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**BIOLOGY** **0610/33**

Paper 3 Theory (Core) **May/June 2021**

**1 hour 15 minutes**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

**INFORMATION**

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

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**1** **(a)** State the name of the large group of organisms that includes insects, arachnids, crustaceans and myriapods.

..... [1]

**(b)** Fig. 1.1 shows a key that identifies nine genera of invertebrates that have jointed legs.

View solution

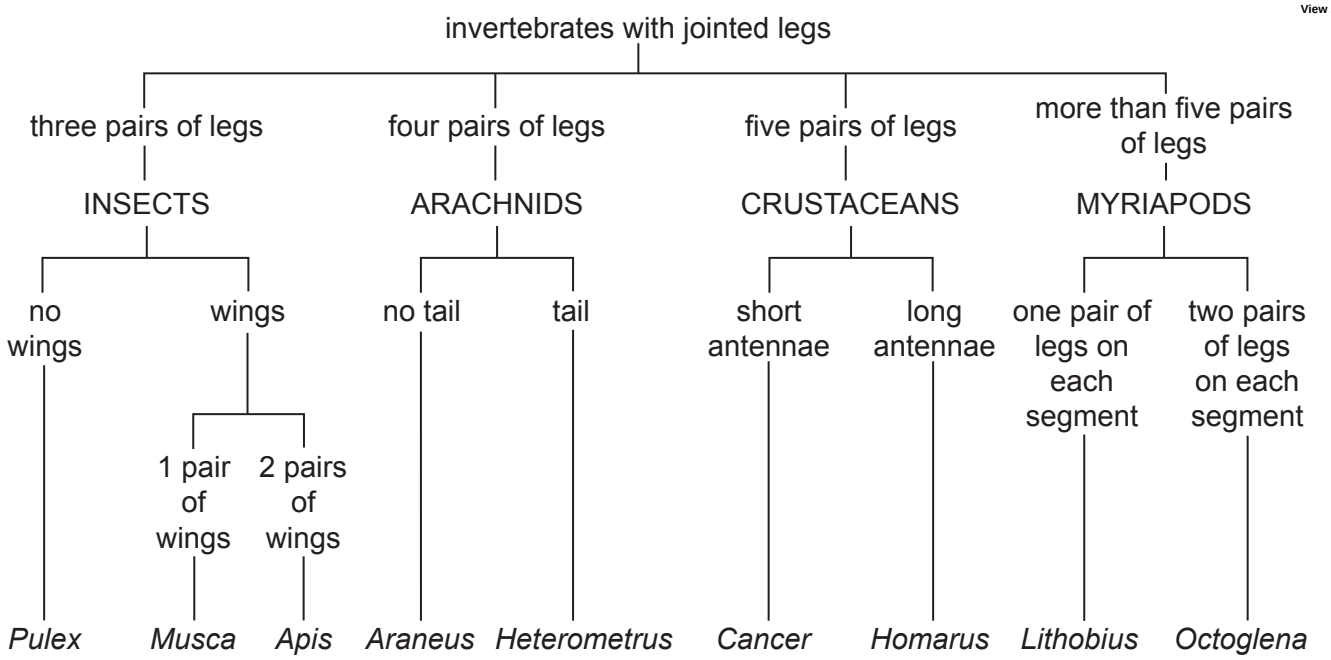


**Fig. 1.1**

**(i)** Use the information in Fig. 1.1 to describe **two** features of *Musca*.

1 .....

.....

2 .....

.....

[2]

**(ii)** Fig. 1.2 shows one of the animals described in the key.

View solution

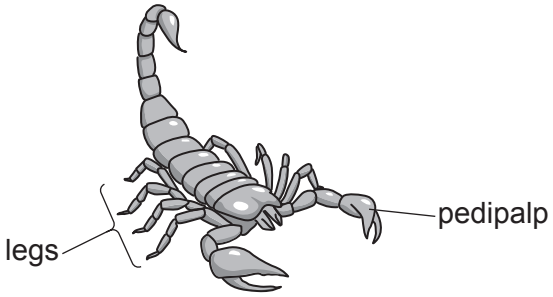


**Fig. 1.2**

Use the key in Fig. 1.1 to identify this animal.

..... [1]

[Total: 4]

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**2** **(a)** **(i)** State the name of the process that occurs in the presence of chlorophyll.

..... [1]

**(ii)** State the name of the mineral ion the plant needs to make chlorophyll.

View solution

..... [1]

**(iii)** State the name of the structure that contains chlorophyll in a plant cell.

..... [1]

**(b)** Fig. 2.1 shows a diagram of a cross-section of a leaf.

View solution

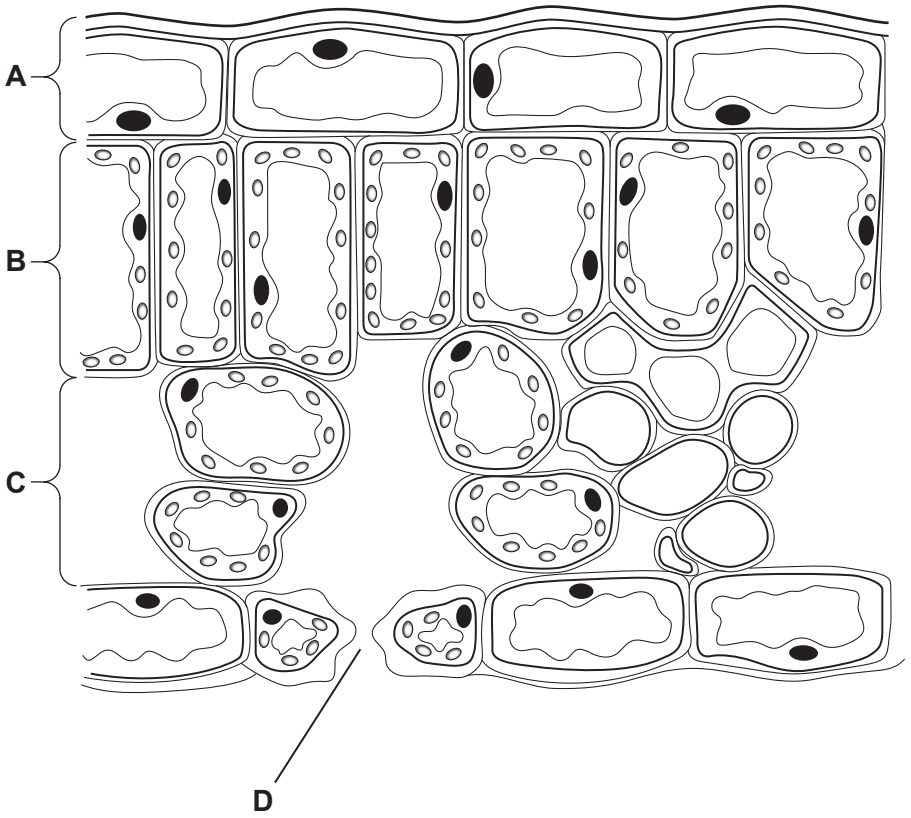



**Fig. 2.1**

**(i)** State the letter that identifies the part of the leaf that contains the most chlorophyll in Fig. 2.1.

..... [1]

**(ii)** State the name of the tissue in the leaf that does **not** contain chlorophyll.

..... [1]

[Total: 5]

View solution

**3** All living organisms need water. Most plants obtain water from the soil.

**(a) (i)** State the pathway taken by water as it enters and passes through a plant.

View solution

Use words from the list to fill in the spaces.

**mesophyll cells** **root cortex cells** **root hair cells** **xylem vessels**

enters ..... → ..... → ..... → .....

[2]

**(ii)** Some of the water that enters the plant is used for transpiration.

View solution

Define the term transpiration.

.....

.....

.....

.....

..... [3]

**(iii)** State **two** ways a plant uses water other than for transpiration.

View solution

1 .....

.....

2 .....

.....

[2]

**(b)** Fig. 3.1 shows apparatus that can be used to measure water loss in a plant.

View solution

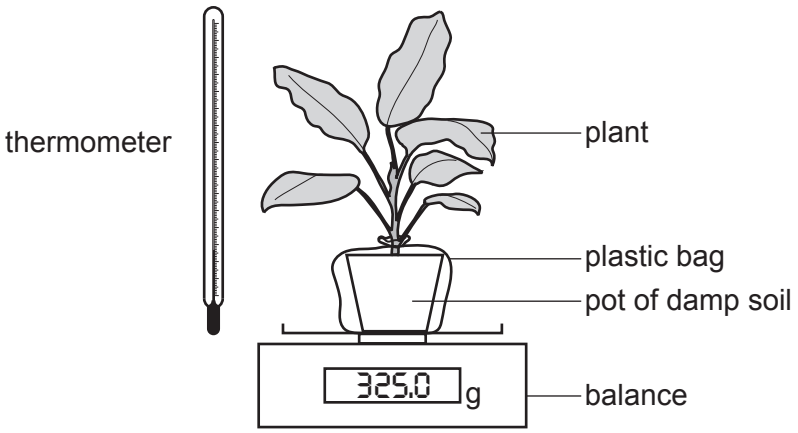



**Fig. 3.1**

Suggest a reason why the pot of damp soil was placed inside a sealed plastic bag.

.....

.....

..... [1]

**(c)** The apparatus shown in Fig. 3.1 was used in an investigation. The results of this investigation are shown in Fig. 3.2.

Readings were taken at hourly intervals during the day between 9:00 and 16:00.

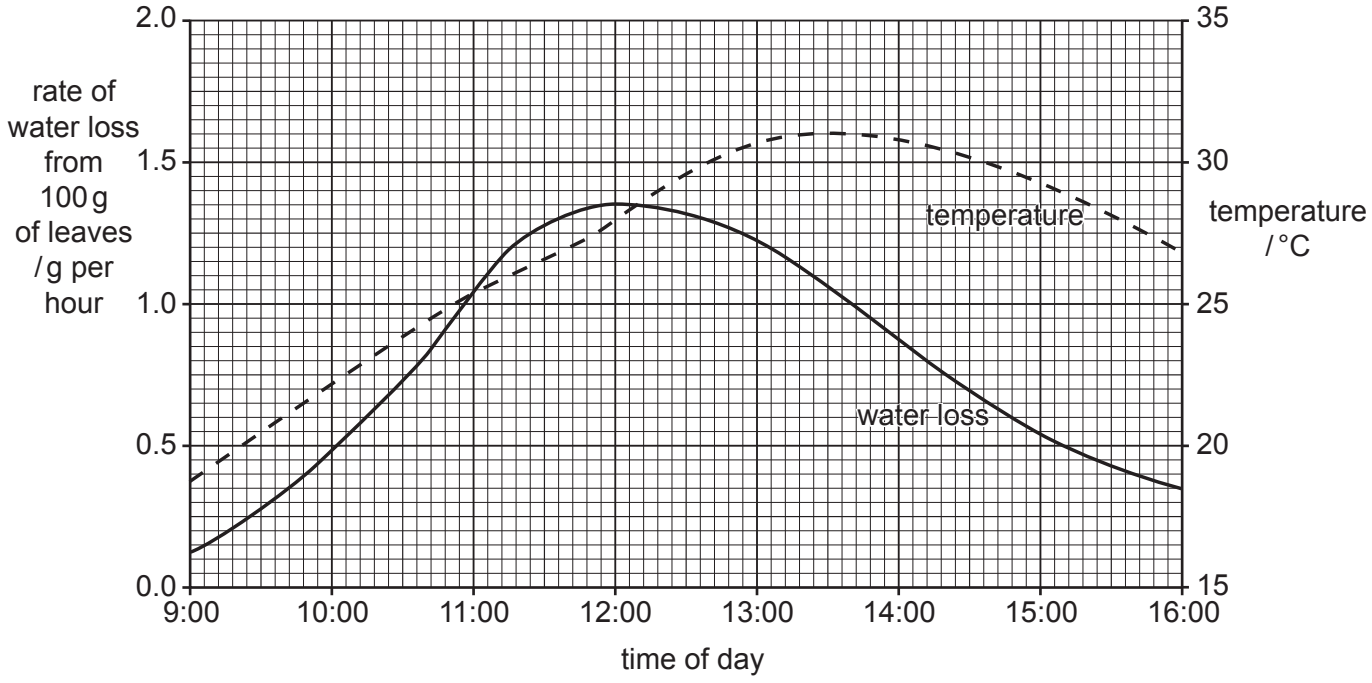



**Fig. 3.2**

**(i)** Use the information in Fig. 3.2 to state:

View solution

the maximum rate of water loss from 100 g of leaves ..... g per hour

the time at which the temperature was highest .....

the maximum temperature reached during the investigation ..... °C
[3]

**(ii)** Describe the relationship between temperature and the rate of water loss from leaves shown in Fig. 3.2.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 14]

View solution

**4** Fig. 4.1 shows part of the human nervous system.

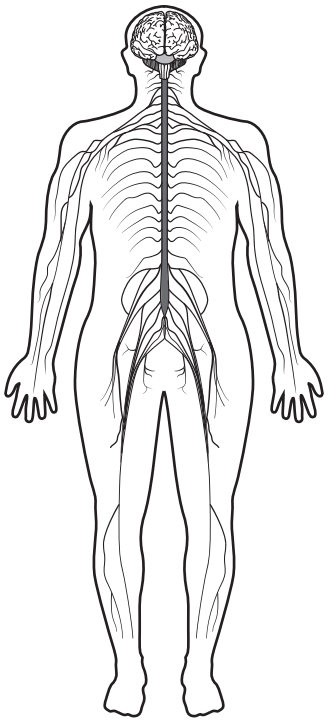


**Fig. 4.1**

**(a) (i)** State the **two** parts of the central nervous system.

View solution

1 .....

2 .....

[2]

**(ii)** Describe the main function of the nervous system.

View solution

.....

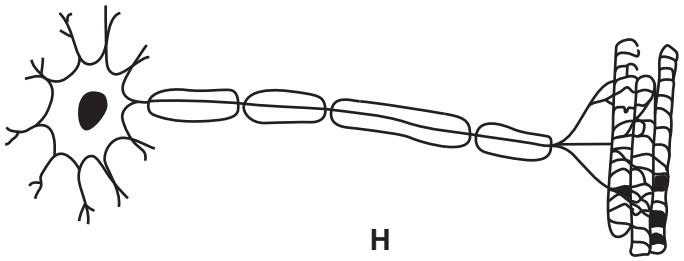
.....

..... [1]

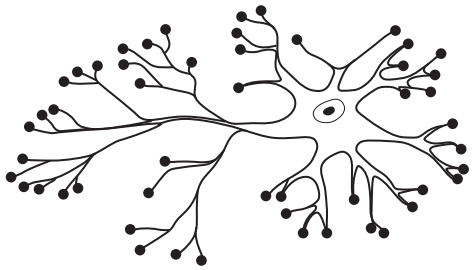
**(b)** Fig. 4.2 shows three different types of neurone.

These cells are used in some reflex actions.

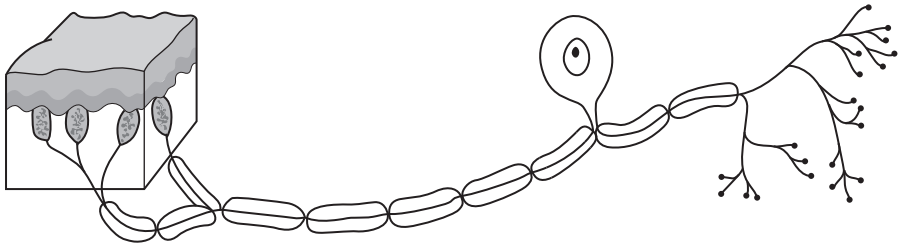
View solution



**H**



**J**



**K**

not to scale

**Fig. 4.2**

**(i)** State the names of cells **H** and **K** in Fig. 4.2.

**H** .....

**K** .....

[2]

**(ii)** Describe **one** feature of a reflex action.

.....

.....

..... [1]

**(iii)** State **one** example of a reflex action.

..... [1]

**(c)** Certain types of drugs can affect the nervous system.

View solution

Heroin and alcohol both affect reflex actions.

**(i)** State **one** effect of heroin on the nervous system.

..... [1]

**(ii)** State **one** long-term effect of excessive consumption of alcohol.

..... [1]

[Total: 9]

View solution

**5** **(a)** The four boxes on the left contain definitions of processes carried out by the alimentary canal.

The six boxes on the right contain the names of processes.

View solution

Draw a straight line to join each definition to the matching process.

Draw only **four** lines.

| **definition** | **process** |
|---|---|
| | absorption |
| The breakdown of large, insoluble molecules into small, soluble molecules. | assimilation |
| The movement of digested food molecules into the cells of the body where they are used, becoming part of the cells. | chemical digestion |
| The passing out of food that has not been digested or absorbed, as faeces, through the anus. | egestion |
| The taking of food substances, e.g. food and drink, into the body through the mouth. | mechanical digestion |
| | ingestion |

[4]

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**(b)** Fig. 5.1 shows yeast being used to produce alcohol.

View solution

A mixture of yeast and fruit juice is placed in a jar. Fruit juice contains sugar.

A valve lets gas out of the jar but stops gas from entering the jar.

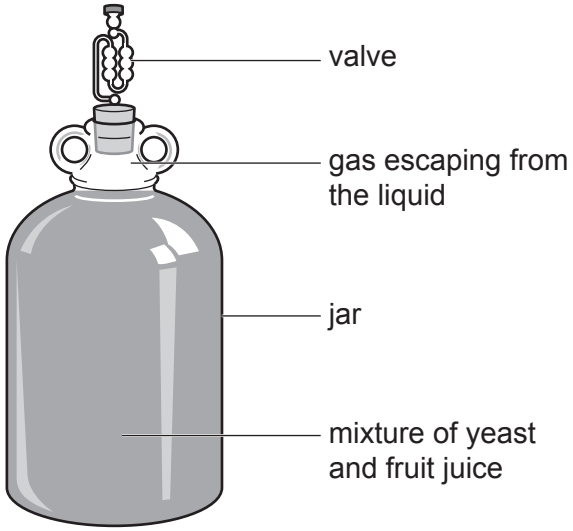


**Fig. 5.1**

**(i)** State the name of the process that the yeast uses to make alcohol.

..... [1]

**(ii)** State the name of the gas produced when yeast makes alcohol.

..... [1]

**(iii)** State the name of the gas that must be stopped from entering the jar when alcohol is being made.

..... [1]

**(iv)** State the name of the group of chemicals that yeast uses to catalyse the breakdown of glucose molecules.

Choose your answer from the list.

**antibiotics** **antibodies** **enzymes** **hormones**

..... [1]

[Total: 8]

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**6** Fig. 6.1 is a section of a flower that has both male and female parts.

Parts of the flower are labelled with the letters **L** to **S**.

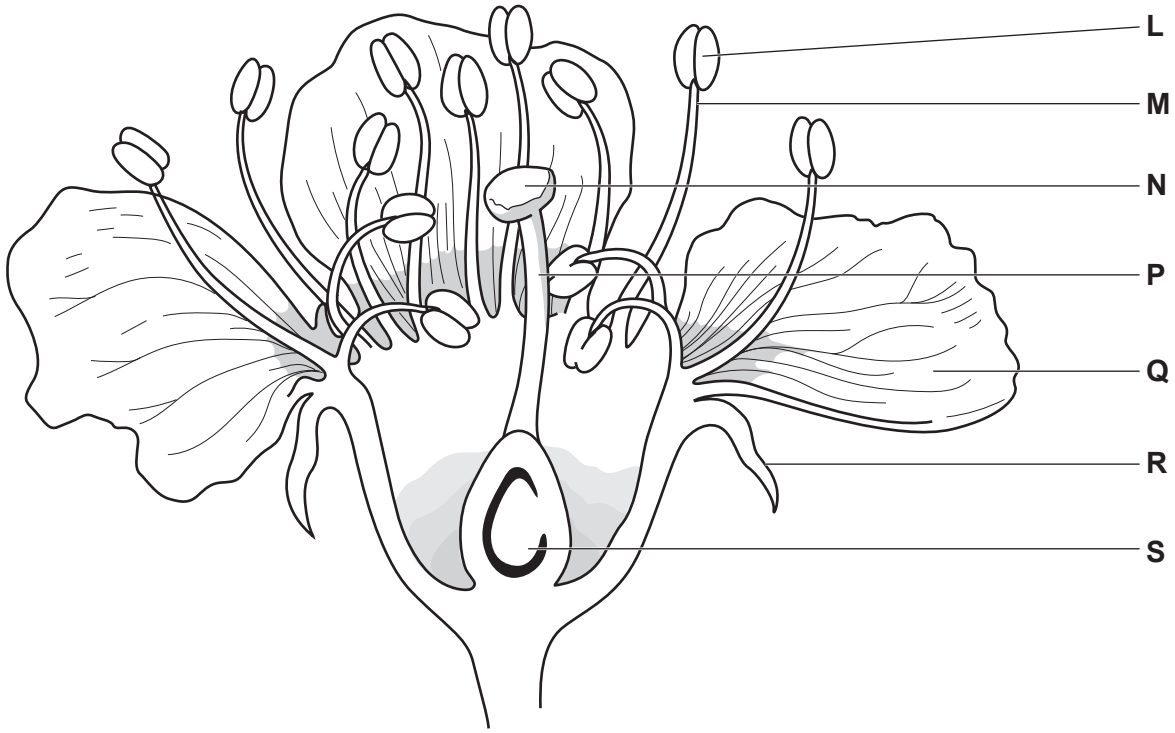



**Fig. 6.1**

**(a) (i)** Describe a **function** of each of the parts labelled **L**, **N** and **Q**.

View solution

**L** .....

.....

**N** .....

.....

**Q** .....

.....

[3]

**(ii)** State the names of parts **M**, **P**, **R** and **S**.

View solution

**M** .....

**P** .....

**R** .....

**S** .....

[4]

**(b)** Fig. 6.2 shows a mature maize plant. Maize plants have separate male and female flowers.

Maize plants are pollinated by the wind.

View solution

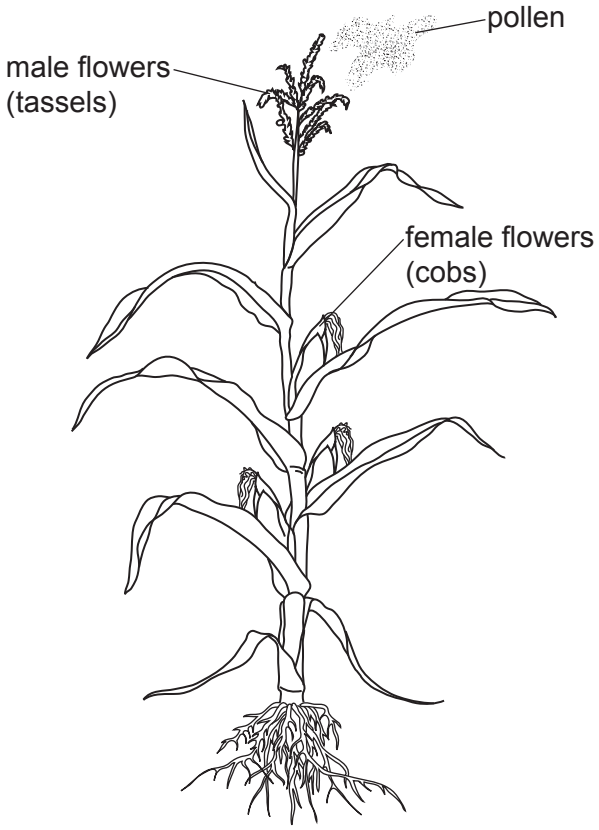



**Fig. 6.2**

**(i)** Use the information in Fig. 6.2 to describe how the **position** of the male and female flowers can increase the chance of pollination taking place.

.....

.....

..... [1]

**(ii)** Describe **two** ways pollen from an insect-pollinated flower differs from pollen from a wind-pollinated flower.

1 .....

.....

2 .....

.....

[2]

[Total: 10]

View solution

**7** **(a)** Define the terms herbivore and carnivore.

herbivore .....

.....

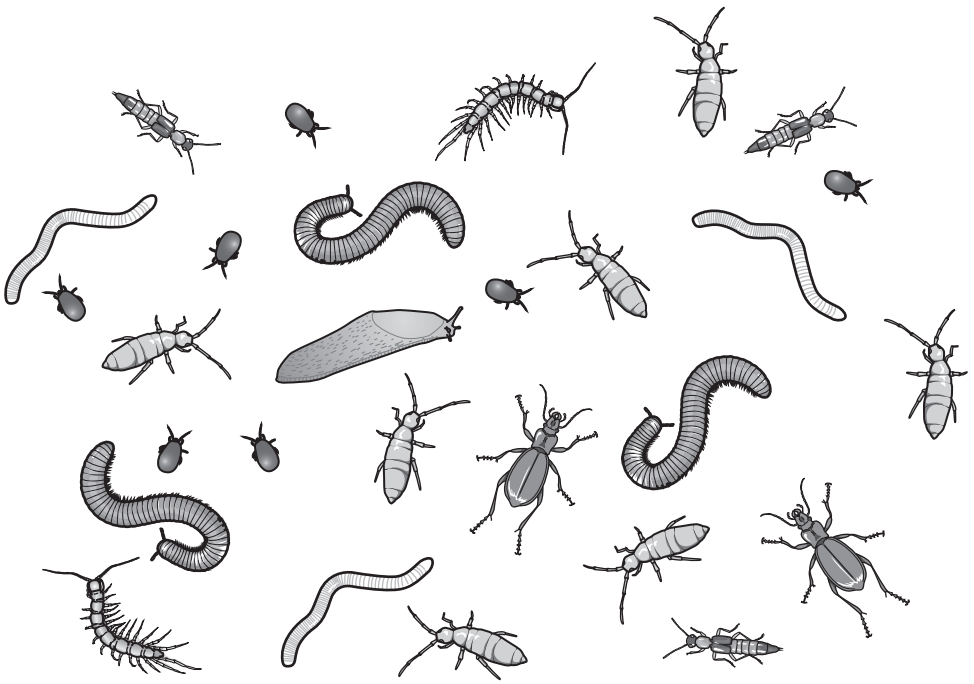
carnivore .....

.....

[2]

**(b)** Fig. 7.1 shows some organisms collected from underneath a rotting log.

View solution

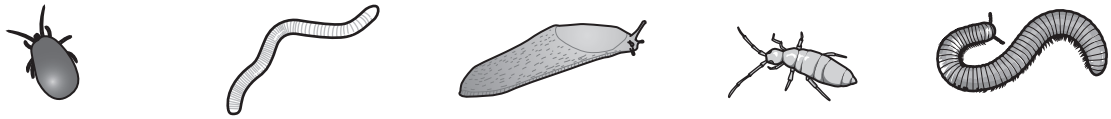


not to scale

**Fig. 7.1**

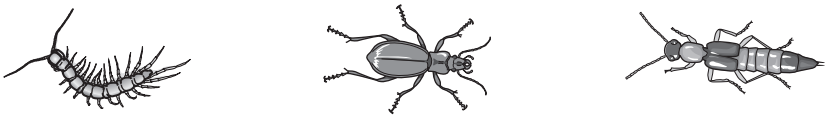
Fig. 7.2 can be used to identify these organisms.

**herbivores**



soil mite | potworm | slug | springtail | millipede

**carnivores**



centipede | ground beetle | rove beetle

not to scale

**Fig. 7.2**

Some students used Fig. 7.2 to identify and count the numbers of each soil organism.

Some of their results are shown in Table 7.1.

**Table 7.1**

| | herbivores | | | | | carnivores | | |
|---|---|---|---|---|---|---|---|---|
| names of organisms | millipedes | potworms | slugs | soil mites | springtails | centipedes | ground beetles | rove beetles |
| number of organisms | ..... | 3 | 1 | ..... | 7 | 2 | ..... | ..... |
| total number of organisms | 21 | | | | | 7 | | |

**(i)** Complete Table 7.1 by identifying and counting the **four** remaining named organisms in Fig. 7.1.

Write your answers in the four spaces in Table 7.1.

[2]

**(ii)** Use the information in Table 7.1 to draw a pyramid of numbers in Fig. 7.3.

View solution

Write the names of the **two** types of organism in the spaces at the side.

The row for the rotting log (the producer) has been done for you.

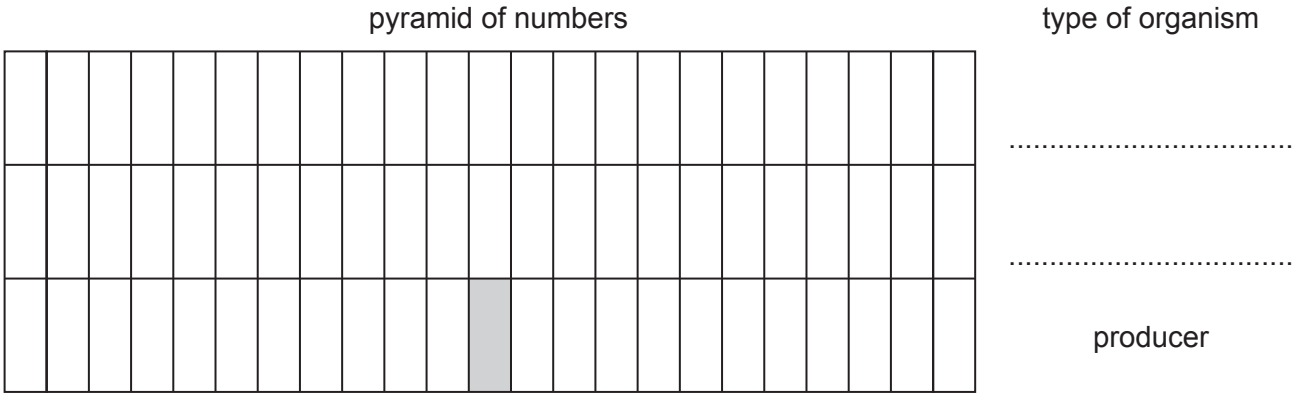



**Fig. 7.3**

[3]

[Total: 7]

**8** Fig. 8.1 shows an area of land where the trees have been cut down.



**Fig. 8.1**

**(a) (i)** List **three** undesirable effects of deforestation.

View solution

1 .....

2 .....

3 .....

[3]

**(ii)** Deforested land may be used for growing monocultures of crop plants.

Describe the negative impacts to an ecosystem of large-scale monocultures of crop plants.

.....

.....

.....

.....

..... [2]

View solution

**(b)** Replanting trees in deforested areas can help to conserve endangered species.

View solution

Describe **two** other ways that endangered species can be conserved.

1 .....

.....

.....

2 .....

.....

.....

[2]

[Total: 7]

**9** **(a)** Fig. 9.1 is a label taken from a container of semi-skimmed milk.

The milk is pasteurised and some of the milk fat has been removed.

View solution

| Fresh Pasteurised Semi Skimmed MILK | Nutritional information per 100 $cm^3$ of milk | |
|---|---|---|
| | Energy | 209 kJ |
| | Carbohydrate | 4.8 g |
| | Fat | 1.7 g |
| | Protein | 3.6 g |
| | Fibre | 0.0 g |
| | Salt | 0.1 g |

**Fig. 9.1**

**(i)** Fig. 9.1 gives information about five groups of nutrients.

State **two** parts of a balanced diet that are missing from the label.

1 .....

2 .....

[2]

**(ii)** State the name of the group of organisms that produce milk to feed their young.

..... [1]

**(b)** **(i)** Describe the dietary importance of fats, carbohydrates and proteins in the human diet.

fats .....

.....

.....

carbohydrates .....

.....

.....

proteins .....

.....

.....

[3]

View solution

**(ii)** State the name of the element which is present in a protein but which is **not** found in fats or carbohydrates.

..... [1]

**(c)** Some doctors recommend that people with a risk of coronary heart disease should drink skimmed or semi-skimmed milk instead of whole milk.

View solution

State **two** risk factors for coronary heart disease, **other than** diet.

1 .....

2 .....

[2]

[Total: 9]

**10 (a)** Fig. 10.1 shows the results of crossing a plant with red flowers with a plant with white flowers.

View solution

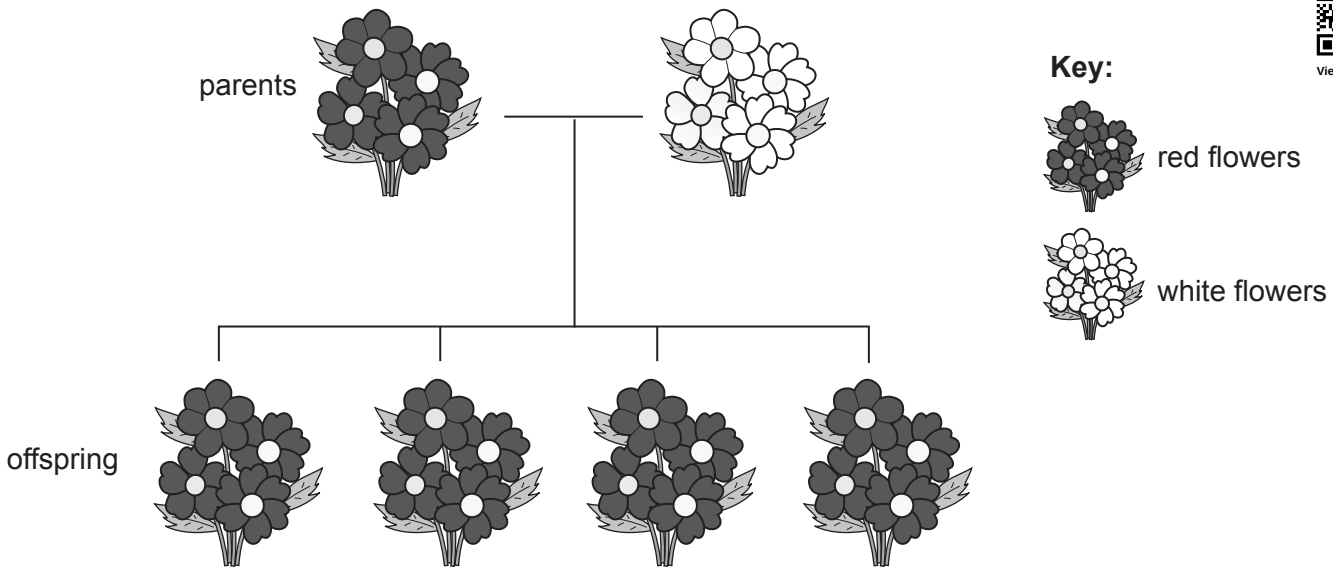



**Fig. 10.1**

Both of the parent plants were homozygous for flower colour.

All of their offspring had red flowers.

**(i)** State what is meat by the term homozygous.

.....

.....

..... [1]

**(ii)** The gene controlling flower colour in this plant species has two alleles:

View solution

- **R** is dominant and represents the allele for red flowers
- **r** is recessive and represents the allele for white flowers.

Describe the evidence shown in Fig. 10.1 that supports the fact that **R** is the dominant allele for flower colour in this species of plant.

.....

.....

..... [1]

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**(b)** Another plant with red flowers was crossed with a plant with white flowers.

Some of the offspring plants from this cross had red flowers and some of the offspring plants had white flowers.

View solution

Complete the genetic diagram to show the results of this cross.

| | red-flowered plant | X | white-flowered plant |
|---|---|---|---|
| parental genotypes | ..... | X | ..... |

parental gametes ( ..... ) ( ..... ) ( ..... ) ( ..... )

offspring genotypes .....

offspring phenotypes .....

[5]

[Total: 7]

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