Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE   **0653/06**

CO-ORDINATED SCIENCES   **0654/06**

Paper 6 Alternative to Practical

May/June 2005

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 in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **14** printed pages and **2** blank pages.

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International Examinations

[Turn over

1 A student was studying the parts of an insect-pollinated flower. He put the flower on its side. The flower is shown in Fig. 1.1.

Fig. 1.1

(a) (i) On Fig. 1.1 label a sepal.
What is the function of the sepals?

....

.... [2]

(b) He then carefully removed the sepals, petals and stamens. He laid out a petal and two stamens, as shown in Fig. 1.2.
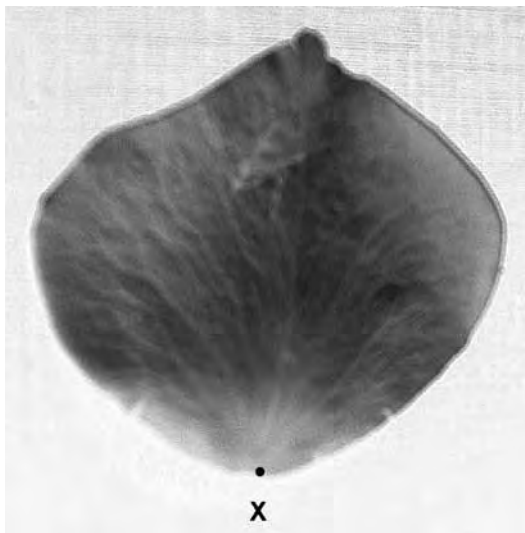

Fig. 1.2

(i) Draw the petal and one stamen in the space below.

petal   stamen

(ii) Label the anther and filament on your drawing. [4]

(iii) The length of the petal is the maximum distance across it from the point **X**.

Measure the length of the petal on your drawing .... mm

Now measure the length of this petal on Fig. 1.2 .... mm

Use the two lengths you have measured to calculate the magnification of your
drawing.

....

....

....

.... [4]

2 A teacher has the following objects that are all the same size.

a magnet   **a soft iron block**   **an aluminium block**

He paints them all black so that a student cannot see which is which, and labels them **A**, **B** and **C**.

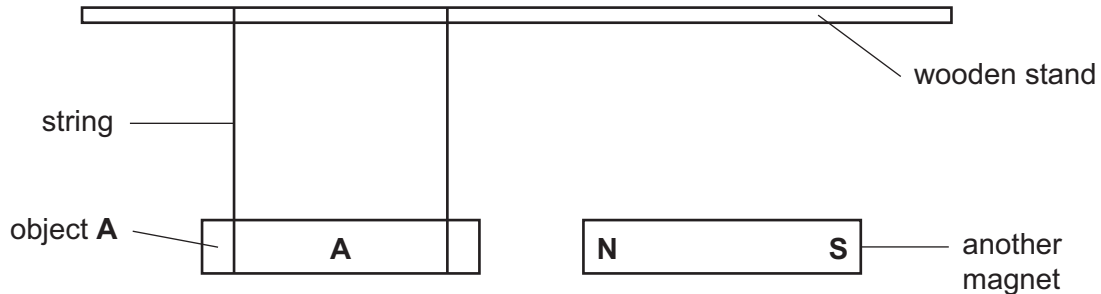He gives them to the student for the experiment shown in Fig. 2.1.

Fig. 2.1

The student hangs object **A** from a wooden stand using two pieces of string.

- He holds a magnet so that its north pole is facing **A** and notes the effect in Fig. 2.2.

- He reverses the magnet so that the south pole is facing **A**. He notes the effect in Fig. 2.2.

- He repeats the experiment using objects **B** and **C**, each time noting the results in Fig. 2.2.

(a) The student has written two of his results in Fig. 2.2.
Complete the table to show the results you expect the student to obtain.
In the last column, identify **A, B** and **C**. Remember that one is a magnet, one is soft iron and one is aluminium.

object	north pole facing	south pole facing	name of the object
A	repelled		
B			
C	no effect		

[4]

Fig. 2.2

(b) The teacher gives the student two more magnets, **D** and **E**.
One of these two magnets is stronger than the other one.
Explain how, using the apparatus shown in Fig 2.1 and another magnet, the student can find out which of the two magnets **D** and **E** is the stronger.

....

....

....

....

.... [4]

(c) The student investigates the magnetic field around a magnet. He uses a magnetic compass to do this. The needle of the magnetic compass is a small magnet, shown in Fig. 2.3.

magnetic compass   needle

Fig. 2.3

Complete Fig. 2.4 by drawing the needle when the magnetic compass is placed at the two points shown in the diagram.
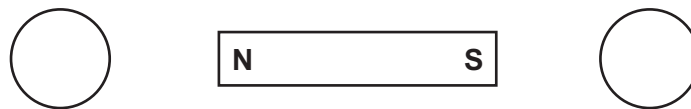
| N   S |

[2]

Fig. 2.4

3 A student did an experiment to find the effects of heating three different solids in air. Fig. 3.1 shows the page of his notebook in which he wrote the results, which are all mixed up.
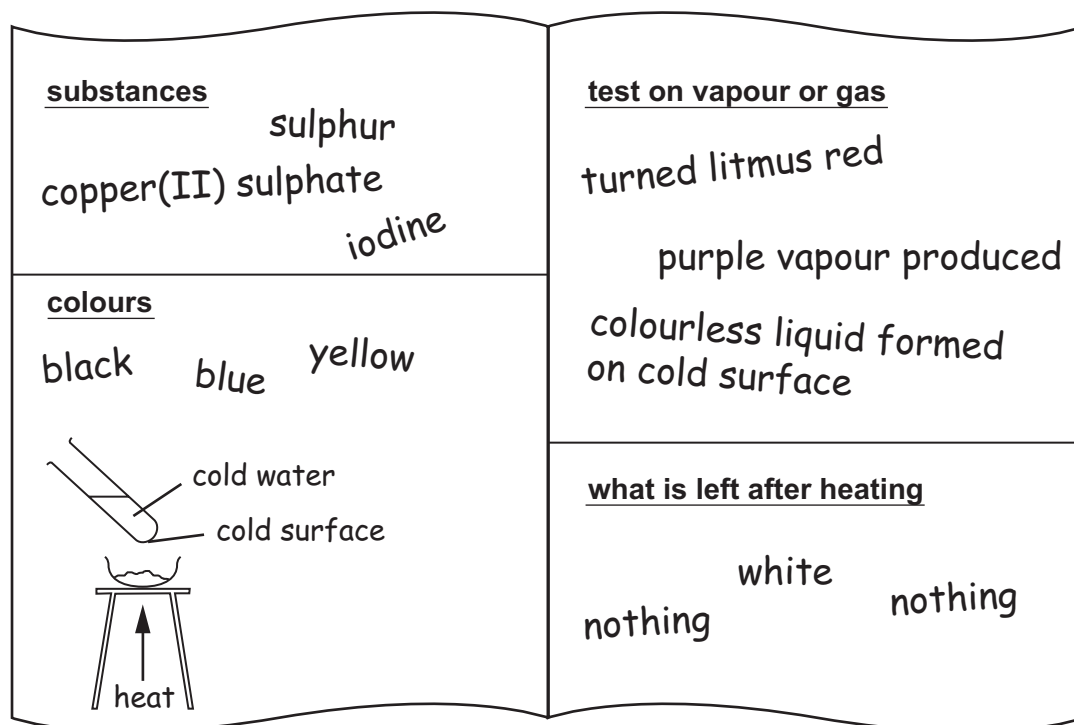

Fig. 3.1

(a) Organise the results from the student's notebook to complete Fig. 3.2.

name of solid	colour of solid	test on gas or vapour	what is left after heating

[6]

Fig. 3.2

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(b) Name the gas or vapour given off that condensed to a colourless liquid.

.... [1]

(c) Two of the changes that occurred when the solids were heated are reversible.

   (i) Name **one** of the solids that can be obtained chemically unchanged after heating.

   .... [1]

   (ii) Explain what you would do to obtain the solid you have named in **(i)** chemically unchanged, after it had been heated.

   ....

   .... [1]

(d) Suggest a safety precaution that should be taken during the heating experiment, giving a reason for your precaution.

precaution ....

reason .... [1]

 [Turn over

4 A student did an experiment to find how the intensity (strength) of light affected the rate of photosynthesis. She used a plant called *Elodea* that lives in water. This plant takes carbon dioxide from the water and uses it for photosynthesis. It then produces oxygen as a waste product which appears as bubbles coming out of the plant. She counted the number of bubbles produced in a minute.
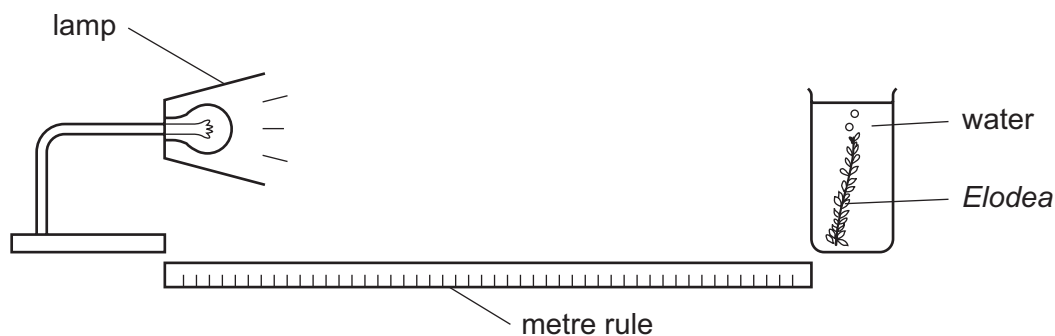
The apparatus she used is shown in Fig. 4.1.

Fig. 4.1

At the start of the experiment the lamp is placed close to the plant for a high light intensity which reduces as the lamp is moved further away.

The student took readings at certain distances of the lamp from the plant. At each distance she counted the number of bubbles produced by the *Elodea* for one minute, recorded it, then repeated the reading. The results are shown in Fig. 4.2.

| distance of lamp from plant/cm	first reading/ number of bubbles per minute	second reading/ number of bubbles per minute	average number of bubbles per minute
10	70	74	
20	35	33	
30	20	18	
40	13	9	11
50	8	8	8

Fig. 4.2

(a) (i) Complete the table, Fig. 4.2, with the missing average values. [3]

(ii) Draw a graph of the average number of bubbles per minute, against the distance
from the lamp. [3]

average number of
bubbles per minute
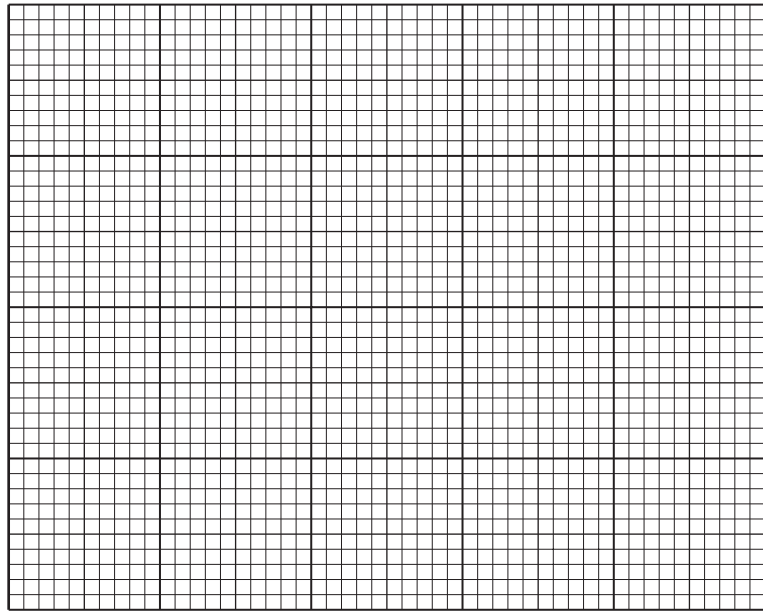
distance / cm

(iii) Use your graph to draw conclusions about the effect of light intensity on the rate of
photosynthesis.

....

....

.... [2]

(b) Suggest two reasons why the first and second readings at each distance may be
different.

reason 1 ....

....

reason 2 ....

.... [2]

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5 A student investigated the relationship between the deflection of a wooden ruler and the mass placed on it.

He clamped a wooden metre rule to the bench so that 700 mm of it extended beyond the edge of the bench. See Fig. 5.1
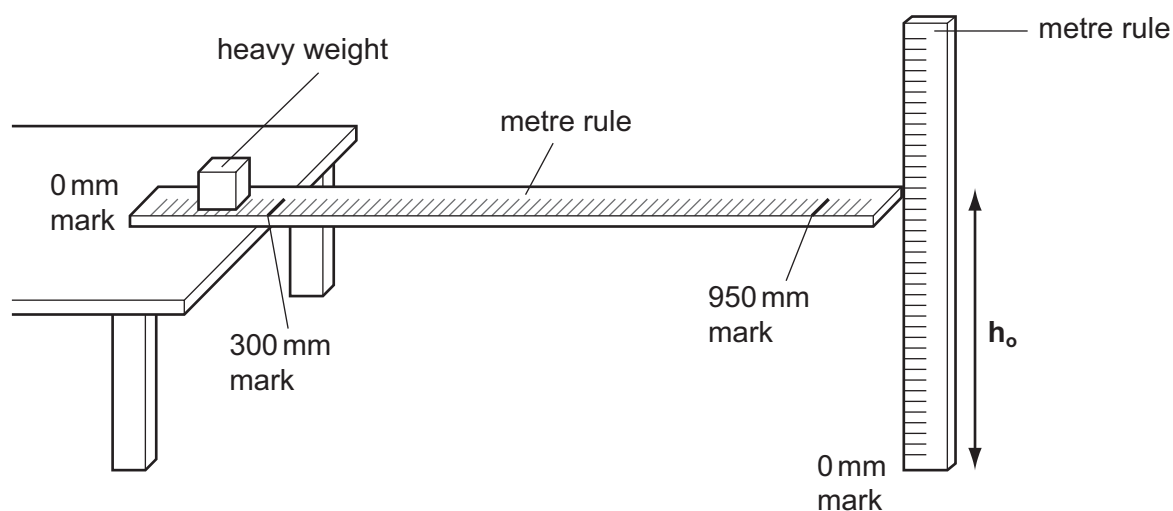

Fig. 5.1

He measured the distance, h_o, of the end of the ruler from the floor and recorded it in Fig.5.2.

The student was given a large mass of plasticine. He divided the plasticine into five pieces roughly equal in size.

- He weighed a piece of plasticine to the nearest gram and recorded its mass, m_1, in Fig. 5.2.

- He placed the plasticine on the 950 mm mark of the ruler. He measured and recorded the new distance from the floor, h_1.

- He added another piece of plasticine to the first one and found the combined mass of the two pieces. He recorded this mass, m_2, in Fig. 5.2.

- He placed the mass, m_2, on the 950 mm mark of the ruler. He found the distance from the floor, h_2, and recorded it in Fig. 5.2.

- The student repeated this procedure to give three more sets of readings.

mass of plasticine/g	distance from the floor/mm	deflection/mm
0	$h_0 =$ 630	0
$m_1 =$ 85	$h_1 =$ 614	16
$m_2 =$ 180	$h_2 =$ 597	33
$m_3 =$	$h_3 =$	
$m_4 =$	$h_4 =$	
$m_5 =$ 450	$h_5 =$ 548	82

Fig. 5.2

(a) (i) Fig. 5.3 shows the mass of plasticine **m** and the distance from the floor **h** for the two sets of readings missing from Fig. 5.2. Read the balance windows to find m_3 and m_4. Read the rulers to find h_3 and h_4. Record these readings in Fig. 5.2.   [3]
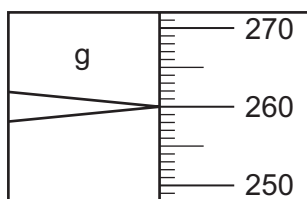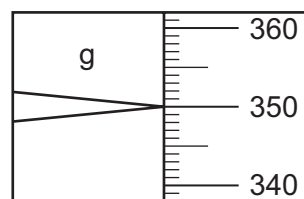
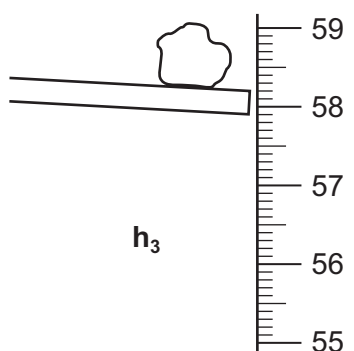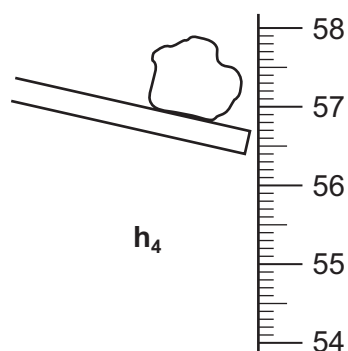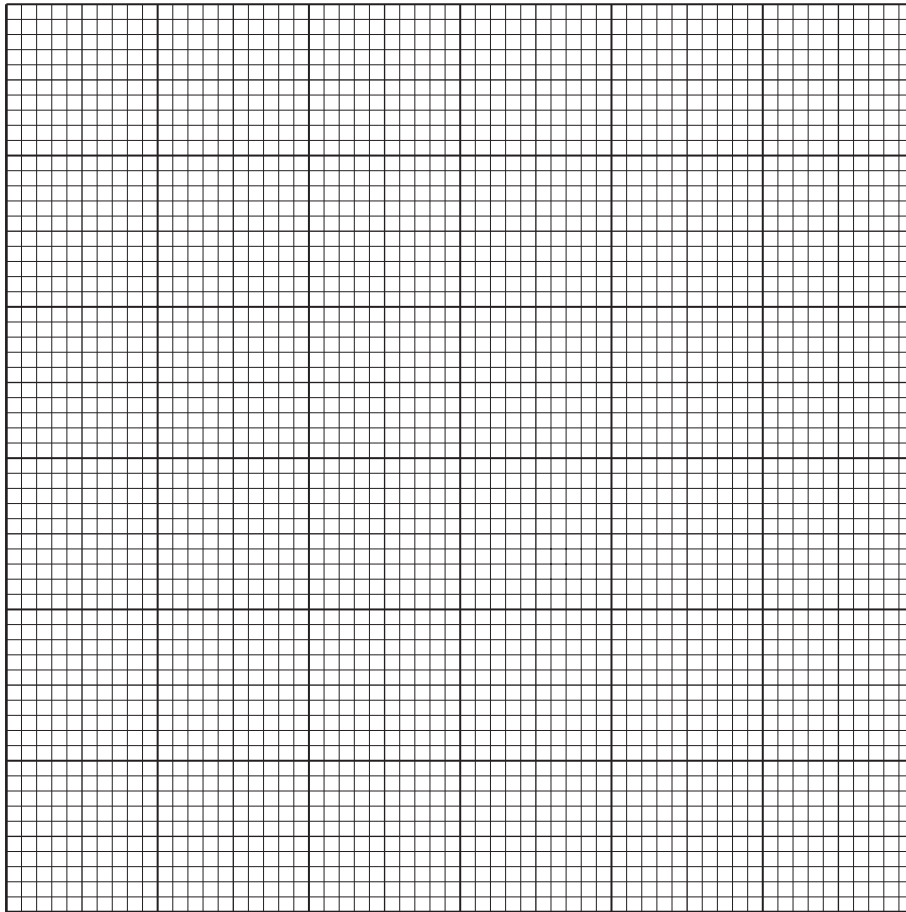In the diagrams below, read the scale level with the **top edge** of the metre rule.

Fig. 5.3

(ii) Calculate the deflection of the ruler for the masses m_3 and m_4.
Record these deflections in Fig. 5.2.   [1]

(b) On the grid provided, plot a graph of deflection (vertical axis) against mass of plasticine. Draw the best straight line through the points. [3]

(c) (i) Use your graph to find the mass of plasticine required to give a deflection of 100 mm.

.... [1]

(ii) What is the relationship between the mass added and the deflection?

.... [1]

(d) If the masses had been placed at the 750 mm mark of the metre rule instead of the 950 mm mark, what effect would this have on the measurements of deflection?

.... [1]

[Turn over

6 The teacher shows the class an experiment to measure the temperature rise when four different metals, **A**, **B**, **C**, and **D** are reacted separately with dilute hydrochloric acid.
For each metal similar amounts and particle sizes are used.

- Using a measuring cylinder he places $5\,cm^3$ of dilute hydrochloric acid in a test-tube. He measures the temperature of the acid and records it in Fig. 6.1.

- He adds metal **A** to the acid and stirs the mixture. The students notice that bubbles of gas are given off, so this observation is noted.

- He records in Fig. 6.1 the maximum temperature reached by the mixture.

- The teacher repeats the experiment using metals **B**, **C** and **D**, recording the temperatures and noting the observations in Fig. 6.1.

- He tests the gas given off by metal **C**, using a lighted splint, and notes the result.

metal	temperature of acid/^{o}C			observations
	initial	maximum	temperature rise	
A	21.0	24.5		bubbles are given off slowly
B				bubbles are given off more rapidly and metal dissolves
C				bubbles are given off very rapidly and metal dissolves. gas pops! with lighted splint
D	20.0	20.0	0	no bubbles given off

Fig.6.1

(a) (i) Fig.6.2 shows the thermometer scale for the initial and maximum temperatures of the acid using metals **B** and **C**.
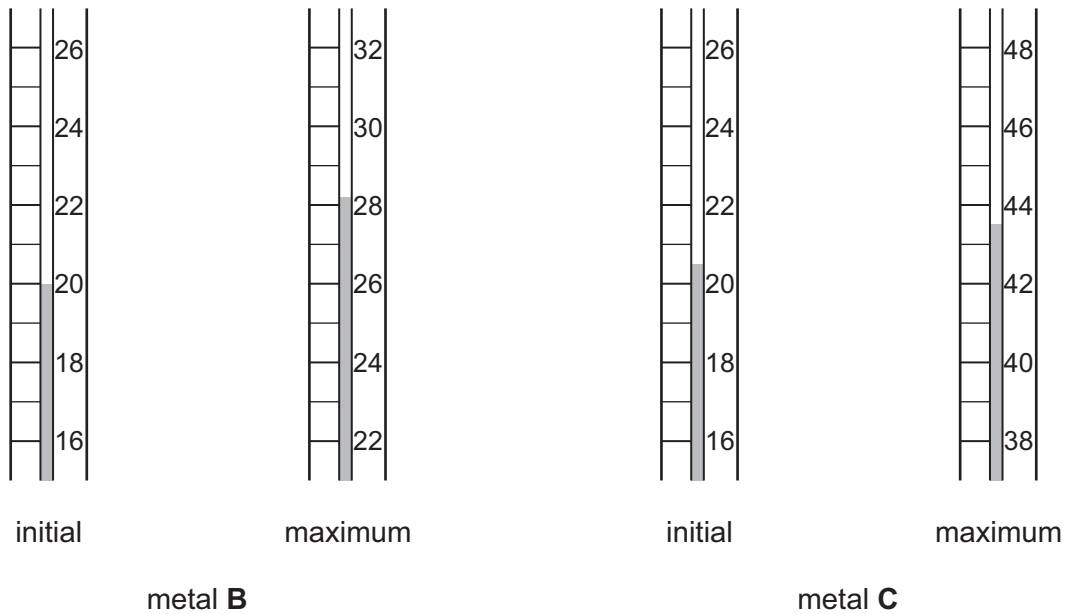Read the thermometers and record the temperatures in Fig. 6.1   [4]

initial   maximum   initial   maximum

metal **B**   metal **C**

Fig. 6.2

(ii) Complete Fig. 6.1 by calculating the temperature rise for each of the metals **A**, **B** and **C.**   [1]

(b) (i) Name the gas given off in the experiment with metal **C**.

....   [1]

(ii) Which metal is most reactive with hydrochloric acid?
Give two reasons why you chose this metal.

metal   ....

reason 1 ....

....

reason 2 ....

....   [2]

(c) Another metal **E** does not react with acids. Given some aqueous copper(II) sulphate and a sample of powdered metal **E**, describe how you would show that metal **E** is more reactive than copper.

....

....

....

....   [2]

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