Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2018**

1 hour

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

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1 Young mammals feed on milk containing protein.

Some mammals produce an enzyme called rennin. Rennin changes the protein in milk so that it can be digested by another enzyme.

The action of rennin causes small lumps or clots to form in the milk.

An investigation was carried out to find the effect of pH on the activity of the enzyme rennin.

Step 1 Three test-tubes were labelled **P**, **Q** and **R**.

Step 2 A syringe was used to add 5 cm^3 of milk to each of these test-tubes.

Step 3 A dropping pipette was used to add two drops of acid to test-tube **P**.

Step 4 A dropping pipette was used to add two drops of distilled water to test-tube **Q**.

Step 5 A dropping pipette was used to add two drops of alkali to test-tube **R**.

Step 6 Another three test-tubes were labelled **P1**, **Q1** and **R1**.

Step 7 A clean syringe was used to add 1 cm^3 of 0.1% rennin solution to each of test-tubes **P1**, **Q1** and **R1**.

Step 8 All six test-tubes were placed into a water-bath at 40 °C and left for three minutes.

Step 9 The contents of test-tube **P1** were added to test-tube **P**.
The contents of test-tube **Q1** were added to test-tube **Q**.
The contents of test-tube **R1** were added to test-tube **R**.

Step 10 Test-tubes **P**, **Q** and **R** were kept in the water-bath and a stop-clock was started.

Step 11 After one minute, test-tube **P** was removed from the water-bath.
It was tipped and rotated as shown in Fig. 1.1.
The appearance of the milk was observed, and the stage of clotting was decided by comparing it to the diagrams in Fig. 1.1.

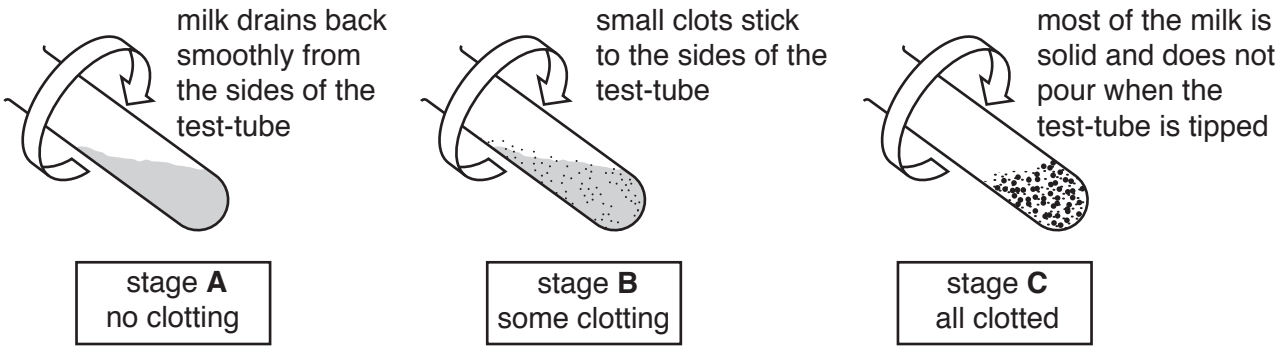

Fig. 1.1

Step 12 Test-tube **P** was returned to the water-bath.

Step 13 Steps 11 and 12 were repeated for test-tubes **Q** and **R**.

Step 14 Steps 11, 12 and 13 were repeated every minute for five minutes.

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The results are shown in Fig. 1.2.

Test-tube **P** had some clotting at one minute and was all clotted at two minutes. Test-tube **Q** had no clotting at one, two or three minutes but some clotting at four and five minutes. Test-tube **R** had no clotting throughout the investigation, and remained unchanged after five minutes.

Fig. 1.2

(a) Prepare a table in which to record these results. Use the information in Fig. 1.2 to complete this table.

View solution

[3]

(b) State a conclusion for these results.

View solution

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..... [2]

(c) **(i)** Suggest why, in step 8, all of the test-tubes were placed into a water-bath for three minutes before mixing the contents together in step 9.

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..... [1]

(ii) State **two** variables that were kept constant in this investigation.

View solution

1 .....

2 .....

[2]

(d) Identify **four** sources of error in this investigation.

View solution

1 .....

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2 .....

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3 .....

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4 .....

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[4]

(e) Identify **one** hazard associated with this procedure that would require the use of eye protection.

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..... [1]

View solution

(f) Clotting separates milk into a solid part and a liquid part.

View solution

Describe how you could find out if there was any protein remaining in the liquid part.

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..... [2]

(g) State the name of the test that would be used to test the milk for the presence of fat.

..... [1]

(h) After rennin has changed the protein in milk into a white solid, protease enzymes can be used to digest the protein. The digested protein forms a colourless liquid.

View solution

A hypothesis stated:

The optimum temperature for protease enzymes to digest changed milk protein is 37 °C.

Describe a method that could be used to test this hypothesis.

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..... [6]

[Total: 22]

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2 A student wanted to investigate a garden ecosystem.

She counted the number of insects caught in spider webs in one small section of the garden.

She found six spider webs in the small section of garden sampled.

Diagrams of the spider webs are shown in Fig. 2.1. Each black dot represents one insect caught in a spider web.

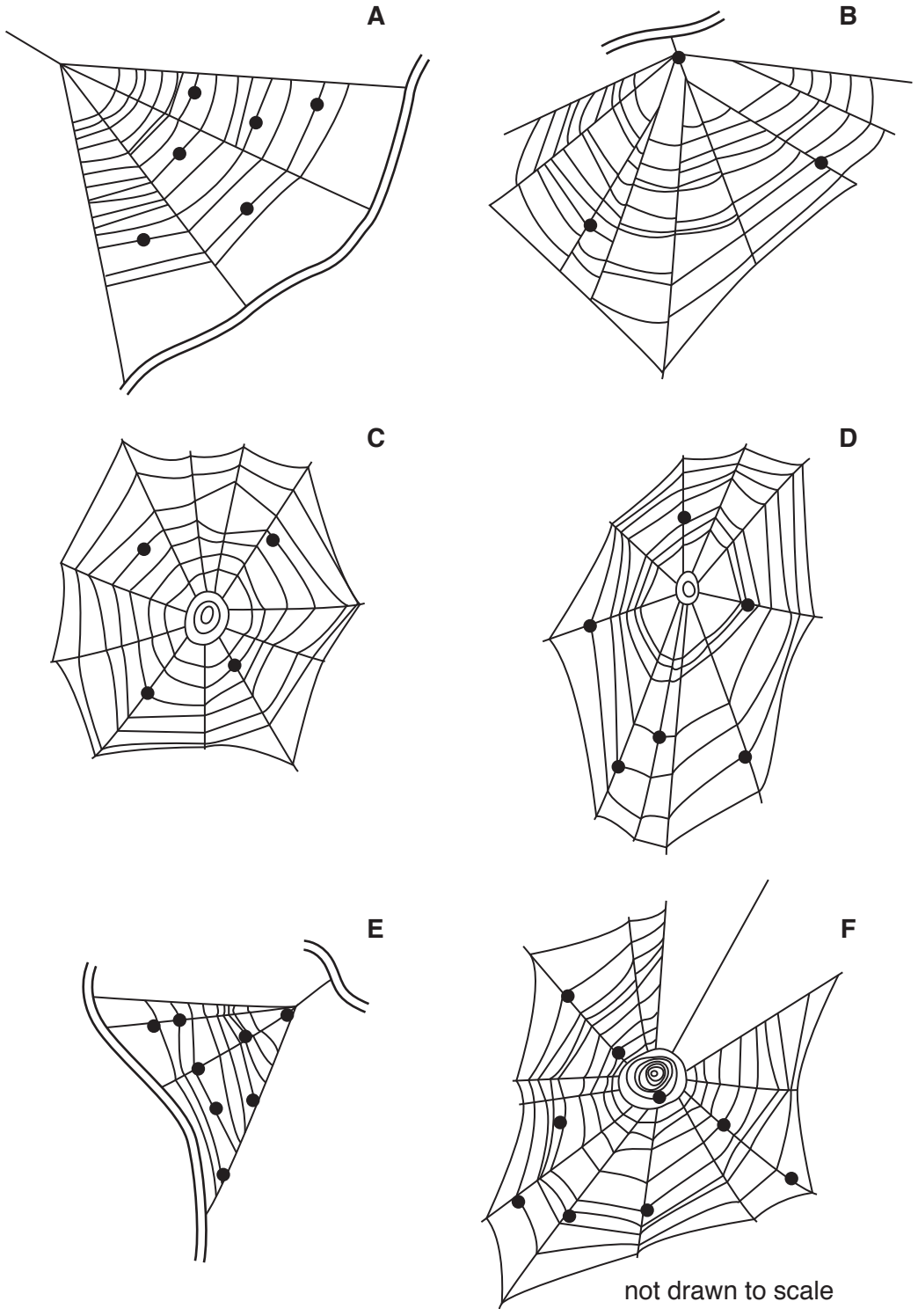

Fig. 2.1

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(a) (i) Use Fig. 2.1 to complete Table 2.1.

View solution

Table 2.1

spider web	number of insects caught in each web
A	
B	
C	
D	
E	
F	
total	

[2]

(ii) Calculate the average number of insects per web in the small section of garden, using the information in Fig. 2.1 and Table 2.1.

View solution

Space for working.

..... [1]

(iii) The student counted the total number of spider webs in the whole garden and found that there were a total of 102 spider webs.

Use this information and your answer to part **2(a)(ii)** to estimate the total number of insects caught in webs in the whole garden.

View solution

Space for working.

..... [1]

(iv) Suggest **one** reason why the estimated total number of insects caught in webs in the whole garden may not be accurate.

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..... [1]

View solution

(b) Fig. 2.2 is a photograph of a spider.

A spider's body has two main parts. The legs are all attached to the cephalothorax which is the upper part of the body and starts at label **X** on Fig. 2.2. The lower part of the body is called the abdomen and is nearest to label **Y** on Fig. 2.2.

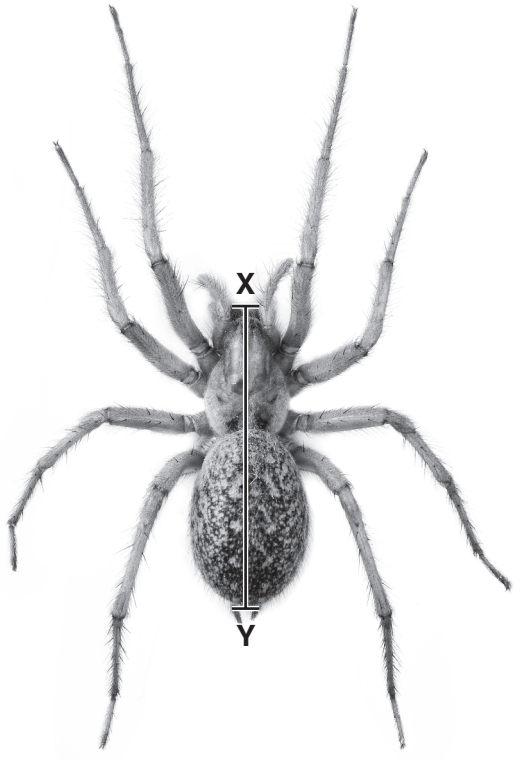

Fig. 2.2

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(i) Make a large drawing of the spider in Fig. 2.2 to show its outline, including its legs.

View solution

Label the abdomen.

[5]

(ii) Measure the length of the spider between points **X** and **Y** on Fig. 2.2. Include the units.

Length of line **XY** on the spider in Fig. 2.2 .....

Draw a line in the same position on your drawing and measure the length on your drawing.

Length of line **XY** on the spider in your drawing .....

Calculate the magnification of your drawing using your measurements and the following equation:

View solution

$$\text{magnification} = \frac{\text{length of line } \mathbf{XY} \text{ on your drawing}}{\text{length of line } \mathbf{XY} \text{ on Fig. 2.2}}$$

Space for working.

.....

[3]

(c) Table 2.2 contains some other data collected by the student from the garden ecosystem.

Table 2.2

type of organism	number found in the garden ecosystem
trees	2
bushes	5
other plants	37
herbivores	118
carnivores	14

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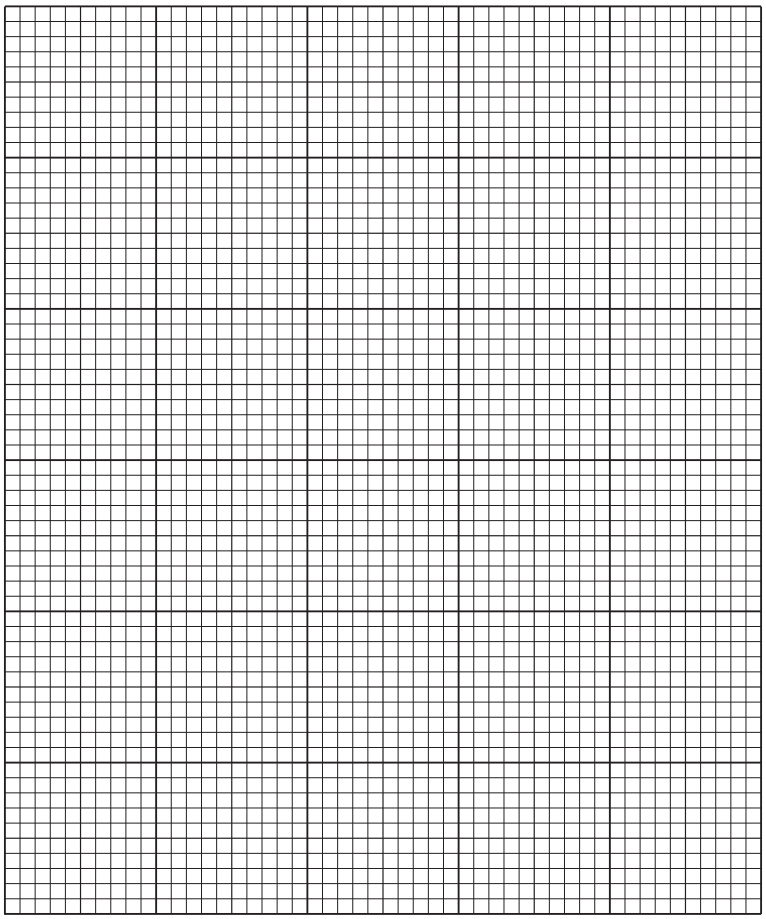
(i) Plot a bar chart of the data in Table 2.2.

View solution



[3]

(ii) Herbivores and carnivores are animals.

View solution

Use the data in Table 2.2 to calculate the ratio of animals to plants.

Show your working and give your answer in its simplest form.

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[2]

[Total: 18]

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