Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	3	7	/	3	F	Signature	

Paper Reference(s)

4437/3F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Science (Double Award)

Physics

Paper 3F

Foundation Tier

Tuesday 3 November 2009 – Morning

Time: 1 hour 15 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions. Write your answers in the spaces provided in this question paper.
Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (~~☒~~) and then mark your new answer with a cross (☒).
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 75. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**. There are 12 questions in this question paper.
Any blank pages are indicated.
Useful formulae are given on page 2.

Advice to Candidates

Write your answers neatly and in good English.

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FORMULAE

You may find the following formulae useful.

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

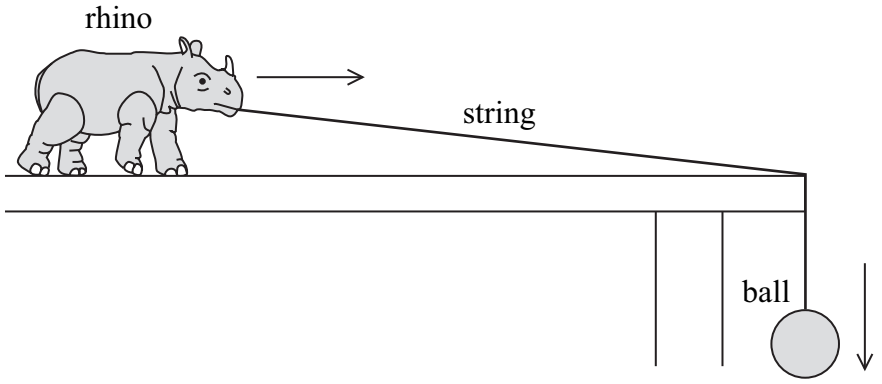
$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

Leave blank

1. The diagram shows a child's toy. As the ball falls the rhino moves across a table.



(a) Name the force which opposes the motion.

.....

(1)

(b) The box contains the names of different forms of energy.

Use names from the box to fill in the spaces.

chemical	**elastic potential**	**electrical**	**gravitational potential**	
heat	**kinetic**	**light**	**nuclear**	**sound**

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

(i) The useful energy transfer for the toy is

..... energy to ..... energy.

(2)

(ii) Energy is wasted by the toy as ..... energy

and ..... energy.

(2)

(iii) The child gets her energy from the food she eats in the form of

..... energy.

(1) **Q1**

(Total 6 marks)

Leave blank

2. A student investigates a metal spring which is 250 mm long.

The student changes the load on the spring.

He records the new length of the spring and calculates the extension.

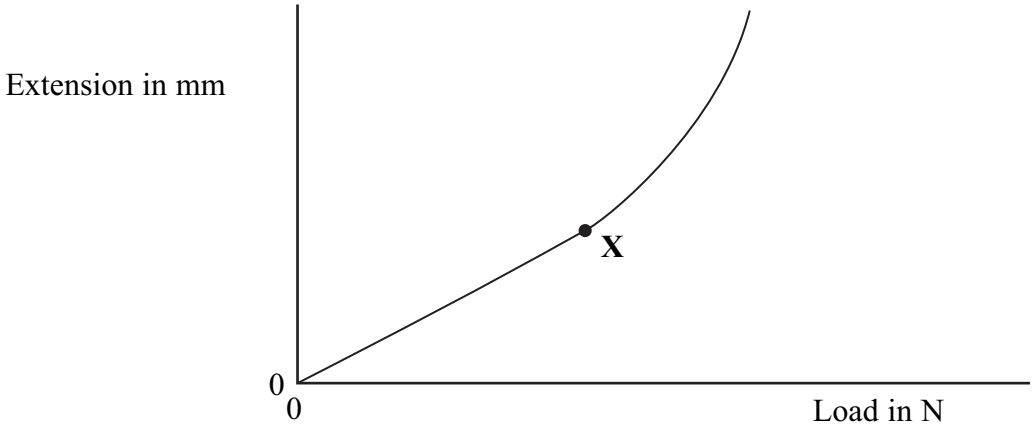
(a) Complete the space in his table of results.

Load in N	1	2	3	4	5
New length in mm	265	280	295	310	325
Extension in mm	15	30	.....	60	75

(1)

(b) Another student carries out a similar experiment.

The sketch graph shows her results.



(i) Complete the sentence.

The first part of the graph shows that the spring obeys

..... law.

(1)

Leave blank

(ii) Write this law in words.

.....

.....

(1)

(iii) The graph changes shape after point **X**.

Use words from the box to fill in the spaces.

added	**elastic**	**inelastic**	**longer**	**removed**	**shorter**

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

Point **X** shows the ..... limit of the spring.

When extended beyond point **X** the spring does not go back to its original length if the load is..... .

The spring ends up ..... than it was before.

(3) **Q2**

(Total 6 marks)

Leave blank

3. (a) The diagram shows the electrical circuit symbol for a component called a light dependent resistor.

(i) Which three letters are used to name this component?

.....

(1)

(ii) How can you decrease the resistance of this component?

.....

.....

(1)

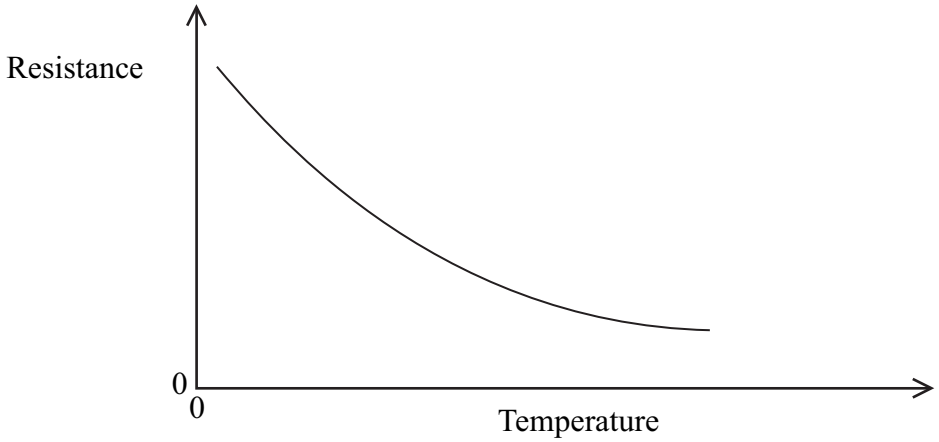
(iii) How can you increase the resistance of this component?

.....

.....

(1)

(b) The sketch graph shows how the resistance of an electrical component changes as its temperature changes.



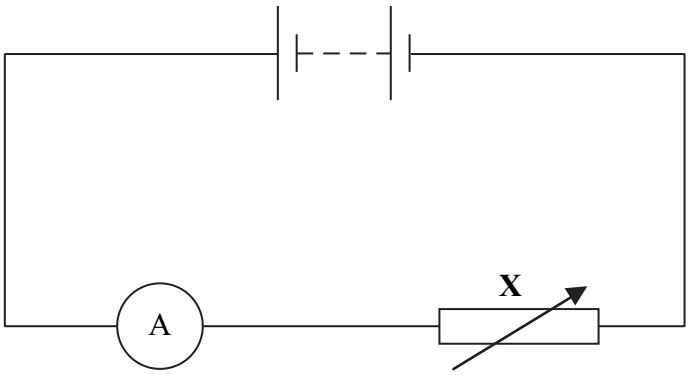
What is this component called?

.....

(1)

Leave blank

(c) The diagram shows an electrical circuit.



The resistance of the circuit can be changed.

(i) Name component **X**.

.....

(1)

(ii) Put a cross (☒) next to the correct words to complete this statement.

Only two crosses should be used; one for resistance and one for current.

When the resistance is decreased ☒ / increased ☒ the current is decreased ☒ / increased ☒ .

(1)

Q3

(Total 6 marks)

Leave blank

4. (a) Use the words in the box to complete the sentence.

energy	**information**	**matter**

Waves can transfer ..... and .....

without transferring ..... .

(1)

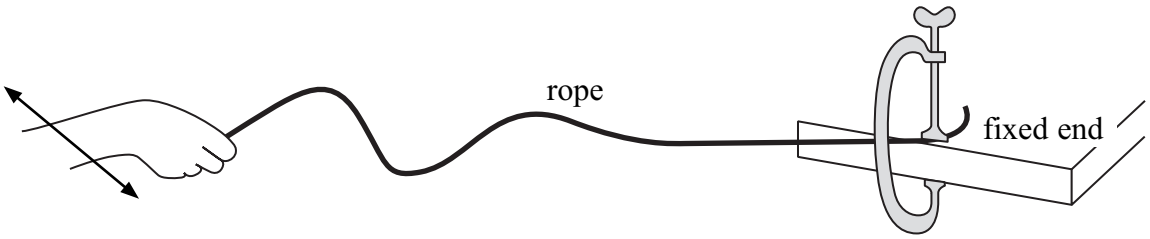
(b) One type of wave is a longitudinal wave.

Give an example of a longitudinal wave.

.....

(1)

(c) A teacher demonstrates a wave. She fixes a rope at one end. She holds the rope at the other end and shakes it from side to side.



(i) What type of wave does she demonstrate?

.....

(1)

(ii) Give another example of this type of wave.

.....

(1) **Q4**

(Total 4 marks)

Leave blank

5. There are many different uses for the parts of the electromagnetic spectrum.

(a) Draw a line from each part to its correct use.

Part	Use
gamma rays	fluorescent lamps
infra-red rays	investigating broken bones
microwaves	night vision equipment
ultraviolet radiation	satellite transmissions
	sterilising medical equipment

(4)

(b) Complete the sentence.

All the parts of the electromagnetic spectrum have the

same ..... in free space.

(1)

Q5

(Total 5 marks)

Leave blank

6. (a) Electricity can be generated from several different sources.

Put a cross (☒) against **all** the resources which can be used to generate electricity.

☒ fossil fuels

☒ geothermal resources

☒ moving water

☒ nuclear power

☒ solar energy

☒ wind

(2)

(b) (i) Use the words in the box to complete the sentence.

coil	**field**	**magnet**	**wire**

A voltage is induced across a generator either by rotating a

..... within a

coil of ..... or by rotating a .....

of wire within a magnetic ..... .

(2)

(ii) Give **two** ways which will increase the voltage induced across the generator.

1 .....

.....

2 .....

.....

(2) **Q6**

(Total 6 marks)

Leave blank

7. (a) The particles in an atom are called subatomic particles.

The box contains the names of three subatomic particles.

electrons	**neutrons**	**protons**

Use these names to complete the sentences.

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

(i) The nucleus of an atom contains ..... and ..... .

(1)

(ii) The nuclei of different isotopes of the same element contain the same number of ..... but different numbers of ..... .

(2)

(iii) In a neutral atom the number of ..... is equal to the number of ..... .

(1)

(b) Some atoms are unstable. They emit ionising radiations.

Use words from this box to complete the sentence.

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

neutrons	**particles**	**protons**	**rays**

The nucleus of an unstable atom may emit alpha (α) ..... , beta (β) ..... and gamma (γ) ..... .

(2)

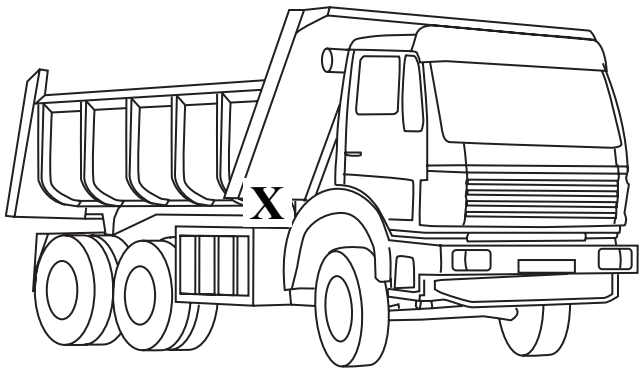
Q7

(Total 6 marks)

Leave blank

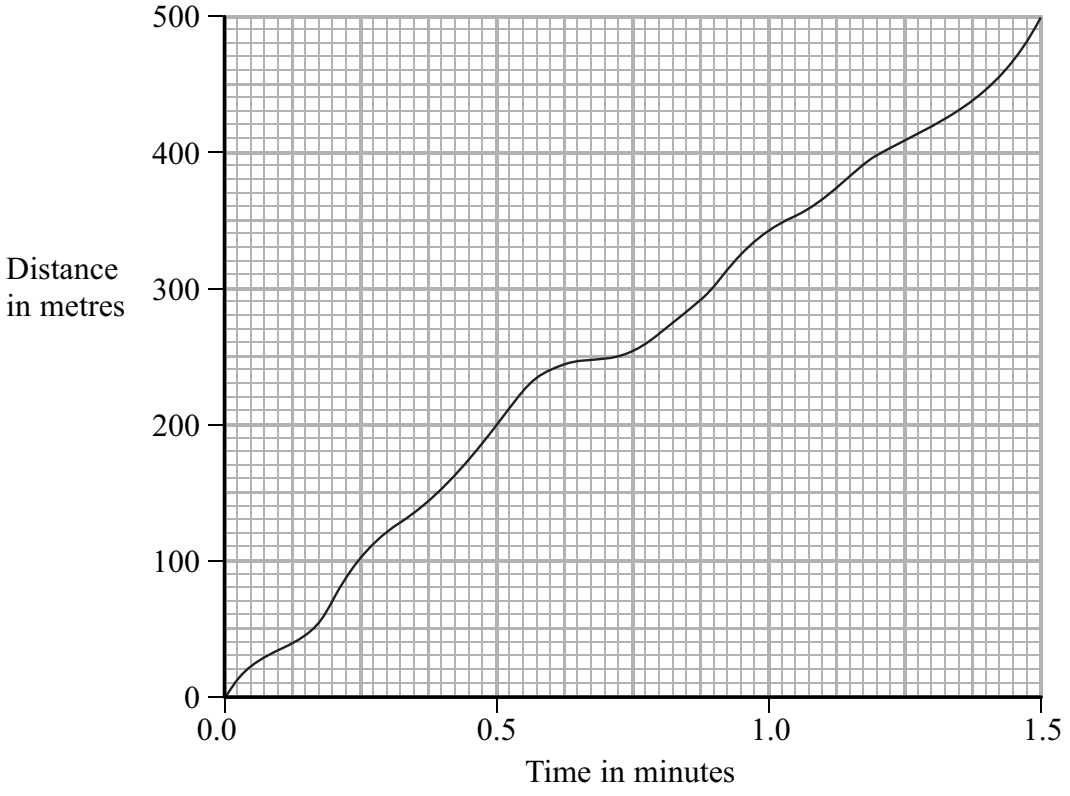
8. (a) The diagram shows a dumper truck. The **X** on the diagram shows the centre of gravity of the truck.

Draw an arrow on the diagram to show the direction of the weight of the truck.



(1)

(b) A dumper truck crosses a building site.
The graph below is the distance-time graph for the journey.



(i) Calculate the time, in seconds, that it takes for the truck to make this journey.
Show your working.

.....

Time = ...s

(2)

Leave blank

(ii) State the relationship between average speed, distance moved and time taken.

.....

.....

(1)

(iii) Calculate the average speed, in metres per second, of the truck.
Give your answer to the nearest whole number.

.....

Speed = ... m/s

(2)

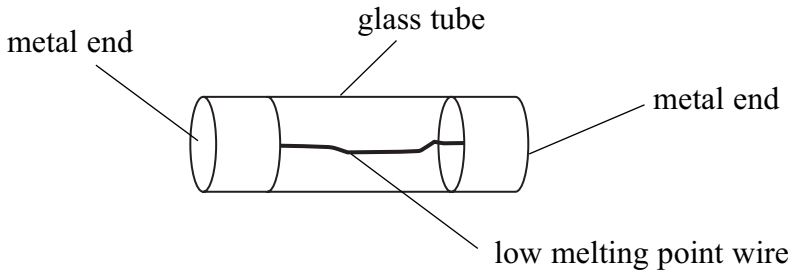
Q8

(Total 6 marks)

Leave blank

9. A student uses a hair dryer. The hair dryer's plug contains a fuse.

The diagram shows the fuse.



(a) Explain how the fuse prevents too large a current in the hair dryer.

.....

.....

.....

(2)

(b) The hair dryer is rated at 240 V, 1500 W. Calculate the current rating in amps of the hair dryer.

.....

.....

Current = ...A

(3)

Leave blank

(c) The fuse in the hair dryer blows and the student has to replace it.

The following fuses are available:

1 A 3 A 5 A 13 A

(i) Which fuse should the student choose? Put a cross (☒) in the correct box.

☒ 1 A

☒ 3 A

☒ 5 A

☒ 13 A

(1)

(ii) Explain your choice.

.....

.....

(1)

(d) A hair dryer heats up air.

Name one other example of electrical heating used in the home.

.....

(1)

Q9

(Total 8 marks)

Leave blank

10. (a) One source of background radiation is cosmic rays.

Cosmic rays are 90% protons, 9% alpha particles and 1% electrons.

(i) What does an alpha particle consist of?

.....

.....

(2)

(ii) Name a source of background radiation other than cosmic rays.

.....

(1)

(b) Experiments in a laboratory show that alpha particles from radioactive sources can only travel a few centimetres in air.

Why can they travel much further in space?

.....

.....

(1)

(c) Cosmic rays produce radioactive carbon-14 in the atmosphere. As carbon-14 decays, its activity decreases with a long half-life.

(i) What is meant by half-life?

.....

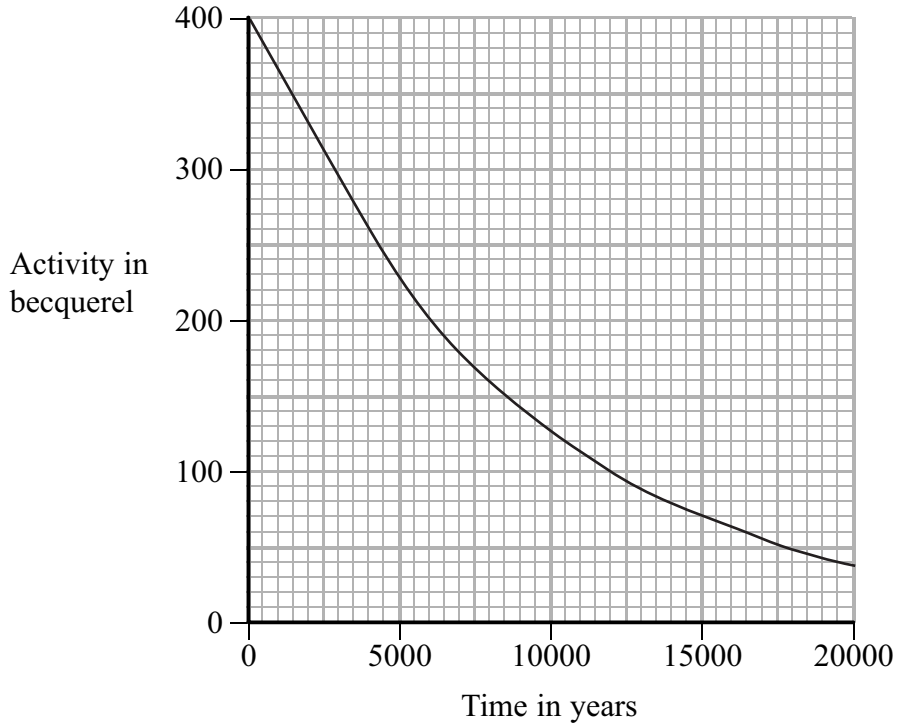
.....

(1)

Leave blank

(ii) The activity of the carbon-14 in a piece of wood can be used to estimate the age of the wood.

The graph shows how the activity of a sample of carbon-14 varies with time.



1 Use the graph to determine the half-life in years of carbon-14.
You must show your method on the graph.

.....

(2)

2 State why it is not possible to use carbon-14 to date a specimen that is more than 60 000 years old.

.....

(1)

(d) State another use of radioactivity.

.....

(1) **Q10**

(Total 9 marks)

Leave blank

11. (a) Use words from the box to complete the sentence.

acceleration	**direction**	**distance**
energy	**force**	**velocity**

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

Work done is equal to ..... times .....

moved in the ..... of the force.

(3)

(b) A machine does 2000 J of useful work in 5 s.

Calculate the useful output power in watts of the machine.

.....

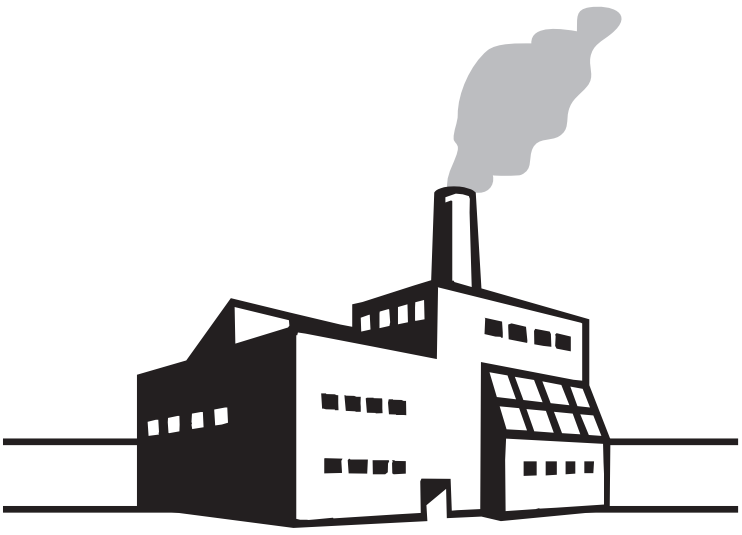
.....

Power = ... W

(2)

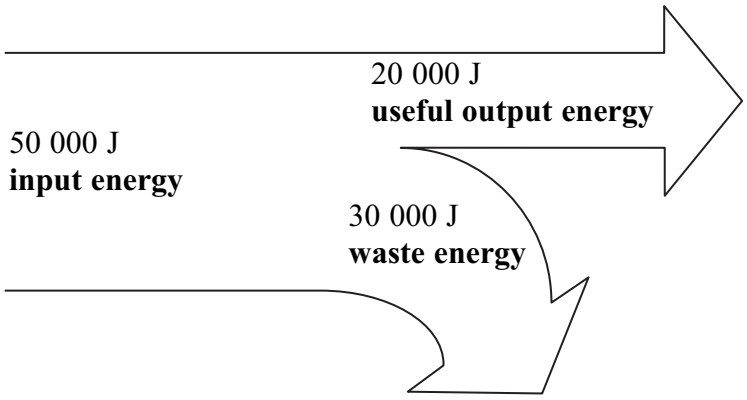
(c) An industrialist takes his daughter on a visit to his factory.

He tells her that the factory is 100% efficient because it is working all the time.



Leave blank

She asks to see a flow diagram for a process that takes place within the factory.
The flow diagram is shown below.



(i) Write down a formula for efficiency using two of the three terms in bold type in the diagram.

.....

.....

(1)

(ii) Calculate the efficiency of the process shown in the diagram.

.....

.....

Efficiency = ...

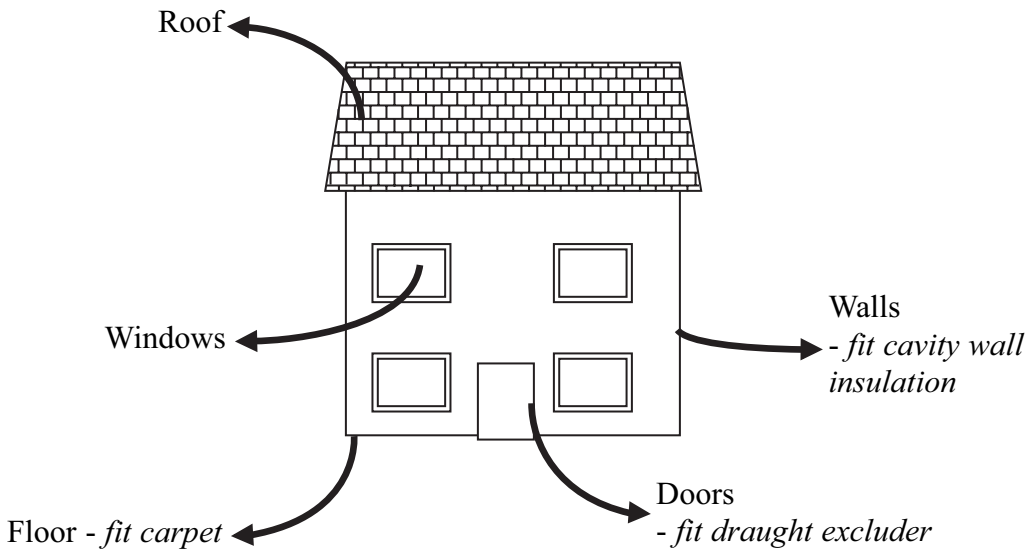
(2)

Q11

(Total 8 marks)

Leave blank

12. (a) The diagram shows heat losses from a house in a cold climate and ways of reducing some of these losses.



State a way of reducing the heat losses from

(i) the roof,

.....

(1)

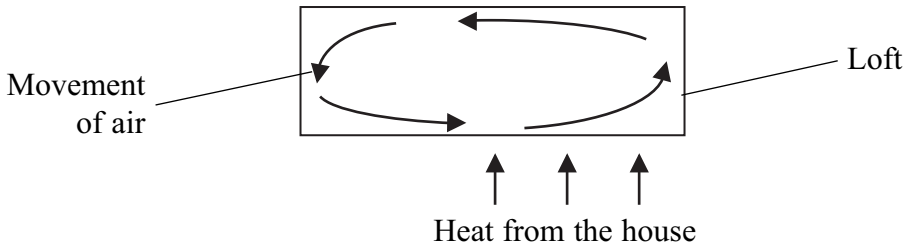
(ii) the windows.

.....

(1)

Leave blank

(b) The movement of air in part of the loft forms a convection current.



Explain the movement of air during convection.

.....

.....

.....

(3) **Q12**

(Total 5 marks)

TOTAL FOR PAPER: 75 MARKS

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