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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Materials and their Management
Module 4

Foundation Tier

[GSC41]

GSC41

FRIDAY 25 FEBRUARY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the elements, is provided for you.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

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Marks	Remark

1 **(a)** Below are four types of materials. Using lines match each material to one example.

The first one has been done for you.

Material	Example
Glass	iron
Plastic	tiles
Ceramic	window
Metal	packaging

[2]

(b) Complete the table below by giving a property which makes each material suitable for the use given.

Choose from:

easy to mould : very hard : electrical conductor : strong fibre

Material	Use	Property
copper wire	house wiring	
plastic	basin	
ceramic	bricks	
linen	curtains	

[3]

(c) Some shirts are made from a mixture of cotton, nylon and polyester.

© http://www.LateralLineCo.com

Which **one** of the three materials in the shirt is a natural material?

_____ [1]

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Marks	Remark

2 Each year many tourists visit the Marble Arch Caves in Fermanagh. The water in this area is described as hard water.

© Marble Arch Caves Global Geopark http://www.archhouse.com/sites/90/marblearch.jpg

(a) Given below are the steps needed to test for the hardness of water but not in the correct order.

A Continue adding soap solution one drop at a time
B Note the number of drops of soap solution used
C Measure out 50 cm^3 of the water sample
D Add one drop of soap solution and shake
E Stop adding soap solution when a permanent lather forms

(i) Using the letters **A**, **B**, **C**, **D** and **E**, complete the correct order of steps.

Order C ____ ____ ____ ____ [2]

(ii) Name a piece of apparatus which could be used to measure the 50 cm^3 of hard water.

Circle the correct answer.

beaker : measuring cylinder : conical flask [1]

(iii) How would you know when a permanent lather forms?

_____ [1]

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(b) Use ticks (✓) to show the advantages and disadvantages of hard water.

One example is done for you.

	Advantage	Disadvantage
Good for bones	✓	
Helps in brewing beer		
Leaves stains on clothes		
Forms boiler scale		
Strengthens teeth		
Forms kettle fur		

[3]

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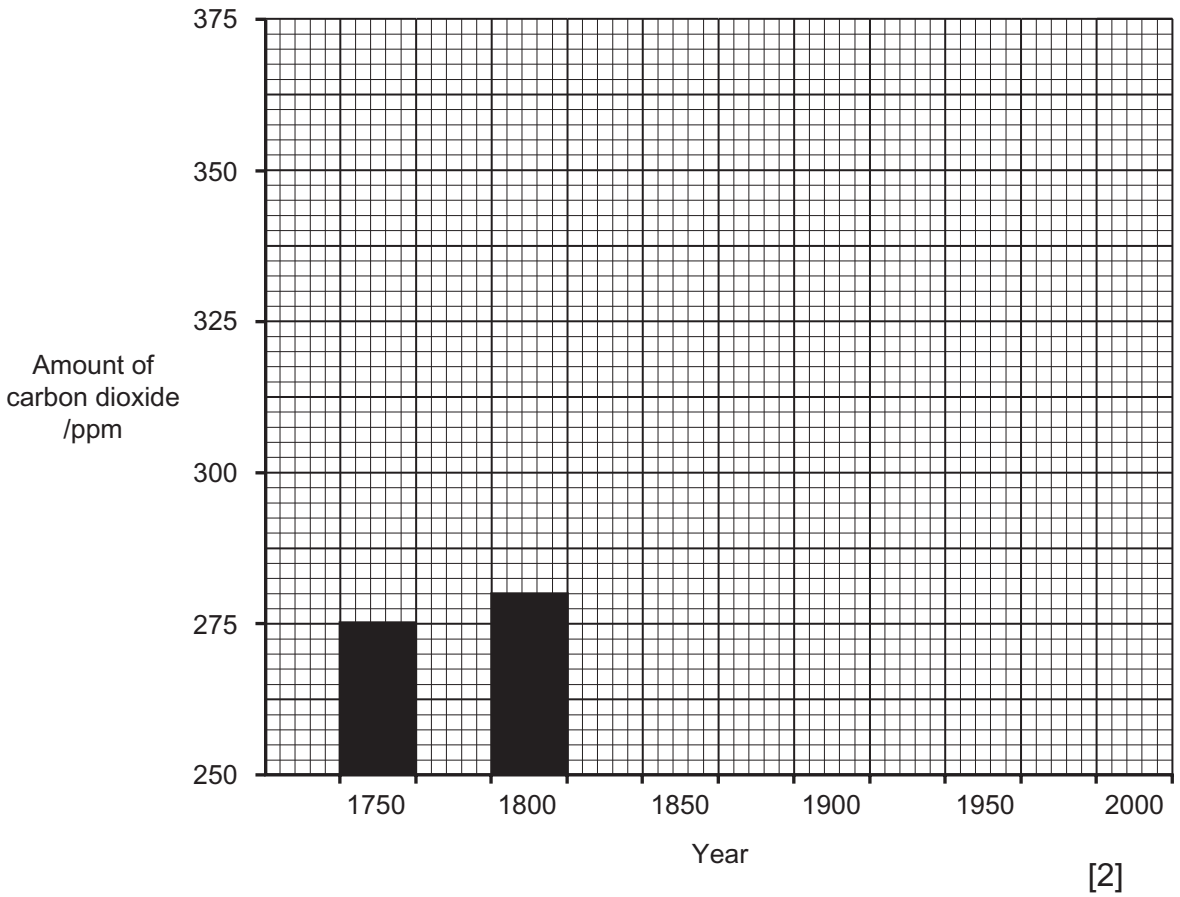
3 The table below shows how the amount of carbon dioxide in the air has changed from 1750 to 2000.

Year	Amount of carbon dioxide/ppm
1750	275
1800	280
1850	285
1900	295
1950	320
2000	370

(a) (i) Complete the bar chart below using the information in the table.



[2]

(ii) Complete the sentence below to give the trend shown by the information.

From 1750 to 2000 the amount of carbon dioxide has

_____ [1]

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(b) Natural gas which is mainly methane, CH_4, produces carbon dioxide on burning.

© Getty Images/Jupiterimages/Photos.com

(i) Name the **two** elements present in methane gas.

(You may find your Data Leaflet useful).

_____ and _____ [1]

(ii) Name the gas in air which combines with methane when it burns.

_____ [1]

(iii) Name the other product formed when methane burns in air.

Circle the correct answer.

sulphur dioxide : water : nitrogen dioxide [1]

(iv) Give **one** harmful effect, to the environment, of burning methane.

_____ [1]

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Marks	Remark

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4 **(a)** The table below contains information about five hydrocarbon molecules.

Molecule	Melting point/°C	Boiling point/°C	Energy produced per gram /kJ
Methane	–182	–161	56
Ethane	–183	–88	52
Propane	–188	–42	51
Butane	–138	–0.5	50
Pentane	–130	36	49

(i) Name the hydrocarbon with the highest **melting point**.

_____ [1]

(ii) Calculate the energy produced from 10 grams of methane.

Show your working.

_____ kJ [2]

(iii) Calculate the difference in **boiling point** between propane and methane.

_____ [1]

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(b) Complete the following sentences.

A cup painted with thermochromic paint changes colour when the _____ changes while a cup painted with photochromic paint will change colour when the _____ changes. [2]

(c) Shown below is a picture of a genuine £50 note.

© *Bank of England*

Banks use special paper which can be tested using UV light to avoid counterfeiting.

(i) Give three other ways that bank notes are protected against counterfeiting.

1. _____

2. _____

3. _____ [3]

(ii) Explain fully how shop owners use UV light to test for counterfeit notes.

_____

_____

_____ [2]

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5 Glass recycling has greatly increased over the last ten years.

© Chris Garner http://www.pettistree.suffolk.gov.uk/images/bottlebankcimg1687crg.jpg

(a) Describe the main steps in the recycling of glass.

_____

_____

_____

_____ [3]

(b) Waste glass is dangerous and causes litter problems because it is very unreactive and is non-biodegradable.

(i) Explain fully the meaning of the term **non-biodegradable**.

_____

_____ [2]

(ii) Give two ways in which local councils are promoting the recycling of glass.

1. _____

2. _____ [2]

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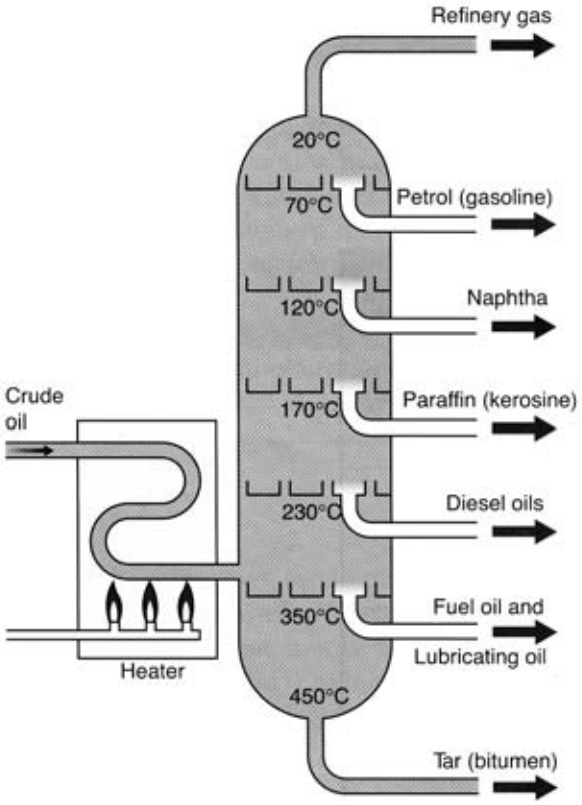
6 Crude oil is made up of many hydrocarbons and these can be separated using fractional distillation.



(a) (i) Describe how fractional distillation separates the fractions in crude oil.

_____

_____

_____

_____ [3]

(ii) Give **one** use of the paraffin fraction.

_____ [1]

(b) Ethene is an important hydrocarbon which is used to make polythene.

Describe what happens to ethene molecules when they are polymerised to form polythene.

_____

_____ [2]

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(c) The Clean Air Acts were introduced by government to help reduce the problems of air pollution.

Give one way of reducing the problems caused by burning hydrocarbon fuels.

_____ [1]

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THIS IS THE END OF THE QUESTION PAPER

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