Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0123456789

COMBINED SCIENCE **0653/06**

Paper 6 Alternative to Practical **For Examination from 2019**

SPECIMEN PAPER

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 document consists of **13** printed pages and **1** blank page.

CAMBRIDGE International Examinations

[Turn over

1 **(a)** Fig. 1.1 shows a flower seen in longitudinal section.

Fig. 1.1

(i) In the box provided, make a large, clear pencil drawing of this flower.

[2]

(ii) On your drawing, label an anther and a filament. [1]

(iii) On your drawing, label a part that is male and a part that is female. [1]

(b) Fig. 1.2 shows the cut half of the flower from **(a)(i)** being cut again to produce a cross-section of the carpel.

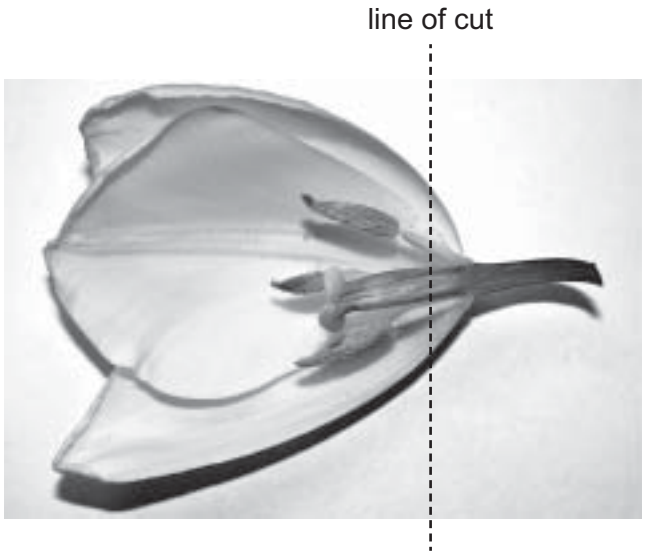


Fig. 1.2

Fig. 1.3 shows the cross-section of the carpel.

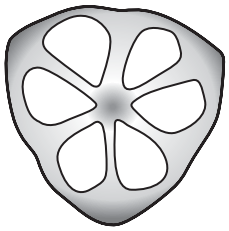


Fig. 1.3

(i) In the box provided, make a large, clear pencil drawing of the cross-section of the carpel.

[1]

(ii) Label any **two** features of the carpel on your diagram in **(b)(i)**. [2]

[Total: 7]

[Turn over

2 Amylase is a digestive enzyme that breaks down starch into reducing sugars.

(a) Name the reagent that is used to test for reducing sugars.

..... [1]

(b) A student stated:

"The activity of the enzyme amylase is greatest at 40 °C."

Describe an investigation using the reagent you have named in **(a)** to test whether this statement is correct.

In your answer, include:

- the apparatus needed, including a labelled diagram if you wish
- a brief description of the method, including how you will treat variables and any safety precautions
- the measurements you will make
- how you will process your results
- how you will use your results to draw a conclusion.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 7]

3 A student investigates how the concentration of a reactant affects the rate of a reaction.

In this reaction a potassium salt reacts with a reducing agent to produce iodine.

The student uses the following method.

- place 10 cm^3 of the potassium salt solution into a conical flask
- add 5 cm^3 of starch solution to the conical flask
- add 5 cm^3 of the reducing agent to the conical flask and start the stopwatch
- stop the timer when the mixture goes blue-black
- record in a table the time taken, to the nearest second, for the mixture to go blue-black
- repeat the experiment four more times varying the volumes of the potassium salt solution and water

The student's results are shown in Table 3.1.

Table 3.1

Volume of potassium salt solution / cm^3	volume of water / cm^3	time / s
10	0	10
8	2	13
6	4	
4	6	30
2	8	

(a) Read the stopwatches in Fig. 3.1 and record the times in Table 3.1.

6 cm^3 of potassium salt solution

2 cm^3 of potassium salt solution

Fig. 3.1 [2]

(b) (i) State why the starch is used in this experiment.

.....

..... [1]

(ii) State why different amounts of water are used in each experiment.

.....

..... [1]

(iii) Suggest a piece of apparatus suitable for measuring 5 cm^3 of starch solution.

..... [1]

(c) (i) State what the data in Table 3.1 tells you about how the time for the appearance of the blue-black colour depends upon the volume of potassium salt solution used.

.....

..... [1]

(ii) Use your answer to **(c)(i)** to state the relationship between the rate of the reaction and the concentration of potassium salt solution.

.....

..... [1]

(d) It is difficult to determine when the same amount of blue-black colour is produced in each of the five reactions. Describe a method the student could use to help them decide when to stop the stopwatch.

.....

.....

.....

..... [2]

(e) The student wishes to find out if the rate of this reaction depends on the concentration of the reducing agent.

Suggest how the student should modify the experiment to carry out this investigation.

.....

.....

..... [2]

(f) Another student carries out the same experiment at a higher temperature.

Predict the time for the appearance of the blue-black colour using 10 cm^3 of the potassium salt solution.

Explain your answer.

time ….....s

explanation .....

.....

[2]

[Total: 13]

Question 4 starts on page 10

4 A student finds the value of an unknown fixed mass, *M*, by balancing it against a range of known masses, *m*, on a metre rule.

The apparatus is set up as shown in Fig. 4.1.

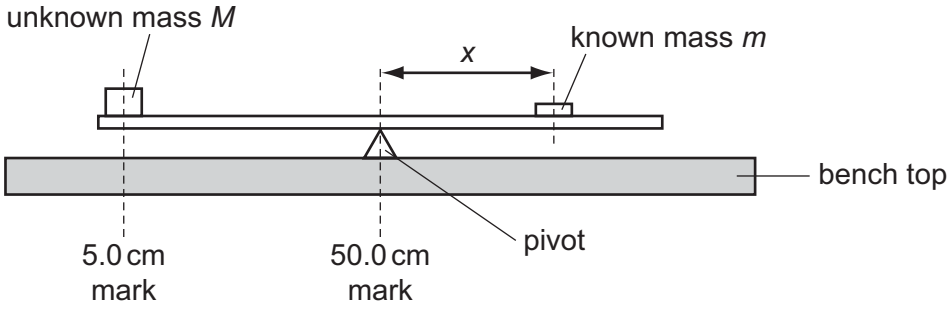


Fig. 4.1

The unknown mass *M* is fixed at the 5.0 cm position on the metre rule. The student places the pivot at the 50.0 cm mark.

He places a 60 g mass *m* on the metre rule and adjusts the position of the known mass *m*, until the metre rule is balanced.

He records the distance *x* in centimetres from the pivot to the known mass *m*.

He repeats the procedure for known masses *m* of 70 g, 80 g, 90 g and 100 g.

His results are shown in Table 4.1.

Table 4.1

mass *m* / g	position of mass *m* / cm	distance *x* / cm	$\frac{1}{x} \Big/ \frac{1}{\text{cm}}$
60	87.4	37.4	0.027
70	81.9	31.9	0.031
80			
90			
100	72.7	22.7	0.044

(a) Fig. 4.2 shows the positions of the 80 g and 90 g masses when the metre rule is balanced.

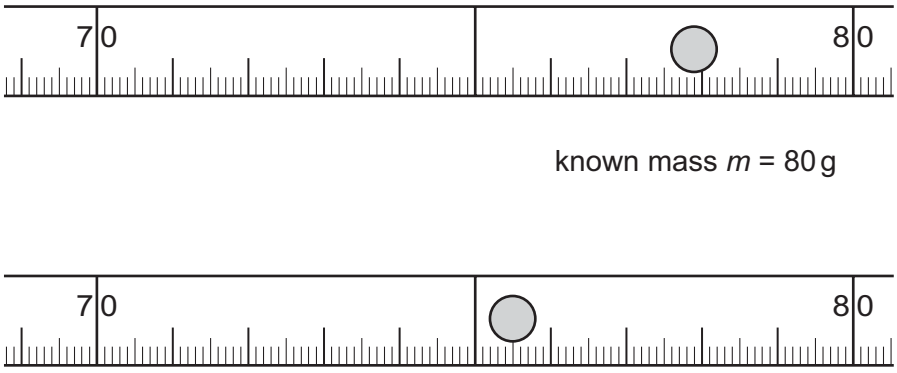


Fig. 4.2

(i) Read and record in Table 4.1 the positions of the 80 g and 90 g masses.

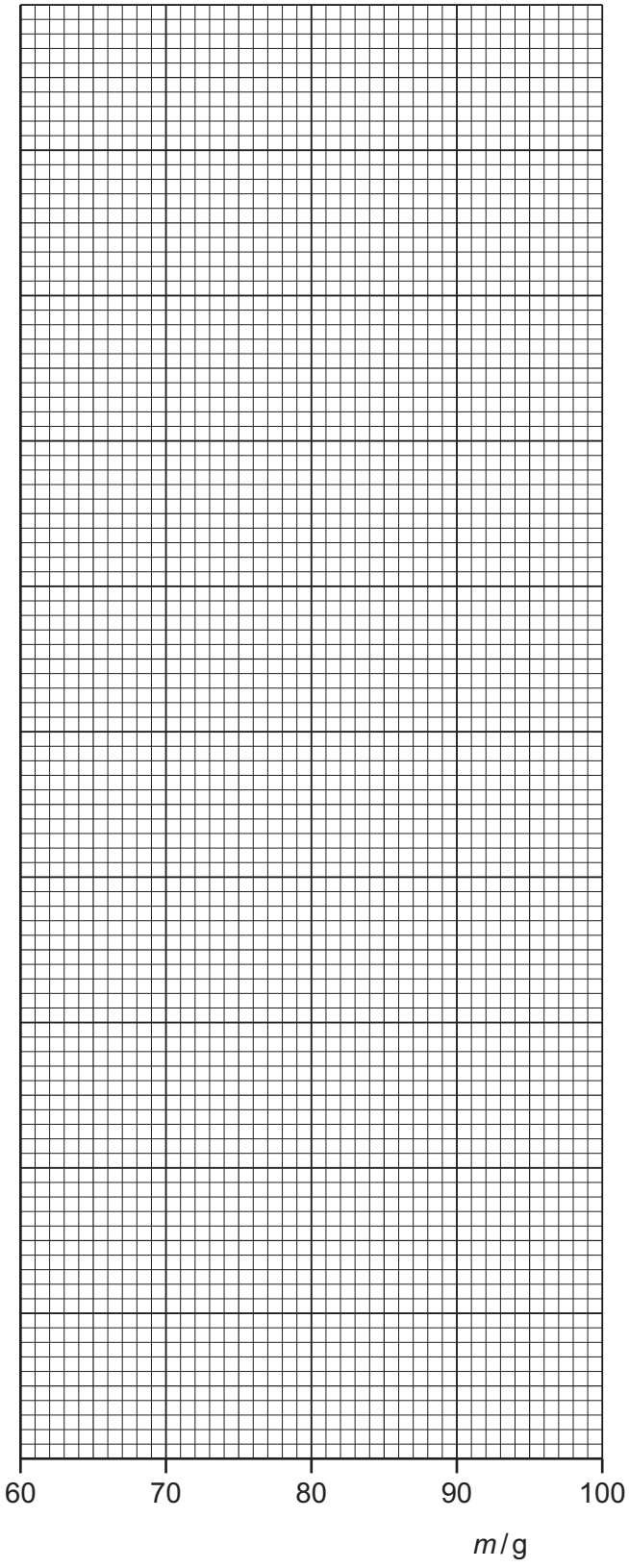
Measure to the centre of the mass. [1]

(ii) Use your readings in **(a)(i)** to find the distance x for the 80 g and 90 g masses to the nearest 0.1 cm. Record these values in Table 4.1. [1]

(iii) Calculate $\frac{1}{x}$ for the 80 g and 90 g masses.

Record your answers in Table 4.1. [1]

(b) (i) On the grid provided, plot the data points of $\frac{1}{x}$ against the known mass m. [2]



(ii) Draw the best-fit straight line. [1]

(iii) Identify the independent variable in this experiment.

..... [1]

(iv) Calculate the gradient of your line.

Show all working and indicate on your graph the values you choose to calculate the gradient.

gradient of line = ... [2]

(c) Calculate the unknown mass *M* using the equation shown.

$$M = \frac{1}{(\text{gradient} \times 45)}$$

Give your answer to two significant figures.

M = ... g [1]

(d) This method of finding the mass of unknown masses is **not** suitable for very large masses.

Suggest why using a very large mass is a hazard.

.....

..... [1]

(e) Consider the experimental procedure used for determining the unknown mass *M*.

(i) Identify **one** limitation in the procedure which could lead to inaccuracies in determining the value obtained for the unknown mass *M*.

.....

..... [1]

(ii) Suggest how the procedure could be improved to reduce the inaccuracy identified in **(e)(i)**.

.....

..... [1]

[Total: 13]

BLANK PAGE