SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

CHEMISTRY

Tuesday 2 June 2009

Please read this information before the examination starts.

- This examination is 40 minutes long.
- The answers should be written on the question paper.
- Answer **all** the questions.
- Calculators may be required.

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1. Underline the option which best completes each of the following:

(a) A gas which turns limewater milky is

carbon dioxide **carbon monoxide** **hydrogen** **oxygen**

(b) An example of a mixture is

air **copper oxide** **magnesium** **water**

(c) A substance which decomposes when heated is

copper oxide **magnesium** **potassium permanganate** **water**

(d) Metals are always

conductors **gases** **insulators** **soluble**

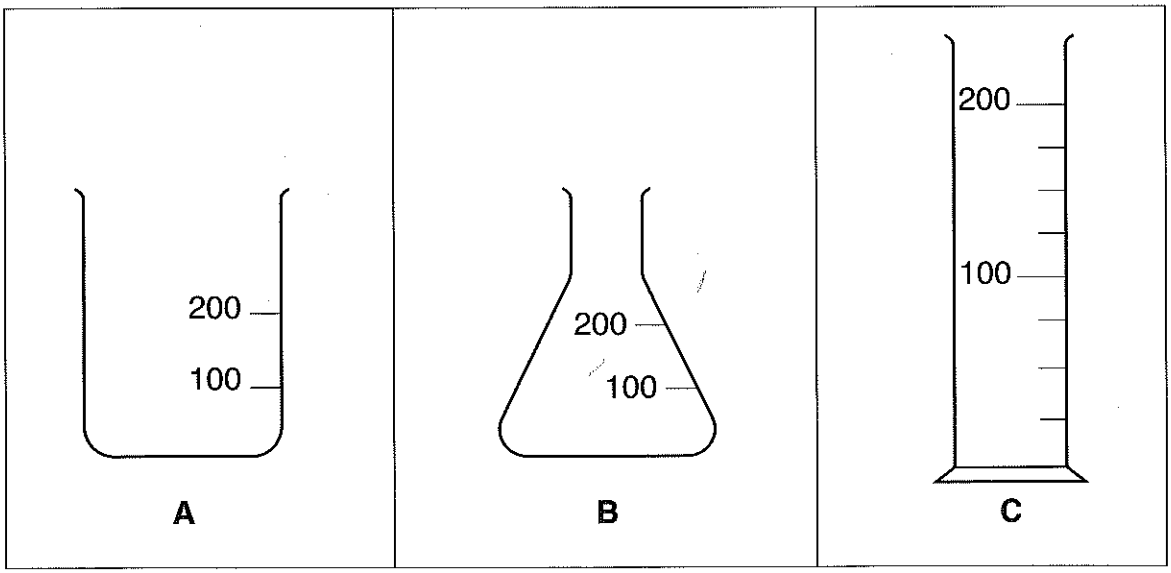
(e) In the reaction:

copper oxide + carbon → copper + carbon dioxide

the copper oxide has been

decomposed **neutralised** **oxidised** **reduced** (5)

2. The following pieces of glassware (not drawn to scale) can be used to hold liquids.



(a) Name each piece of glassware.

A: .....

B: .....

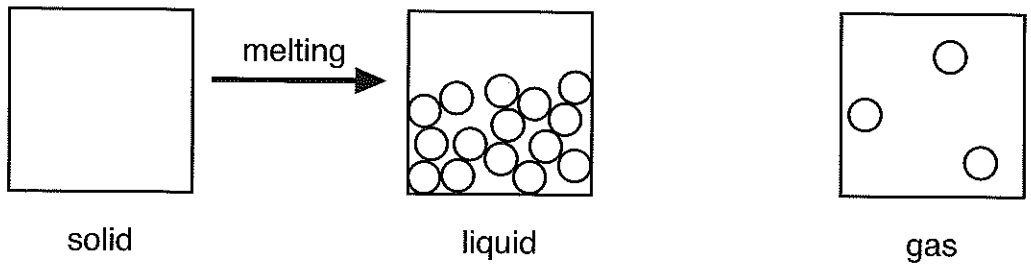
C: ..... (3)

(b) Which of the three pieces of glassware, **A, B** or **C**, would be

(i) the most accurate for measuring out 100 cm^3 of water? ..... (1)

(ii) the most convenient for adding two liquids together and then shaking the mixture? ..... (1)

3. The three boxes below represent the particles in solids, liquids and gases.



(a) Draw circles in the empty box to show how particles are arranged in a solid. (1)

(b) Draw and label four arrows on the diagram, like the one shown for melting, to show the changes which take place for

- condensing
- evaporating
- freezing
- subliming

(4)

4. This question is about fossil fuels.

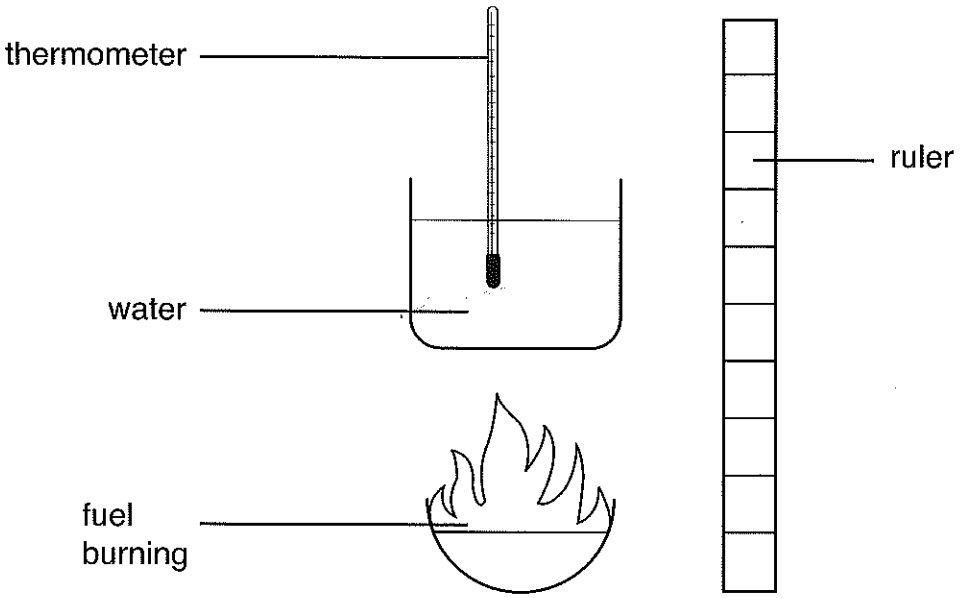
(a) Give the name of a fossil fuel which is

(i) a solid: .....

(ii) a liquid: .....

(iii) a gas: ..... (3)

Toby was asked to carry out an investigation by his teacher. He had to find out how much heat was given out when different fuels were burned in air. He decided to see how much the temperature of water was increased when heated by the different fuels. His apparatus is shown in the diagram below.



(b) Describe three ways in which Toby could ensure that his experiment was a fair test.

1: .....

2: .....

3: ..... (3)

(c) Name one major source of inaccuracy in Toby's investigation.

..... (1)

(d) The fuels which Toby used were compounds from fossil fuels. Name the two products which are formed when a fossil fuel is completely burnt.

1: .....

2: ..... (2)

(e) Acid rain occurs when some fossil fuels are burned.

(i) Describe carefully how you would measure the pH of a sample of rain water.

.....

..... (2)

(ii) Give two harmful effects of acid rain.

1: .....

2: ..... (2)

(iii) Explain, in terms of particles, why filtering acid rain would not prevent it from harming the environment.

.....

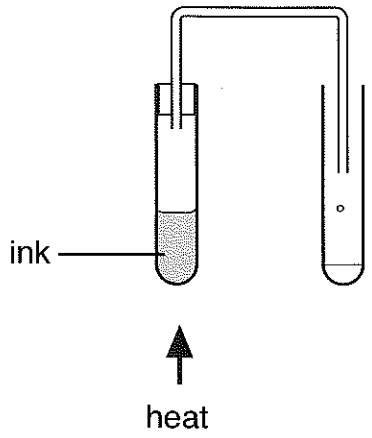
..... (2)

(iv) The acidity of water in a lake can be reduced by adding a suitable substance. Underline the substance which would be most suitable for this.

calcium hydroxide **sodium** **sodium chloride** **vinegar**

(1)

5. Here is the apparatus which was used to distil some water from a sample of ink:



(a) Label the place on the diagram where evaporation occurs. (1)

(b) Label a place on the diagram where condensation occurs. (1)

(c) How could you test to see if water had been produced?

test: .....

result: ..... (2)

(d) In this experiment, which substance is the solvent and which is the solute?

solvent: .....

solute: ..... (2)

(e) How would you expect the blue colour of the ink being heated in the tube to change as the distillation takes place?

..... (1)

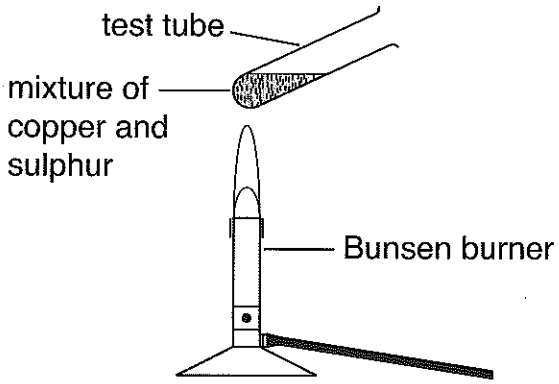
(f) Describe one way in which you could improve the way this experiment was carried out.

..... (1)

6. The two elements copper and sulphur react together to form the compound copper sulphide.

A class carried out an experiment to heat copper powder with lots of sulphur to form copper sulphide.

The reaction was carried out in a test tube as shown below:



After the reaction happened, any unused sulphur was removed by burning it off, and the mass of copper sulphide measured.

(a) Write down the three weighings which must be made in order to work out the mass of copper and mass of copper sulphide.

1: .....

2: .....

3: ..... (3)

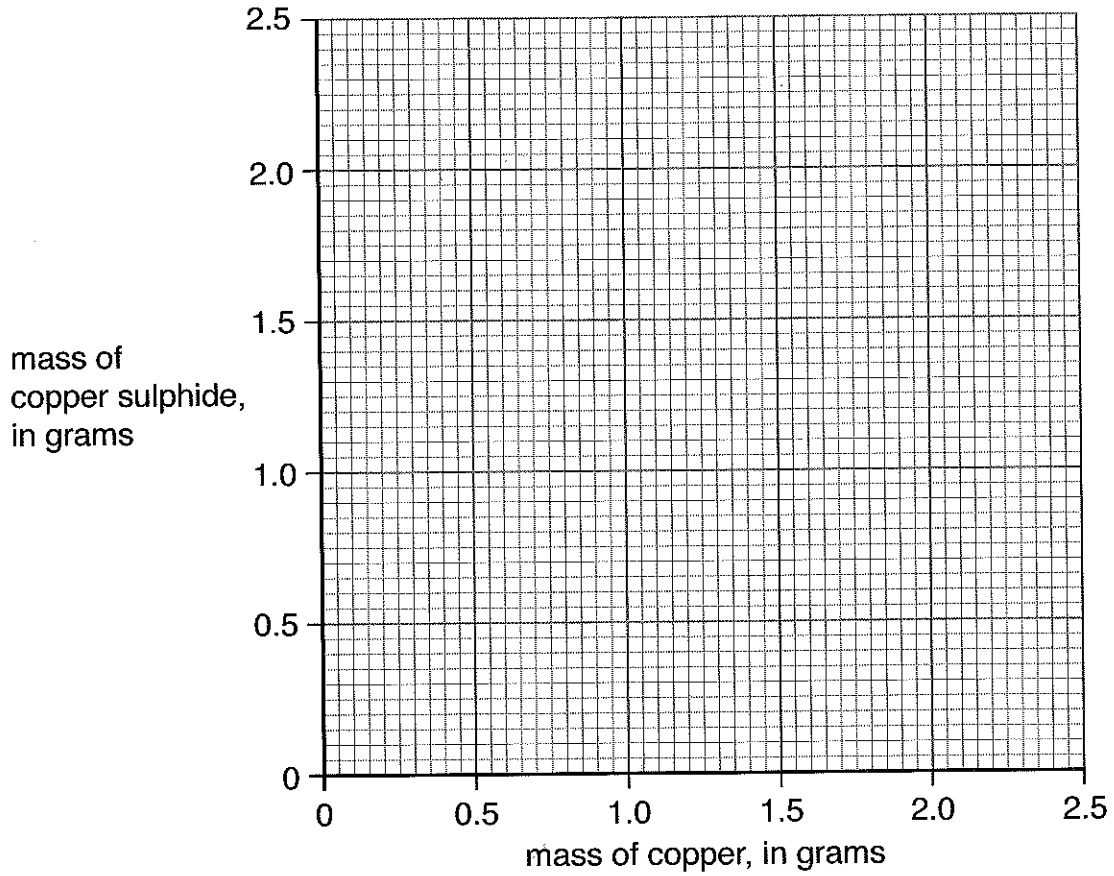
(b) Why was copper **powder** used?

..... (1)

(c) The results obtained by six pupils are shown below:

	mass of copper, in grams	mass of copper sulphide, in grams
John	0.32	0.40
Susan	0.60	0.75
Kim	0.84	1.05
Lara	1.20	1.50
Pauline	1.30	1.85
Richard	1.56	1.95

(i) Plot these results on the grid below.



(2)

(ii) Would you expect the line of the graph to go through the origin (0,0)? Give a reason for your answer.

.....

..... (1)

(iii) Whose result does not seem to fit the pattern?

..... (1)

(iv) Draw a best fit line through the other points. (1)

(v) From the graph, what mass of copper would be needed to make 1.0 g of copper sulphide?

..... (1)

(vi) Calculate the percentage of sulphur by mass in the compound copper sulphide. Show your working.

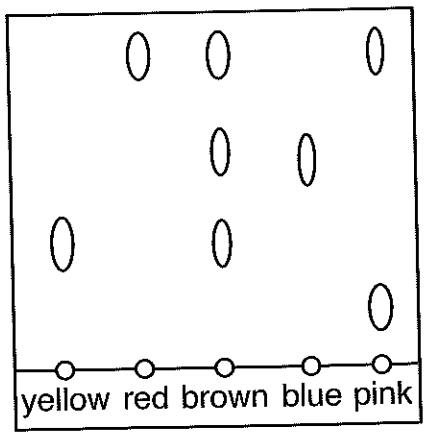
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percentage of sulphur: .....% (2)

7. The inks from several felt-tipped pens have been tested to see which colours are present in them. A spot of each colour pen was drawn onto the bottom of a piece of filter paper and then the filter paper was allowed to absorb some water. The results are shown below.



(a) What is the name of this method of separating colours?

..... (1)

(b) State carefully what the results tell you about the brown ink.

.....

.....

..... (2)

(c) Which is the most soluble colour? ..... (1)

(d) Which colour is used most often in the five pens?

..... (1)

(e) Other mixtures must be separated in different ways. Explain how you could separate a mixture which contained iron filings, salt and chalk.

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..... (4)

(Total marks: 60)