Specimen Paper

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
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5	
6	
7	
8	
9	
10	
11	
TOTAL	

General Certificate of Secondary Education
Foundation Tier

Science A — Physics 1F

Unit Physics P1

Physics

Unit Physics P1

F

For this paper you must have:
- a ruler
- the Equations Sheet (enclosed).

You may use a calculator.

Time allowed
- 60 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 space 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 60.
- You are expected to use a calculator were appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 11(d) 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.

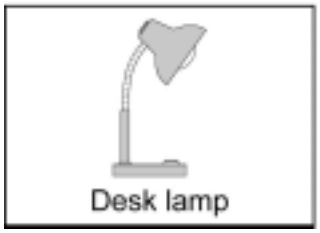
Advice
- In all calculations, show clearly how you work out your answer.

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

1 The diagrams in **List A** show three electrical appliances. Each appliance is designed to transfer electrical energy.

Draw **one** straight line from each appliance in **List A** to the useful energy output produced by that appliance in **List B**.

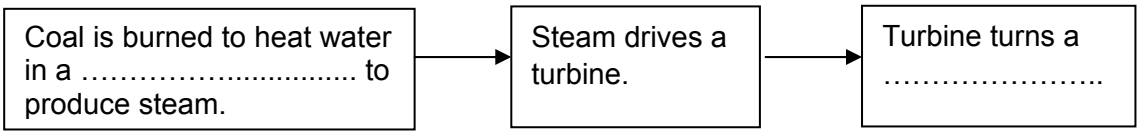
Draw only **three** lines.

List A Appliance	List B Useful energy output
 MP3 player	Light
 Food processor	Sound
 Desk lamp	Electrical
	Kinetic

(3 marks)

3

2 (a) The block diagram shows the important parts of a coal burning power station.

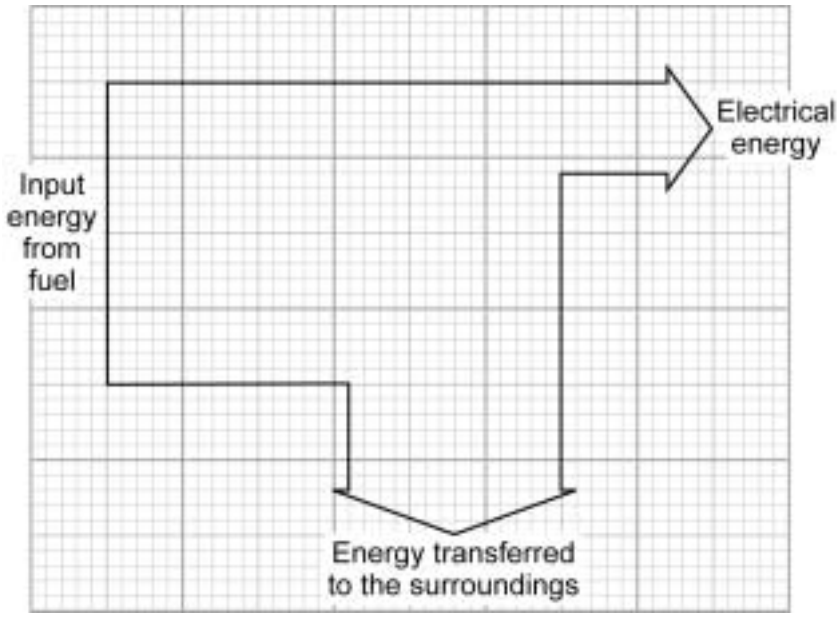


Use words from the box to complete the block diagram.

boiler	**condenser**	**furnace**	**generator**

(2 marks)

2 (b) The diagram shows the energy transformations in a coal burning power station.



Calculate the efficiency of the power station.
Write down the equation you use, and then show clearly how you work out your answer.

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.....

Efficiency = ...

(2 marks)

Question 2 continues on the next page

2 (c) Draw a ring around the correct answer to complete the following sentence.

If fewer coal burning power stations are used to generate electricity the amount of carbon dioxide emitted into the atmosphere will

decrease.

not change.

increase.

(1 mark)

2 (d) Some types of power station generate electricity by burning a biofuel.

Give **one** example of a biofuel.

.....

(1 mark)

2 (e) Nuclear power stations generate electricity without burning a fuel.

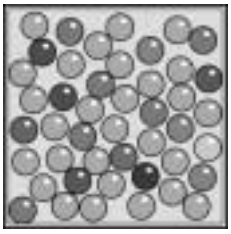
Name the process by which a nuclear fuel provides the energy needed to generate electricity.

.....

(1 mark)

7

3 Marbles inside a box can be used as a model for the particles in a solid, a liquid or a gas.



Use words from the box to complete the following sentences. Each word can be used once, more than once or not at all.

gas	**liquid**	**solid**

3 (a) The particles in a .....vibrate about fixed positions.

(1 mark)

3 (b) The particles in a .....move at high speed in any direction.

(1 mark)

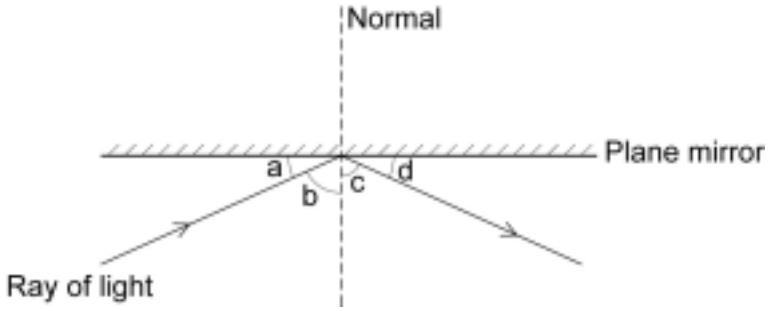
3 (c) The particles in a ..... are arranged in a pattern.

(1 mark)

3

Turn over for the next question

4 (a) The diagram shows a ray of light being reflected by a plane mirror.



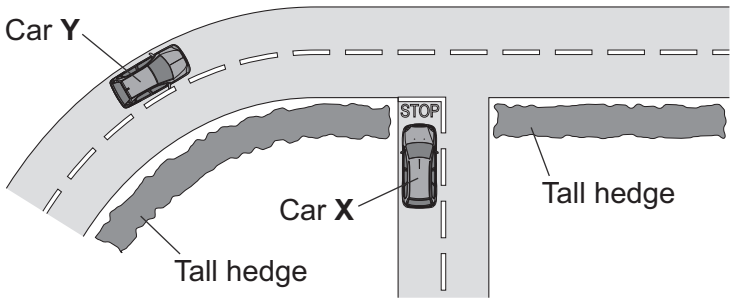
Which of the angles, **a**, **b, c** or **d,** is:

the angle of incidence; ☐

the angle of reflection? ☐

(2 marks)

4 (b) The diagram shows a road junction seen from above.



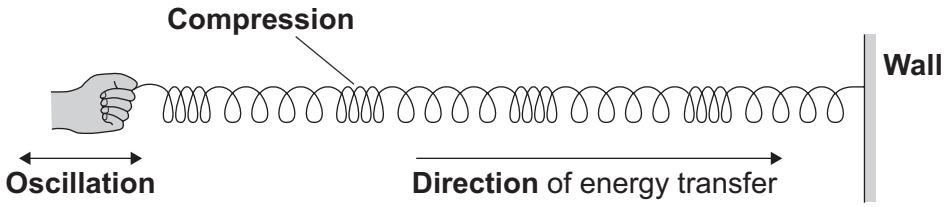
A mirror placed at the side of the road allows the driver of car **X** to see car **Y**.

Using the same mirror symbol given in part (a), draw a plane mirror to show how it should be placed so that the driver of car **X** can see car **Y**.

(2 marks)

4

5 (a) The diagram shows a longitudinal wave being produced in a stretched spring.



5 (a) (i) Use the bold words from the diagram to complete the following sentence. Put only **one** word in each space.

A longitudinal wave is one in which the ..... causing

the wave is parallel to the …….. of energy transfer.

(2 marks)

5 (a) (ii) Name the type of energy that is transferred by longitudinal waves.

.....

(1 mark)

Question 5 continues on the next page

5 (b) The diagram shows water waves made by a wave machine in a swimming pool.

Every second, two waves go past a person standing in the swimming pool.

The waves have a wavelength of 0.8 metres.

Calculate the speed of the water waves.

Write down the equation you use, and then show clearly how you work out your answer.

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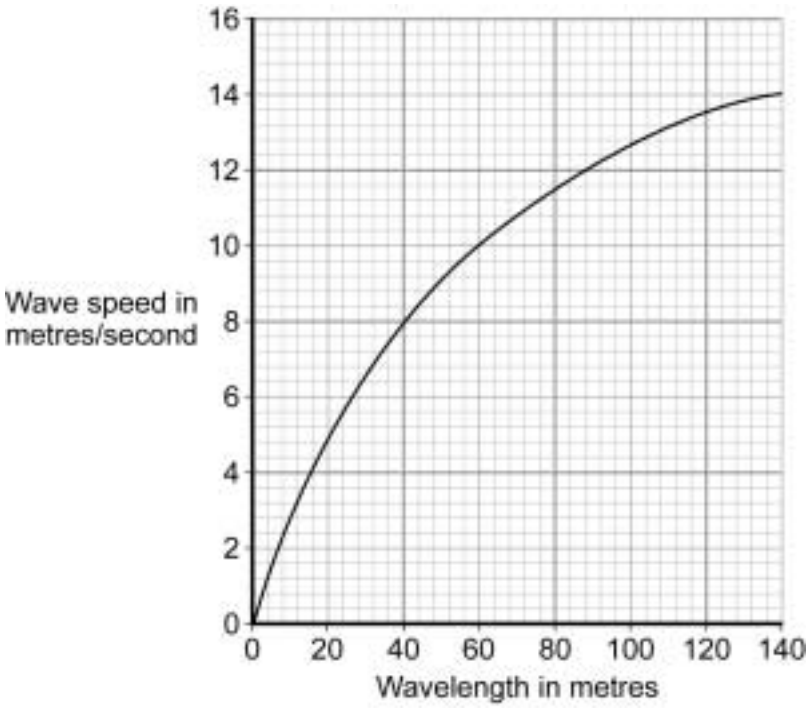
Wave speed = ... m/s

(2 marks)

5 (c) The graph shows how the speed of deep ocean waves depends on the wavelength of the waves.



What can you conclude from the graph?

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(2 marks)

7

Turn over for the next question

6 Scientists have observed that the wavelengths of the light given out from galaxies that are moving away from the Earth are longer than expected.

6 (a) (i) What name is given to this observation?

.....

(1 mark)

6 (a) (ii) Draw a ring around the correct answer to complete the following sentence.

This observation gives evidence for the idea that the Universe is

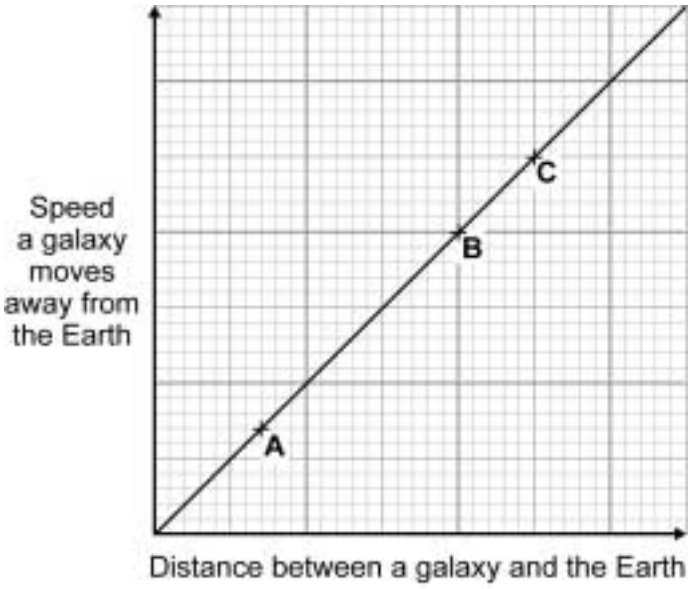
shrinking.

not changing.

expanding.

(1 mark)

6 (b) The graph shows that there is a link between the speed at which a galaxy moves away from the Earth and the distance of the galaxy from the Earth.



The positions of three galaxies, **A**, **B** and **C**, are marked on the graph.

From which galaxy, **A**, **B** or **C**, would the wavelength of the light reaching the Earth seem to have changed the most?

Galaxy .....

Give a reason for your answer.

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(2 marks)

4

Turn over for the next question

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

7 The instruction booklet for a washing machine contains the following information.

Wash cycle	Average power during cycle	Time taken to run cycle
HOT	1.6 kW	2 hours
COOL	1.1 kW	1 ¼ hours
FAST	1.2 kW	¾ hour

7 (a) Electricity costs 15 pence per kilowatt-hour.

Calculate, in pence, the cost of using the washing machine for one **HOT** wash cycle.

Write down the equation you use, and then show clearly how you work out your answer.

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Cost = ... pence

(2 marks)

7 (b) Why does it cost more to use the washing machine on the **HOT** cycle than on the **COOL** or the **FAST** cycle?

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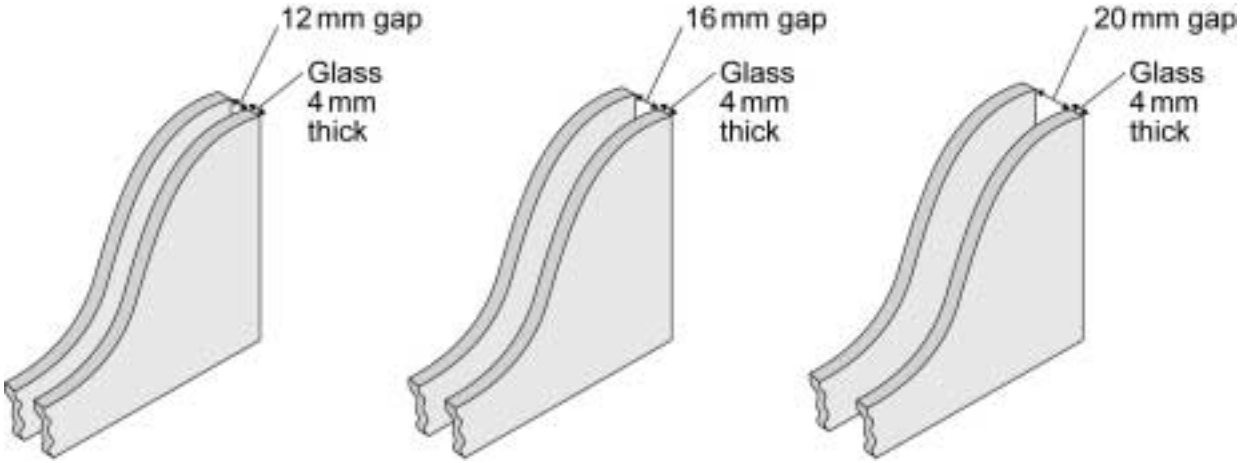
(1 mark)

3

Turn over for the next question

8 The diagrams show the cross-section of three double glazed windows.



The gap between the two sheets of glass can be filled with either air or a mixture of air and argon.

The U-values for different types of double glazed windows, using different types of glass **X** and **Y**, are given in the table.

	Type of window	12 mm gap	16 mm gap	20 mm gap
1	Glass type **X** with air	2.9	2.7	2.8
2	Glass type **X** with air and argon	2.7	2.6	2.6
3	Glass type **Y** with air	1.9	1.8	1.8
4	Glass type **Y** with air and argon	1.6	1.5	1.5

8 (a) Which type of window, **1**, **2**, **3** or **4**, is the least energy efficient?

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(1 mark)

8 (b) Which windows should be compared to decide if adding argon to the gap improves the energy efficiency of the window?

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(1 mark)

8 (c) A householder is going to buy new windows. The sales assistant recommends that the householder buys windows with a 20 mm gap. These windows are much more expensive than those with a 16 mm gap.

It is **not** worth the householder paying the extra cost to buy 20 mm windows rather than 16 mm windows.

Explain this in terms of energy efficiency.

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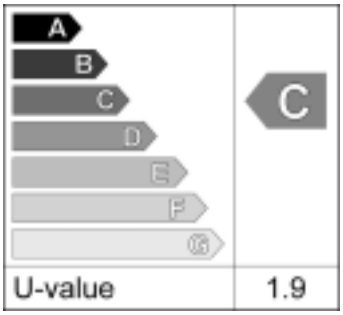
(2 marks)

8 (d) Windows are given an energy rating, from **A** down to **G**. The diagram shows the energy label from one type of double glazed window.



All new double glazed windows must have an energy rating of **C** or above.
Windows having a **C rating** have a U-value of 1.9.

Which windows given in the table would the householder be **unable** to buy?

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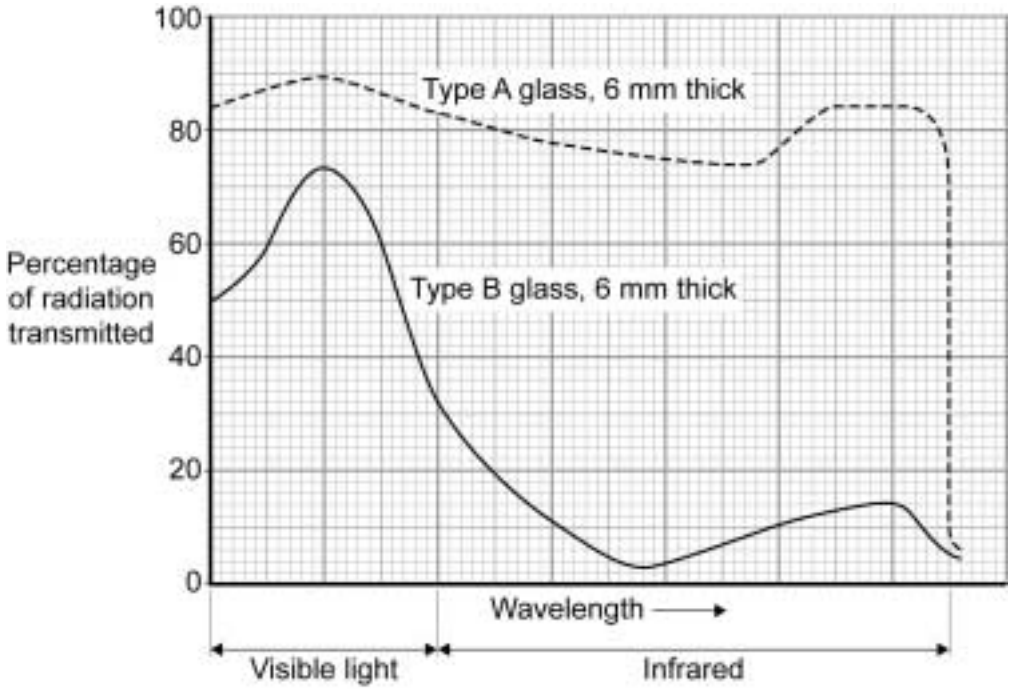
(1 mark)

Question 8 continues on the next page

Turn over▶

8 (e) Glass transmits infrared radiation and visible light. The amount transmitted depends on the type and thickness of the glass. The data from tests on two different types of glass is displayed in the graph below.



A homeowner has a glass conservatory built on the back of the house. The homeowner tells the builder that the inside of the conservatory should stay as cool as possible throughout the summer.

Explain why the builder uses 'Type B' glass for the conservatory.

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(2 marks)

7

Turn over for the next question

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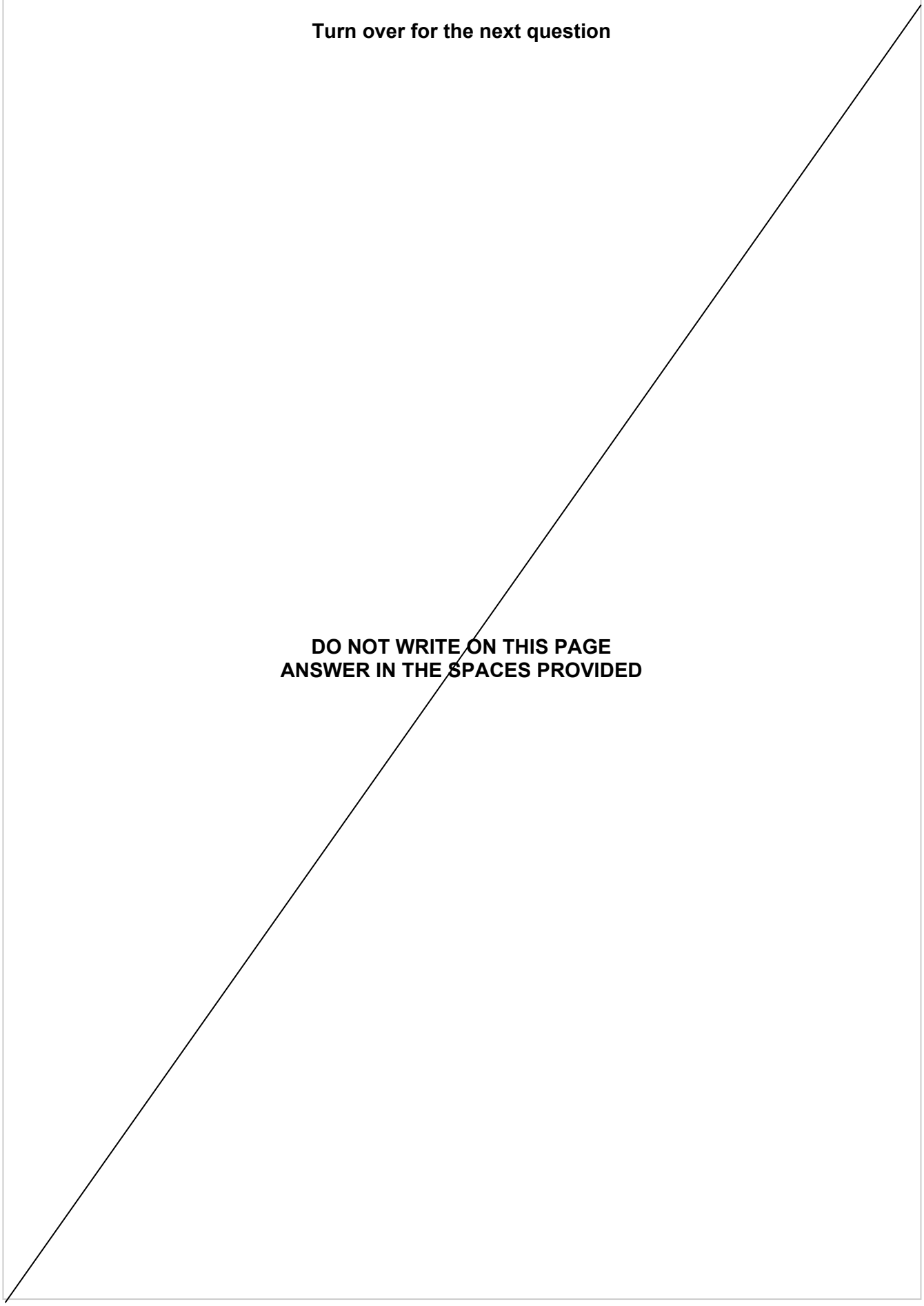
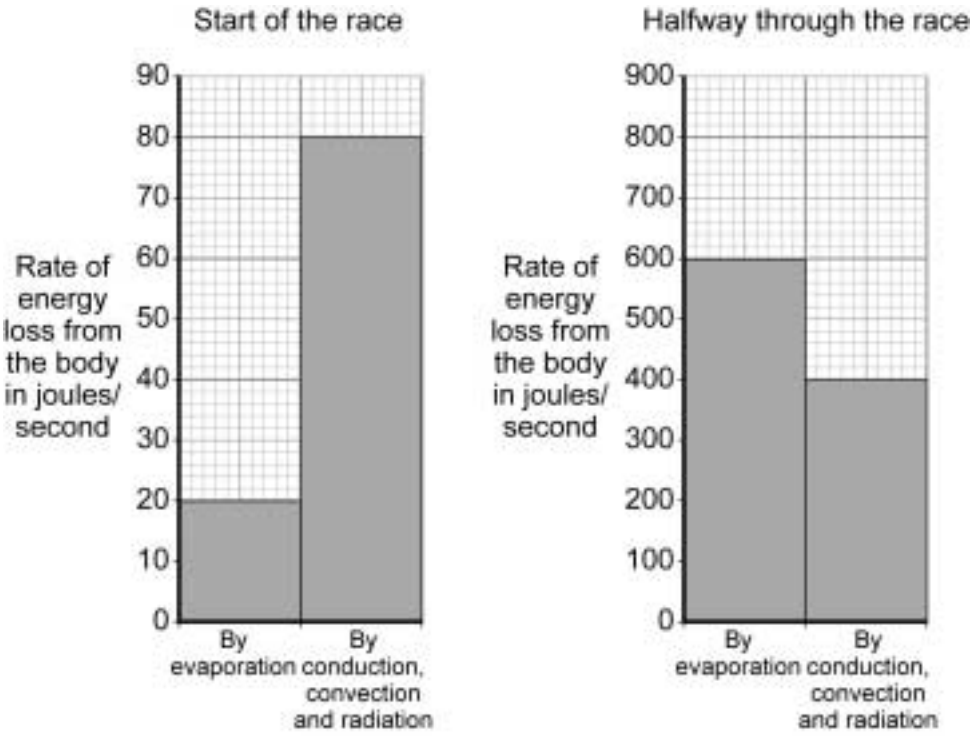
ANSWER IN THE SPACES PROVIDED



9 The bar charts show the rate of energy loss from the body of a runner at the start of a marathon race and halfway through the race.



9 (a) It is important that the energy loss by evaporation increases during the race.

Explain why.

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(2 marks)

9 (b) At the end of the marathon the runner covers herself in a silvered space blanket.

Explain how the space blanket helps keep the runner warm.

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(2 marks)

4

Turn over for the next question

10 (a) Scientific research carried out in 13 countries has tried to find out if there are any links between using a mobile phone and developing different types of cancer.

About 13 000 people, half with cancer and half in good health, were interviewed about their mobile phone use.

10 (a) (i) Suggest why people in good health were interviewed.

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(1 mark)

10 (a) (ii) Interviewing 13 000 people gave the researchers a large sample size.

Give **one** advantage, in any research project, of having a large sample size rather than a small sample size.

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(1 mark)

10 (b) The following information was included in a newspaper article about the research project.

- It may be difficult to prove there is a link simply by asking people how much they use a mobile phone. People's memories are not always accurate.
- Scientists in Israel found that people who use a mobile phone a lot are 50 % more likely to develop a cancer on the salivary gland just in front of the ears.
- The cost of the research, £20 million, has been partly paid for by mobile phone companies.
- No children were included in the research.

10 (b) (i) Draw a ring around the correct answer to complete the following sentence.

Using children in scientific research raises | environmental / ethical / social | issues.

(1 mark)

10 (b) (ii) Suggest **two** reasons why some people are concerned that the research was partly paid for by mobile phone companies.

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(2 marks)

10 (b) (iii) In Germany, mobile phones that emit very low levels of radiation are marked with a special symbol.

Explain why low emission mobile phones should be marked in this way.

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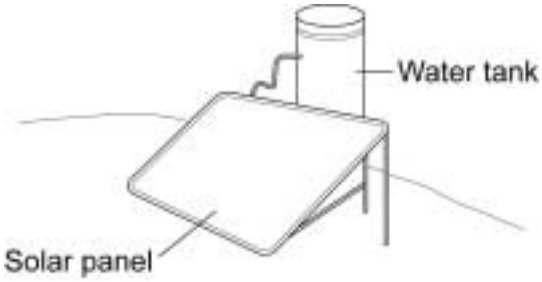
(2 marks)

7

Turn over for the next question

11 The picture shows one type of solar water heater. Water from the tank is slowly pumped through copper pipes inside the solar panel where the water is heated by energy from the Sun.



11 (a) Explain why the copper pipes inside the solar panel are painted black.

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(2 marks)

11 (b) Each day the average European family uses 100 kg of hot water.
To kill bacteria, the water going into the tank at 20 °C must be heated to 60 °C.

Calculate the energy needed to increase the temperature of 100 kg of water by 40 °C.

Specific heat capacity of water = 4200 J/kg °C.

Write down the equation you use, and then show clearly how you work out your answer.

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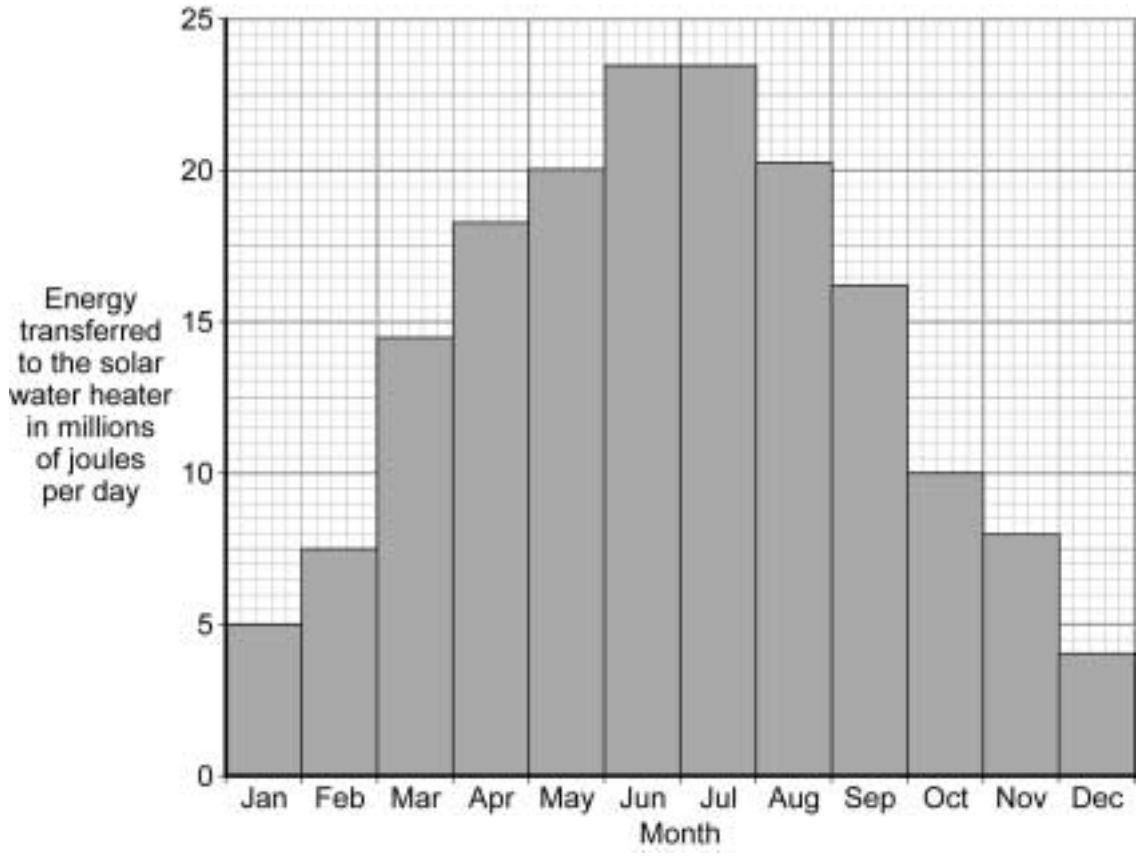
Energy transferred = ... J

(2 marks)

11 (c) The bar chart shows how the amount of solar energy transferred to the water heater varies throughout the year.



How many months each year will there **not** be enough solar energy to provide the hot water used by an average European family?

..... months
(1 mark)

Question 11 continues on the next page

Turn over▶

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

The water in the tank could be heated by using an electric immersion heater.

Outline the advantages and the disadvantages of using solar energy to heat the water rather than using an electric immersion heater.

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(6 marks)

11

END OF QUESTIONS

AQA

GCSE Physics Equations Sheet

Unit 1 F and H

$E = m \times c \times \theta$	E energy transferred m mass θ temperature change c specific heat capacity
$\text{efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} (\times 100\%)$	
$\text{efficiency} = \frac{\text{useful power out}}{\text{total power in}} (\times 100\%)$	
$E = P \times t$	E energy transferred P power t time
$v = f \times \lambda$	v speed f frequency λ wavelength