

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 **18 JANUARY 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

--	--	--	--	--	--	--	--

Candidate
Number

--	--	--	--	--

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.**

FOR EXAMINER'S USE		
1	11	
2	12	
3	9	
4	12	
5	14	
6	12	
TOTAL	70	

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.

This question paper consists of 16 printed pages.

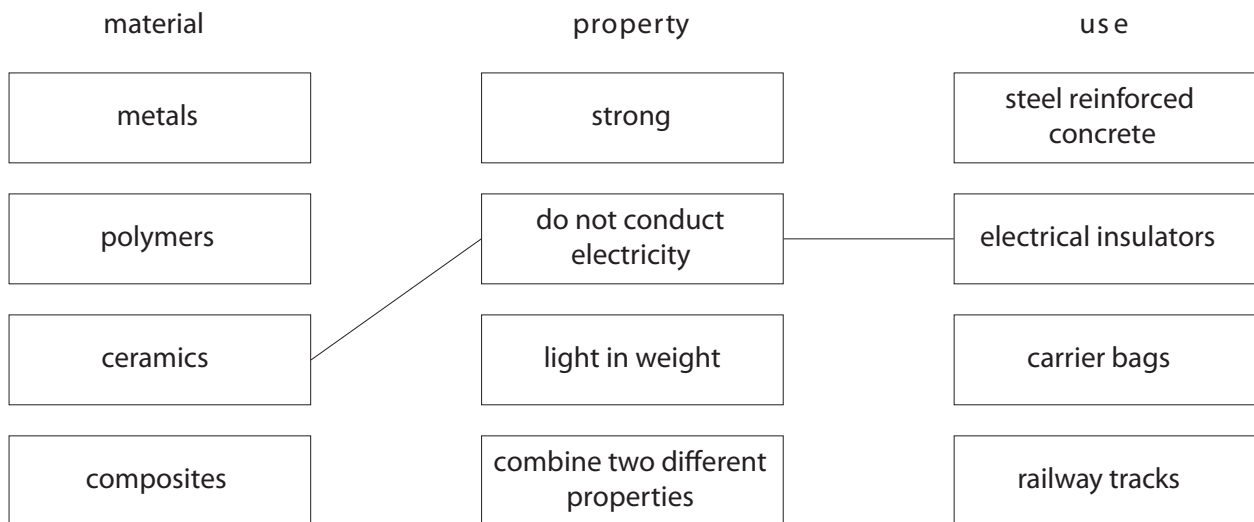
Answer all the questions.

- 1 (a) Different materials have different properties.

Engineers use these properties to decide which material to use.

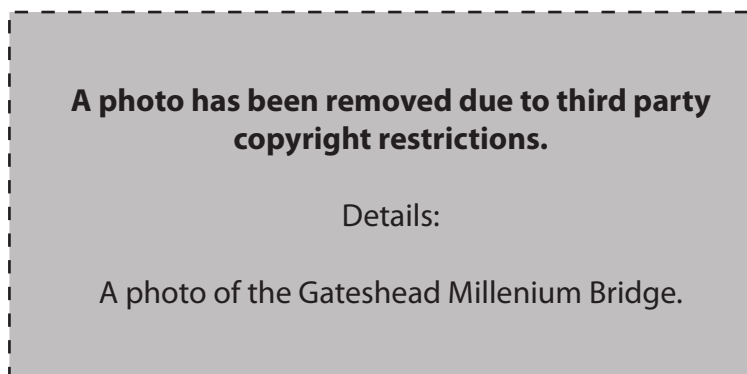
Draw a straight line to join each property to the correct material and use .

One has been done for you.



[6]

- (b) Davina is an engineer who worked on the Gateshead Millennium Bridge.



Davina chose the material to make the main structure of the bridge.

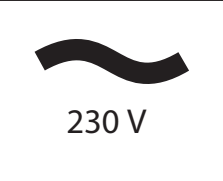


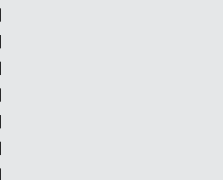
Put **(rings)** round two of the words that describe a useful property of this material.

brittle conductor light soft strong

[1]

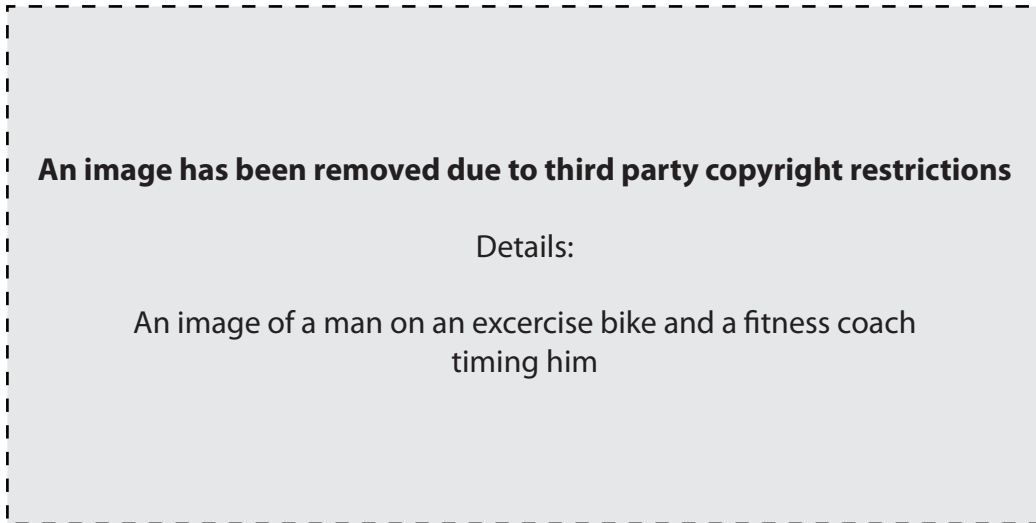
- (c) The bridge needs to be raised to let ships through.
A student is doing a project about the bridge.
He asks Davina about sources of energy for raising the bridge.
Look at the student's notes.
Complete the statements to show her reasoning.

Images of the items labelled have been removed due to third party copyright restrictions

method	explanation
 230 V mains powered electric motor	best method because
 battery powered motor	not a good idea because
 hand winch	not a good idea because
 steam powered	not a good idea because

2 Luke is in a cycling club.

He trains every day with a fitness coach.



(a) Complete the sentences to describe what is happening in Luke's body.

Use the following words.

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

aerobic anaerobic decreases energy glucose increases lactic oxygen

When Luke trains, his breathing rate

This helps to supply more to his muscles.

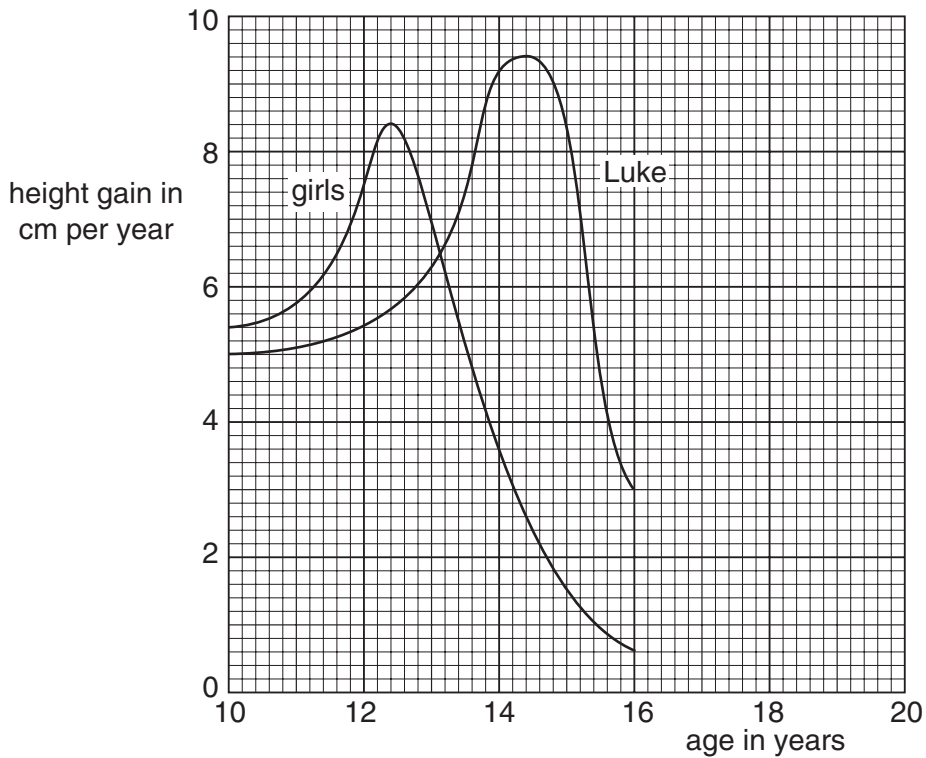
His muscles break down to release

After training hard for several minutes, his muscles do not get sufficient oxygen.

They now produce acid.

This is called respiration and causes an oxygen debt.

- (b) The graph shows how Luke’s gain in height compares with the average gain in height for one thousand girls.



- (i) In year 20, the gain in height of both Luke and the girls is 0.2 cm.
Plot this on the grid and complete the lines of the graph. [2]

- (ii) Look at the graph.
It shows similarities and differences in the growth patterns of Luke and the girls.
Describe these.

similarities.....
.....
differences

- (iii) Luke thinks that the graph shows that his gain in height is above average.
Explain why this is not a good conclusion.

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

- (iv) The coach wants to know Luke’s height when he was ten.
State why it is not possible to read Luke’s **actual** height from the graph.

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

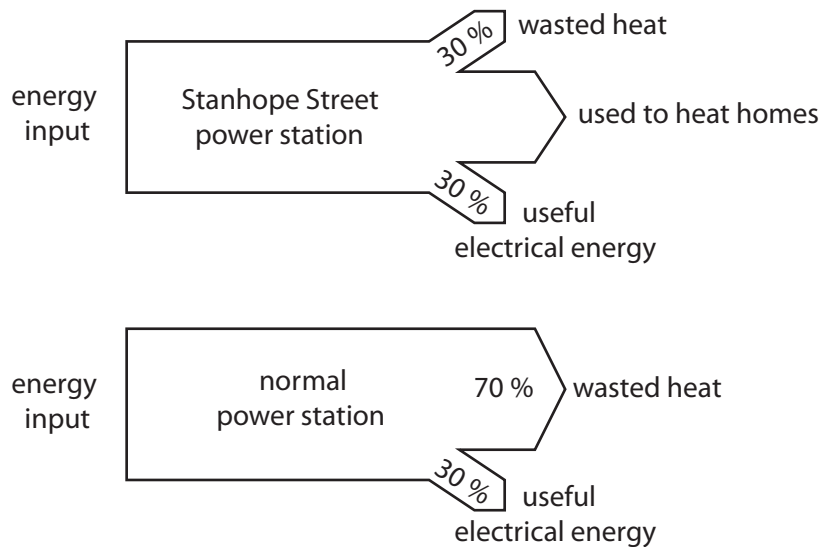
3 People on Stanhope Street pay only a small amount to heat their homes.



They use some of the wasted heat from their local power station.

(a) Look at the energy diagrams.

They compare the energy output from the Stanhope Street power station to a normal power station.



(i) What percent of energy from the power station is used to heat people's homes in Stanhope Street ?

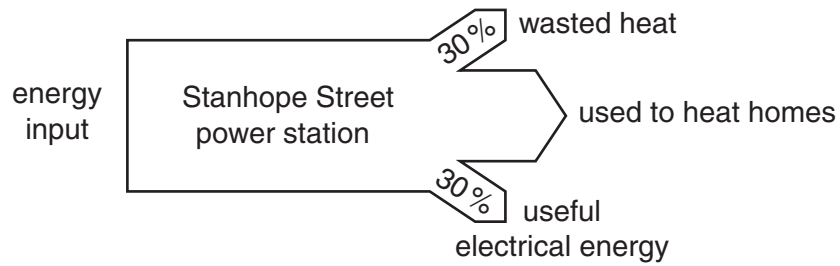
..... % [1]

(ii) What happens to this energy in a normal power station?

..... [1]

(b) The Stanhope Street power station is much more efficient.

Look at the energy diagram for Stanhope Street.



Calculate the **total** efficiency of Stanhope Street power station.

You are advised to show your working.

efficiency = % [2]

(c) Stanhope Street power station has reduced carbon dioxide emissions by 4 200 tonnes per year.

Describe the advantage of this to the environment.

You should include ideas about:

- global warming
- polar ice caps
- weather patterns.

.....

 [3]

(d) Most power stations burn coal, oil or gas.

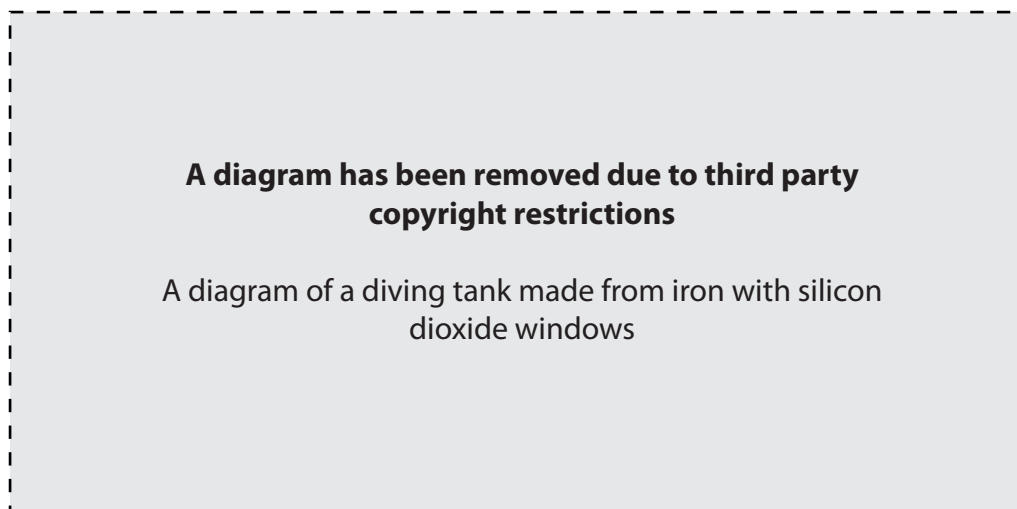
Suggest how electricity will be generated when these fuels are all used up.

.....

 [2]

4 In the 1930s, two men went on the first deep-sea dives.

They used a diving tank to go down 900 m.



(a) Use the substances in **bold type** on the diagram to help you answer the following questions.

(i) Name a **compound** from the diagram.

..... [1]

(ii) Name a **mixture** from the diagram.

..... [1]

(iii) Name an **element** from the diagram and give the element **symbol** .

element name symbol [1]

(b) Give one **advantage** and one **disadvantage** of using iron to make diving tanks for using in the sea.

advantage

disadvantage [2]

- (c) The dive took several hours.

The divers were worried that there would be a dangerous build up of carbon dioxide in the air in the tank.

- (i) What process in the divers' body produces carbon dioxide?

..... [1]

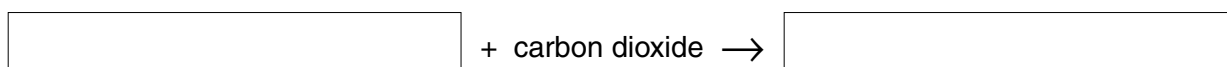
- (ii) The divers put trays of sodium oxide in the diving tank.

The sodium oxide got rid of all the carbon dioxide by reacting with it.

This is part of the equation for the reaction.

Finish the equations by filling in the empty boxes.

WORD EQUATION



SYMBOL EQUATION



[3]

- (iii) What happens to the mass of the tray of sodium oxide when it reacts with carbon dioxide in the tank?

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

gets lighter

gets heavier

stays the same

[1]

- (d) Diving deeper in the sea takes more time and the sea pressure gets much higher.

Suggest **two** reasons why it would not be safe for this diving tank to dive any deeper.

.....

..... [2]

[Total: 12]

5 The World Health Organisation records outbreaks of 'flu in different countries.

(a) Look at the map. It shows information about outbreaks of 'flu in Europe in 2002.



(i) Countries that recorded a large amount of 'flu tend to be close together.

Explain why.

.....

.....

..... [2]

(ii) One country on the map registered no 'flu.

Does that mean that no one caught 'flu in that country during that period?

Explain why.

.....

.....

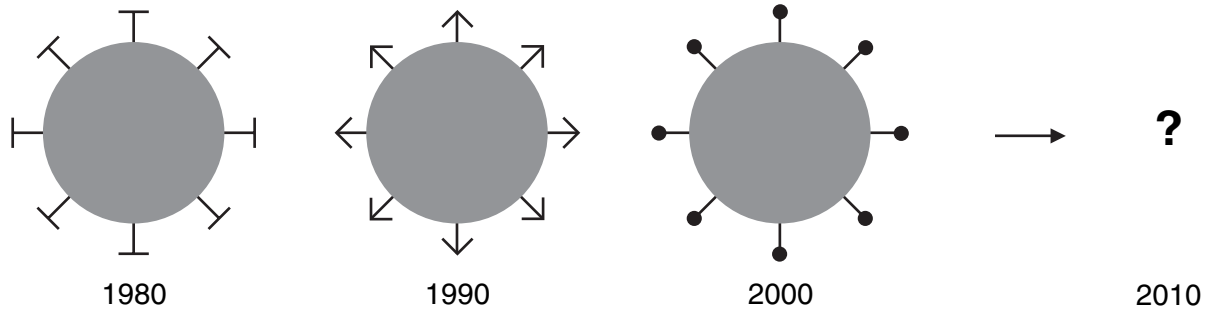
..... [2]

(b) Some people have a vaccination to protect them from 'flu.

They need a different 'flu vaccination **each year**.

Explain why.

Use your knowledge of vaccinations and the following diagrams of a 'flu microorganism to help you.



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

(c) The following types of microorganisms can all cause disease.

Put a tick (✓) in the box next to the one that causes measles.

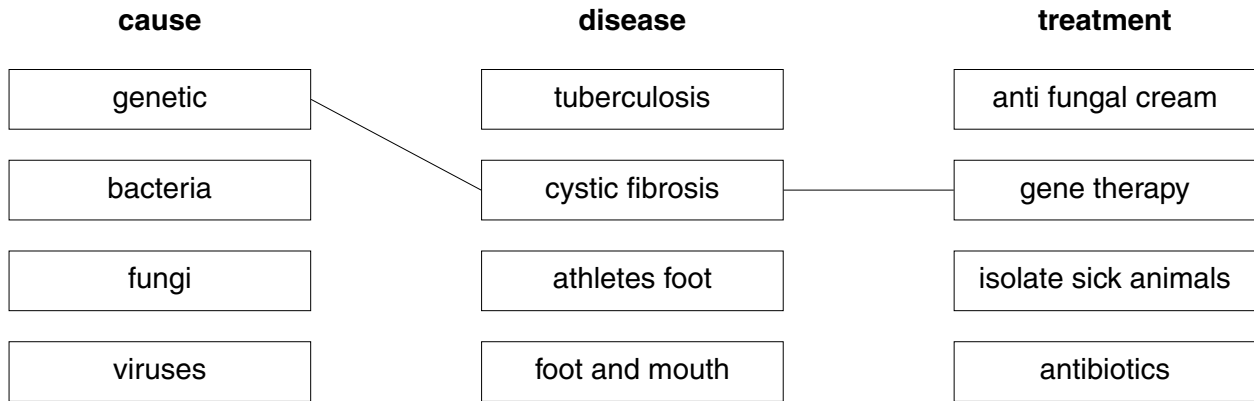
- bacteria
- fungi
- viruses

[1]

(d) Different microorganisms cause different diseases and have different treatments.

Draw a straight line from each **disease** to its correct **cause** and to its best **treatment**.

The first one has been done for you.



[6]

[Total: 14]

6 Mary is a lecturer at a technical college.

(a) She makes a crossword about energy for her students.

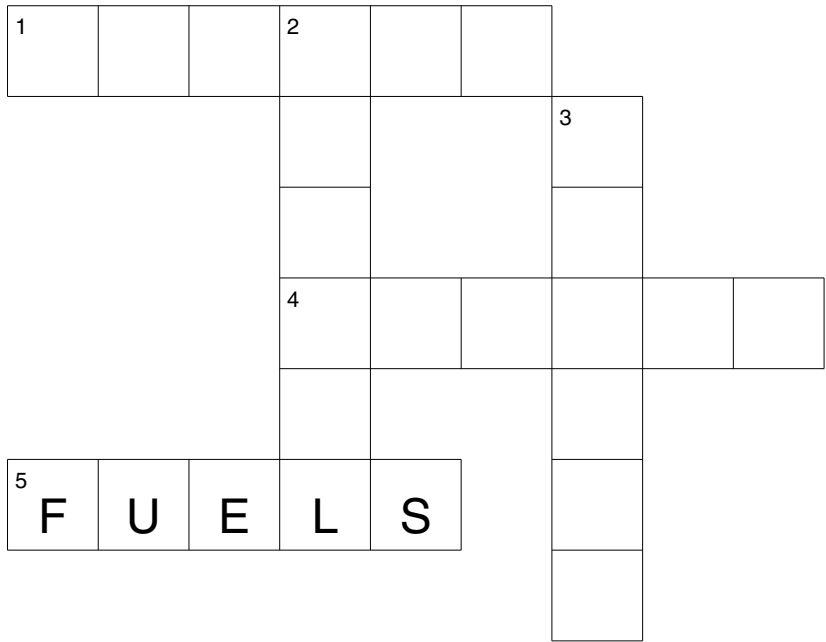
Complete Mary's crossword.

One has been done for you.

Choose from the following words.

Each word may be used once, more than once, or not at all.

energy fossil fuels safely solids spread useful wasted



Across

- 1 energy that is not wasted
- 4 energy is less useful when it is out
- 5 concentrated sources of energy

Down

- 2 this type of fuel will eventually run out
- 3 obtained from fuels

[4]

(b) Mary teaches her students about energy efficiency.

There are **two** different meanings of energy efficiency.

Put a tick (✓) in the **two** boxes, next to the **two** correct meanings.

Energy efficiency is getting as much oil out of the ground as possible.

Energy efficiency is converting as much of the energy in fuel into useful energy as possible.

Energy efficiency is burning as much coal as possible.

Energy efficiency is being able to use as many different kinds of fuels as possible.

Energy efficiency is reducing energy losses such as heat as much as possible.

[2]

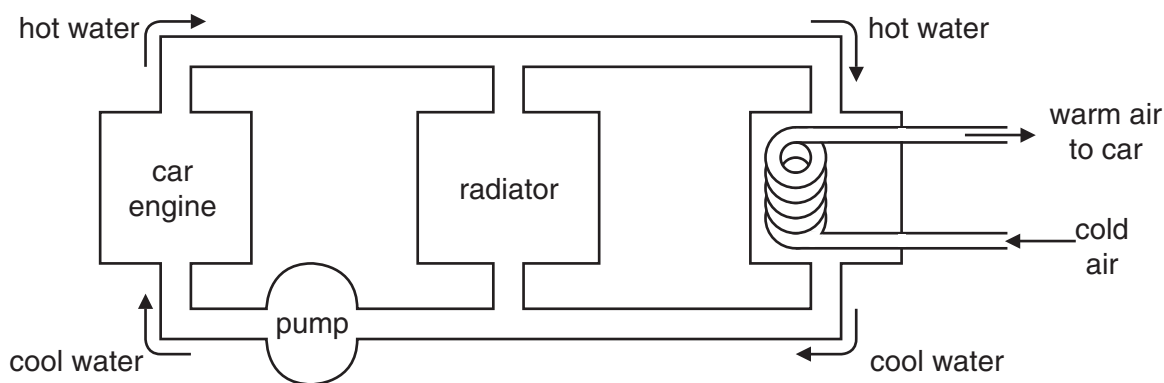
(c) Car engines get hot.

Heat must be removed from the engine.

The heat can be:

- used to warm the **inside** of the car
- given to the air **outside** the car by the radiator.

A heat exchanger is used to provide heat for the **inside** of the car.



(i) On the diagram above, put a **(ring)** round the heat exchanger. [1]

(ii) When the heater is on, the percentage energy efficiency of the engine increases.

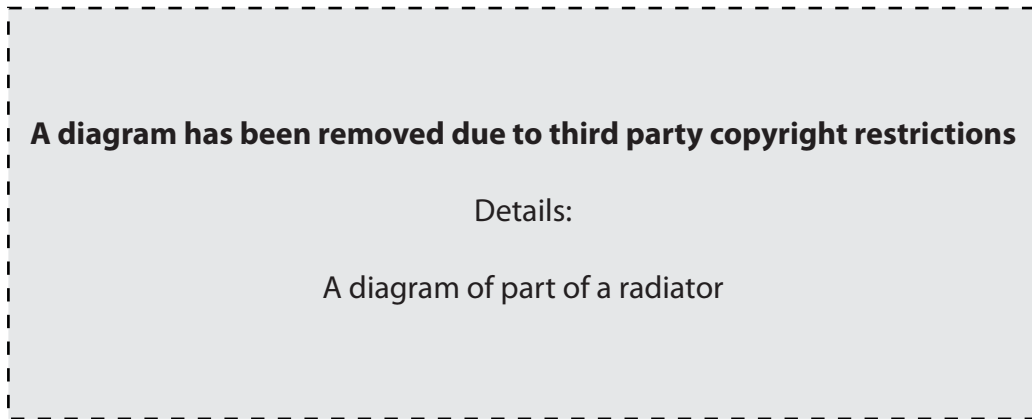
Explain why.

.....

.....

..... [2]

(d) The diagram shows part of a radiator.



It is made of metal .

It has lots of fins which increase the surface area.

There are gaps between the fins.

Explain how this design helps to cool the water.

Use ideas about conduction, convection and radiation to help you answer the question.

.....

.....

.....

.....

..... [3]

[Total: 12]

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