Specimen Paper

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

General Certificate of Secondary Education
Higher Tier

Science A
Unit Physics P1

Physics 1H

H

Physics
Unit Physics P1

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

You may use a calculator.

Time allowed
- 60 minutes

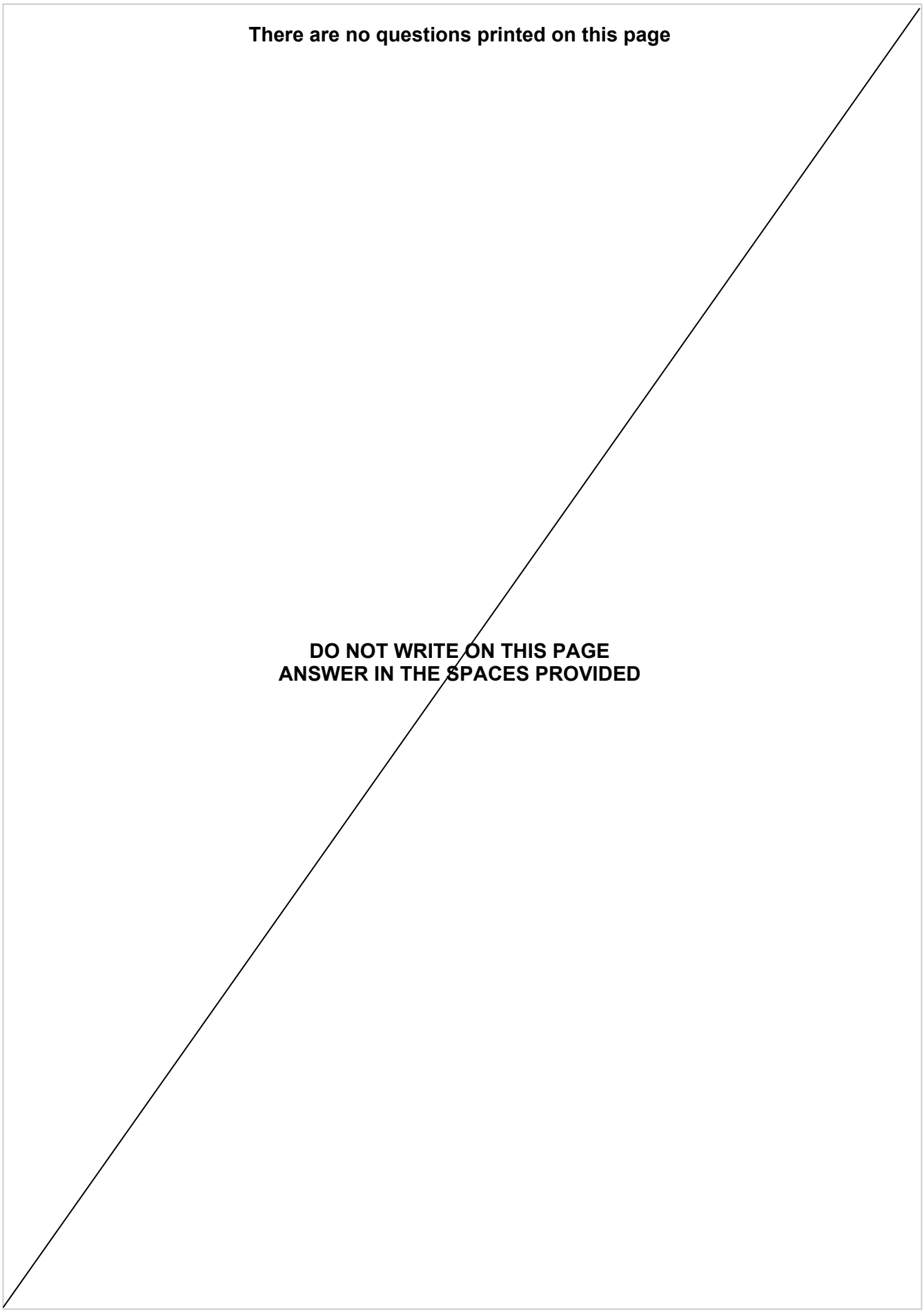
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work 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 where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 4(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.

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED



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

1 The diagram shows a plane mirror used by a dentist to see the back of a patient's tooth.

1 (a) Use a ruler to draw a ray of light on the diagram to show how the dentist is able to see the tooth labelled **Z**.

(3 marks)

1 (b) Describe the image formed by a plane mirror.

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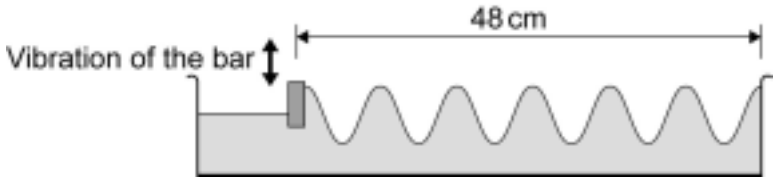
(2 marks)

5

Turn over▶

2 Water waves can be made by vibrating a wooden bar up and down in a tray of water.

The bar moves up and down at a frequency of 5 hertz.



2 (a) Calculate the speed, in cm/s, of the water waves.

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

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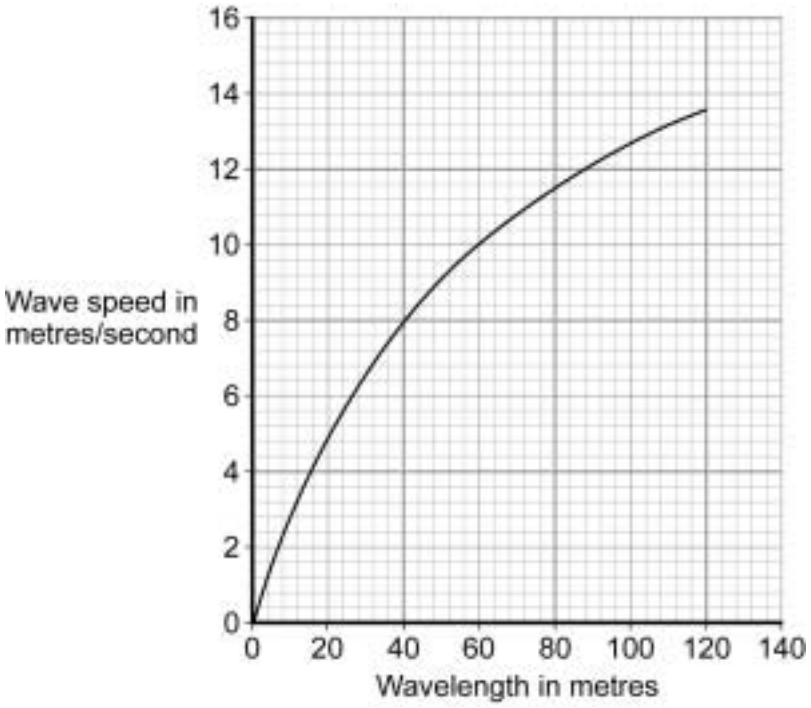
Wave speed = ... cm/s

(3 marks)

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



Use the graph to predict a speed for waves with a wavelength of 140 m.

Show clearly how you have used the graph to work out your answer.

Speed of waves = ... m/s

(2 marks)

5

Turn over for the next question

3 (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.

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

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(1 mark)

3 (a) (ii) Interviewing 13000 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)

3 (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.

3 (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)

3 (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)

3 (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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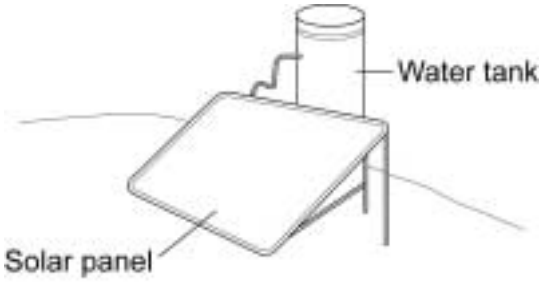
(2 marks)

7

Turn over for the next question

4 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.



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

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(2 marks)

4 (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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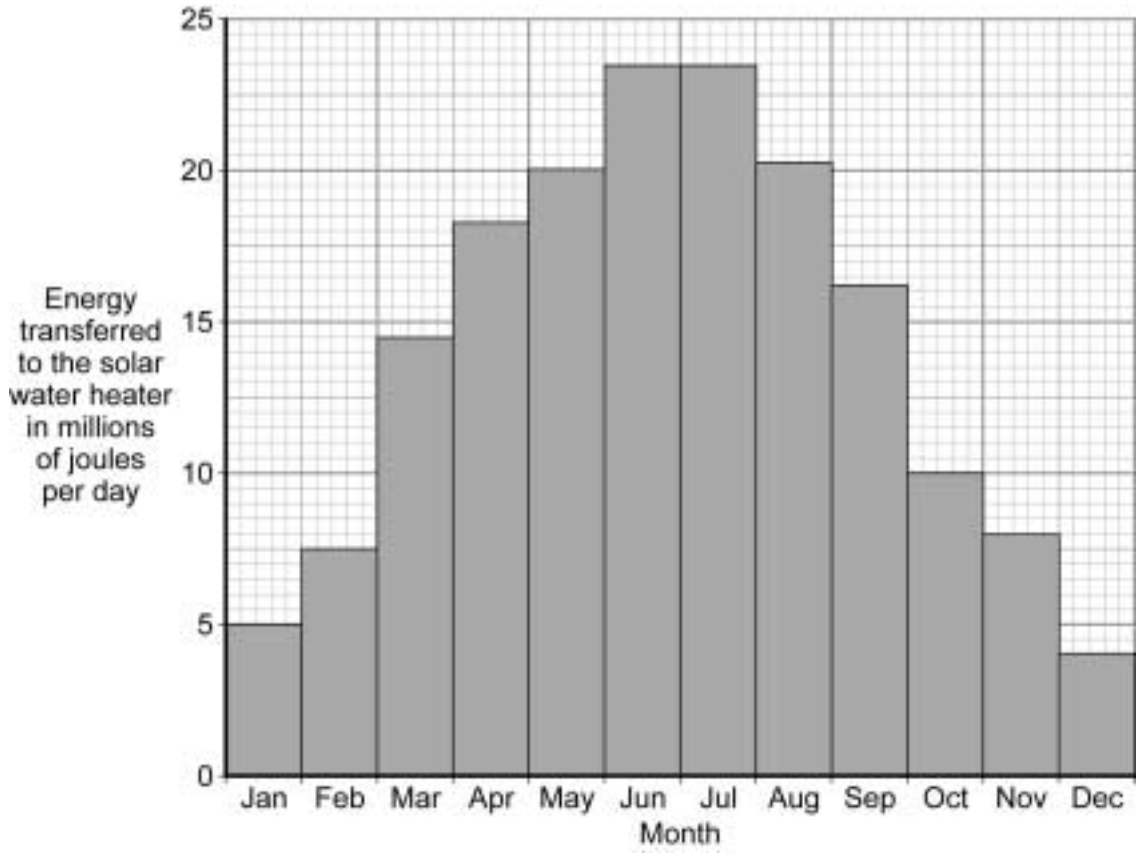
Energy transferred = ... J

(2 marks)

4 (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 4 continues on the next page

Turn over▶

4 (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 disadvantages of using solar energy to heat the water rather than using an electric immersion heater.

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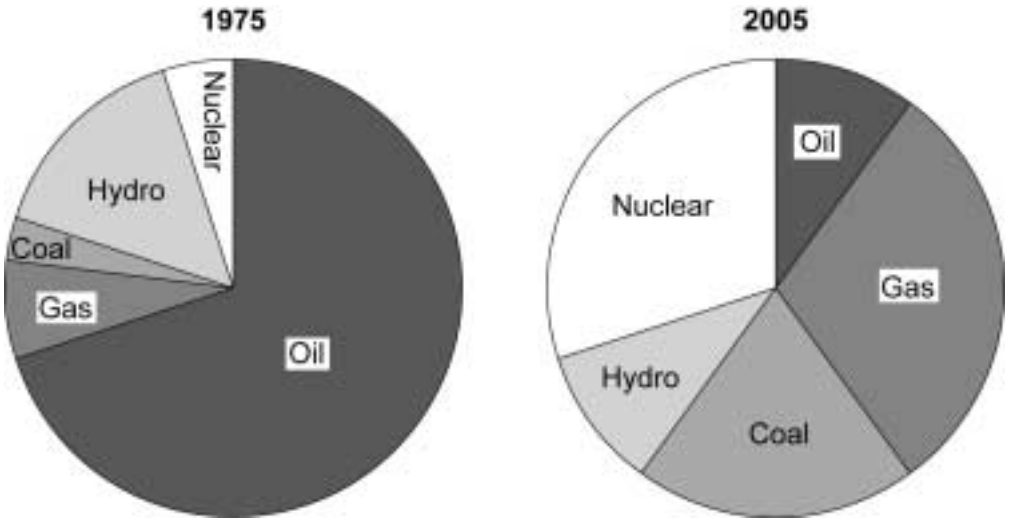
(6 marks)

11

5 The pie charts show the relative proportions of electricity generated in Japan from different energy sources in 1975 and 2005.



5 (a) Describe and suggest a reason for **two** differences in the energy sources used in 2005 compared with 1975.

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(2 marks)

Question 5 continues on the next page

Turn over▶

5 (b) Mining for coal often releases large amounts of methane gas. Methane is both explosive and a greenhouse gas. At the Sihe coal mine in China the methane is diverted to a gas burning power station where it is used to generate electricity.

5 (b) (i) A newspaper reported a scientist as saying:

> If the concentration of greenhouse gases in the atmosphere doubles, the average temperature of the Earth will increase by up to 5 °C over the next 100 years.

What has been stated in the newspaper?

Draw a ring a round your answer.

a fact **a guess** **a prediction**

Give a reason for your answer.

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(2 marks)

5 (b) (ii) Explain an environmental advantage of taking the methane gas from coal mines and using it to generate electricity.

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(2 marks)

5 (c) The average person in Britain uses 1930 kWh of electricity each year. Many people in the world's poorest countries do not have access to electricity.

Giving examples, explain why electricity is essential for both improving public health and for modern communications.

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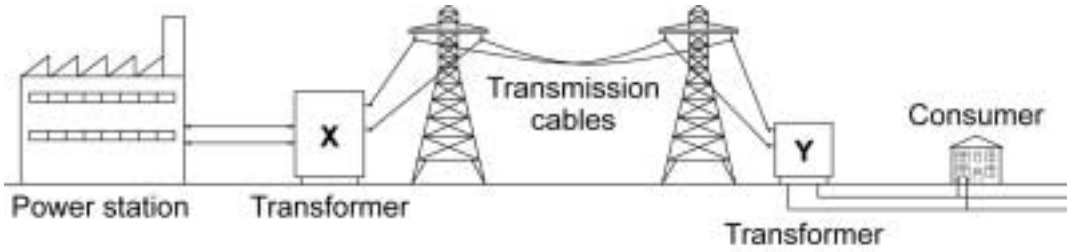
(3 marks)

9

Turn over for the next question

6 The diagram shows the National Grid system.



Transformers **X** and **Y** are an essential part of the National Grid system.

Explain why.

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(4 marks)

4

7 The picture shows a food processor, which is used to grate, shred, liquidise and mix food.
The table gives some information about the food processor.

Energy input	Electrical
Useful energy output	Kinetic
Power rating	1200 watts
Efficiency	0.8

7 (a) The food processor is used for a total of 30 minutes a day.

Calculate the cost of the energy **wasted** by the food processor each day.

Electricity costs 15 p per kilowatt-hour.

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

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Cost of **waste** energy = ... p

(4 marks)

7 (b) Explain what happens to the waste energy.

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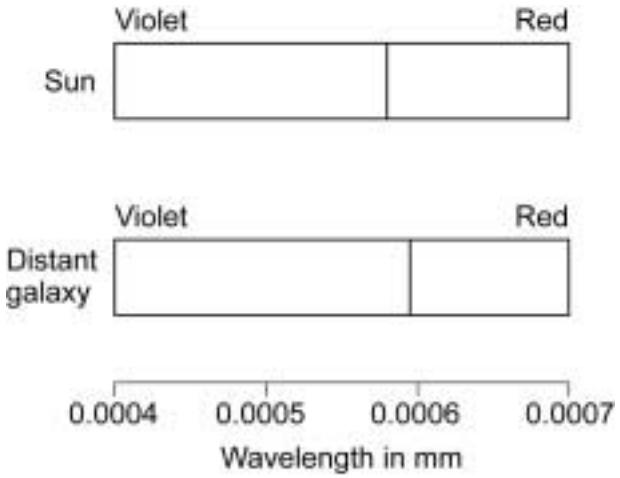
(2 marks)

Turn over ▶

6

8 The visible part of the electromagnetic spectrum from a star includes a dark line. This line is at a specific wavelength.

The diagram shows the position of the dark line in the spectrum from the Sun and in the spectrum from a distant galaxy.



8 (a) Explain how the spectrum 'shift' of the dark line supports the theory that the Universe began from a very small initial point.

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(3 marks)

8 (b) Name **one** other piece of evidence that supports the theory that the Universe began from a very small initial point.

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(1 mark)

4

Turn over for the next question

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9 (a) The diagram shows a tray of marbles being shaken from side to side. As this happens some of the marbles jump out of the tray.

Explain how the tray of marbles is acting as a model for the evaporation of a liquid.

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(2 marks)

9 (b) Before giving an injection, a nurse dabs some alcohol onto the patient's arm. This makes the patient's skin feel cold.

Explain what happens to make the patient's skin feel cold.

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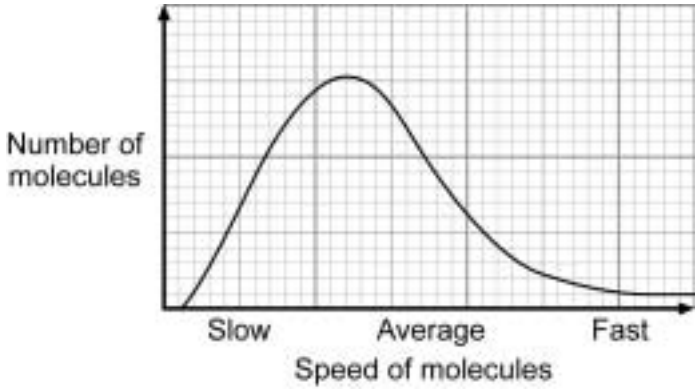
(2 marks)

9 (c) The graph shows that the molecules in a liquid do not all have the same speed.



Use the information in the graph to explain why a liquid cools down when it evaporates.

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(5 marks)

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END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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