Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2017**

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.

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 **10** printed pages and **2** blank pages.

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CAMBRIDGE International Examinations

1 Vitamin C is an important component of many fruits and vegetables.

The vitamin C content of a vegetable juice extract can be determined by carrying out a 'titration'. This is done by adding drops of iodine solution to a vegetable juice extract until a blue-black colour appears. The more iodine solution that needs to be added, the more vitamin C there is in the vegetable juice extract.

A student set up the apparatus as shown in Fig. 1.1 to determine the vitamin C content of three different vegetable juice extracts; **P**, **Q** and **R**.

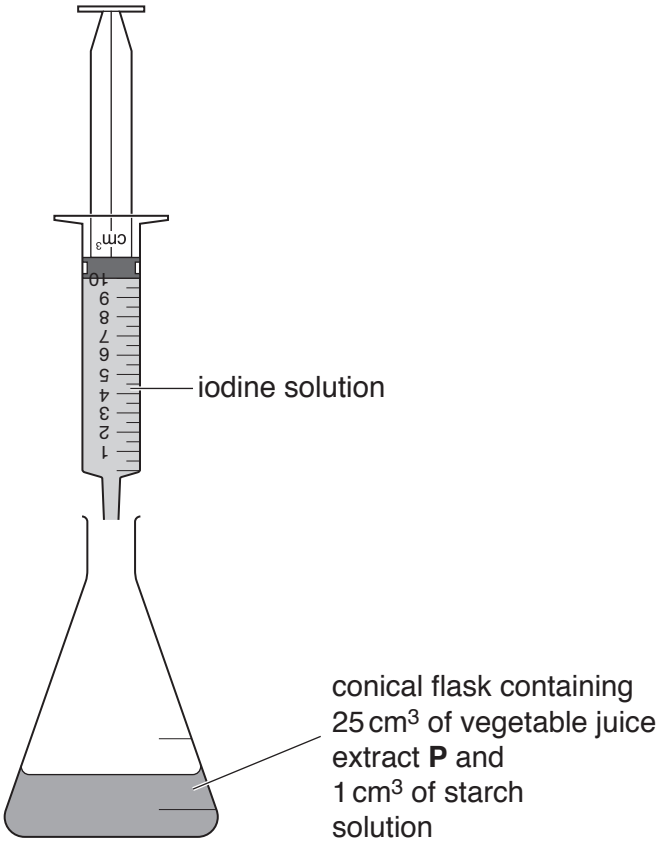


Fig. 1.1

Step 1 A conical flask was labelled **P**.

Step 2 25 cm^3 of vegetable juice extract **P** was added to conical flask **P**.

Step 3 1 cm^3 of starch solution was added to conical flask **P** and mixed well using a glass rod.

Step 4 A 10 cm^3 syringe was filled with iodine solution.

Step 5 One drop of the iodine solution was added to conical flask **P** and mixed for 5 seconds using the glass rod.

Step 6 Step 5 was repeated, adding one drop at a time, until the solution in conical flask **P** remained blue-black.

Step 7 Steps 1 to 6 were repeated for the other two vegetable juice extracts; **Q** and **R**.

Fig. 1.2 shows the volume of iodine solution that was left in each syringe at the end of the investigation. Each syringe contained 10 cm^3 of iodine solution at the start of the investigation.

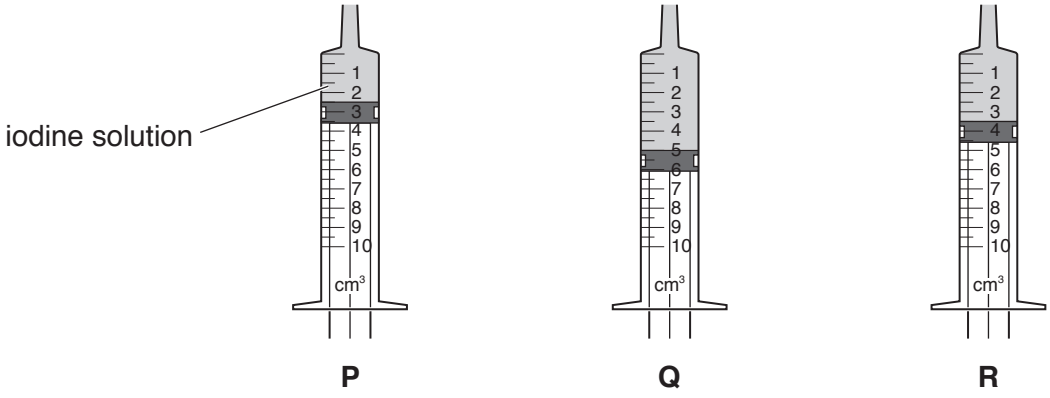


Fig. 1.2

(a) Use Fig. 1.2 to calculate the volume of iodine solution **used** in **P**, **Q** and **R**.

Prepare a table and record these results in your table.

[3]

(b) Explain why the starch solution was added to the vegetable juice extracts.

.....

.....

.....[1]

(c) State **two** variables that should be kept constant in this investigation.

1 .....

2 .....

[2]

(d) Identify **two** sources of error in this investigation and suggest a possible improvement for each error.

error .....

.....

improvement .....

.....

error .....

.....

improvement .....

.....
[4]

(e) A student was given a concentrated solution of vitamin C.

The solution contained 1000 mg of vitamin C in 100 cm^3 of distilled water.

The student made four dilute solutions of vitamin C, using the volumes of concentrated vitamin C solution and distilled water shown in Table 1.1.

Table 1.1

solution	volume of concentrated vitamin C solution added / cm^3	volume of distilled water added / cm^3	final volume / cm^3	vitamin C content in the final solution / mg
K	50.00	0.00	50.00	500.0
L	25.00		50.00	250.0
M	12.50	37.50	50.00	125.0
N	6.25	43.75	50.00	

(i) Calculate the volume of distilled water added to make solution **L** and the vitamin C content of solution **N**. Write your answers in Table 1.1. [3]

The student recorded the volume of iodine solution needed to change solutions **K**, **L**, **M** and **N** to a blue-black colour.

Fig. 1.3 shows their results.

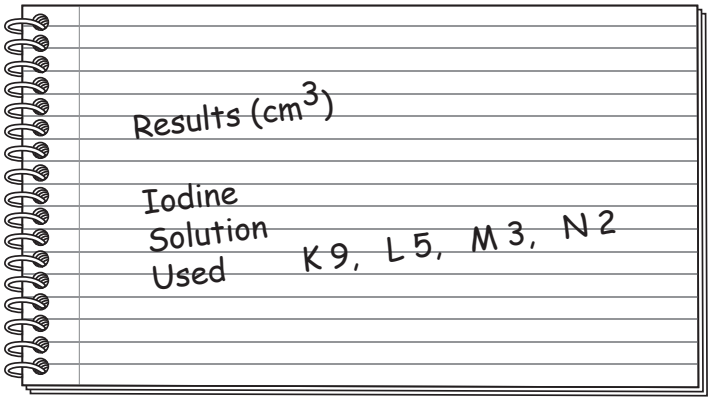
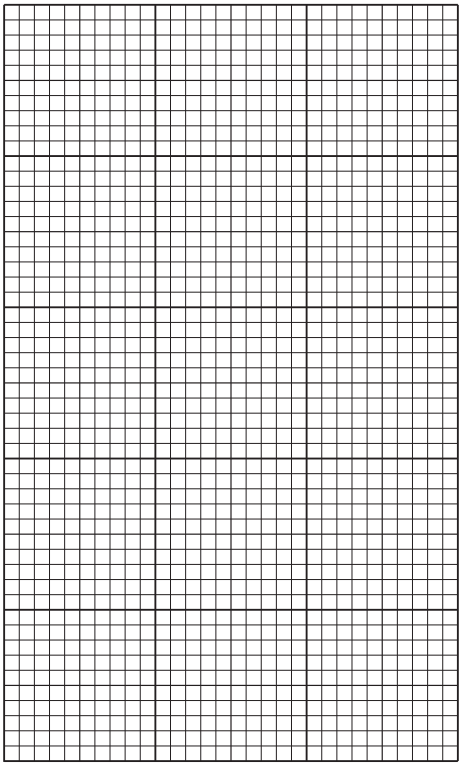


Fig. 1.3

(ii) Plot a graph on the grid of the vitamin C content of the final solutions shown in Table 1.1 against the volume of iodine solution used by the student shown in Fig. 1.3.

Add a line of best fit.



[4]

(iii) Students were given vegetable juice extract **T**. The extract needed 7 cm^3 of iodine solution to change it to a blue-black colour.

Use the graph to estimate the vitamin C content of vegetable juice extract **T**.

On the graph show how you estimated the vitamin C content.

vitamin C content of **T** ..... mg

[2]

(f) The vitamin C in vegetables breaks down when they are cooked at high temperatures.

Plan an investigation to determine the effect of temperature on the vitamin C content of vegetables.

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.....[6]

[Total: 25]

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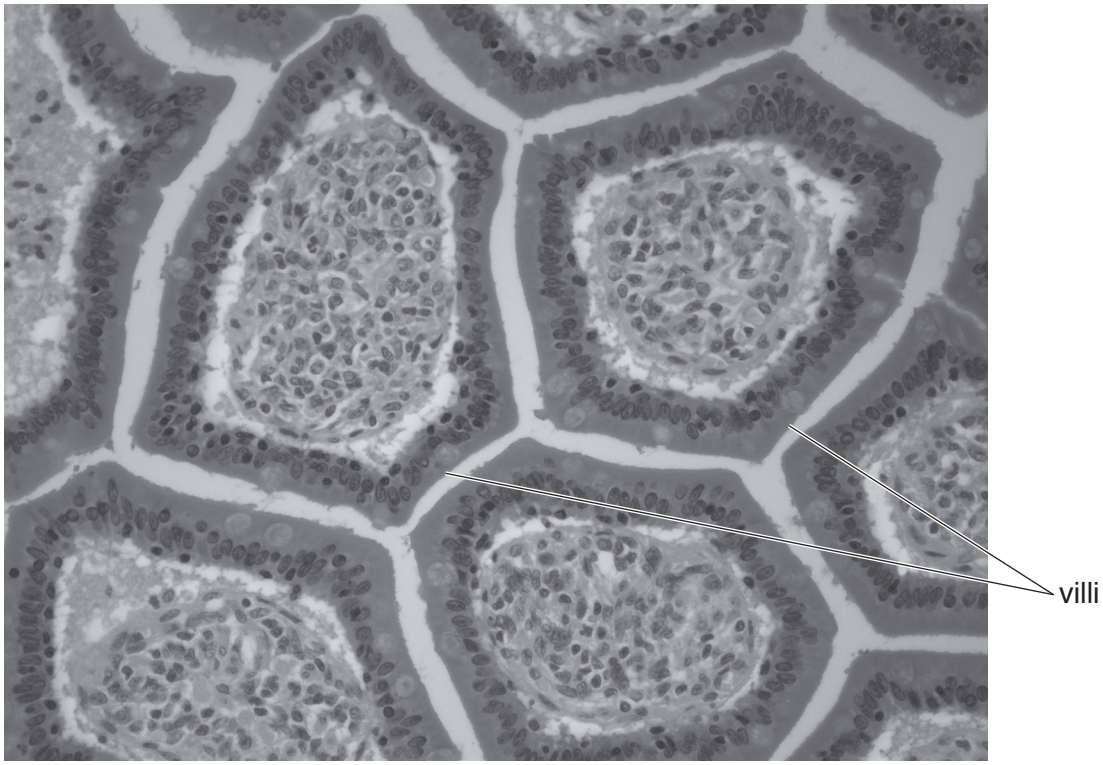
2 The small intestine is involved in the digestion and absorption of food.

Fig. 2.1 shows a photomicrograph of cross-sections of villi in the small intestine.



magnification ×130

Fig. 2.1

(a) Make a large drawing of the two labelled villi shown in Fig. 2.1.

Do not draw individual cells.

[4]

(b) Fig. 2.2 is a photomicrograph that shows a cross-section of part of the wall of the small intestine.

Fig. 2.2

(i) The actual length of **PQ** on Fig. 2.2 is 1.25 mm.

Measure the length of line **PQ** on Fig. 2.2. Include the unit.

length of **PQ** .....

Calculate the magnification of Fig. 2.2 using the equation:

$$\text{magnification} = \frac{\text{measured length of line } \mathbf{PQ}}{\text{actual length of line } \mathbf{PQ}}$$

Show your working.

.....
[3]

(ii) Describe **two** ways in which the photomicrograph in Fig. 2.2 is different from the photomicrograph in Fig. 2.1.

1 .....

.....

2 .....

.....
[2]

(c) Digestion of starch occurs in the small intestine.

A student investigated the effect of temperature on the digestion of starch by amylase.

The student set up three tubes at different temperatures, each containing starch, amylase and iodine solution. The student calculated the rate of reaction and recorded it in Table 2.1.

Table 2.1

		rate of reaction / arbitrary units			
tube	temperature / °C	trial 1	trial 2	trial 3	average
A	10	2	6	1	
B	20	8	9	10	
C	30	12	10	11	

(i) Calculate the average rate of reaction for each tube. Write your answers in Table 2.1.

Space for working.

[1]

(ii) Identify the optimum temperature for the digestion of starch in this experiment **and** give a reason for your choice.

optimum temperature .....

reason .....

.....

.....
[2]

(iii) The student decided that the result collected for tube **A** during trial 2 was anomalous.

Suggest a reason for their decision.

.....

.....

.....[1]

(iv) The independent variable is the variable that is changed in an investigation. The dependent variable is the variable that is measured in an investigation.

Identify the independent and dependent variables in this investigation.

independent variable .....

.....

dependent variable .....

.....
[2]

[Total: 15]

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