

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
General Certificate of Secondary Education

APPLIED SCIENCE:
DOUBLE AWARD



1497 4882/01

Science for the needs of society

FOUNDATION TIER

Thursday **16 JUNE 2005**

Morning

1 hour 30 minutes

Candidates answer on the question paper.

Calculators may be used.

Additional materials required:

Pencil

Ruler (cm/mm)

Candidate
Name

Centre
Number

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Candidate
Number

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TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.

FOR EXAMINER'S USE		
1	11	
2	11	
3	12	
4	11	
5	11	
6	14	
TOTAL	70	

This question paper consists of 16 printed pages.

Answer all the questions.

- 1 (a) Steve is a market gardener. He grows cucumbers.



He decides to grow some cucumbers of the same type.
Some cucumber plants are grown using fertiliser. Some are grown without fertiliser.

He then collects some of the cucumbers and measures their length.

length of cucumbers grown with fertiliser (cm)	length of cucumbers grown without fertiliser (cm)
38	38
36	38
42	34
38	33
46	29
38	28
42	31
average = 40	average =

- (i) Calculate the average length of the cucumbers grown without fertiliser.

Show your working.

..... cm [2]

- (ii) The average length of the cucumbers grown with fertiliser is more than those grown without fertiliser.

Explain why.

.....
.....[2]

(b) The fertiliser Steve uses has a label on it.

The label states: **contains NPK**

He knows that the symbol **N** means nitrogen.

State what the other two symbols mean.

(i) **P**

(ii) **K**

[2]

(c) Steve carries out an experiment.

He investigates what happens when different minerals are missing from the fertiliser.

His results are shown below.

(i) For each experiment, explain the result.

Experiment to find the effect of minerals on the growth of cucumbers.	
experiment 1 cucumbers lacking nitrogen. <i>The cucumber plants did not grow very quickly and the cucumbers were quite small.</i>	
explanation:	
.....	[1]
experiment 2 cucumbers lacking magnesium. <i>The plants were yellow and the cucumbers failed to turn green.</i>	
explanation:	
.....	[1]

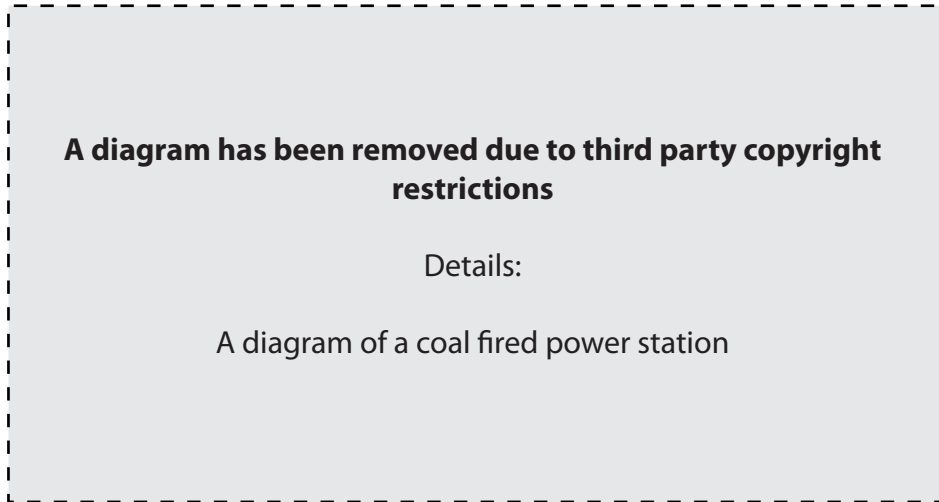
(ii) What should Steve have done to make sure that his tests were fair?

.....
.....
.....
.....[3]

[Total: 11]

- 2 Jane is learning how coal fired power stations generate electricity.

Her teacher gives her a diagram.



- (a) Use the diagram to complete Jane's crossword.

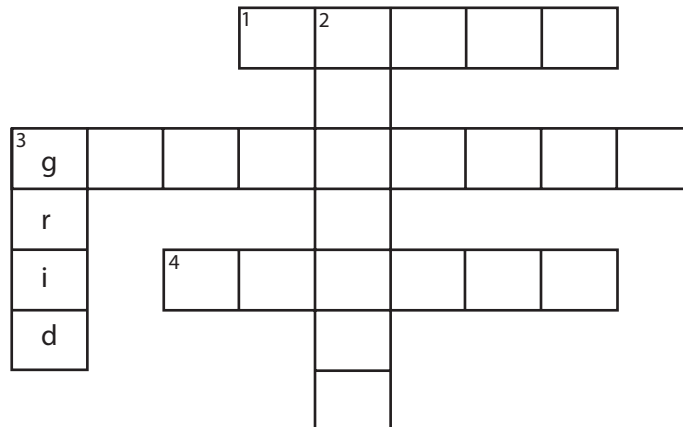
One has been done for you.

Across

- 1 this turns the turbine
- 3 converts kinetic energy to electrical energy
- 4 where water is heated and turns into steam

Down

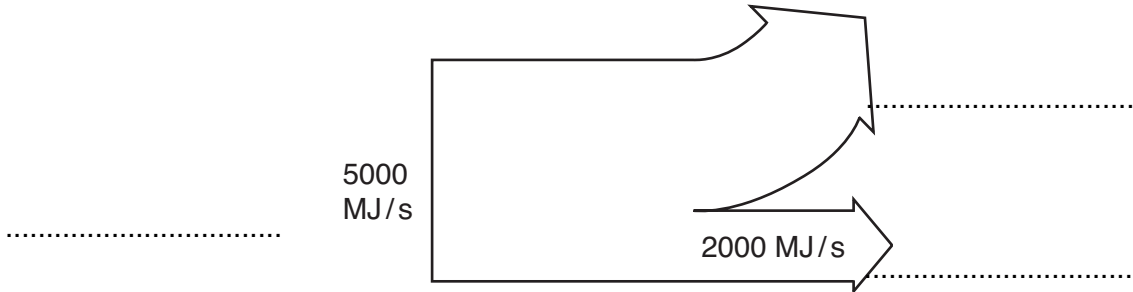
- 2 has blades and spins round
- 3 system of power lines carrying electricity around the country



(b) Jane looks at a diagram that shows what happens to the energy in the coal when it is burnt in the power station.

The coal can release 5000 MJ of energy per second.

The power station produces 2000 MJ of useful electrical energy per second.



(i) Three labels are missing.

Copy the following labels onto their correct places on the diagram.

lost heat energy energy in coal useful electrical energy

[2]

(ii) Calculate the energy efficiency of the power station.

Show your working.

energy efficiency % [2]

(c) (i) Jane knows that coal is a non-renewable energy source.

Explain what **non-renewable** means.

.....
[1]

(ii) State **two** examples of **renewable** energy sources that can be used to generate electricity.

1.
 2.[2]

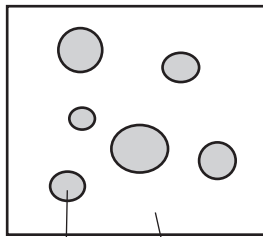
[Total: 11]

[Turn over

3 Dave is a firefighter. He often uses foam to put out fires.

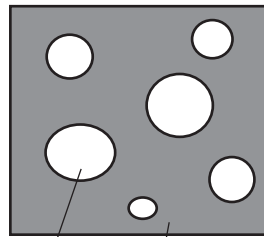
He knows that the foam is a carbon dioxide gas dispersed in a liquid.

(a) State which of the following diagrams, **A**, **B** or **C**, best describes the foam.



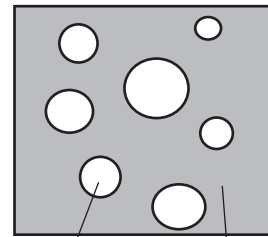
liquid gas

A



gas solid

B



gas liquid

C

diagram of foam

[1]

(b) Dave uses other methods to put out fires.

The table below shows what Dave uses.

Complete the table.

Choose from the following words.

They may be used **once**, **more than once** or **not at all**.

solid liquid gas

	continuous phase	dispersed phase
powder aerosol	gas	
fog / mist		
carbon dioxide foam	liquid	gas

[3]

(c) Dave sometimes gets his hands dirty and greasy in his work.

He uses a gel to clean his hands.



(i) Explain how the structure of the gel is **different** from the foam he uses to put out fires.

.....

[2]

(ii) He notices that when he uses the gel, it turns to a liquid.

Which of the following diagrams, **A**, **B** or **C** best shows what is happening.

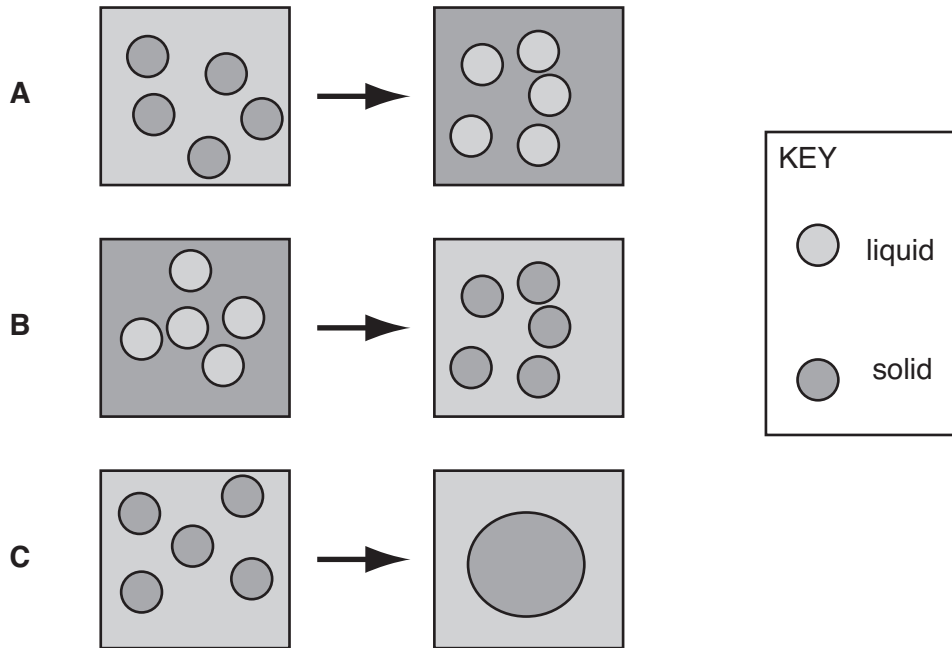


diagram [1]

(iii) Describe what happens when the gel turns into a liquid.

.....

[3]

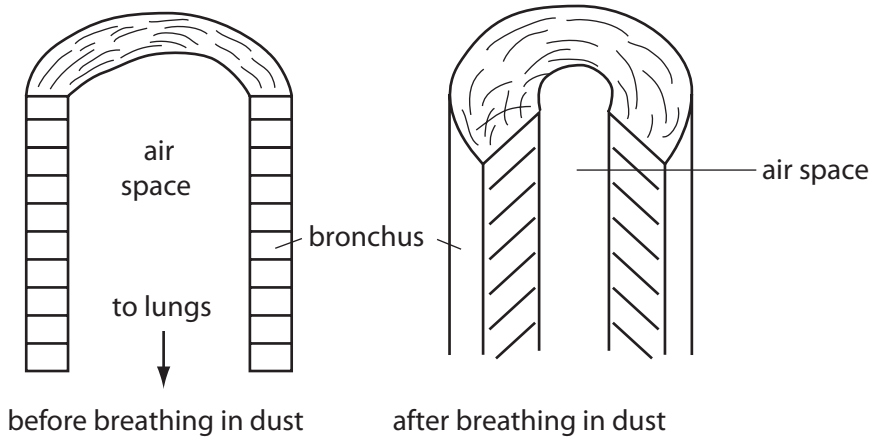
(iv) Name a common gel and explain why it is useful.

.....

[2]

4 Richard suffers from asthma. He is allergic to house dust.

When Richard breathes in the dust, it causes the muscles of his bronchi to contract.



(a) Suggest why this makes it difficult for Richard to breathe.

.....
.....
.....[2]

(b) The bronchi end in alveoli. The alveoli are thin and have a large surface area.

Explain why.

.....[1]

(c) Richard controls his asthma by using an inhaler.

The inhaler contains a drug.

The drug can also be taken in tablet form.

Using an inhaler requires a much smaller dose than a tablet.

Suggest why.

An image has been removed due to third party copyright restrictions

Details:

An image of an inhaler

.....
.....
.....[2]

(d) Richard buys a new vacuum cleaner to remove as much house dust as possible.

The vacuum cleaner has a filter. Viruses can pass through the filter, but dust will not.

(i) Suggest why viruses pass through the filter.

.....[1]

(ii) Unlike Richard's asthma, some diseases are caused by viruses.

Describe **two** differences between Richard's asthma and a disease caused by a virus.

1.

.....

2.

.....[2]

(e) Richard may be allergic to chemical powders in the school laboratory.

He needs to complete a risk assessment before he starts working.

Complete Richard's risk assessment form.

The first two sections have been done for you.

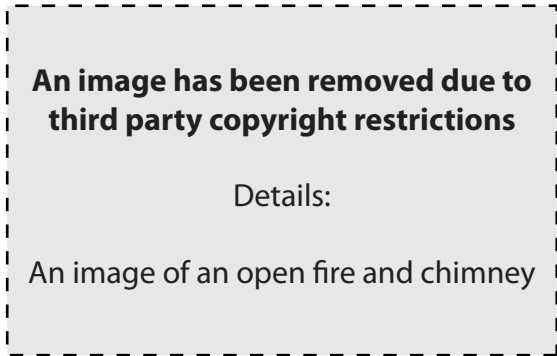
<p>RISK ASSESSMENT FORM Richard Chemistry 16th June 2005</p> <p>Procedure</p> <p><i>Identifying two unknown white powders.</i></p> <p>Hazard</p> <p><i>Dusty powders.</i></p> <p>What could go wrong</p> <p>.....</p> <p>.....</p> <p>Safety precautions</p> <p>.....</p> <p>.....</p> <p>In case of accident</p> <p>.....</p> <p>.....</p>

[3]

[Total: 11]

Question 5 begins on page 12

5 Joe is a heating engineer. Part of his job is to mend old chimneys.
He knows that acidic gases from fires will damage chimneys.



(a) The names of some building materials used in chimneys are

brick cement granite iron limestone

Choose from the list

- (i) a material that is used straight from the ground
.....[1]
- (ii) a material that is not easily damaged by acidic gases.
.....[1]

(b) Joe uses cement to mend the damaged chimneys.

(i) Which one of these words describes how cement is manufactured?

Put a ring round the correct answer.

bulk fine organic speciality [1]

- (ii) Explain your answer.
.....
.....[1]

(c) Joe sometimes fits chimney liners.

A chimney liner is a pipe that protects the damaged chimney.



Chimney liners are made from stainless steel.

This table gives some information about the elements in stainless steel.

Complete the table by filling in the boxes.

element	symbol	metal or non-metal	percentage in steel
iron			74%
carbon			1%
chromium	Cr	metal	18%

[3]

(d) Put a tick to show whether these statements about stainless steel are true or false.

s tatement	true ✓	false ✓
stainless steel is a good conductor of heat		
stainless steel contains mainly chromium		
a blast furnace is used to make one of the elements in steel		
stainless steel contains only three elements		

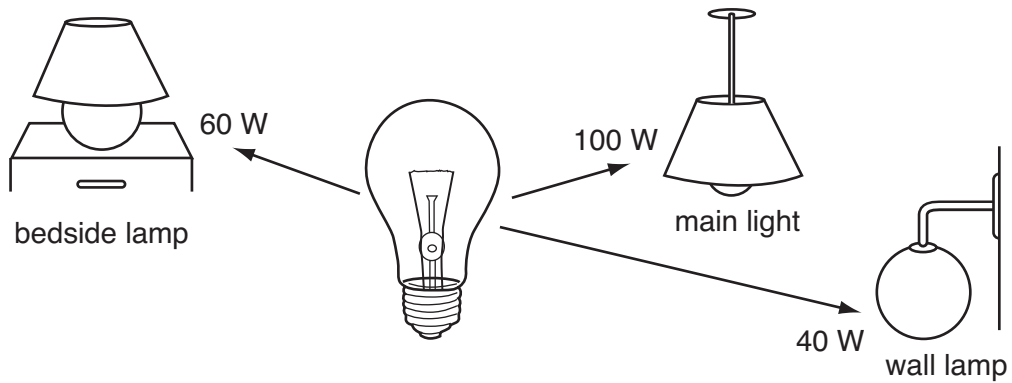
[3]

(e) Give one reason, other than cost, why stainless steel is a good material to use for making chimney liners.

.....

.....[1]

6 Eve is the manager of a hotel. She buys filament light bulbs for the hotel rooms.

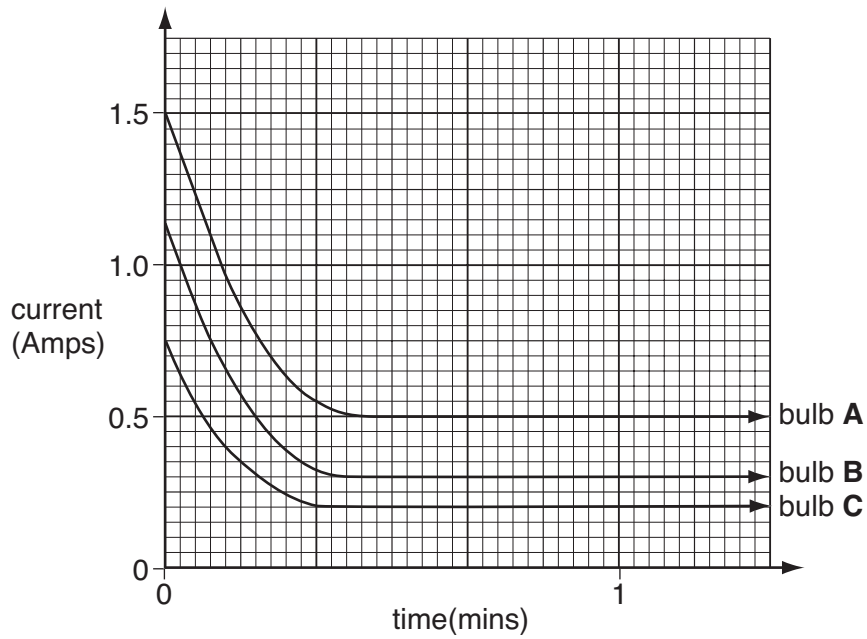


(a) Explain why different light bulbs are used in different places in the room.

.....
[2]

(b) Eve finds this graph on a website.

The graph shows how the current through three light bulbs changes **after** they light up.



What happens to the current **after** the bulbs light up?

.....
[2]

(c) The three light bulbs tested are 40W, 60W and 100W.

Which bulb on the graph, **A**, **B** or **C**, has a power of 40W? Put a ring round the correct answer.

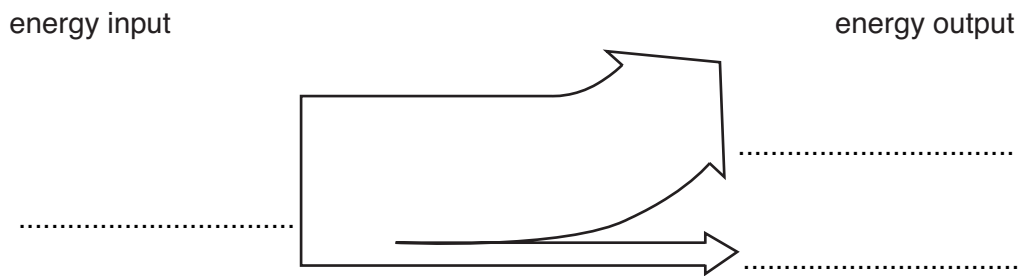
A **B** **C** [1]

(d) Use the graph to find the current flowing through bulb **A** after 1 minute.

current..... unit..... [2]

(e) Eve finds out that the efficiency of the 100W light bulb is 2%.

This diagram shows what happens to the energy when the bulb lights up.

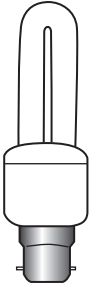
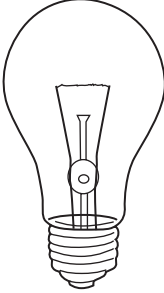


Label the diagram. Use words from this list.

You can use the same word **once**, **more than once** or **not at all**.

chemical **electrical** **heat** **light** **sound** [3]

(f) Eve wants her long-term costs for light bulbs to be cheaper. She looks at two leaflets.

Low Energy Bulb	Filament Bulb
	
Power: 10 W Energy Efficiency: 20% Price: £1.49	Power: 100 W Energy Efficiency: 2% Price: £0.50

Explain why Eve should buy the low energy bulbs.

.....

.....

.....

.....[4]

[Total: 14]

END OF QUESTION PAPER