UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER	☐☐☐☐☐	CANDIDATE NUMBER	☐☐☐☐

TWENTY FIRST CENTURY SCIENCE　　　　　　　　　　　**0608/05**

Paper 5　　　　　　　　　　　　　　　　　　　**October/November 2012**

　　　　　　　　　　　　　　　　　　　　　　　　1 hour 30 minutes

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.
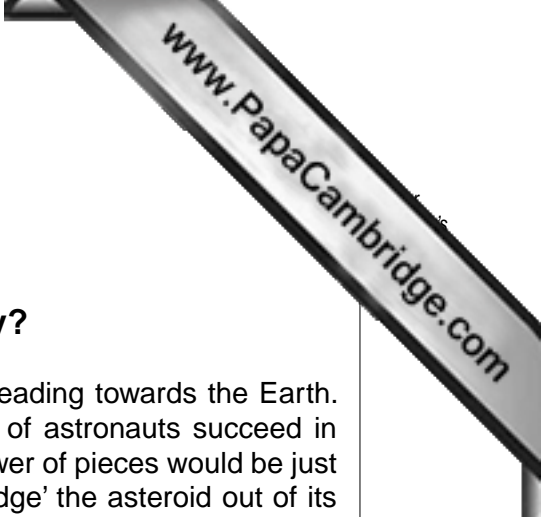
Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
Total	

This document consists of **15** printed pages and **1** blank page.

UNIVERSITY *of* **CAMBRIDGE**
International Examinations

[Turn over

Section A

1

Asteroids – threat or opportunity?

Disaster movies such as *Armageddon* feature a huge asteroid heading towards the Earth. If it hit the Earth, it could destroy all life. In the movies, a team of astronauts succeed in blowing the asteroid to pieces, saving the world. In reality, the shower of pieces would be just as dangerous. It may be possible, however, to use rockets to 'nudge' the asteroid out of its orbit and make it miss the Earth. There are astronomers watching out for asteroids which are heading towards the Earth, but they do need to spot them in plenty of time.

Asteroids could be useful. They are mostly made of heavy metals such as iron, gold, nickel, titanium and platinum. On Earth, these materials are nearly all found in the Earth's core. The tiny amounts in the Earth's crust probably came from asteroids which landed on Earth in the past. In the future, it may be possible to extract these valuable materials from asteroids and send them back to Earth.

Another possibility is to use asteroids to provide materials for building spacecraft in space. This removes the need to send these materials from Earth. Many asteroids are thought to be old comets. It is likely that water will be one of the materials in these asteroids. This could mean that space travellers in the future will be able to extract both building materials and drinking water from asteroids.

**(a)** Asteroids, comets, moons and planets are all part of the solar system.

  (i) Which of these types of object is the largest?

  ....[1]

  (ii) Which one of these types of object orbits around an object **other than** the Sun?

  ....[1]

(b) When a large asteroid collides with the Earth, it causes major destruction.

  (i) Name one group of animals thought to have died out after an asteroid collision.

  ....[1]

  (ii) Explain how a large asteroid crashing in **one part** of the Earth could affect life throughout the **whole planet**.

  ....

  ....

  ....

  ....

  ....

  ....[3]
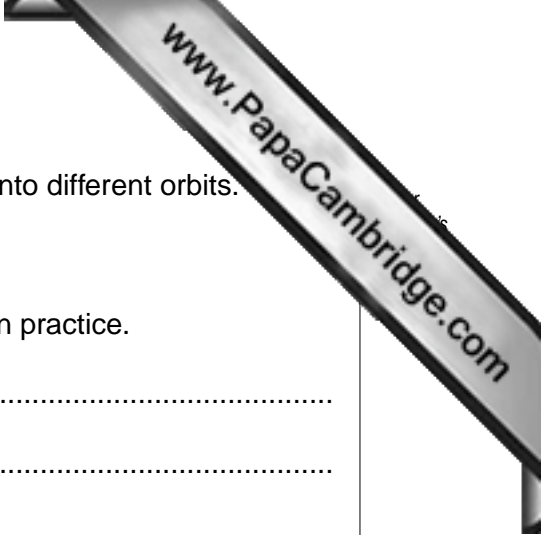
(c) Large asteroids heading towards the Earth could be pushed into different orbits.

This means that they would not hit the Earth.

Suggest and explain reasons why this plan might be difficult in practice.

....

....

....

....[3]

(d) Asteroids contain many useful materials.

  (i) Some of these materials would be worth sending back to Earth.

  Name one of these materials and explain why it would be worth sending it back to Earth.

  ....

  ....

  ....[2]

  (ii) Some asteroid materials could be used in spacecraft travelling further out into space.

  Name one of these materials and explain its use in spacecraft.

  ....

  ....

  ....[2]

(e) Many people believe that research into asteroids is a waste of money.

Suggest **two** reasons why asteroid research is a **good** use of money.

....

....

....[2]

[Total: 15]

2

Salt – a hidden danger

Sodium chloride, common salt, is widely used in foods as a preservative and flavouring agent.

The amount of salt that we eat can have an effect on our health. Too much salt in the diet has been linked to high blood pressure. High blood pressure increases the risk of strokes and heart disease. A high salt intake may also cause other health problems, such as retention of water in your body which leads to swollen ankles and weight gain. Too much salt in the diet has also been linked to the thinning of bones (osteoporosis), asthma, kidney disease and cancer of the stomach.

A healthy diet should not include more than 6 g of salt per day. In most developed countries the salt intake for adults averages 10 – 12 g per day.

One way to reduce salt intake is to stop adding it to food at the table and in cooking. This includes not adding salt to the water you use for cooking vegetables, pasta and rice.

The salt that you put in your own cooking or add at the table is obvious, but only a small part of our salt intake comes from salt that we add. High levels of salt are hidden in processed foods such as bread, cereals, meat products and ready prepared meals. This includes food that we eat in restaurants and canteens. 'Hidden salt' may account for 80% of the daily salt intake of many people.

To avoid this salt intake you can cut down on, or cut out entirely, the processed foods that you eat. Alternatively, you can read the labels on processed foods and only eat those that do not contain large amounts of added salt.

Most food labels state the amount of sodium in the food. Salt actually contains both sodium and chloride. To work out the amount of salt in a food, you need to multiply the amount of sodium by 2.5. In other words, 1 gram of sodium is contained in 1 × 2.5 = 2.5 grams of salt.
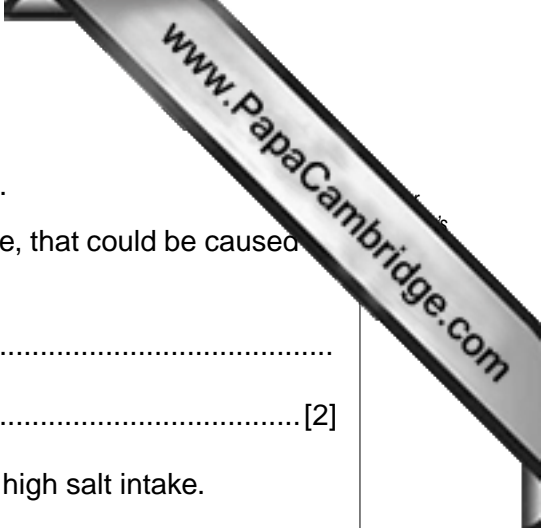
(a) (i) Salt acts as a food preservative.

What is meant by the term *preservative*?

....

....[1]

(ii) For what other reason is salt added to food?

....

....[1]

(b) (i) Too much salt in the diet can lead to high blood pressure.

Write down **two** health conditions, mentioned in the article, that could be caused by high blood pressure.

....

....[2]

(ii) Describe another health problem that may be linked to a high salt intake.

....

....[1]

(c) The article suggests that one way to reduce salt intake is to stop adding it to food at the table and during cooking.

(i) Why is this unlikely to have a **significant** effect on salt intake?

....

....[1]

(ii) What other measure could be taken to reduce salt intake?

....

....[1]

(d) Despite the publicity given to the dangers of eating too much salt, many people make no attempt to reduce their daily intake.

Use ideas about risk to explain why.

....

....

....

....

....[3]

(e) Table 2.1 shows the salt content of some everyday foods.

Table 2.1

type of food	salt content in g
baked beans, 100 g	1.0
baked potato, 100 g	0
cornflakes, 30 g	0.5
crisps, 25 g	0.5
chips, 100 g	0.5
hamburger, 100 g	1.0
milk, 100 g	0.5
pizza, 100 g	1.5

Sam is a student. These are the meals he ate on Monday.

Breakfast
30 g cornflakes
100 g milk

Lunch
200 g hamburger

Dinner
200 g chips
100 g pizza
100 g baked beans

(i) In these meals Sam's total salt intake is above the recommended 6 g.

Work out how much salt was in the food Sam ate.

Show your working.

total mass of salt = ... g [3]

(ii) Sam wanted to reduce his salt intake to below the recommended daily amount.

Suggest an alternative for something he ate on Monday. Use information from Table 2.1 to work out your answer.

....

....[1]

(f) Table 2.2 shows details from a label on a packet of roasted peanuts.

Table 2.2

	content in 100 g peanuts
energy	2470 kJ
protein	25.2 g
carbohydrate	8.0 g
fat	51.5 g
fibre	10.1 g
sodium	0.3 g

How much **salt** is in 100 g of these peanuts?

Show your working.

salt in 100 g peanuts = ... g [1]

[Total: 15]

Section B

3 Michael is investigating the growth of bean seedlings.

He uses the following equipment.

- 31 bean seedlings of equal height
- 5 identical plant pots
- a bag of soil
- water

Here are his results.

number of seedlings planted in each pot	number of seedlings that die	% of seedlings that die
1	0	0
2	0	0
4	1	25
8	3	37.5
16	12	

(a) Describe how Michael does the experiment to obtain his results.

....

....

....

....

....

(b) Michael controls two variables in his experiment to ensure valid results.

Put ticks (✓) in the boxes next to these two variables.

number of seedlings in each pot ☐

volume of soil in each pot ☐

length of time seedlings are left for ☐

number of seedlings that die ☐

which day of the week it is ☐ [2]

(c) Calculate the percentage of seedlings that die in the pot which had 16 seedlings planted in it.

Show your working.

percentage = ...% [1]

(d) (i) Describe how the number of seedlings planted affects the percentage of seedlings that die.

....

....[1]

(ii) Explain the results using your scientific knowledge.

....

....

....[2]

(e) Michael's teacher suggests that Michael should record the height of each living seedling at the end of his experiment.

Suggest how this information could support the conclusion in **(d)**.

..

....[1]

[Total: 10]

4 A student uses this apparatus to measure the percentage of oxygen in air.

iron filings

50 cm³ graduated tube

air
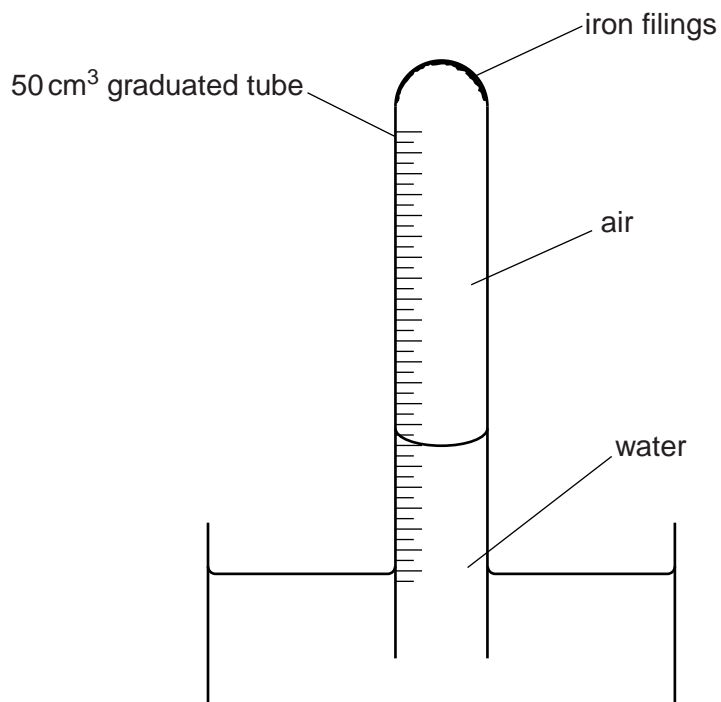
water

The iron filings react with oxygen, removing it from the air in the graduated tube.

The apparatus is left until there is no further change in the volume of gas in the graduated tube.

(a) The diagrams show the level of water in the graduated tube at the beginning and end of the experiment.

beginning
18
19
20
21
22
23
24
25

end
18
19
20
21
22
23
24
25
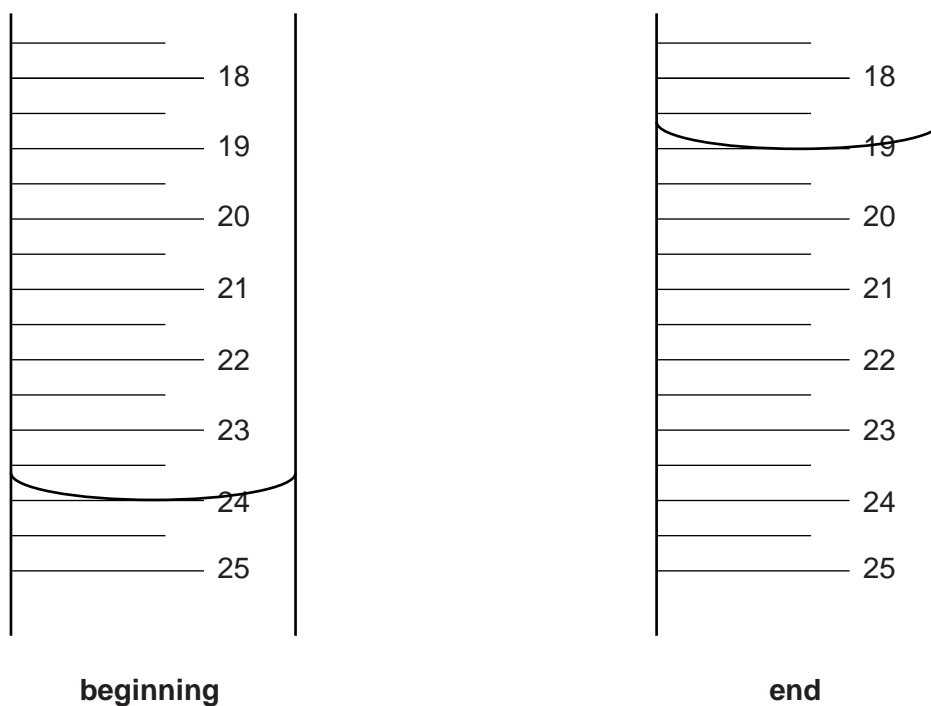
(i) From the diagrams, read the volume of air at the beginning of the experiment and the volume of gas remaining at the end of the experiment. Record these in Table 4.1.

Use these volumes to work out the volume of oxygen removed from the air in the graduated tube. Record this in Table 4.1.

Table 4.1

	volume in cm^3
air at beginning of experiment	
gas remaining at end of experiment	
oxygen removed	

[2]

(ii) The experiment is repeated. The results are shown in Table 4.2.

Table 4.2

	volume in cm^3
air at beginning of experiment	33
gas remaining at end of experiment	27
oxygen removed	6

Use the results in Table 4.2 to work out the percentage of oxygen in air.

percentage = ... % [1]
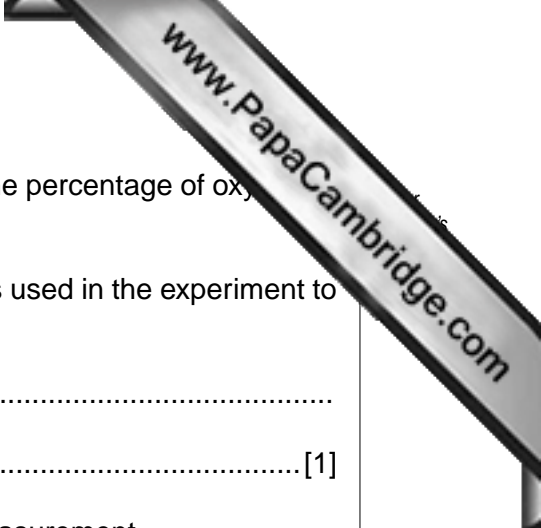
(b) The experiment does not give an accurate measurement of the percentage of oxygen in air.

(i) Describe a change that you would make to the apparatus used in the experiment to get a more accurate measurement.

....

....[1]

(ii) Explain how this change would give a more accurate measurement.

....

....[2]

(c) **(i)** What else would you do to obtain a best estimate of the percentage of oxygen in air that is closer to the true value?

....

....[2]

(ii) Explain how this would give a best estimate closer to the true value.

....

....[2]

[Total: 10]

PLEASE TURN OVER FOR QUESTION 5

5 Anita and Vijay are doing an experiment to investigate how water absorbs microwaves.

They set up their experiment as in the diagram.
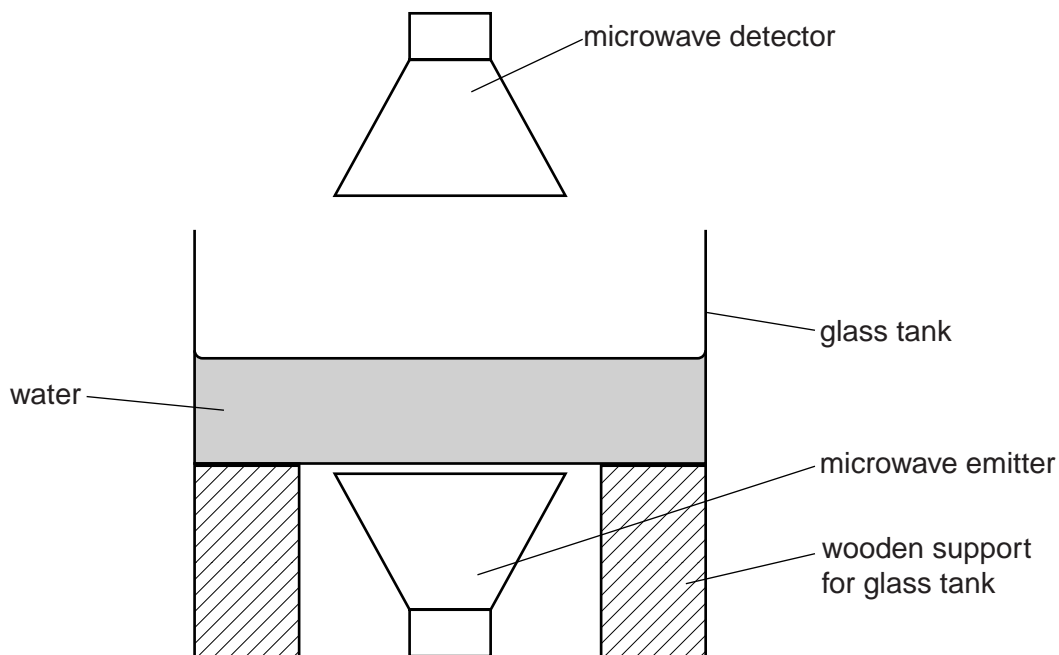
Anita and Vijay measure the depth of the water in the tank and the intensity of the microwave signal received by the detector.

(a) Vijay and Anita do their experiment five times with a water depth of 3.0 cm.

Their readings are in Table 5.1.

Table 5.1

microwave intensity	3	4	3	5	5

Calculate the mean value of intensity for this water depth.

mean value of intensity = ...[2]

(b) They use six depths of water over a range 0.5 cm to 3.0 cm and calculate the mean value of intensity for each.

Use your mean value from **(a)** to complete Table 5.2 opposite.

Table 5.2

depth of water in cm	0.5	1.0	1.5	2.0	2.5	3.0
mean microwave intensity	30	20	13	9	6	

Use the data in Table 5.2 to plot the graph on the grid below.

Complete the graph by drawing a best-fit curve.
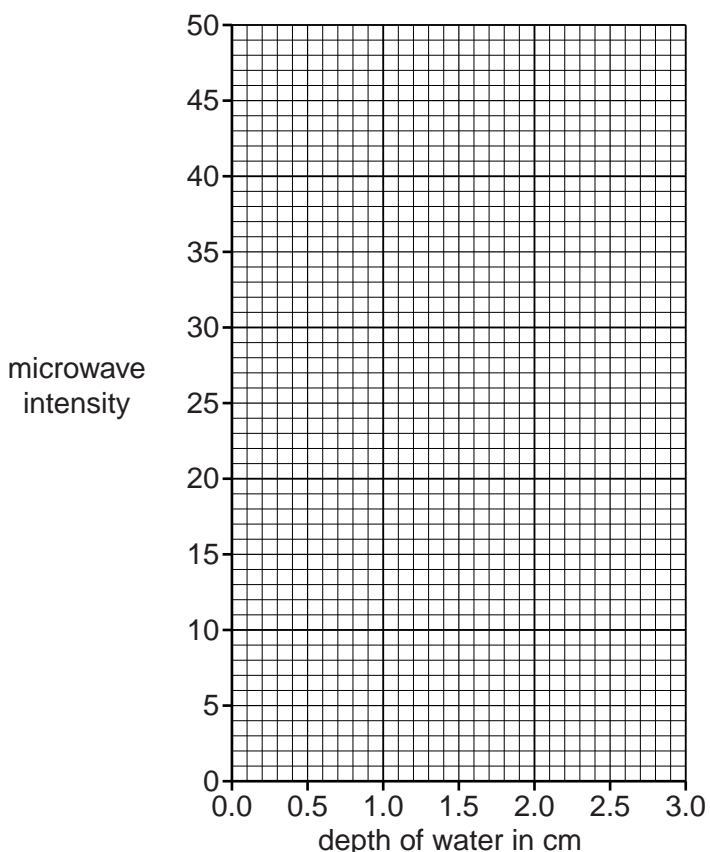
[4]

(c) Use the graph to find the depth of water at which the microwave intensity is 25.

depth = ... cm [1]

(d) Use the graph to find the microwave intensity when the water in the glass tank is 0.6 cm deep.

intensity = ... [1]

(e) Describe in detail the way in which the microwave intensity changes as the depth of the water increases from 0.0 to 3.0 cm.

....

....

....[2]

[Total: 10]

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