c)** Name the mineral likely to be removed from the blood by the bones and teeth.

.....[1]

**[Total: 5]**

View solution

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