Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/43**

Paper 4 Theory (Extended) **October/November 2019**

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.

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

This document consists of **16** printed pages and **4** blank pages.

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1 **(a)** The ant-mimic jumping spider, *Myrmarachne formicaria*, is shown in Fig. 1.1.

The common name of this species describes its behaviour. It is an arachnid that tricks its prey because it looks like the insects that it eats.

View solution



Fig. 1.1

(i) Suggest which trophic level in a food chain *M. formicaria* could belong to.

..... [1]

(ii) State the genus of the spider shown in Fig. 1.1.

View solution

..... [1]

(iii) Some keys use paired choices of features to identify species such as the ant-mimic jumping spider.

State the name of this type of key.

View solution

..... [1]

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(b) Spiders are classified as arachnids. Arachnids are one of the main groups of arthropods.

View solution

Fig. 1.2 shows diagrams of six arthropods, four of which are arachnids.

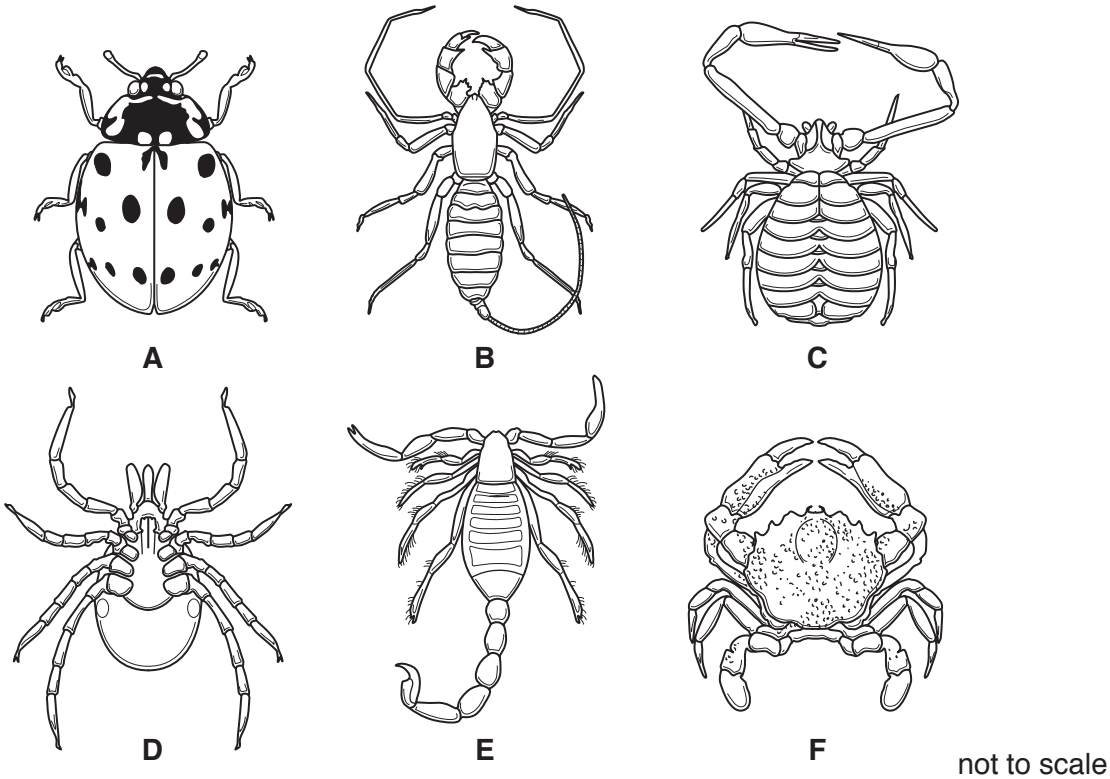

Fig. 1.2

(i) State **two** common features of all the arthropods, visible in Fig. 1.2.

1 .....

2 .....
[2]

(ii) State **two** common features of all arachnids that can be used to distinguish them from other arthropods.

1 .....

2 .....
[2]

(iii) State the letters of the **four** arachnids shown in Fig. 1.2.

..... [2]

(c) The features shown in Fig. 1.2 are morphological features. Many traditional methods of classification used morphology.

View solution

State the name of one **other** type of feature that can also be used in classification.

..... [1]

[Total: 10]

2 Plants produce glucose in leaves and convert some of it to sucrose.

(a) (i) Explain how glucose is produced in leaves.

View solution

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..... [3]

(ii) State the name of the process that plants use to move sucrose from a source to a sink.

..... [1]

(iii) Roots can be an example of a sink.

Explain why sometimes roots act as a source rather than a sink.

.....

.....

.....

.....

..... [2]

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(b) The movement of sucrose in plants can be modelled using laboratory apparatus.

Fig. 2.1 shows the apparatus used to model the movement of sucrose in a plant:

- Partially permeable bags were attached tightly to the ends of tube **Q**.
- The bag representing a **source** was filled with a coloured sucrose solution.
- The bag representing a **sink** was filled with water.
- The containers and tube **Q** and tube **S** were filled with water.

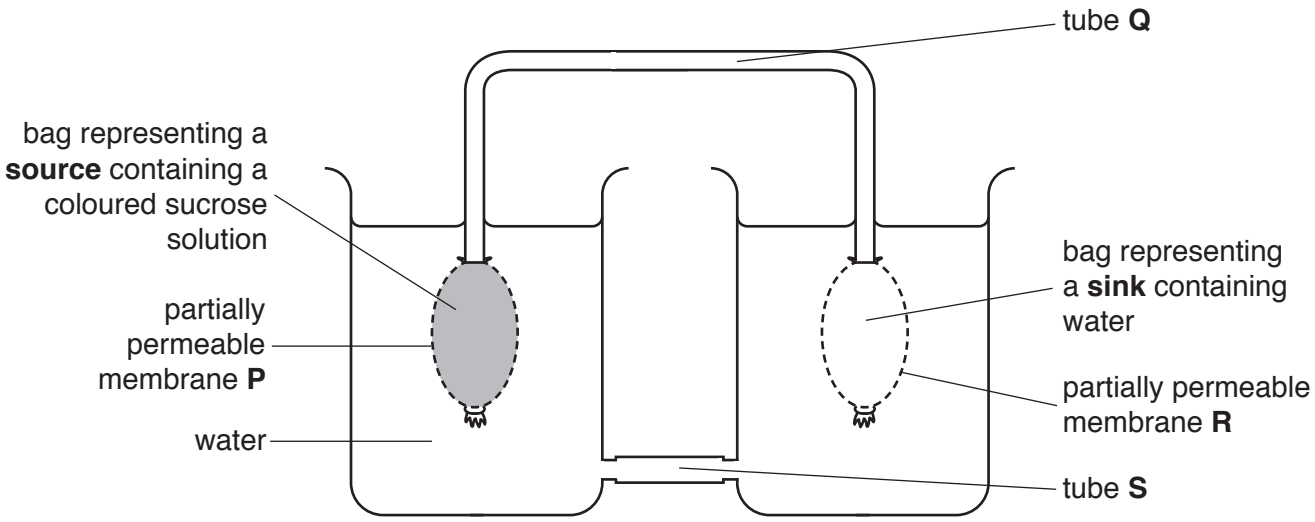

Fig. 2.1

Fig. 2.2 shows the position of the coloured sucrose solution 30 minutes after the apparatus was set up.

The arrows show the direction of the movement of the liquids.

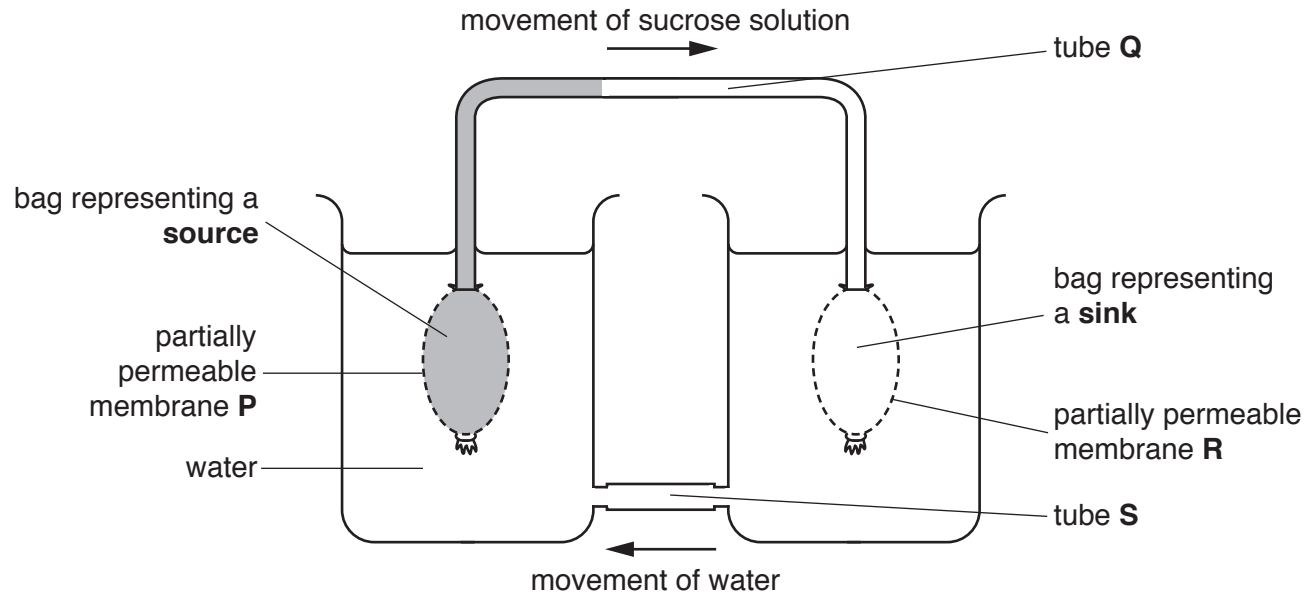

Fig. 2.2

(i) State the name of the tissue represented by tube **Q** and the name of the tissue represented by tube **S** in Fig. 2.2.

Q .....

S .....

[2]

(ii) Explain why the sucrose solution moves along tube **Q** in the model in Fig. 2.2.

View solution

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..... [4]

(c) In plants the movement of sucrose is usually continuous. However, after 2 hours the movement of sucrose in tube **Q** in Fig. 2.2 stopped.

View solution

Suggest why the movement of sucrose in tube **Q** stopped.

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.....

..... [1]

(d) Amino acids are also transported through plants.

View solution

State the name of the mineral ion that is used to make amino acids.

..... [1]

[Total: 14]

3 Carbohydrates are an important component of a balanced diet.

The flow chart in Fig. 3.1 shows some of the processes that happen to carbohydrates in food that is eaten.

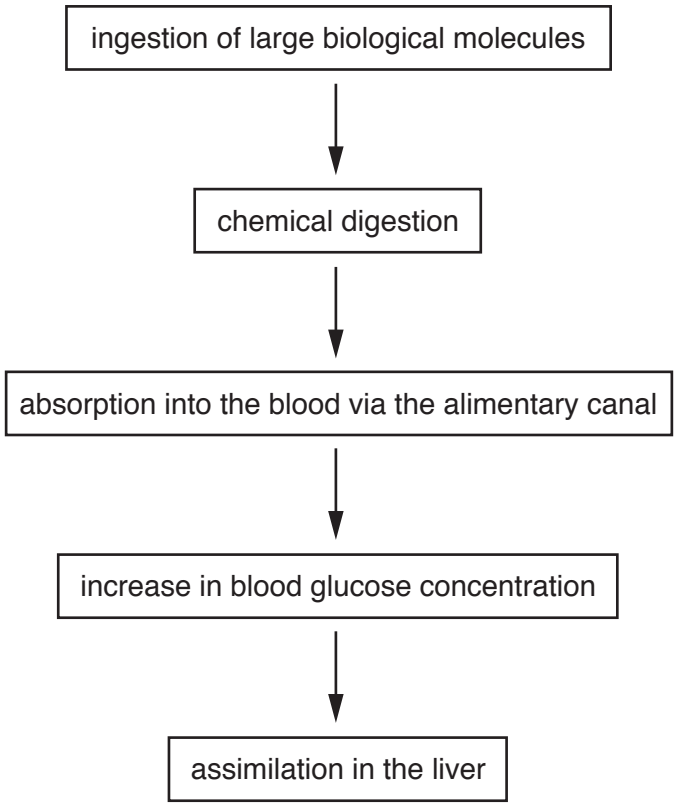

Fig. 3.1

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(a) Describe what happens to carbohydrates in the human body between ingestion and assimilation in the liver.

View solution

Use the information in Fig. 3.1 as a guide.

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..... [8]

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(b) Mineral salts are another important component of a balanced diet.

View solution

State the importance of calcium ions and iron ions in a balanced diet.

calcium ions .....

.....

.....

iron ions .....

.....

.....

[4]

(c) Consuming too much of some mineral salts, such as sodium chloride, increases the risk of developing coronary heart disease (CHD).

View solution

Doctors studied the effect of diet on the risk of developing CHD.

The doctors first selected volunteers who had a high salt diet.

The doctors assessed the volunteers' overall risk of developing CHD and monitored their blood pressure.

(i) List **two** factors, **other than diet and blood pressure**, that the doctors considered when assessing the overall risk of the volunteers developing CHD.

1 .....

2 .....

[2]

(ii) The doctors used urine tests to identify volunteers who had a high salt diet.

View solution

Explain why urine tests are a good indicator of how much salt has been consumed.

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..... [2]

(d) The volunteers were divided into two groups.

View solution

The mass of salt consumed by **both** groups was changed every 4 weeks:
- low salt intake for 4 weeks
- medium salt intake for 4 weeks
- high salt intake for 4 weeks.

In addition, group **2** was given other changes to their diet but group **1** was not.

(i) Suggest **one** component of the diet of group **2**, **other than salt**, that the doctors changed to further reduce the risk of developing CHD.

..... [1]

The systolic blood pressure of the volunteers was measured every 4 weeks.
These results are shown in Fig. 3.2.

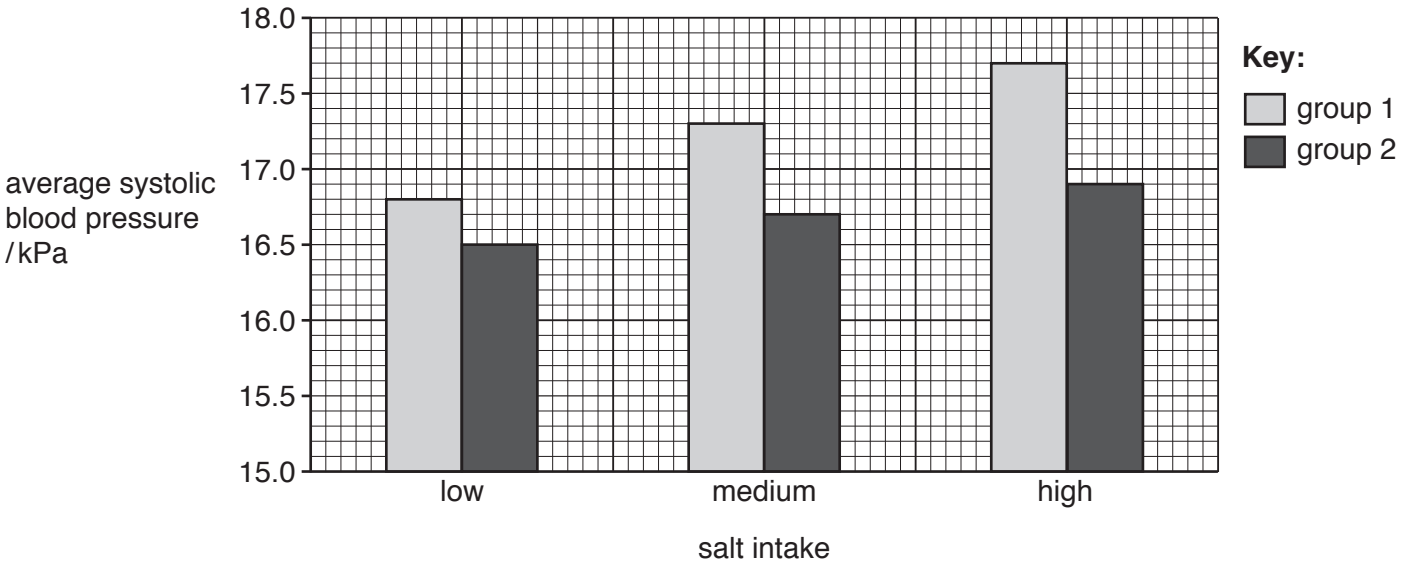

Fig. 3.2

(ii) Calculate the percentage increase in the average systolic blood pressure of the group **1** volunteers when they increased their salt intake from low to high.

View solution

low salt intake ..... kPa

high salt intake ..... kPa

Give your answer to the nearest whole number.

Space for working.

..... %
[3]

(iii) The doctors concluded that some diets reduce the risk of CHD.

Give evidence from Fig. 3.2 to support this conclusion.

View solution

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..... [3]

[Total: 23]

4 Forest ecosystems are threatened by many human activities.

(a) (i) Describe reasons why people cut down forests.

View solution

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..... [3]

(ii) Describe how forests can be conserved.

View solution

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..... [3]

(b) Ecologists in one country were concerned that some mammals had been affected by deforestation.

Fig. 4.1 is a diagram showing how deforestation affected one area of forest.

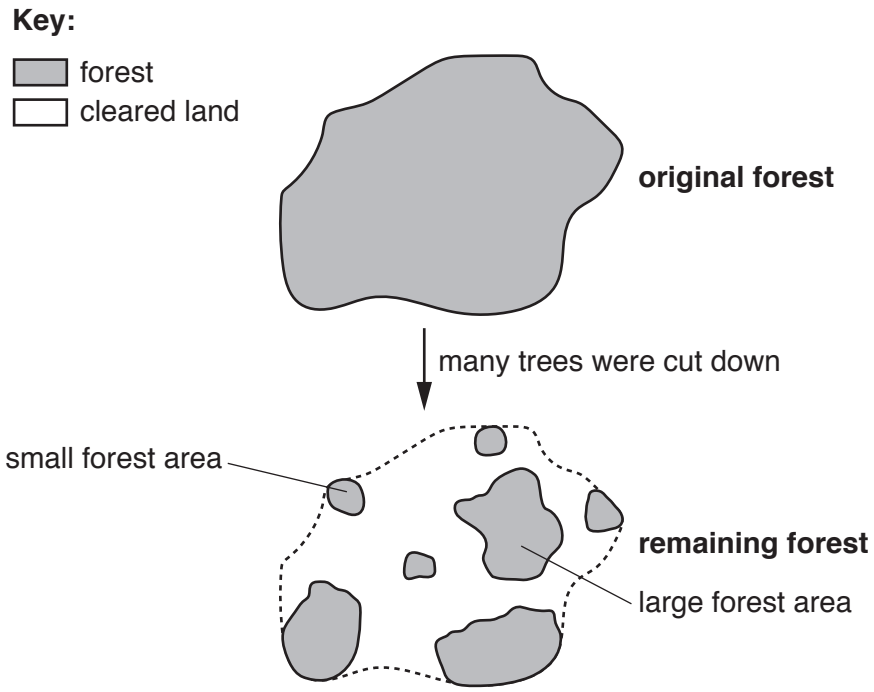

Fig. 4.1

The ecologists studied eight species of mammal. They recorded how many of the small and large areas of the remaining forest contained each of the eight species.

Two species, the black rat and the house mouse, are not usually found in this forest ecosystem. They were introduced to the area by humans many years ago before any trees were cut down.

The other six species are known to live in this forest ecosystem.

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Table 4.1

species of mammal	average body mass / g	percentage of small forest areas containing the species	percentage of large forest areas containing the species
house mouse*	18	46	42
brown antechinus	40	62	83
swamp rat	130	15	25
bush rat	160	85	100
black rat*	200	15	0
southern brown bandicoot	850	31	92
long-nosed potoroo	1100	8	17
long-nosed bandicoot	1300	8	25

*introduced species

(i) State which mammal in Table 4.1 showed almost no preference between small and large areas of forest.

..... [1]

(ii) The ecologists made a hypothesis:

View solution

'Larger areas of forest are better for the conservation of mammals.'

Discuss the evidence from Table 4.1 to support or reject this hypothesis.

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..... [4]

[Total: 11]

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5 Genetic engineering is an example of an important biotechnology.

(a) Complete the passage below by filling in each space with a suitable word.

View solution

DNA is a biological molecule found in the ..... of an animal cell. The sequence of the ..... in mRNA determines the order of the amino acids that will be assembled into a ..... .

When carrying out genetic engineering, sections of human DNA called ..... are cut using restriction enzymes. Next bacterial plasmids are cut with the ..... restriction enzymes to form complementary ..... ends.

The cut section of human DNA is inserted into the cut plasmid and they are joined together to form a ..... plasmid. These plasmids are inserted into ..... and replication occurs. This process is used to produce human ..... that is used to treat people with diabetes.

[9]

(b) In addition to genetic engineering, enzymes are also useful in other biotechnologies.

View solution

State **two** examples of how enzymes are used in another biotechnology.

1 .....

2 .....

[2]

[Total: 11]

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6 Fig. 6.1 is a photomicrograph of a blood clot.

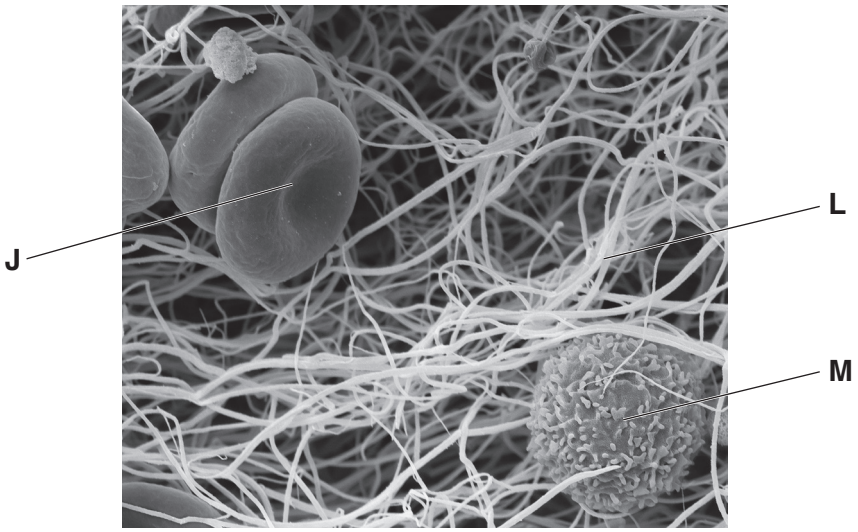

Fig. 6.1

View solution

(a) Describe how a blood clot forms.

Use the letters in Fig. 6.1 in your answer.

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..... [5]

(b) State the importance of blood clotting.

View solution

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..... [2]

(c) There are four blood group phenotypes A, B, AB and O in humans.

View solution

(i) Define the term *phenotype*.

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..... [1]

(ii) State the name of the type of inheritance that is shown by blood groups.

View solution

..... [1]

(iii) State the **two** possible genotypes for a person who has the phenotype blood group A.

1 .....

2 .....

[2]

[Total: 11]

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