

**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

Wednesday **14 JUNE 2006**

Morning

1 hour 30 minutes

Candidates answer on the question paper.

Calculators may be used.

Additional materials:

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 in the spaces provided on the question paper.
- 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		
<b>1</b>	<b>12</b>	
<b>2</b>	<b>9</b>	
<b>3</b>	<b>12</b>	
<b>4</b>	<b>14</b>	
<b>5</b>	<b>10</b>	
<b>6</b>	<b>13</b>	
<b>TOTAL</b>	<b>70</b>	

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

Answer all the questions.

1 Charlie designs clothes.

(a) Look at the following list of materials that she uses.

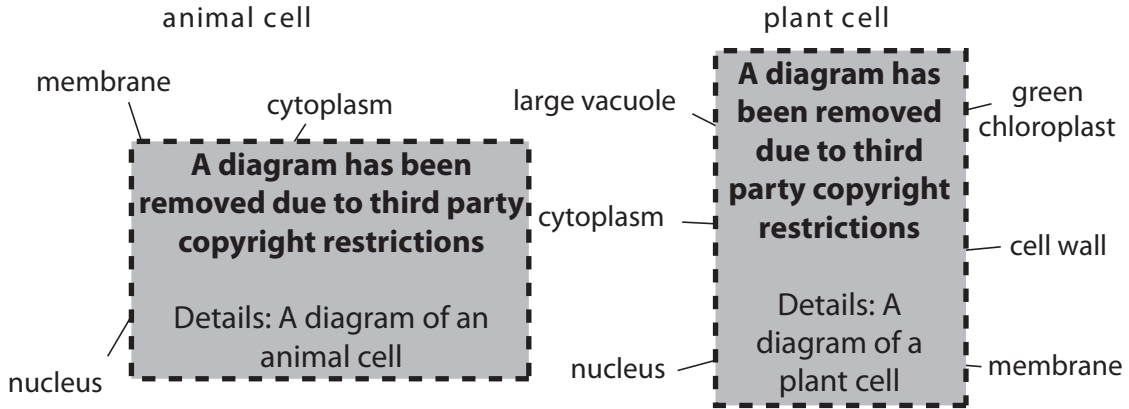
Show whether each one is obtained from an animal, a plant or is artificial.

Put ticks (✓) in the correct boxes.

	animal	plant	artificial
cotton			
leather			
nylon			
wool			

[4]

(b) Look at the diagrams of an animal cell and a plant cell.



(i) Write down three things that are in both animal and plant cells.

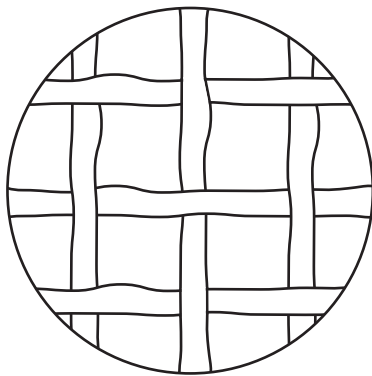
1. ....
2. ....
3. .... [2]

(ii) Write down three ways that a plant cell is **different** from an animal cell.

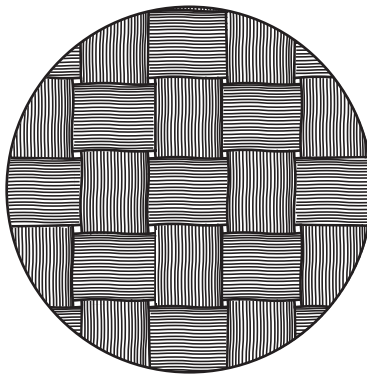
- 1. ....  
.....
- 2. ....  
.....
- 3. ....  
..... [2]

(c) Charlie wants to design new items of clothing.

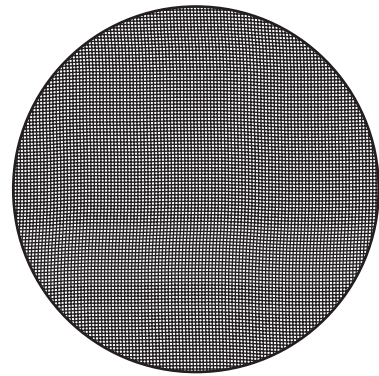
She looks at three different fabrics with a magnifying glass.



fabric A



fabric B



fabric C

(i) Suggest which fabric Charlie should choose to keep you cool.

Choose from **A**, **B** or **C**.

Explain your answer.

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

(ii) Suggest which fabric Charlie should choose to make waterproof clothing.

Explain your answer.

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

[Total: 12]

[Turn over

2 Low density poly(ethene), LDPE, is a plastic.

It was discovered in 1933 by Eric Fawcett.

(a) What is the common name for this plastic?

Put a **ring** round the correct answer.

**ethanol      polygon      polythene      methane**

[1]

(b) Twenty years later, Karl Zeigler developed high density poly(ethene), HDPE.

Look at the table.

It shows the properties of the two different materials.

property	LDPE	HDPE
stiffness	flexible	rigid
density ( $\text{g cm}^{-3}$ )	0.92	0.96
strength when pulled ( $\text{MN m}^{-3}$ )	15	29
stretch before breaking	6 times original length	3 times original length
effect of heat	softens at $90^\circ\text{C}$	no change below $200^\circ\text{C}$

(i) Plastic kettles that are used to boil water are made from HDPE.

Explain why it is better than LDPE.

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

(ii) Cling film that is used to wrap food is made from LDPE.

Explain why it is better than HDPE.

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

(iii) LDPE is made from an **organic** chemical.

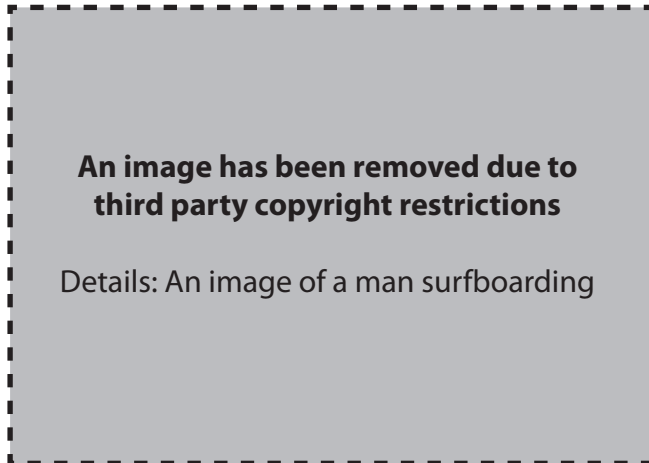
Which of the following elements is LDPE most likely to contain?

Put a **ring** round the correct answer.

**carbon      helium      lead      sulfur**

[1]

(c) Surfboards can be made from Glass Reinforced Plastic (GRP).



GRP is a composite that contains plastic and glass fibres.

(i) Explain what is meant by a composite.

.....  
..... [1]

(ii) Plastic alone would not be suitable for making surfboards.

Suggest why a composite material is better.

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

[Total: 9]

3 Dave gets a big electric bill.

He decides to check the meter reading.

Look at Dave’s electric meter.



(a) Complete the reading for the units of electricity.

LOW .....

NORMAL .....

[1]

(b) This is Dave’s electric bill.

Quarterly Electricity Statement						
New Charges						
Domestic Economy 7						
Meter Number		Present Reading	Previous Reading	kWh Used	Cost Per kWh (p)	Charge Amount (£)
32057	Night	29156	28608	548	2.5	13.7
	Day	02836	01730	1106	6.0	66.36

Use the bill to answer these questions.

(i) The bill is calculated using units called kWh.

What does kWh stand for?

..... [1]

(ii) How many units has Dave used?

night ..... kWh

day ..... kWh [1]

(iii) Suggest and explain how Dave could reduce the cost of his electricity.

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

- (c) Dave reduces the amount of electricity he uses.

His next bill shows 500 kWh used during the day.

The cost of daytime electricity is 6p per kWh.

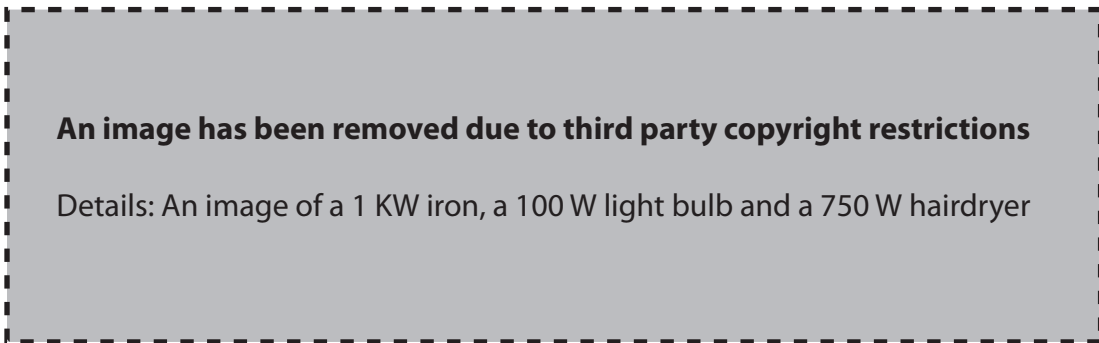
Calculate how much Dave will pay for his daytime electricity.

You are advised to show how you work out your answer.

cost of Dave's electricity £ ..... [3]

- (d) Dave looks at the cost of using three different appliances.

Put a **ring** round the appliance that costs the most to use for 30 minutes.



[1]

- (e) Dave has an electric kettle.

It has this label on the back.

Current	8.6 amps
Voltage	230 volts

Calculate the power of Dave's kettle.

You must:

- write down the correct formula
- show all of your working.



answer ..... W [3]

[Total: 12]

[Turn over

- 4 Sulfur forms in large blocks around some volcanoes.

Local people collect it and sell it to the chemical industry.



Look at the data about sulfur.

sulfur data	
formula	$S_8$
melting point	$113\text{ }^\circ\text{C}$
boiling point	$445\text{ }^\circ\text{C}$
density	$2\text{ g cm}^{-3}$

**A photograph has been removed due to third party copyright restrictions**

Details: A photograph of some sulfur

- (a) Use the data to answer the following questions.

- (i) The people carry the sulfur as solid blocks.

The daytime temperature near the volcano is around  $20\text{ }^\circ\text{C}$ .

How does the information show that sulfur is a solid at this temperature?

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

- (ii) When it reaches the chemical factory, the sulfur is heated to  $200\text{ }^\circ\text{C}$  and transported as a liquid through pipes.

How does the data show that sulfur is a liquid at  $200\text{ }^\circ\text{C}$ ?

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

- (iii) How many atoms are in one molecule of sulfur?

number of atoms ..... [1]



- (b) Finish the sentences about sulfur by putting a **ring** round the correct words.

Sulfur is an example of

**an element      a compound      a composite**

Sulfur is an example of

**a metal      a non-metal      an alloy**

[2]

- (c) The people working near the volcanoes breathe in toxic gases that come from the sulfur.

The boxes show the names and formulae of some hazardous compounds that contain sulfur.

Draw lines to connect the **name** of each compound to the correct **formula**.

name	formula
sulfur trioxide	$H_2SO_4$
sulfuric acid	$H_2S$
hydrogen sulfide	$SCl_2$
sulfur dichloride	$SO_3$

[3]

- (d) One of the toxic gases from volcanoes is sulfur dioxide.

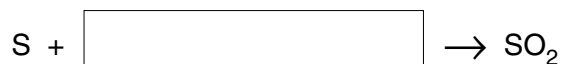
Sulfur dioxide is made when sulfur burns and reacts with oxygen in the air.

- (i) Complete the equations to show what happens when sulfur burns.

**WORD EQUATION**



**SYMBOL EQUATION**



[3]

- (ii) Put a **ring** round the part of the body that could be damaged by breathing in sulfur dioxide.

**artery**

**atrium**

**plasma**

**thorax**

[1]

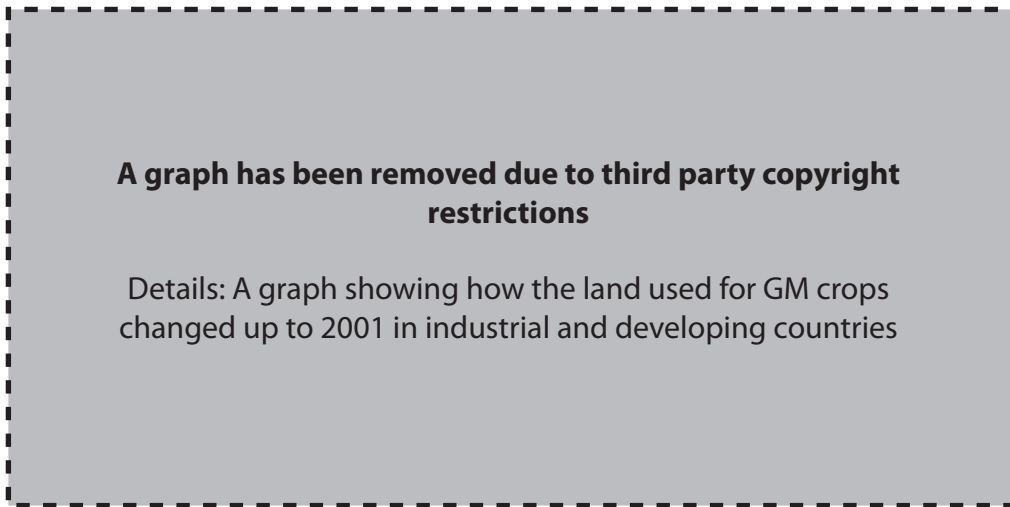
[Total: 14]

[Turn over

5 Genetic engineering produces genetically modified (GM) crops.

The graph shows how the land used for GM crops changed up to 2001.

Look at the graph.



(a) The pattern of land use varies between the types of countries.

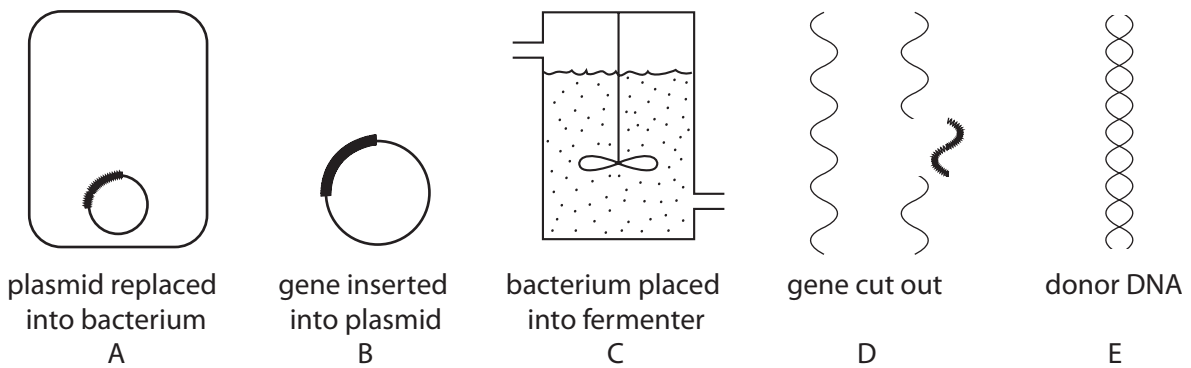
Give one similarity and one difference.

similarity ..... [1]

difference ..... [1]

(b) The diagrams show how genetic engineering can be done in bacteria.

They are in the wrong order.



Write down the letters in the correct order.

The first one has been done for you.

E ..... [3]

(c) Genetic engineering has potential benefits and risks.

Look at the table about genetic engineering.

Put a tick (✓) in the correct box to show if each statement is:

- a benefit
- a risk
- neither a benefit or a risk.

The first one has been done for you.

statement	benefit	risk	neither
medical drugs can be made more cheaply	✓		
produces new treatments for disease			
enzymes are used to insert the gene			
inserted genes may have unknown side effects			
medical drugs can be made more quickly			

[4]

(d) Ethical arguments are sometimes used against genetic engineering.

Give an example of an **ethical** argument against genetic engineering.

.....

.....

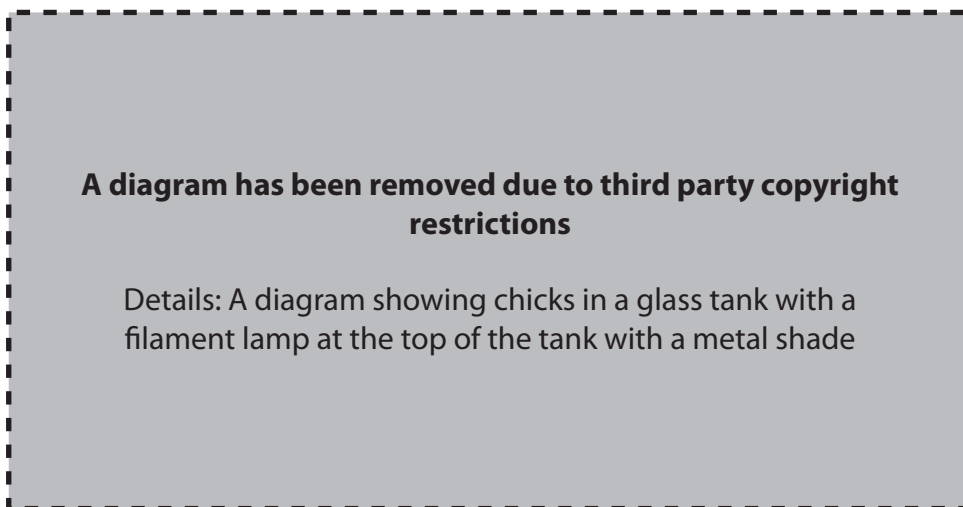
..... [1]

[Total: 10]

6 A farmer sets up a tank for new born chicks.

The tank uses a filament lamp under a metal shade to warm the chicks.

The diagram shows what happens in the tank.



(a) (i) Look at the boxes below. Draw lines to show the main way the heat energy is transferred between the different parts.

parts	how the heat energy is transferred
from lamp to chicks	radiation
through the metal parts of the lamp	convection
around the glass tank	conduction

[2]

(ii) The metal parts of the lamp get very hot but the glass tank only gets warm.

Use ideas about energy transfer to explain why.

.....

.....

.....

..... [2]

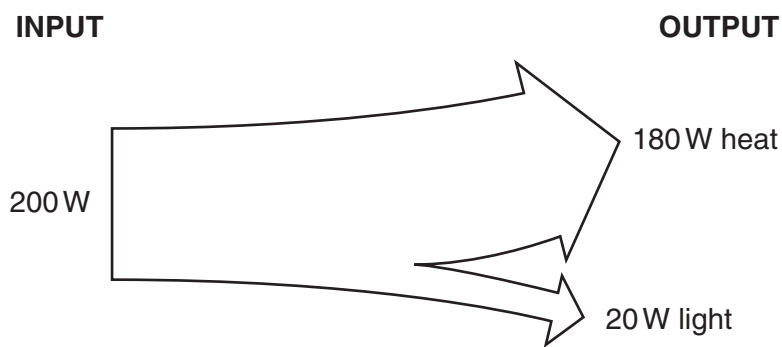
(b) The farmer finds that the chicks near the sides of the tank are too cold.

Suggest ways that the farmer could cut down the amount of heat escaping from the tank.

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

(c) The farmer wants to know how efficient the lamp is at **heating the tank**.

He finds this diagram showing the power inputs and outputs of the lamp.



Work out the percentage efficiency of the lamp.

efficiency ..... % [2]

**Turn over for the remainder of question 6.**

[Turn over

(d) The chick tank is inside a large chicken shed.

The farmer buys low energy bulbs for the main lights in his chicken shed.

What are the advantages of using low energy bulbs for lighting?

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

(e) Suggest a reason why low energy bulbs would **not** be a good choice for using in the chick tank.

..... [1]

[Total: 13]

**END OF QUESTION PAPER**

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