Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Secondary Education
June 2005

ASSESSMENT and QUALIFICATIONS ALLIANCE

SCIENCE: SINGLE AWARD (CO-ORDINATED) 3463/3F
FOUNDATION TIER
Paper 3

Wednesday 22 June 2005 9.00 am to 9.45 am

F

In addition to this paper you will require:
a ruler.
You may use a calculator.

Time allowed: 45 minutes

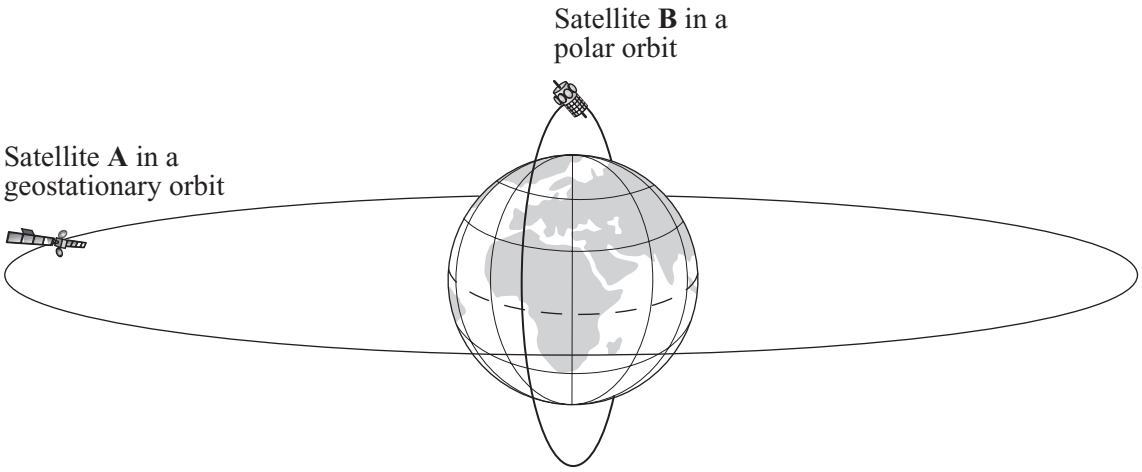
Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information
- The maximum mark for this paper is 45.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		5	
2		6	
3		7	
4			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

NO QUESTIONS APPEAR ON THIS PAGE

1 The diagram shows two satellites orbiting the Earth.



The two satellites have the same mass.

(a) Complete the following sentences by crossing out the **two** lines in each box that are wrong.

(i) The time for one orbit by satellite **B** is

less than
the same as
more than

the time for one orbit by satellite **A**.

(1 mark)

(ii) The force of attraction between the Earth and satellite **B** is

less than
the same as
more than

the force of attraction between the Earth and satellite **A**.

(1 mark)

(b) A communication satellite is put into a *geostationary* orbit.

Describe a *geostationary* orbit.

.....

.....

.....

.....

(2 marks)

4

2 The diagram shows the types of wave that make up the electromagnetic spectrum.

gamma rays	X-rays	ultraviolet	light	infra red	microwaves	radio

(a) Which type of wave:

(i) has the longest wavelength and lowest frequency;

.....

(1 mark)

(ii) can be used to kill harmful bacteria in food;

.....

(1 mark)

(iii) is used in sunbeds to give a sun-tan;

.....

(1 mark)

(iv) is used to send information between mobile phones?

.....

(1 mark)

(b) Complete the following sentence by crossing out the **two** lines in the box that are wrong.

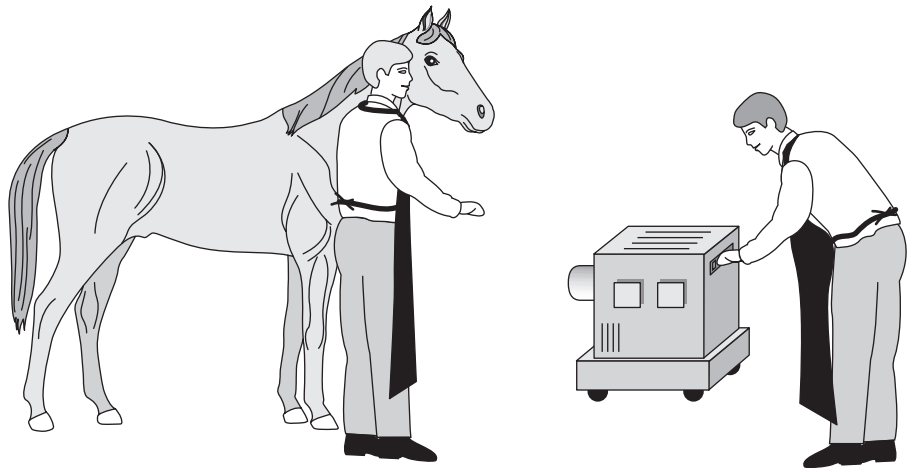
The speed of light rays through space is

faster than the same as slower than

the speed of radio waves through space.

(1 mark)

(c) The picture shows a horse being prepared for an X-ray.



The person who will take the X-ray and the person holding the horse are wearing special aprons. These aprons have a lead lining.

Explain why the lead lining is important.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

.....

.....

.....

.....

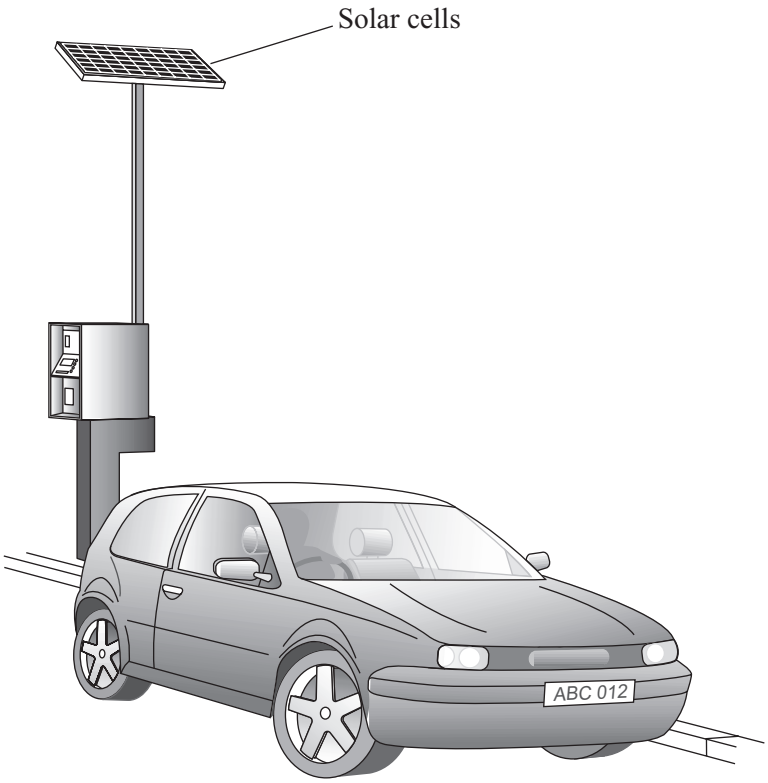
.....

(3 marks)

8

TURN OVER FOR THE NEXT QUESTION

3 A castle is a long way from the nearest town. Batteries power the car park ticket machine. Solar cells are used to keep the batteries charged.



(a) Complete the following sentences by choosing the correct words from the box.

Each word may be used once or not at all.

chemical	**electrical**	**heat**	**light**	**sound**

(i) The energy input to the solar cells is ..... energy.

(1 mark)

(ii) The useful energy output from the solar cells is ..... energy.

(1 mark)

(b) For every 500 J of energy absorbed by the solar cells, 75 J of energy are transferred to the batteries.

Use the following equation to calculate the efficiency of the solar cells.
Show clearly how you work out your answer.

$$\text{Efficiency} = \frac{\text{useful energy transferred by device}}{\text{total energy supplied to device}}$$

.....

.....

Efficiency = ...

(2 marks)

(c) Which **one** of the following statements gives the main reason for using solar cells to charge the batteries?

Tick (✓) the box next to your choice.

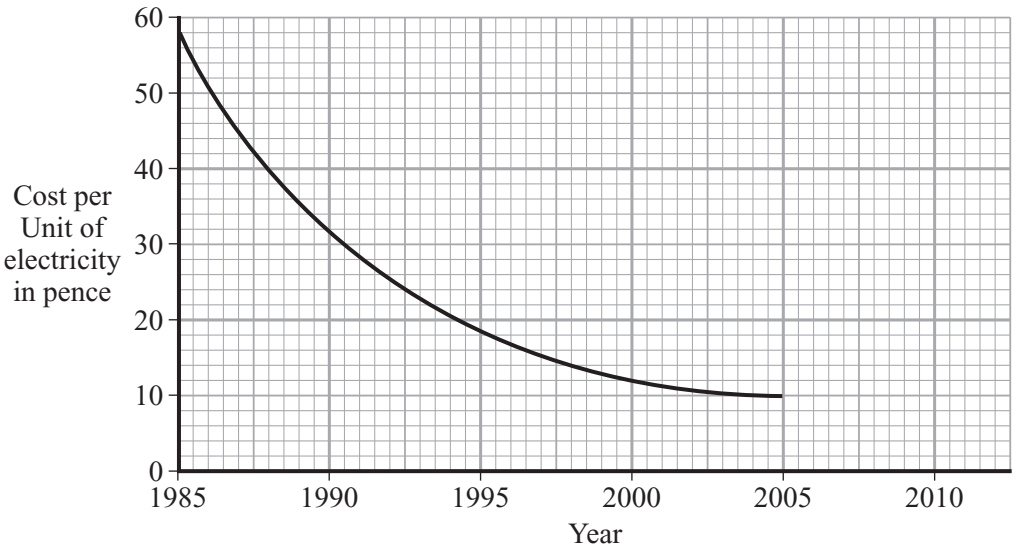
Solar cells give a constant supply of electricity. ☐

A few solar cells can provide a large amount of electricity. ☐

The ticket machine is a long way from other electricity supplies. ☐

(1 mark)

(d) The graph shows how the cost of producing electricity using solar cells has changed.



Use the graph to predict the cost of one Unit of electricity in 2010.

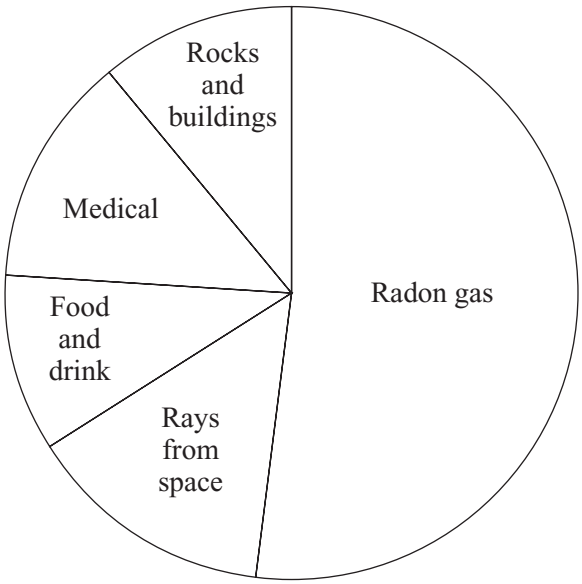
.....

(1 mark)

6

Turn over ▶

4 (a) Radiation is around us all of the time. The pie chart shows the sources of this radiation.



(i) What is the main source of this radiation?

.....

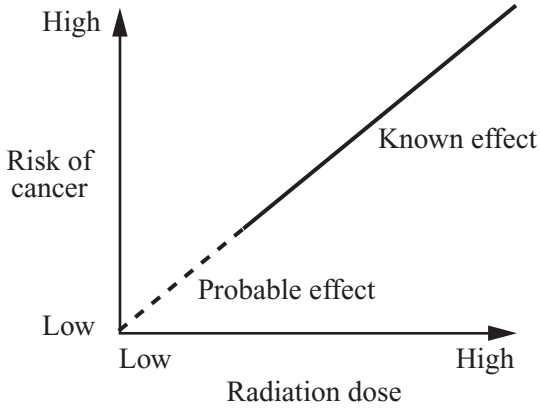
(1 mark)

(ii) What name is given to the radiation that is around us all of the time?

.....

(1 mark)

(b) Radiation can cause cancer. The graph shows that the risk of cancer depends on the radiation dose a person is exposed to.



Complete the following sentence.

The ..... the dose of radiation a person gets, the greater the risk of cancer.

(1 mark)

(c) A worker in a nuclear power station wears a special badge (diagram **1**). Diagram **2** shows what is inside the badge. When the film inside the badge is developed, it will be dark in the places where it has absorbed radiation.

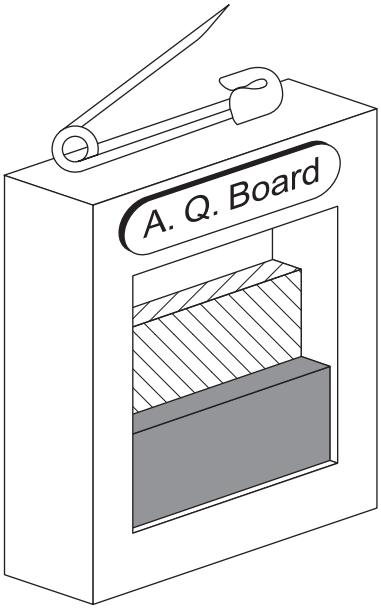


Diagram 1

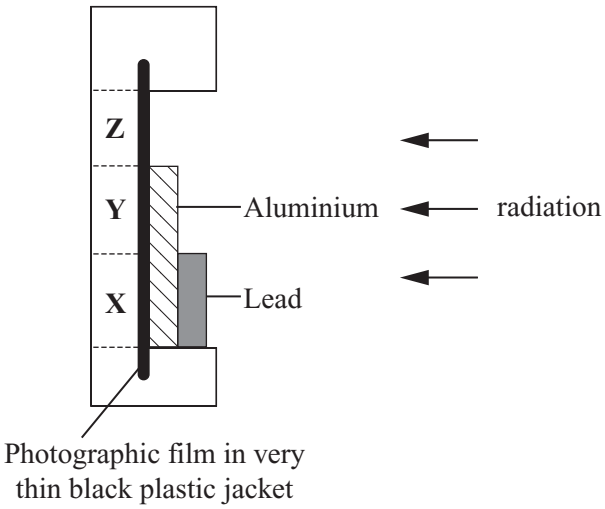


Diagram 2

Which part of the film, **X**, **Y** or **Z**, would darken if the worker had received a dose of alpha radiation?

.....

Give a reason for your answer.

.....

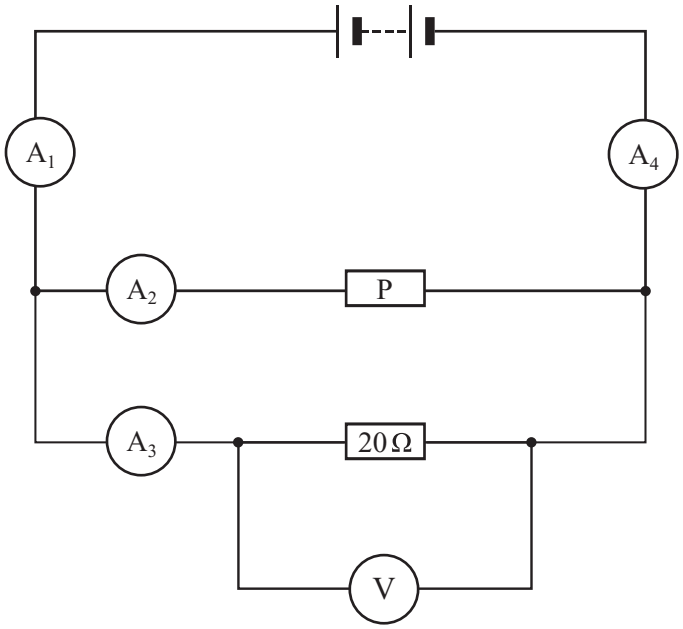
.....

(2 marks)

5

TURN OVER FOR THE NEXT QUESTION

5 The circuit shown has four identical ammeters.



(a) The table gives the current through two of the ammeters.

(i) Complete the table to show the current through the other two ammeters.

Ammeter	Reading on ammeter in amps
A_1	
A_2	0.2
A_3	0.3
A_4	

(2 marks)

(ii) Which **one** of the following statements is correct. Tick (✓) the box next to your choice.

The resistance of **P** is more than 20 Ω. ☐

The resistance of **P** is equal to 20 Ω. ☐

The resistance of **P** is less than 20 Ω. ☐

Give a reason for your choice.

.....

.....

.....

(2 marks)

(b) (i) Write down the equation that links current, potential difference and resistance.

.....

(1 mark)

(ii) Calculate the reading on the voltmeter. Show clearly how you work out your answer.

.....

.....

Voltmeter reading = ... volts.

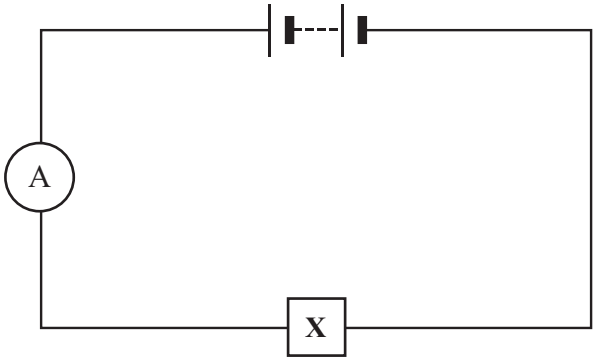
(2 marks)

(iii) State the potential difference of the power supply.

.....

(1 mark)

(c) A second circuit contains an unknown component labelled **X**.



As component **X** is heated, the reading on the ammeter goes up.

What is component **X**?

.....

Give a reason for your answer.

.....

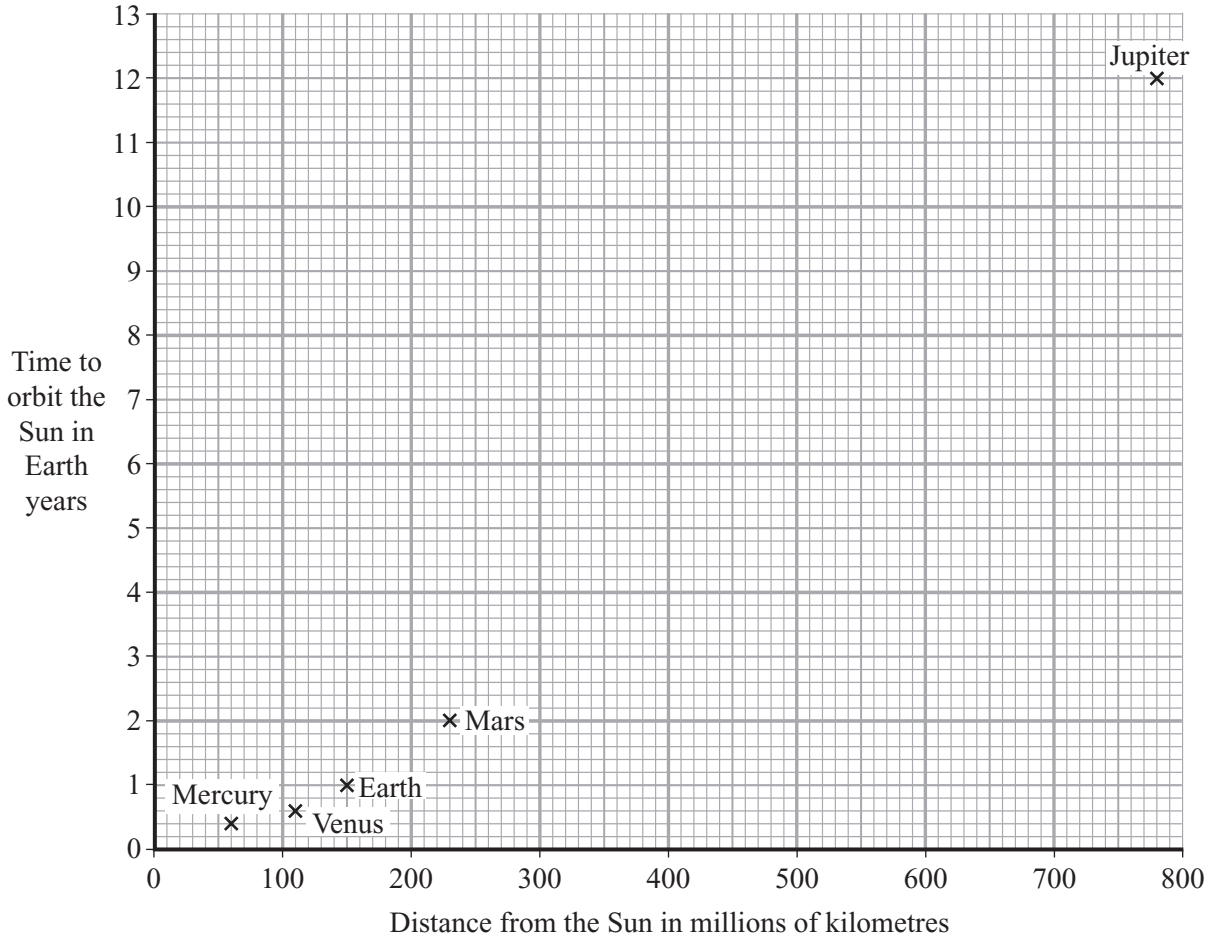
.....

(2 marks)

10

Turn over ▶

6 (a) The chart shows that the time taken by a planet to orbit the Sun depends on its distance from the Sun.



(i) How does the time taken by a planet to orbit the Sun depend on the distance the planet is from the Sun?

.....

.....

(1 mark)

(ii) Asteroids orbit the Sun. One asteroid is 550 million kilometres from the Sun.

Estimate how long this asteroid takes to orbit the Sun.

Time to orbit the Sun = ... Earth years

(1 mark)

(b) The atmosphere on Venus contains a large percentage of a greenhouse gas.

	Mercury	Venus	Earth
Average surface temperature	230 ºC	470 ºC	20 ºC

(i) Which **one** of these gases increases the greenhouse effect? Draw a ring around your answer.

argon **carbon dioxide** **nitrogen** **oxygen**

(1 mark)

(ii) Explain how the information in the table and the chart shows that the atmosphere of Venus produces a greenhouse effect.

.....

.....

.....

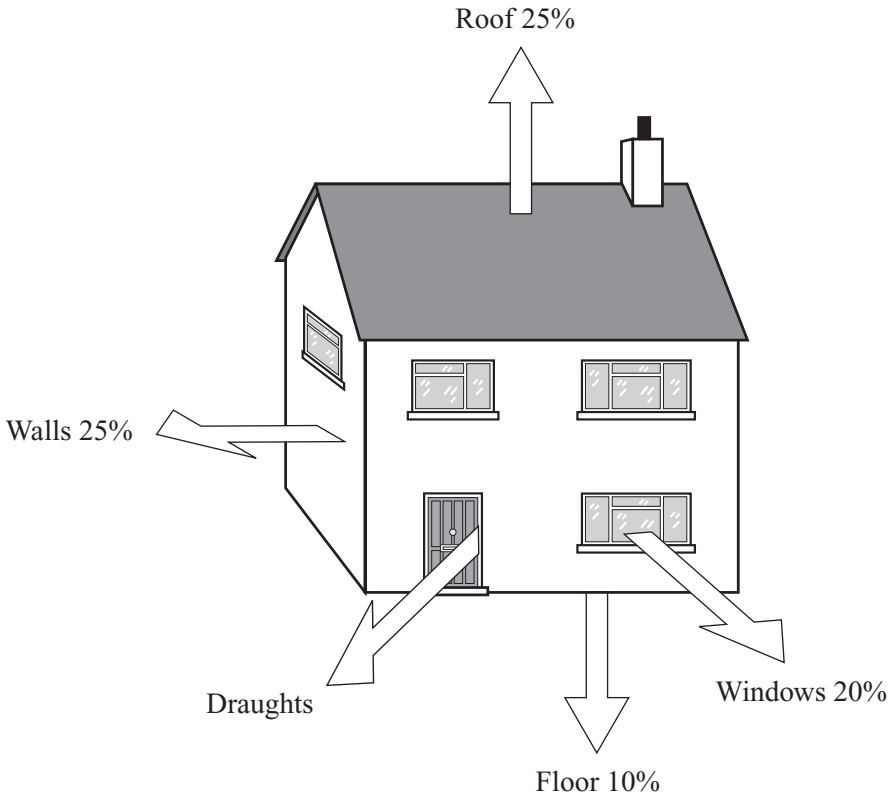
.....

(2 marks)

5

TURN OVER FOR THE NEXT QUESTION

7 (a) The diagram shows the ways in which heat energy can be transferred from an old house.



(i) Calculate the percentage of energy transferred by draughts.

.....

% energy transferred by draughts = ...

(1 mark)

(ii) Complete the following sentence using **one** of the words from the box.

conduction	**convection**	**radiation**

Draughts transfer heat energy by..... .

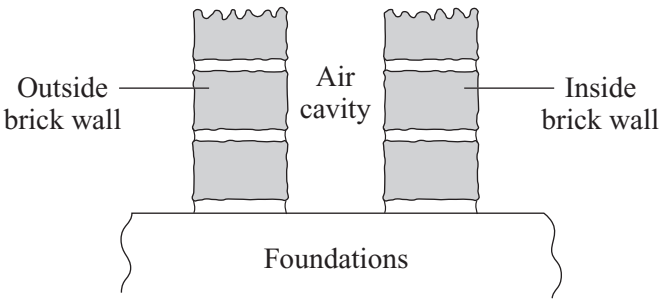
(1 mark)

(iii) State **one** way of reducing the heat transfer by draughts.

.....

(1 mark)

(b) The diagram shows a section through the walls of a house built in 1930.



Explain how the air cavity between the two walls reduces the heat transfer from the house.

.....

.....

.....

.....

(2 marks)

(c) The table shows the installation costs and yearly savings on energy bills for different methods of insulating a house.

Method of insulation	**Installation cost in £**	**Yearly saving on energy bills in £**
Double glazing	4000	65
Loft insulation	240	60
Cavity wall insulation	600	80

(i) Give **one** reason why loft insulation is often fitted to an old house before double glazing or cavity wall insulation.

.....

.....

(1 mark)

(ii) The time it takes for the saving on energy bills to equal the cost of installing the insulation is called the pay-back time.

Calculate the pay-back time for loft insulation.

.....

Pay-back time = ... years

(1 mark)

7

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE