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 **May/June 2013**

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.
Electronic calculators may be used.
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 **15** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

[Turn over

Section A

For Examiner's Use

Answer **both** questions.

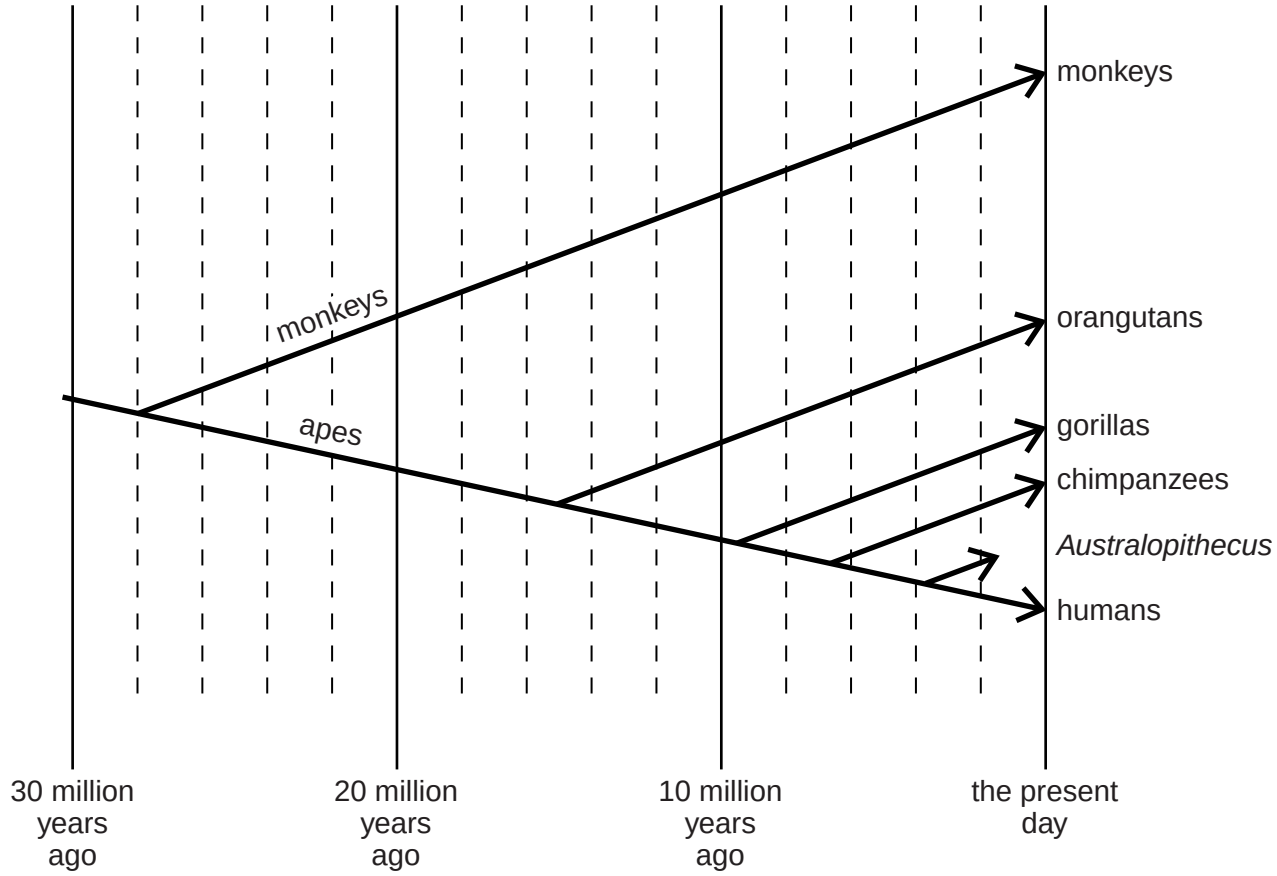
1 Read this article.

Is this fossil the missing link between monkeys and humans?

The fossilised remains of a skull have been discovered by scientists in Saudi Arabia. The skull belongs to a previously unknown species which has been named *Saadanius hijazensis*. *Saadanius* appears to have some features in common with monkeys and some in common with apes. Scientists think that *Saadanius* may be the common ancestor of monkeys and apes and therefore links humans to monkeys. However, scientists need more evidence before they can be sure of these claims.

From genetic studies, scientists previously thought that monkeys diverged from apes more than 30 million years ago. The discovery of this fossil skull now suggests that monkeys and apes diverged from each other later than this.

The diagram shows timelines for the existence and divergence of related species. It shows when scientists now believe monkeys and apes diverged as a result of this fossil discovery.



Scientists can use their knowledge of the conditions *Saadanius* lived in to suggest what changes might have led to the evolution of apes and humans.

(a) Explain how fossils provide scientists with evidence for evolution.

For Examiner's Use

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.....[2]

(b) Scientists believe that *Saadanius* could be the common ancestor of monkeys and apes.

(i) What is meant by the term *common ancestor*?

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.....[1]

(ii) Explain why scientists think *Saadanius* could be the common ancestor of monkeys and apes.

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.....[1]

(iii) Scientists need more evidence to be certain that *Saadanius* is the common ancestor of monkeys and apes.

Suggest what evidence the scientists would need.

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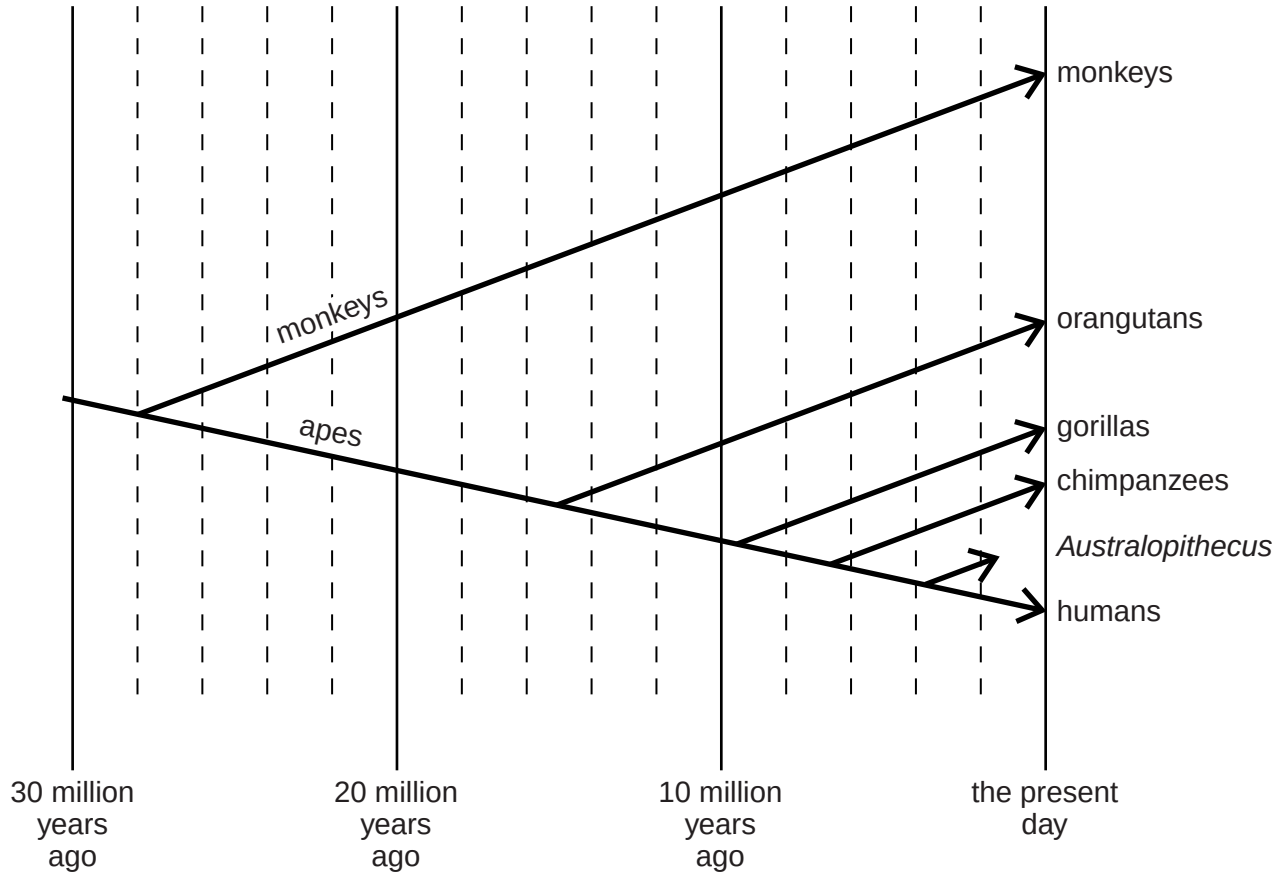
For Examiner's Use

This diagram is repeated from the article for use in parts **(c)** and **(d)**.



(c) **(i)** Use the diagram to work out when scientists now think monkeys and apes diverged from each other.

.....[1]

(ii) Another scientist claims to have discovered a skull which is older than *Saadanius*.

This skull has features which are very similar to monkeys but different from apes.

Suggest and explain how this discovery might affect our ideas of when monkeys and apes diverged.

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(d) **(i)** Which species shown on the diagram is now extinct?

.....[1]

(ii) Suggest two reasons why this species might have become extinct.

1 .....

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2 .....

.....[2]

(e) *Saadanius* provides the scientists with evidence for the evolution of new species.

Explain how environmental change can lead to the evolution of new species.

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.....[3]

[Total: 15]

2 Read this article.

For Examiner's Use

Earthquakes

Earthquakes have long been feared for the terrible damage they cause, but it is only in the last hundred years that science has been able to explain why they happen. This has come about from our better understanding of the structure of the Earth.

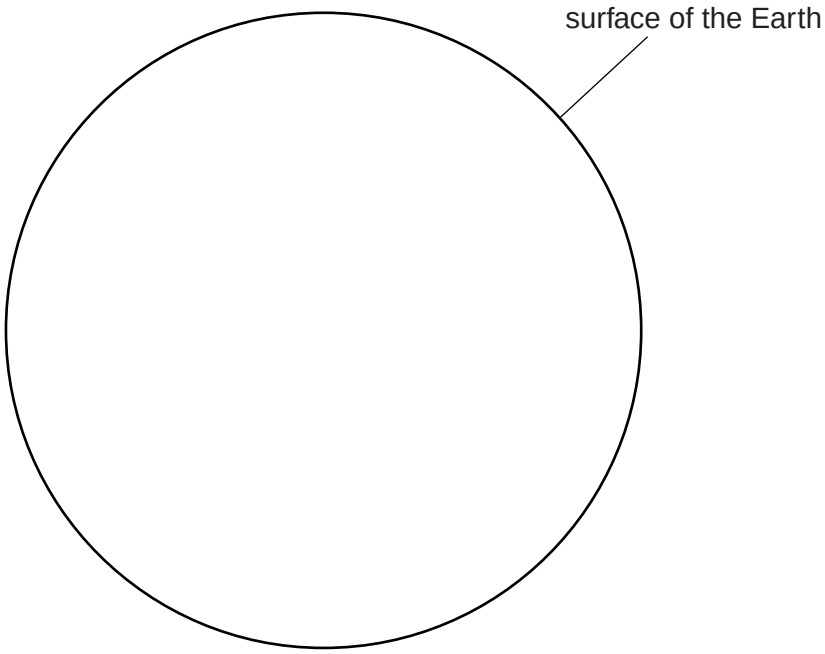
For many years, scientists did not believe that sections of the Earth's crust could move. It is only recently that plate tectonic theory has been accepted. This theory is able to explain earthquakes, and also mountain building and seafloor spreading.

Knowledge of tectonic plates explains why earthquakes happen so often in some places, such as around the Pacific Ocean. People living in these regions have learned to build structures in a way that reduces the damage caused by earthquakes.

In regions where earthquakes are common, the Earth's crust is measured constantly to look for an increase in movements which suggest an earthquake is due soon. One indicator is the radioactive gas radon, which is given out by rocks all the time. Increases in radon emissions suggest that the rocks might be moving more. Care must be taken when interpreting radon changes because these data vary greatly from day to day.

(a) Complete and label the diagram to show the different layers of the Earth.

The surface of the Earth is labelled for you.



[2]

(b) (i) Until the discovery of seafloor spreading, scientists did not believe continents could move.

State **two** reasons why they did not believe continents could move.

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.....[2]

(ii) Seafloor spreading shows that continents do move.

Explain how this movement happens.

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.....[2]

(c) (i) Suggest how earthquakes can damage buildings.

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.....[1]

(ii) Describe one way in which buildings can be built in order to reduce the damage caused to them by earthquakes.

.....

.....[1]

(d) In some parts of the world, governments have to prepare the people for earthquakes.

Suggest and explain one thing governments should do to help people deal with earthquakes.

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.....[2]

(e) (i) Explain how radon gas is used to predict an earthquake.

For Examiner's Use

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.....[2]

(ii) The article states that care must be taken when interpreting radon data.

The data in the table was collected over a seven day period during which there were no earthquakes.

day	1	2	3	4	5	6	7
radon level	23	18	26	20	19	20	27

Use the data to explain whether the reading on day 7 suggests that an earthquake may be about to happen.

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.....[3]

[Total: 15]

Question 3 begins on page 10.

Section B

For Examiner's Use

Answer **all** questions.

3 A river flows past a power station that releases acidic gases.

Scientists want to find out how the acidity of water in this river changes with distance from the power station.

An indicator changes colour to show how much acid is in a solution.

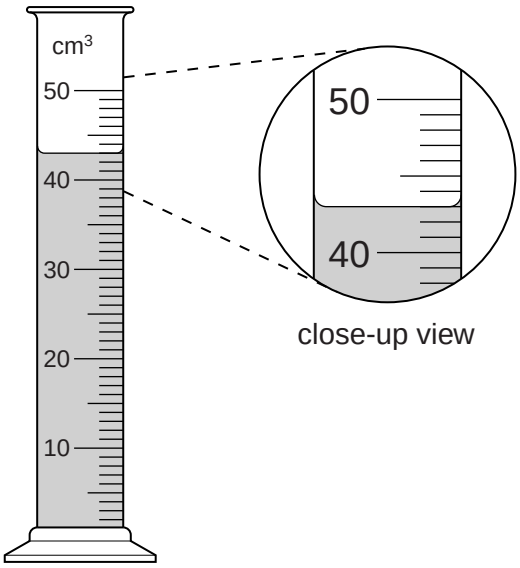
Red indicates acid, blue indicates alkali and green indicates neutral.

The scientists measure the volume of dilute alkali solution needed to remove the acidity from (neutralise) samples of water from the river.

(a) A measuring cylinder is filled to the 50 cm^3 mark with alkali. Some of the alkali is used to neutralise the water sample.

The volume of alkali left in the measuring cylinder is then noted. This volume is subtracted from 50 cm^3 to get the volume of alkali used.

The diagram shows the measuring cylinder after the water sample taken at 2.0 km from the power station has been neutralised.



(i) What volume of alkali is left in the measuring cylinder?

..... cm^3 [1]

(ii) What volume of alkali has been used to neutralise the acid in the water sample?

..... cm^3 [1]

(b) Some of the scientists' results are shown in the table.

Write your answer from **(a)(ii)** in the table.

distance from power station in km	0.5	1.0	1.5	2.0	2.5	3.0
volume of alkali used in cm^3	34	21	12		5	3

The scientists say that their results show a correlation.

Describe this correlation.

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.....[2]

(c) Suggest how the scientists knew when they had added enough alkali to neutralise the acid in a water sample.

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.....[2]

(d) **(i)** What apparatus could the scientists use to improve the precision of measurement of alkali volume?

.....[1]

(ii) Explain how using this apparatus would improve the precision.

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.....[1]

(e) The scientists decide to repeat their measurements five times at each distance from the power station.

How will this improve their results?

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.....[2]

[Total: 10]

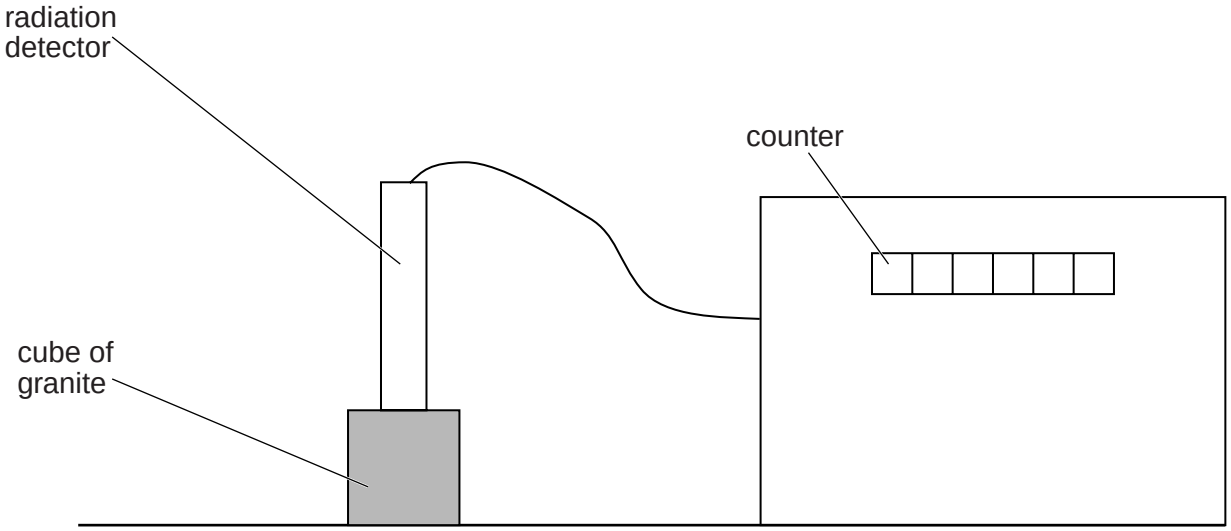
[Turn over

4 Sam and Nita are investigating radiation from granite rocks.

They know that granite is radioactive.

They make measurements on a number of samples of granite from different locations.

They set up their experiment as shown in the diagram.



The counter records how many radioactive counts are received from the detector.

(a) Describe how to use the apparatus to find the number of counts per minute emitted by a set of different rocks.

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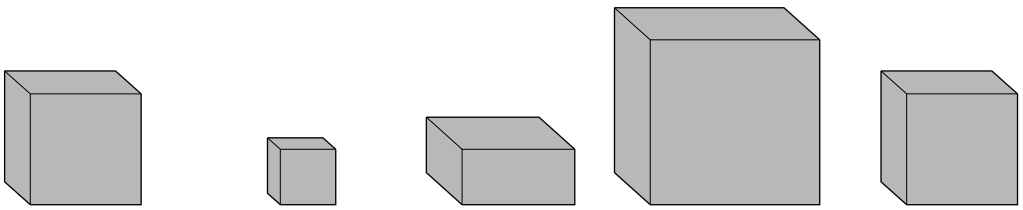
(b) Nita and Sam's granite samples look like this.



They place the radiation detector so that it touches the top of each sample.

Suggest problems they might have in controlling the variables in their experiment.

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.....[2]

(c) Nita and Sam's results are given in the table.

rock sample	**A**	**B**	**C**	**D**	**E**
count in one minute	65	54	32	84	33

Look at the diagrams of samples **A** to **E** in **(b)** and the data in this table.

What conclusions can you make about the radioactivities of the different samples of granite?

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.....[2]

(d) Nita thinks that the amount of radiation given off by a rock may depend on the temperature of the rock.

(i) Write down what **additional** apparatus she will need to test her idea.

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.....[1]

(ii) Describe how she should use this apparatus to test her idea.

.....

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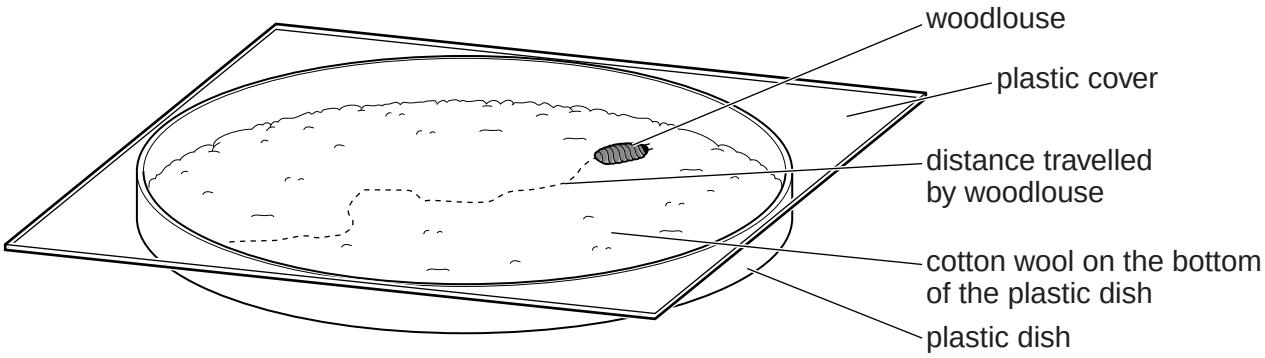
[Total: 10]

5 Ryan is investigating the movement of woodlice under different environmental conditions.

Woodlice are small invertebrates that usually live in damp places.

Ryan uses the apparatus shown in the diagram.



Ryan records the distance travelled by the woodlouse in one minute.

He does this three times.

He repeats the experiment using different volumes of water to dampen the cotton wool.

Here are his results.

volume of water in cm^3	distance travelled by the woodlouse in cm			
	experiment 1	experiment 2	experiment 3	best estimate
0	11	10	9	10.0
1	8	2	9	8.5
2	7	7	7	7.0
3	5	6	1	
4	4	4	5	4.3

(a) Write down two variables that should be kept the same throughout Ryan's experiment.

1 .....

2 ..... [2]

(b) Calculate the best estimate for the distance travelled by the woodlouse in the experiment using 3 cm^3 of water.

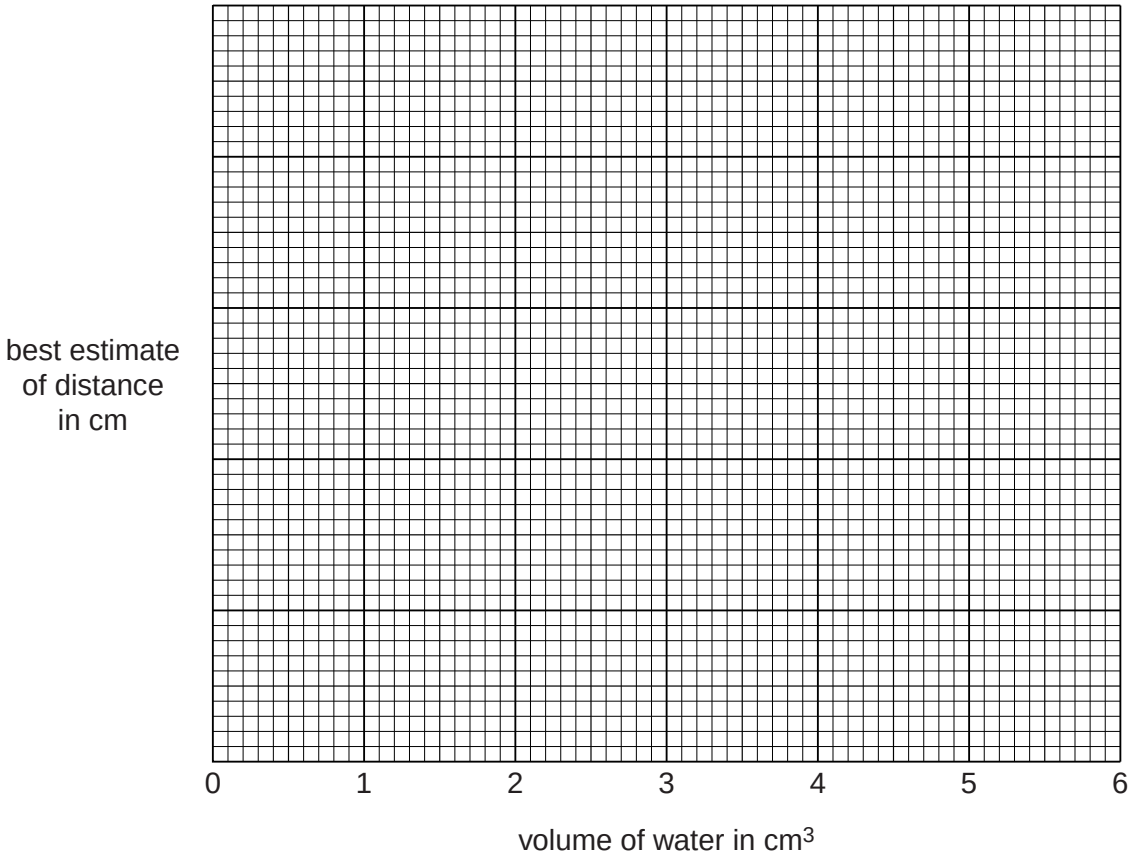
Show your working.

best estimate = ... cm [2]

(c) Complete the vertical axis on the graph grid below by adding an appropriate scale. [1]

(d) Plot the five points on the grid. [3]

(e) Draw a line of best fit on your graph. [1]



(f) Use your graph to predict how far the woodlouse would travel if Ryan uses 6 cm^3 of water.

Show your working **on the graph**.

distance = ... cm [1]

[Total: 10]

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