

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2012

Science A 1

SCA1FP

Unit 5

F

Tuesday 12 June 2012 9.00 am to 10.30 am

For this paper you must have:

- a ruler
- the Chemistry Data Sheet and Physics Equations Sheet Booklet (enclosed).
You may use a calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 17 should be answered in continuous prose.
In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
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TOTAL	



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SCA1FP

Answer **all** questions in the spaces provided.

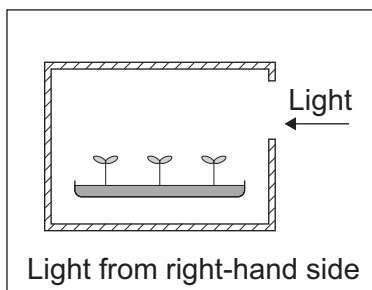
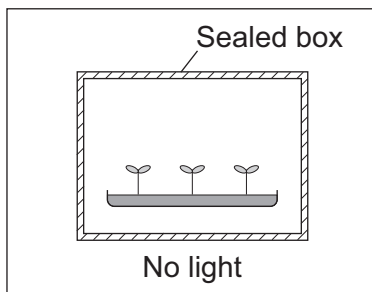
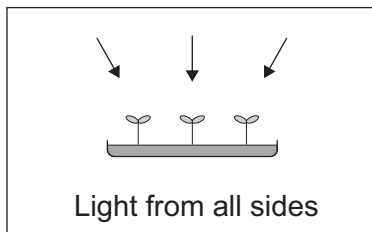
Biology Questions

- 1 (a) Identical dishes of cress seedlings were put in different conditions as shown in the diagrams in **List A**.

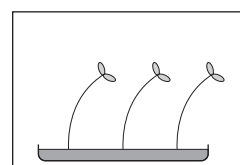
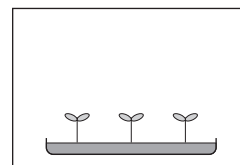
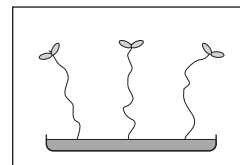
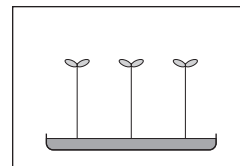
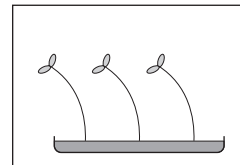
List B shows the possible appearance of each dish of seedlings after a few days.

Draw **one** line from each condition in **List A** to the appearance of the seedlings after a few days in **List B**.

List A Condition



List B Appearance after a few days



(3 marks)



1 (b) (i) Draw a ring around the correct answer in the box to complete the sentence.

The response of plants to light is called

- geotropism.
- photosynthesis.
- phototropism.

(1 mark)

1 (b) (ii) Complete the following sentence.

The response of plants to light is controlled by a hormone called

(1 mark)

5

Turn over for the next question

Turn over ►



2 Drugs affect our body chemistry.

2 (a) **List A** gives the names of some drugs.
List B gives the uses of some drugs.

Draw **one** line from each drug in **List A** to the use of the drug in **List B**.

List A Drug	List B Use
Anabolic steroid	To increase fertility in women
Statin	To treat leprosy
Thalidomide	To stimulate muscle growth
	To reduce the risk of heart and circulatory diseases

(3 marks)

2 (b) A new drug was trialed on 80 healthy volunteers.
The volunteers were asked to report any side effects.

The results of the trial are shown in the table.

Reported effects	Number of volunteers
No side effects	20
Severe sickness	42
Itchy skin	18



Based on the results of this trial, what should the drug company do next?

Tick (✓) **one** box.

Test on a small group of patients to find the optimum dose

Test on a large group of patients to see if the drug works on ill people

Stop the trial

Give a reason for your answer.

.....
.....

(2 marks)

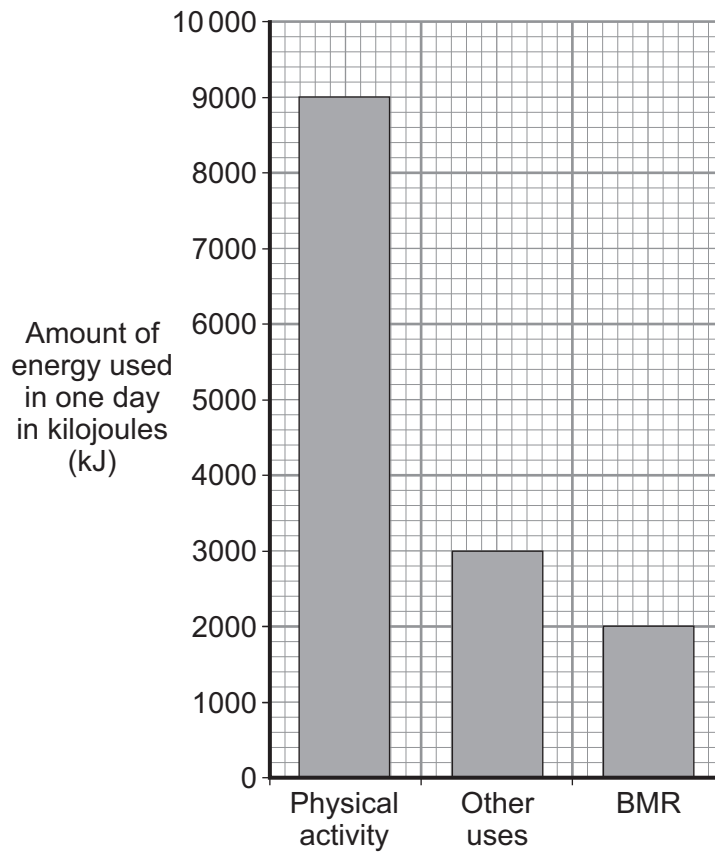
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Turn over ►



- 3 (a)** The bar chart shows the amount of energy an active young man uses each day.
 BMR is the amount of energy needed for essential body processes.



- 3 (a) (i)** Calculate the total amount of energy the young man uses in one day.

Show clearly how you work out your answer.

.....

Total amount of energy used = kJ
 (1 mark)

- 3 (a) (ii)** Suggest what would happen to the young man if he takes in 15000 kJ of energy each day for a month.

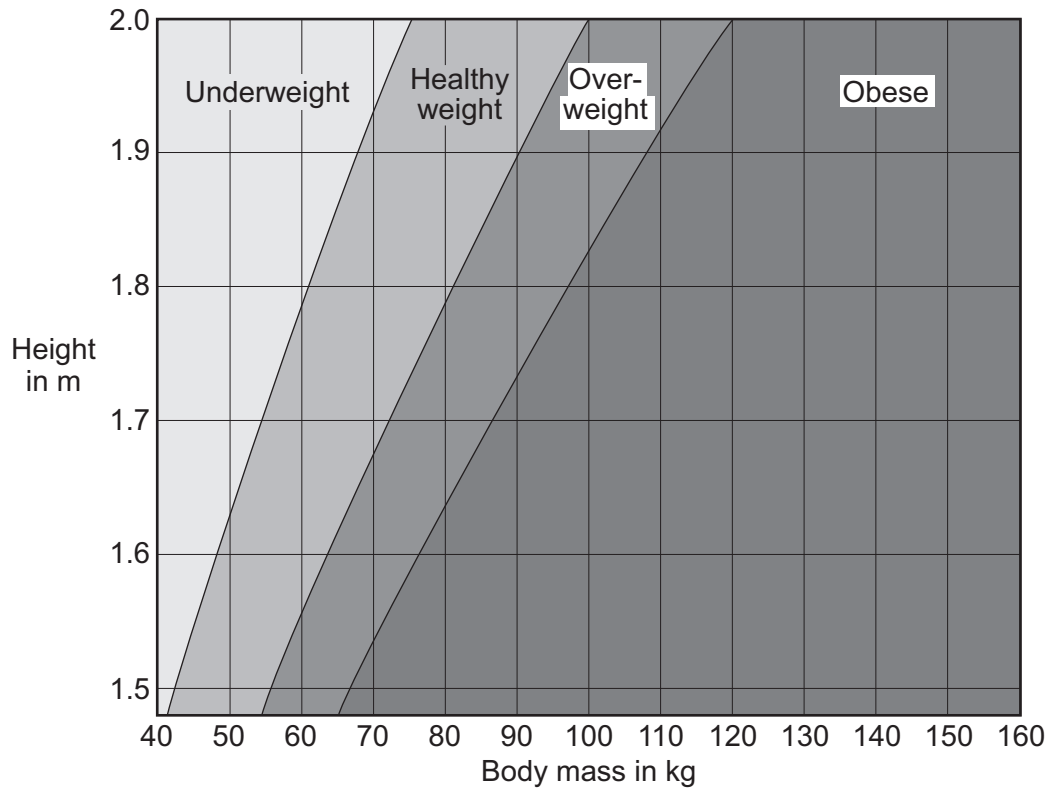
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(1 mark)



3 (b) An obesity chart is used to find if a person has a healthy weight.

Obese people are very overweight.



Draw a ring around the correct answer in each box to complete each sentence.

3 (b) (i) A girl has a mass of 65kg and a height of 1.7 m.

The girl
 is underweight.
 has a healthy weight.
 is overweight.

(1 mark)

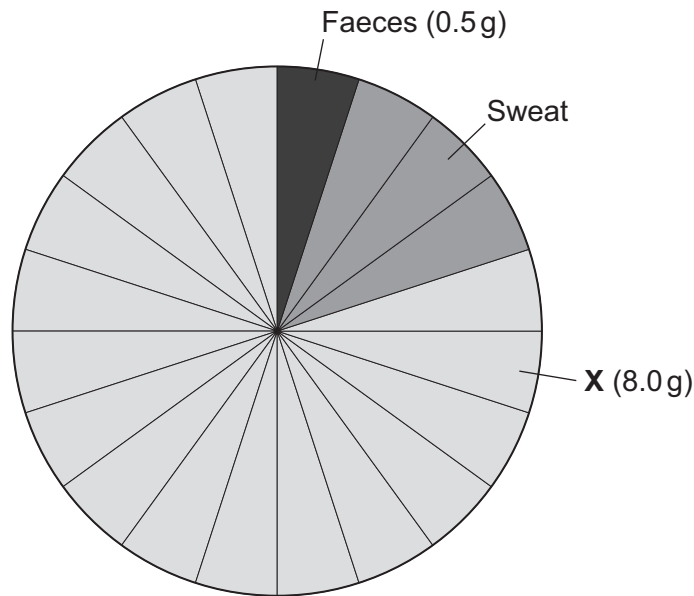
3 (b) (ii) Based on the obesity chart a doctor would probably advise her to

carry on as normal.
 do less exercise.
 eat more food.

(1 mark)



- 4** To stay healthy, the sodium ions in the body must stay at the correct concentration.
A healthy boy eats 10 grams of sodium ions in a day.
The pie chart shows the mass of sodium ions lost from his body in one day.



- 4 (a) (i)** The pie chart shows that most sodium ions are lost from his body in **X**.

What is **X**?

.....
(1 mark)

- 4 (a) (ii)** How many grams of sodium ions are lost from his body in sweat?

.....

Answer = grams
(1 mark)

- 4 (b)** The boy runs a long race on a hot day.

- 4 (b) (i)** How will this affect the mass of sodium ions he loses in his sweat?

.....

.....
(1 mark)



4 (b) (ii) Suggest what the boy should do after the race to make sure that his body contains the correct concentration of sodium ions.

.....
.....

(1 mark)

4 (b) (iii) Describe how **one** other internal condition may change when the boy runs a long race.

Explain what the boy should do after the race to bring this internal condition back to normal.

.....
.....
.....
.....
.....
.....

(3 marks)

7

Turn over for the next question

Turn over ►



Chemistry Questions

- 5** Gold, silver and bronze medals were made for a competition.



- 5 (a)** Draw a ring around the correct answer in each box to complete each sentence.

- 5 (a) (i)** Gold is found as a pure metal in the Earth because gold is

coloured.
reactive.
unreactive.

(1 mark)

- 5 (a) (ii)** Gold is an element because all of its

atoms
molecules
symbols

are the same.

(1 mark)



- 5 (b)** The atomic number of silver is 47.
The mass number of a silver atom is 108.

Use this information to work out the number of protons and neutrons in a silver atom.

Draw **one** line from each particle in **List A** to the correct number in **List B**.

List A Particle	List B Number
Proton	47
Neutron	61
	108

(2 marks)

- 5 (c)** Bronze is an alloy of copper and tin.

- 5 (c) (i)** What is an alloy?

.....
.....

(1 mark)

- 5 (c) (ii)** Medals made of copper or bronze cost the same.

Bronze is used to make medals instead of pure copper.

Give **one** reason why.

.....
.....

(1 mark)

6

Turn over for the next question

Turn over ►



6 Limestone is a rock. Many buildings and statues are made from limestone.
The picture shows a limestone quarry.



6 (a) A company wants to open a limestone quarry.

6 (a) (i) Some local people want the quarry to be opened.

Suggest **one** reason why.

.....
.....

(1 mark)

6 (a) (ii) Other local people do **not** want the quarry to be opened.

Suggest **one** reason why.

.....
.....

(1 mark)



6 (b) Limestone is used to produce other materials.

Draw a ring around the correct answer in each box to complete each sentence.

6 (b) (i) Limestone is mainly made of

CaCO₃

CuCO₃

ZnCO₃

(1 mark)

6 (b) (ii) When limestone is heated it forms a metal oxide and a gas.

The gas is

carbon dioxide.

carbon monoxide.

oxygen.

(1 mark)

6 (b) (iii) This type of reaction is called

combustion.

decomposition.

oxidation.

(1 mark)

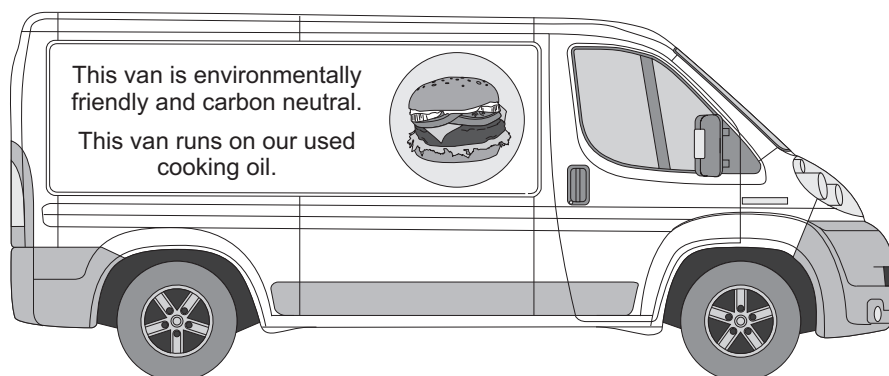
5

Turn over for the next question

Turn over ►



- 7 A burger van has a sign on the side.



The company uses cooking oil to make biodiesel, which is a type of biofuel.

- 7 (a) Tick (✓) **two** correct statements about biofuels.

Statement	Tick (✓)
They are made from plants.	
They are made from crude oil.	
They are renewable resources.	
Hydrogen is a biofuel.	

(2 marks)

- 7 (b) Ethanol (C_2H_5OH) is a biofuel made from sugar cane.

Complete the table below to show the number of atoms of each element in the formula of ethanol.

Carbon has been completed for you.

Element	Number of atoms of each element in the formula C_2H_5OH
Carbon, C	2
Oxygen, O	
Hydrogen, H	

(2 marks)



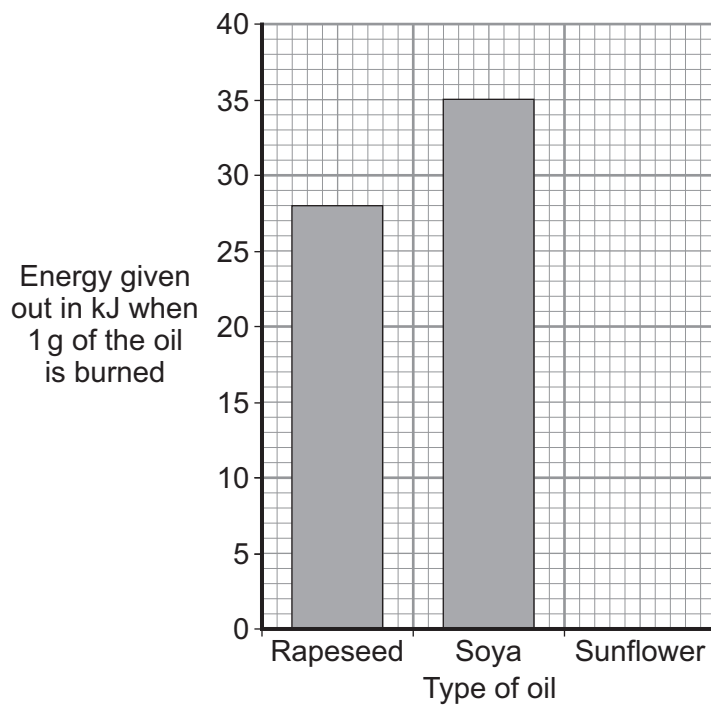
7 (c) Biodiesel can be made from different oils.

A student investigated the energy given out when three different oils were burned.

The energy each oil gives out is shown in the table below.

Oil	Energy given out in kJ when 1 g of the oil is burned
Rapeseed	28
Soya	35
Sunflower	30

The student used the results to draw a bar chart.



7 (c) (i) Draw the bar for sunflower oil on the bar chart.

(1 mark)

Question 7 continues on the next page

Turn over ►



7 (c) (ii) To help you answer this question, the table from the previous page is repeated here.

Oil	Energy given out in kJ when 1 g of the oil is burned
Rapeseed	28
Soya	35
Sunflower	30

Rapeseed is a crop that is widely grown in Britain. Rapeseed has yellow flowers. Sunflower and soya are not widely grown crops in Britain.

A British company decides to make biodiesel from rapeseed oil.

Suggest **one** advantage and **one** disadvantage to the company of using rapeseed oil to make biodiesel.

Use only the information given on this page to help you answer the question.

Advantage

.....

Disadvantage

.....

(2 marks)



- 7 (d)** A scientist investigated the emissions from biodiesel and petroleum diesel.
- The scientist burned the same mass of each fuel in a diesel engine.
- The scientist compared the emissions produced.
- The results are shown in the table below.

	Biodiesel	Petroleum diesel
Carbon dioxide emitted in g	3000	3000
Unburnt fuels emitted in g	7	10
Soot emitted in g	6	12

The scientist also compared the amount of sulfur in the fuels.

The sulfur content in biodiesel was 0.0001 % and the sulfur content in petroleum diesel was 0.001 %.

Which of the two fuels causes more damage to the environment?

Use the information given to support your answer.

.....

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(3 marks)

10

Turn over for the next question

Turn over ►



Physics Questions

- 8** A battery powered electric fan is used to move air around a room.



- 8 (a)** Use words from the box to complete each sentence.

chemical**light****kinetic****electrical****sound**

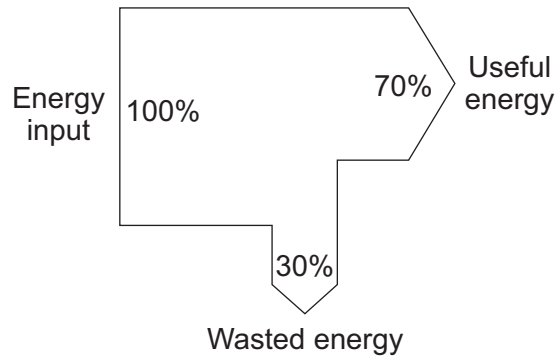
In the batteries, energy is transferred to
..... energy in the wires.

The fan has energy as it rotates.

(3 marks)



- 8 (b)** The Sankey diagram shows how much energy is usefully transferred when the fan is being used.



- 8 (b) (i)** What is the efficiency of the fan?

.....
(1 mark)

- 8 (b) (ii)** Draw a ring around the correct answer in the box to complete the sentence.

All of the energy from the fan is eventually transferred to the surroundings.

This makes the temperature of the surroundings

increase.
decrease.
stay the same.

(1 mark)

5

Turn over for the next question

Turn over ►



9 Convection is an important energy transfer.

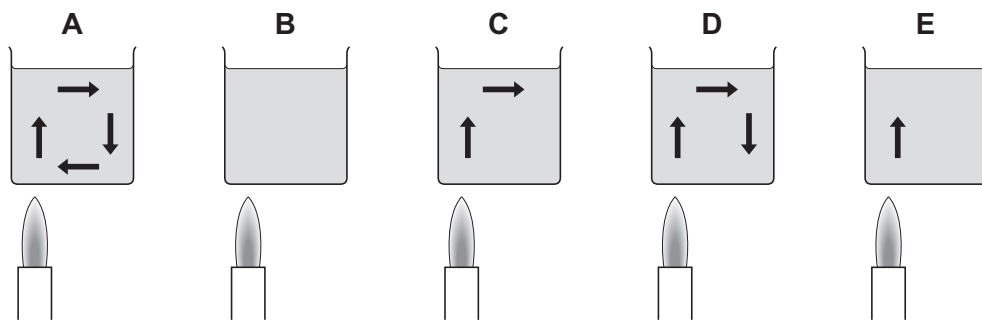
9 (a) Complete the following sentence.

Convection only happens in and
because the particles in these states are free to move around.

(2 marks)

9 (b) A Bunsen burner is used to heat a beaker of water.
The energy is transferred through the water by a convection current.

The arrows on the diagrams show the movement of water as it is heated.
The diagrams are **not** in order.



Complete the sequence below to put the diagrams in the correct order.

The first and last boxes have been completed for you.



(2 marks)

4



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ANSWER IN THE SPACES PROVIDED**

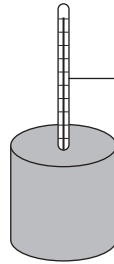
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10

A student investigated how surface area affects the time taken for an object to cool. The student made three shapes **A**, **B** and **C**, from modelling clay. Each shape used the same volume of modelling clay.

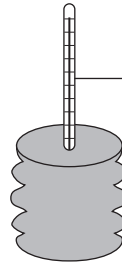
Shape A



Thermometer

Surface area: 188 cm²

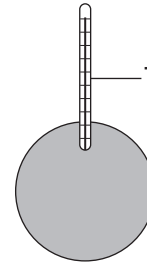
Shape B



Thermometer

Surface area: 255 cm²

Shape C

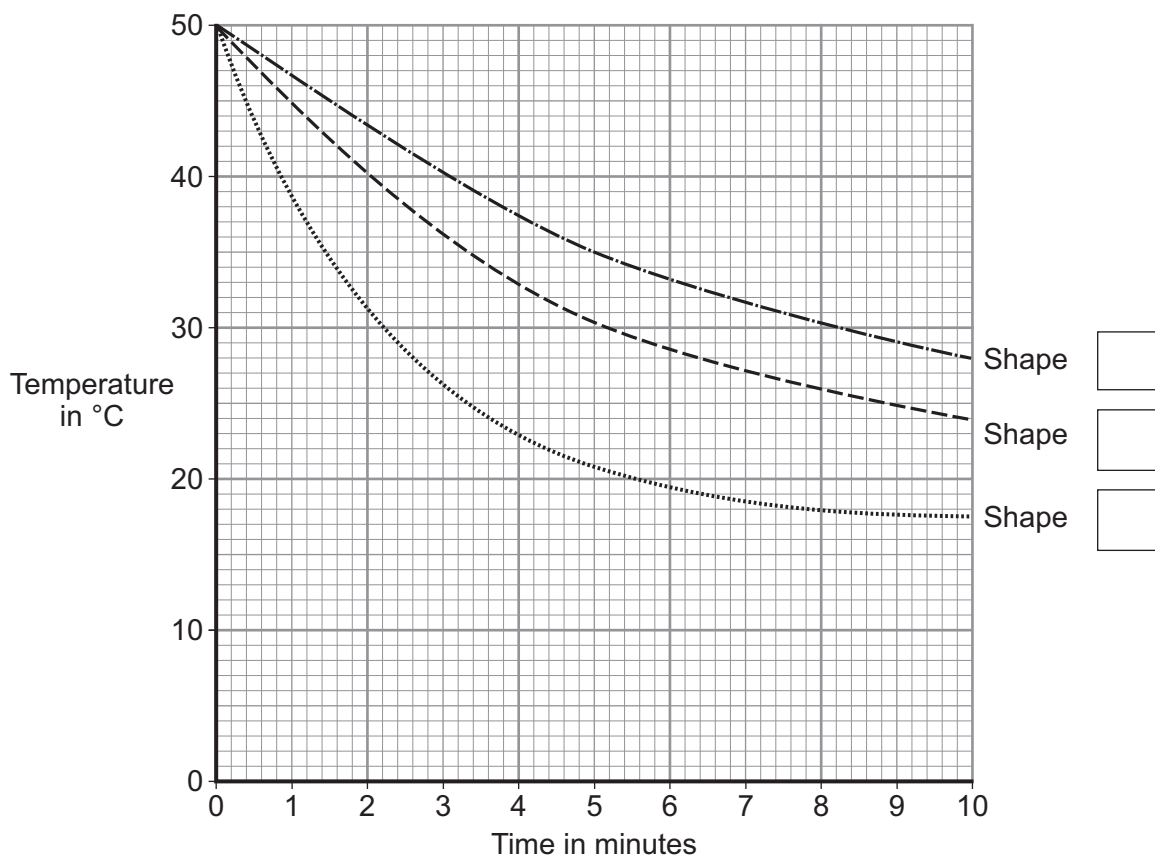


Thermometer

Surface area: 165 cm²

Each shape was heated up to 50 °C. The shapes were then allowed to cool down. The temperature of each shape was recorded every minute for 10 minutes.

The graph shows the student's results.



10 (a)

Label each line on the graph with the correct shape **A**, **B** or **C**.

(2 marks)



10 (b) (i) Between which times do **all** the shapes cool fastest?

Draw a ring around the correct answer.

0–2 minutes

4–6 minutes

8–10 minutes

(1 mark)

10 (b) (ii) Why did the shapes cool the fastest between the times you have chosen in part **(b)(i)**?

Tick (✓) **one** box.

Explanation	Tick (✓)
There is a small temperature difference between the three shapes	
There is a big temperature difference between the shapes and the surroundings	
There is no temperature difference between the room and the outside	

(1 mark)

10 (c) Give **two** ways to increase the rate of energy transfer from shape **C** to the surroundings.

1

2

(2 marks)

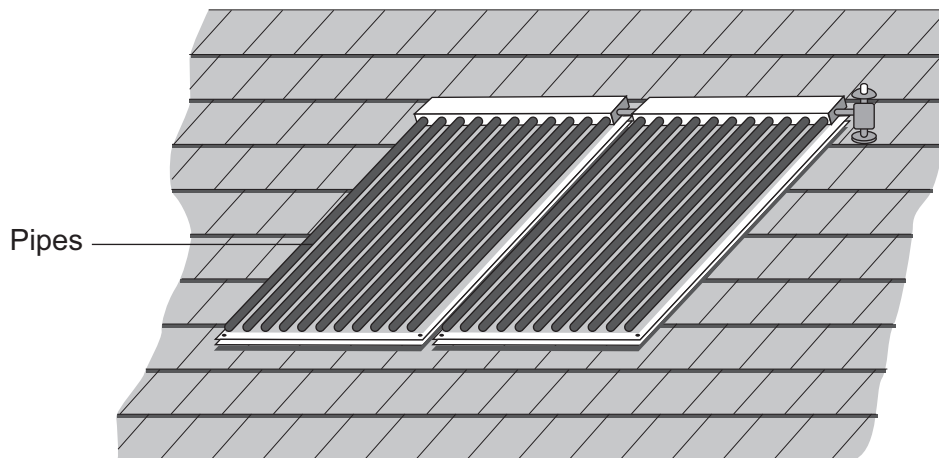
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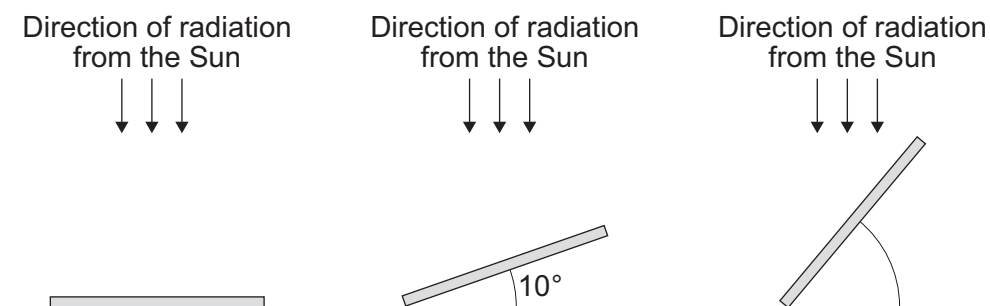
- 11 Solar panels may be fixed to the roofs of buildings to provide hot water for central heating systems.



An engineer investigated how the position of a 4 m^2 solar panel relative to the Sun affected the temperature rise of the water in the pipes.

The engineer:

- measured the initial temperature of the water in the pipes of the solar panel
- pointed the solar panel directly at the Sun (angle 0°) and measured the temperature of the water in the pipes after one hour
- allowed the solar panel to cool and moved the solar panel round by 10° and measured the temperature of the water in the pipes after one hour
- repeated the measurements at 10° intervals.



- 11 (a) (i) Give **one** variable the engineer controlled during the investigation.

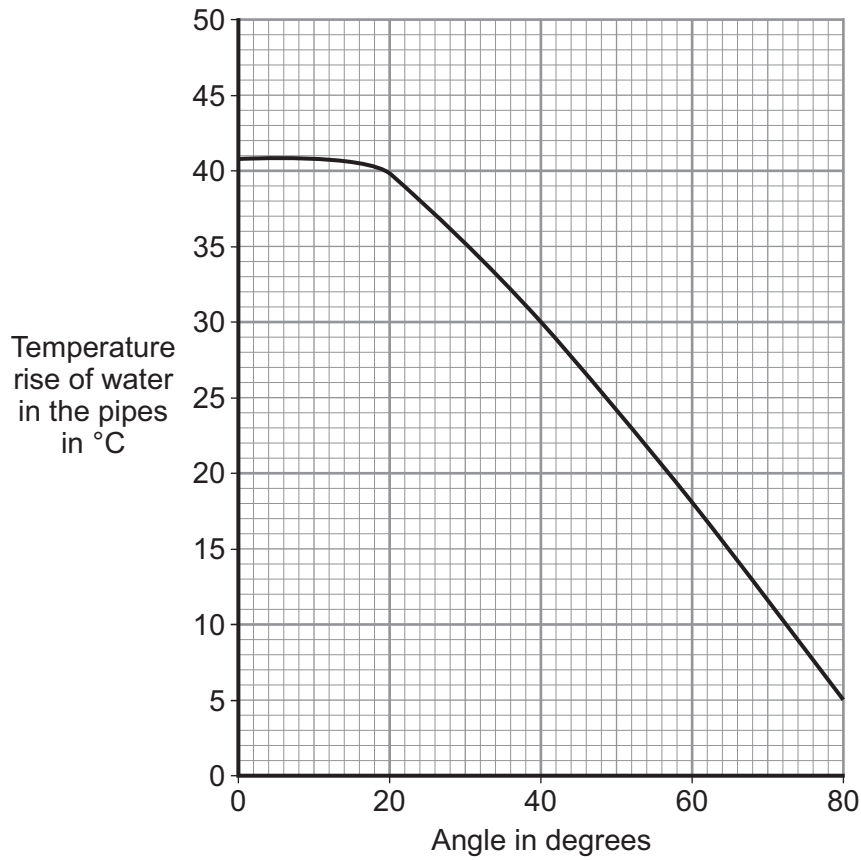
..... (1 mark)

- 11 (a) (ii) Why are the solar panel pipes painted black?

..... (1 mark)



11 (b) The engineer calculated the temperature rise of the water in the pipes at each angle.
The graph shows the engineer's results.



11 (b) (i) Describe how the temperature rise of the water in the pipes varies with the angle.

.....

.....

.....

.....

(2 marks)

11 (b) (ii) What advice should the engineer give to the people who fit solar panels on roofs?

Use data from the graph to support your answer.

.....

.....

.....

(2 marks)

6

Turn over ►

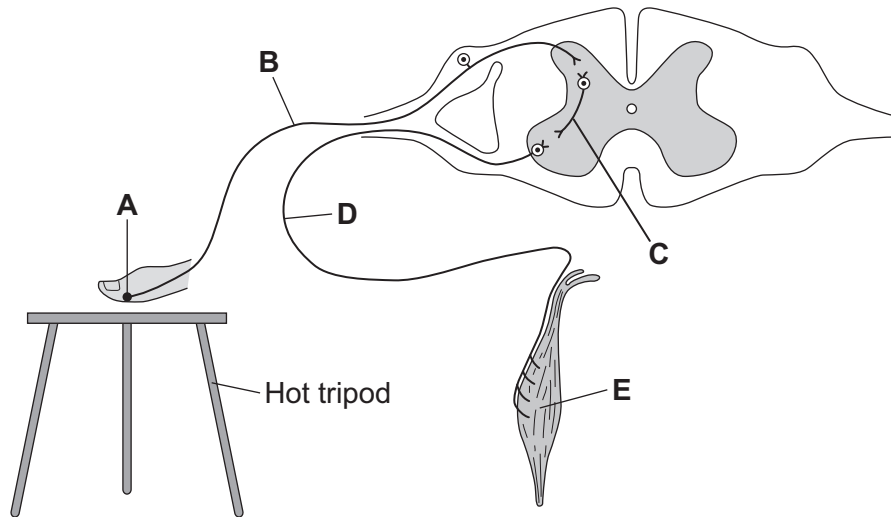


Biology Questions

12

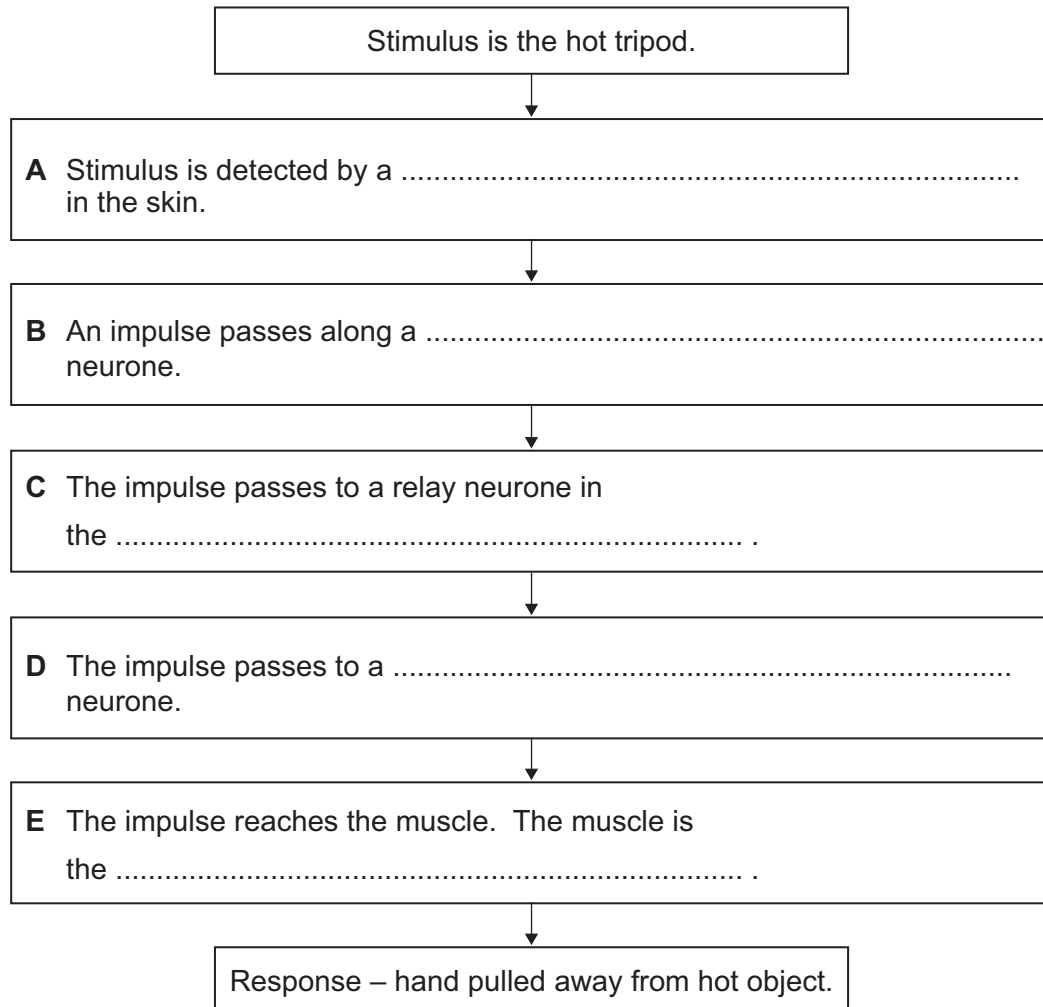
If you touch a hot object you automatically pull your hand away.
This is called a reflex action.
The reflex action happens quickly and protects the body from harm.

The diagram shows the structures involved in this reflex action.



The flow diagram shows the pathway of a nerve impulse in a reflex action.

Use information from the diagram to complete the flow diagram.



(5 marks)

5

Turn over for the next question

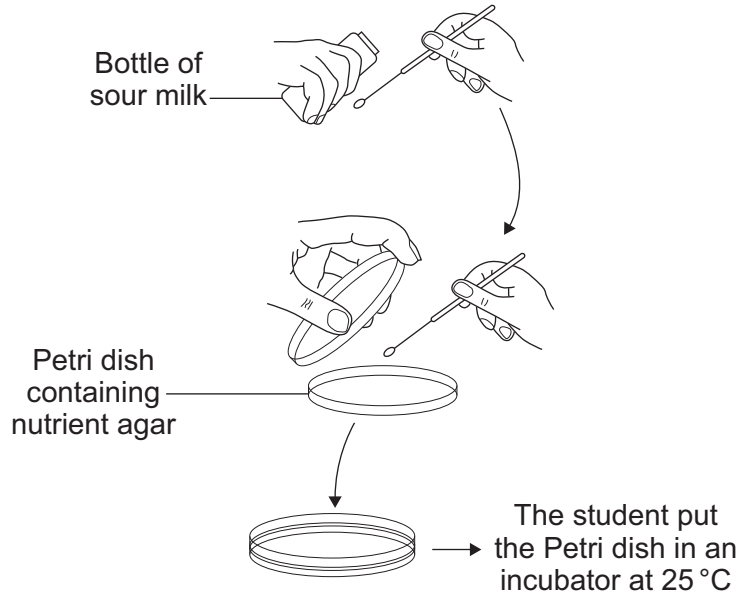
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13

A student transferred some sour milk from a bottle to a Petri dish containing nutrient agar.

The student then incubated the Petri dish.



Describe and explain **two** precautions the student should take so that only bacteria from the milk grow on the nutrient agar.

.....

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(4 marks)

4



Chemistry Questions

- 14** A burning torch is carried by a runner.
- The fuel in the torch is a mixture of propane and butane.
- Propane and butane are alkanes.
- Alkanes have the general formula C_nH_{2n+2}



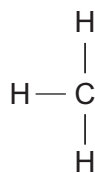
- 14 (a)** Propane has 3 carbon atoms.
- What is the formula of propane?

.....

(1 mark)

- 14 (b)** Butane has the formula C_4H_{10}

Complete the displayed (structural) formula for one molecule of butane.



(1 mark)

- 14 (c)** Complete the word equation for the complete combustion of butane.

butane + oxygen \rightarrow +

(1 mark)

- 14 (d)** In earlier designs of the torch, propene (C_3H_6) was used as the fuel.

Smoke is produced when propene is burned.

Explain why smoke is produced.

.....

.....

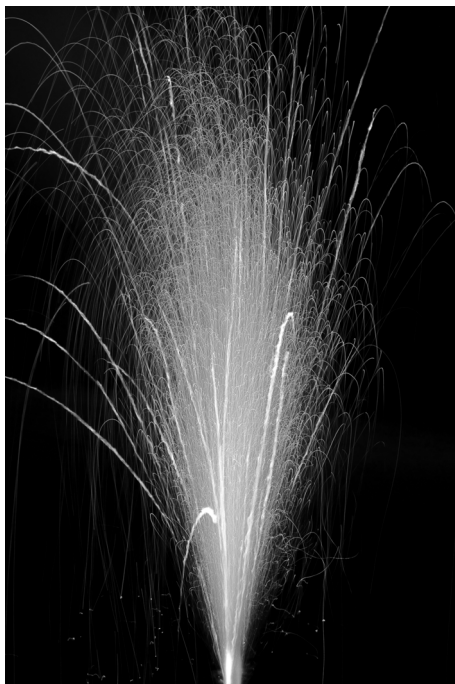
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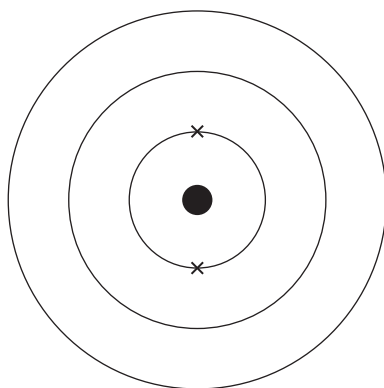


- 15 Lithium chloride can be used to colour flames dark red.



- 15 (a) A chlorine atom has 17 electrons.

Complete the diagram to show the electronic structure of a chlorine atom.

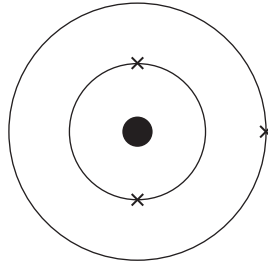


(1 mark)



15 (b) Lithium chloride (LiCl) can be made by reacting lithium with chlorine.

The electronic structure of a lithium atom is shown below.



Describe what happens to a lithium atom when the atom reacts with chlorine.

.....

.....

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.....

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(3 marks)

4

Turn over for the next question

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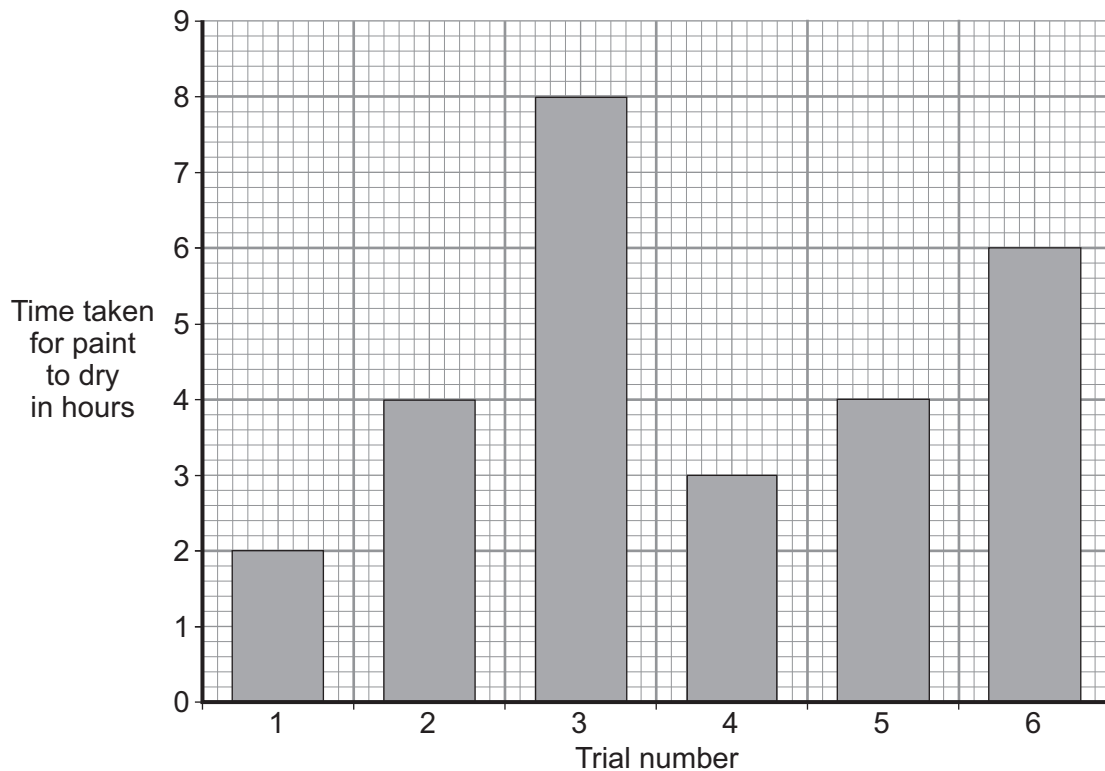
Physics Questions

16 A student investigated the factors that affect the time taken for paint on a wall to dry.

The table shows the drying conditions for each trial.

Trial number	Drying conditions	
	Temperature in °C	Humidity in %
1	25	30
2	15	30
3	5	30
4	15	10
5	15	30
6	15	60

The student's results are shown in the bar chart.



16 (a) Write **two** conclusions that can be made from this data.

Conclusion 1

.....

Conclusion 2

.....

(2 marks)

16 (b) Suggest **one** other factor that will affect the time it takes for the paint to dry.

.....

.....

(1 mark)

3

Turn over for the next question

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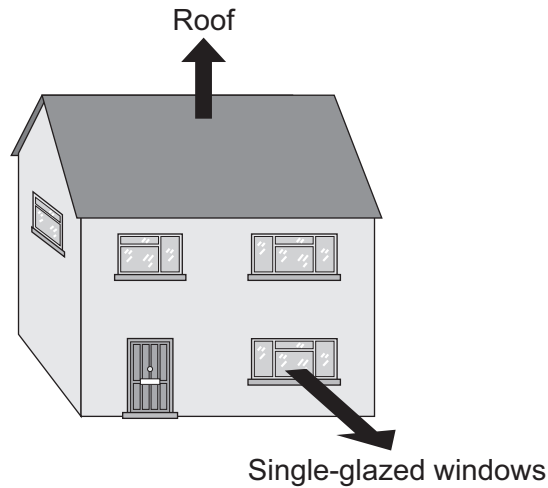


17

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

All the energy we use to heat our houses is eventually transferred to the surroundings.

The diagram shows two places where energy is transferred from a house to the surroundings.



Describe how energy is transferred to the surroundings through the roof **and** windows.

For each place:

- name the processes involved in the energy transfer
- suggest a method of reducing the rate of energy transfer
- explain how your chosen methods reduce the rate of energy transfer.

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(6 marks)

6

END OF QUESTIONS



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Question 15: Firework photo © Thinkstock

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