Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

0123456789

COMBINED SCIENCE **0653/05**

Paper 5 Practical Test **For Examination from 2019**

SPECIMEN PAPER

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

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.
Practical notes are provided on page 13.

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.

For Examiner's Use	
Total	

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

CAMBRIDGE International Examinations

1 **(a)** You are going to investigate the internal parts of a flower. Dish **A** contains two flowers of the same species.

(i)
- Take one of the flowers from dish **A**, and place it on the white tile.
- Cut the flower lengthways. The best way to do this is by starting at the flower stalk and then cutting upwards through the middle of the flower, as shown in Fig. 1.1.

  Be careful with the cutting blade, it is very sharp. Make sure you cut away from your fingers.

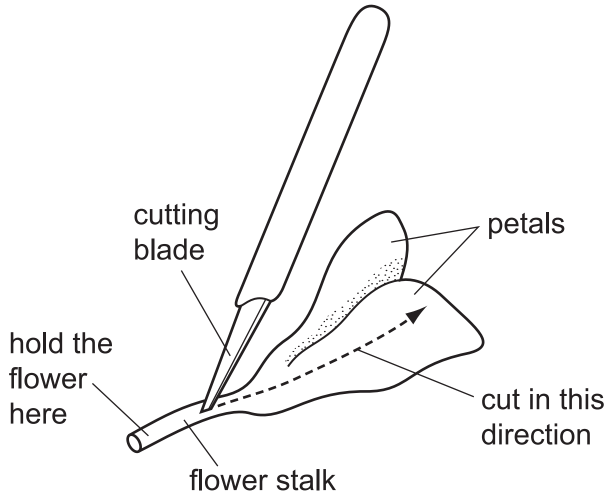

Fig. 1.1

- Look at the two halves of the flower, and choose the one that shows the internal flower parts most clearly.

In the box provided, make a large, clear pencil drawing of this half of the flower, showing the internal flower parts.

[2]

(ii) On your drawing, label a stamen and the carpel. [1]

(iii) Next to each of the labels in **(a)(ii)** state whether each part is male or female. [1]

(b)
- Take the second flower from dish **A** and place it on the white tile.
- Cut the flower horizontally so that your cut follows the path and position as shown in Fig. 1.2. Be careful with the cutting blade, it is very sharp.

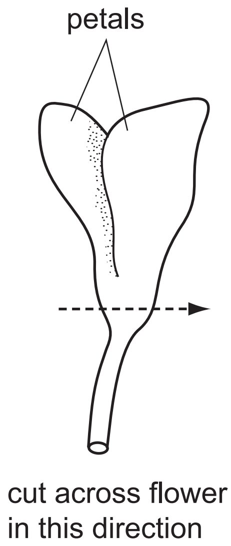

Fig.1.2

In the box provided, make a large, clear pencil drawing of the carpel section which shows the features of the carpel most clearly.

Label any **two** features of the carpel that are visible in your drawing.

[3]

[Total: 7]

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.

You are not required to carry out this investigation.

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.

....

....

....

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....

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....

....

....

....

.... [6]

[Total: 7]

3 You are going to investigate 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.

Solution **A** is a potassium salt solution.

Solution **B** contains the reducing agent.

(a) **(i)**

- Use the measuring cylinder labelled **A** to place 10 cm^3 of solution **A** into a conical flask.
- Using the test-tube with the 5 cm^3 mark, add 5 cm^3 of starch solution to the conical flask.
- Use the measuring cylinder labelled **B** to measure 5 cm^3 of solution **B**.
- Start the stopwatch as you add this 5 cm^3 of solution **B** to the conical flask.
- Stop the stopwatch when the mixture goes blue-black.

Record in Table 3.1 the time taken to the nearest second for the mixture to go blue-black.
[1]

Table 3.1

volume of solution **A** / cm^3	volume of water / cm^3	time / s
10	0	
8	2	
6	4	
4	6	

(ii)

- Wash out the conical flask with water.
- Use the measuring cylinder labelled **A** to place 8 cm^3 of solution **A** into the conical flask.
- Also using the measuring cylinder labelled **A**, add 2 cm^3 of water to the conical flask.
- Add 5 cm^3 of starch solution to the conical flask using the test tube with the 5 cm^3 mark.
- Use the measuring cylinder labelled **B** to measure 5 cm^3 of solution **B**.
- Start the stopwatch as you add 5 cm^3 of solution **B** to the conical flask.
- Stop the stopwatch when the mixture goes blue-black.

Record in Table 3.1 the time taken to the nearest second for the mixture to go blue-black.
[1]

(iii) Repeat **(a)(ii)**, changing the volumes of solution **A** and of water as shown in Table 3.1. [3]

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

....

.... [1]

(ii) State why different volumes of water are used in this experiment.

....

.... [1]

(iii) Suggest an alternative piece of apparatus for measuring the volumes of water.

....

.... [1]

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

....

.... [1]

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

....

.... [1]

(d) It is difficult to determine when the same amount of blue-black colour is produced in each of the four reactions. Suggest **one** improvement you could make to help you decide when to stop the stopwatch.

....

.... [1]

(e) A student wanted to find out if the rate of this reaction depends on the concentration of the reducing agent in solution **B**.

Suggest how the student should modify the experiment that you have carried out to investigate this.

....

....

....

.... [2]

[Total: 13]

Question 4 starts on page 10

4 You are going to find the value of an unknown fixed mass M by balancing this mass against a range of known masses on a metre rule.

The apparatus is on the bench. The unknown mass, M, has been secured to the metre rule. Its position is fixed with its centre over the 5.0 cm mark. Do **not** attempt to move this mass during the experiment.

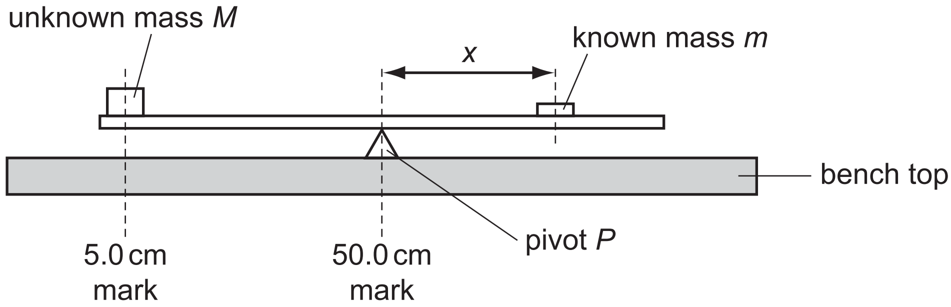


Fig. 4.1

(a) (i)
- Set up the apparatus as shown in Fig. 4.1 using a known mass m of 60 g.
- With the pivot directly under the 50.0 cm mark, adjust the position of the known mass m until the metre rule is balanced.
- Measure the distance x from the centre of the known mass m to the 50.0 cm mark on the metre rule.

Record in Table 4.1 this distance to the nearest 0.1 cm. [1]

Table 4.1

mass m / g	distance x / cm	$\frac{1}{x} \Big/ \frac{1}{\text{cm}}$
60		
70		
80		
90		
100		

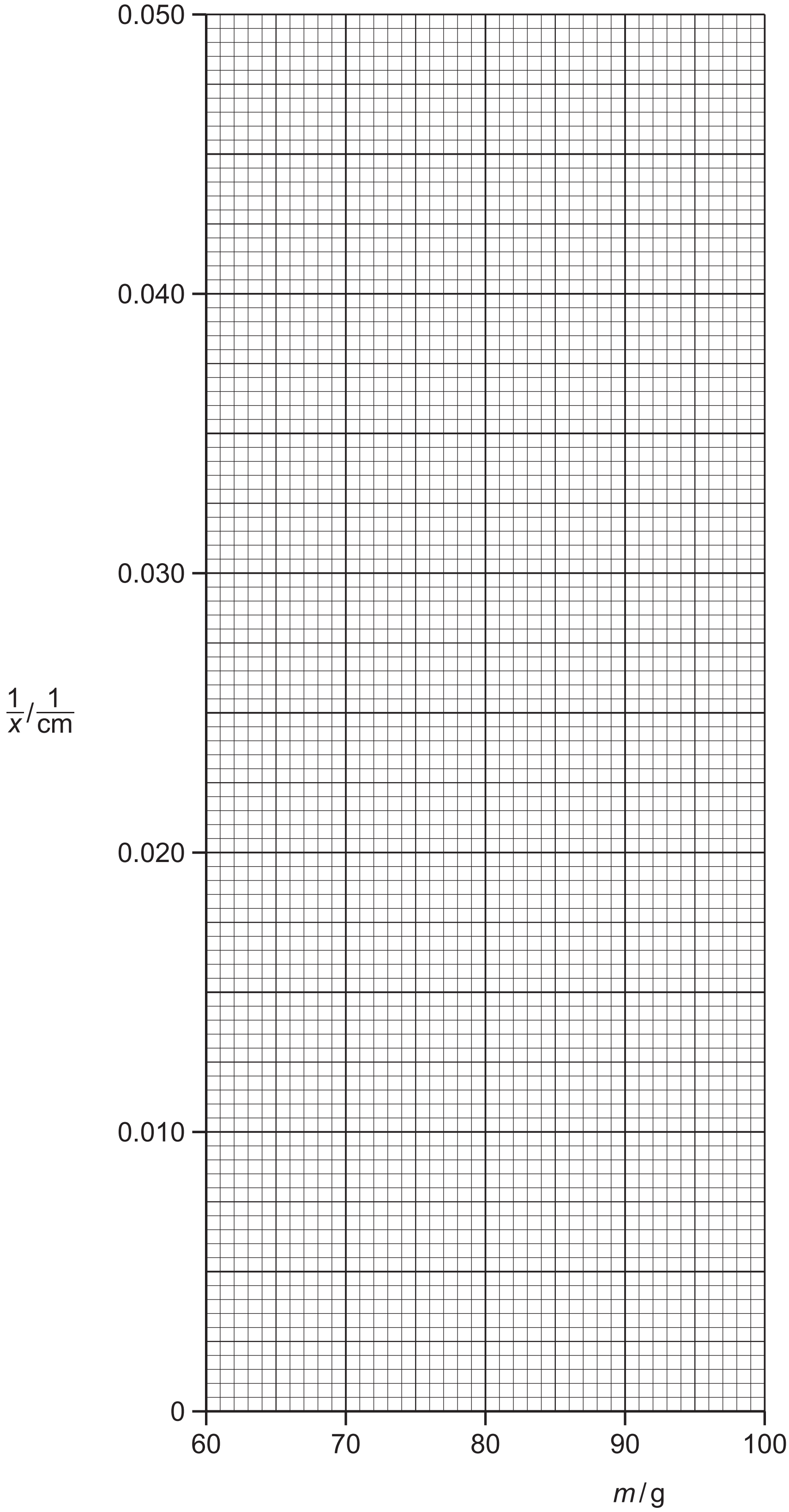
(ii) Repeat **(a)(i)** four more times, using known masses m of 70 g, 80 g, 90 g and 100 g.

Each time, record in Table 4.1, distance x to the nearest 0.1 cm. [2]

(iii) For each value of x in the table, calculate the value of $\frac{1}{x}$.

Record in Table 4.1 these values to two significant figures. [2]

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



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

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

....

.... [1]

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

....

.... [1]

[Total: 13]

NOTES FOR USE IN QUALITATIVE ANALYSIS

Test for anions

anion	test	test result
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify, then add aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	effect of aqueous sodium hydroxide	effect of aqueous ammonia
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
copper (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Test for gases

gas	test and test results
ammonia (NH_3)	turns damp, red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	'pops' with a lighted splint
oxygen (O_2)	relights a glowing splint

Flame tests for metal ions

metal ion	flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac
copper(II) (Cu^{2+})	blue-green

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