

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2008

SCIENCE B
Unit Physics P1

PHYSICS
Unit Physics P1

Foundation Tier

Friday 20 June 2008 9.00 am to 9.45 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> a ruler. <p>You may use a calculator.</p>

Time allowed: 45 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. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice

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

PHY1F
F



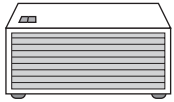
For Examiner's Use			
Question	Mark	Question	Mark
1		6	
2		7	
3			
4			
5			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



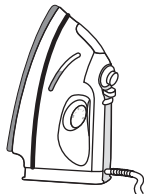
Answer **all** questions in the spaces provided.

1 The pictures show six different household appliances.

Fan heater



Iron



Hairdryer



Vacuum cleaner

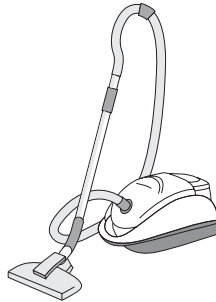
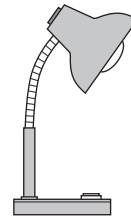


Table lamp



Kettle



1 (a) Four of the appliances, including the fan heater, are designed to transform electrical energy into heat.

Name the other **three** appliances designed to transform electrical energy into heat.

1

2

3

(3 marks)

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

chemical	heat	kinetic	sound
-----------------	-------------	----------------	--------------

Energy that is not usefully transformed by the fan heater is wasted as

..... energy.

(1 mark)



- 1 (c) The table gives information about two different fan heaters.

	Useful energy transferred each second in joules	Wasted energy transferred each second in joules
Fan heater L	1200	10
Fan heater M	1200	20

Complete the following sentence by drawing a ring around the line in the box that is correct.

Fan heater **L**
 is more efficient than
 has the same efficiency as
 is less efficient than
 fan heater **M**.

(1 mark)

5

Turn over for the next question

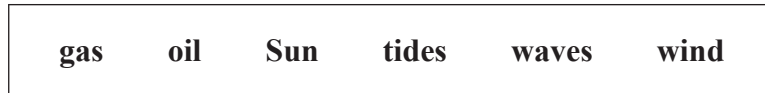
Turn over ▶



- 2 (a) Different energy sources are used to generate electricity.

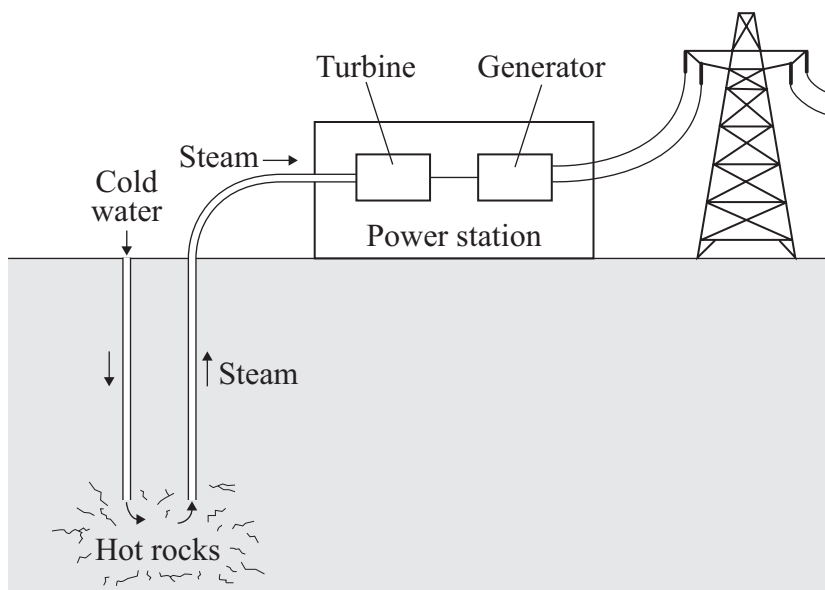
Which **two** of the energy sources in the box are likely to be used up first?

Draw a ring around each of your answers.



(2 marks)

- 2 (b) The diagram shows a geothermal power station. Hot rocks in the Earth's crust heat water to produce steam. The steam is used to drive turbines that turn electrical generators.



How is the way in which a geothermal power station generates electricity the same as the way in which a coal burning power station generates electricity?

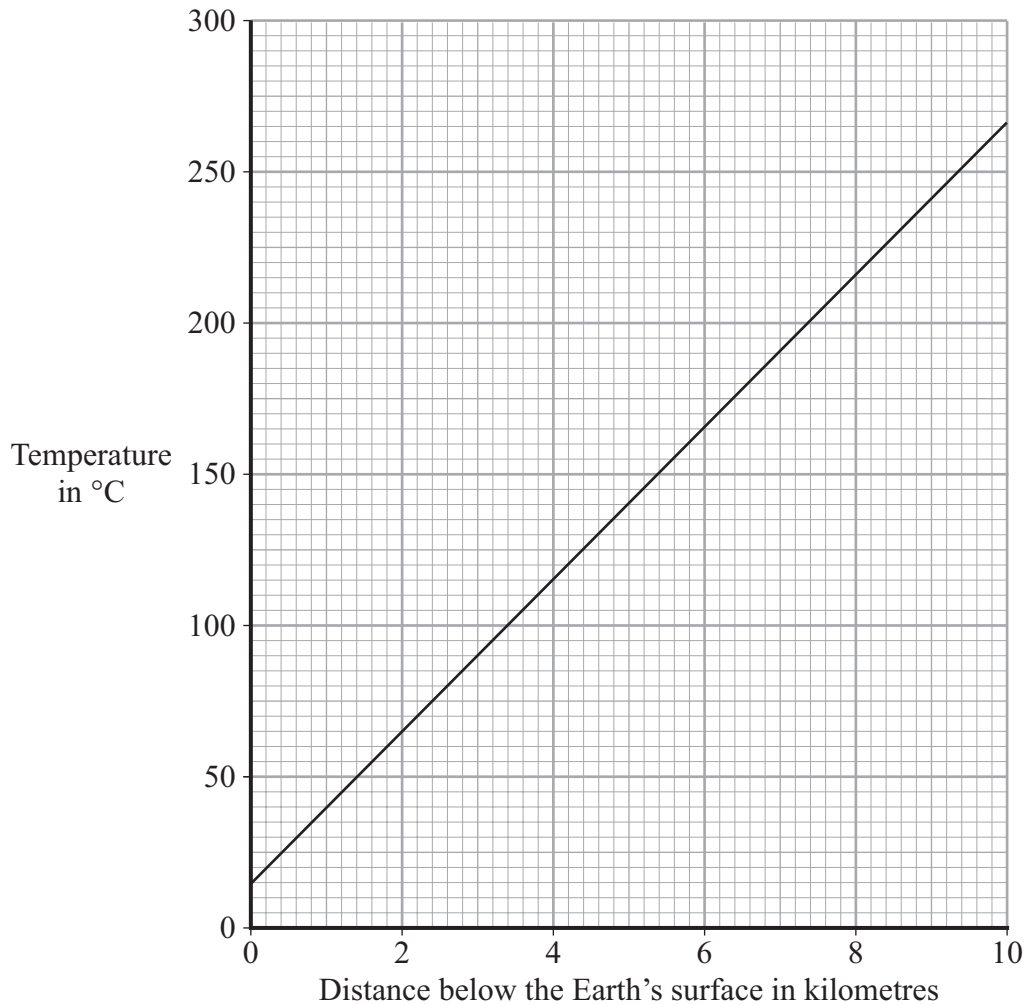
.....

.....

(1 mark)



- 2 (c) The graph shows how the temperature of the rocks in the Earth's crust depends on how far the rocks are below the Earth's surface.



Estimate the temperature of the rocks 5 kilometres below the Earth's surface.

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

.....

Temperature = °C
 (2 marks)

Question 2 continues on the next page

Turn over ►



- 2 (d) Scientists have estimated that one quarter of the world's electricity could be generated using geothermal energy.

Give **one** reason that scientists might use to persuade a government to spend large amounts of money building geothermal power stations.

.....

(1 mark)

6

- 3 (a) The names of three types of nuclear radiation are given in **List A**. Some properties of these three types of radiation are given in **List B**.

Draw a straight line to link each type of radiation in **List A** to its correct property in **List B**. Draw only **three** lines.

List A
Type of nuclear radiation

List B
Property of radiation

alpha

not deflected by an electric field

beta

stopped by thin metal but not paper

gamma

the most strongly ionising

will not harm living cells

(3 marks)



- 3 (b) Nuclear radiation is given out from the centre of some types of atom.

What name is given to the centre of an atom?
(1 mark)

- 3 (c) One of the substances in the table is used as a radioactive tracer. A hospital patient breathes in air containing the tracer. The radiation given out is measured by a doctor using a detector outside the patient's body.

Substance	Radiation given out	Solid, liquid or gas
X	alpha	gas
Y	gamma	gas
Z	gamma	solid

Which **one** of the substances, X, Y or Z, should be used as the tracer?

Give **two** reasons for your answer.

1

.....

2

.....

(3 marks)

- 3 (d) Radiation can also be used to kill the bacteria on fresh food.

Give **one** reason why farmers, shop owners or consumers may want food to be treated with radiation.

.....

.....

(1 mark)

8

Turn over ►



- 4 The table gives data about two space telescopes. The Hubble telescope is already in space, but the James Webb telescope is still being built.

Name of telescope	Mirror diameter in metres	Launch Year	Orbit distance from the Earth in kilometres
Hubble	2.4	1990	575
James Webb	6.5	2013	1 500 000

- 4 (a) Give **one** reason why the image from an optical telescope on the Earth may not be as clear as the image produced by a space telescope.

.....

.....

(1 mark)

- 4 (b) Explain why it is easier for astronauts to service the Hubble telescope than it will be for astronauts to service the James Webb telescope.

.....

.....

.....

.....

(2 marks)

- 4 (c) The large mirror for the James Webb telescope will be folded, launched into space and then opened out. This will be a complicated process so a working scale model of the mirror system has been built.

Which statement gives a reason for building the scale model?

Put a tick (✓) in the box next to your answer.

To see what the mirror system will look like

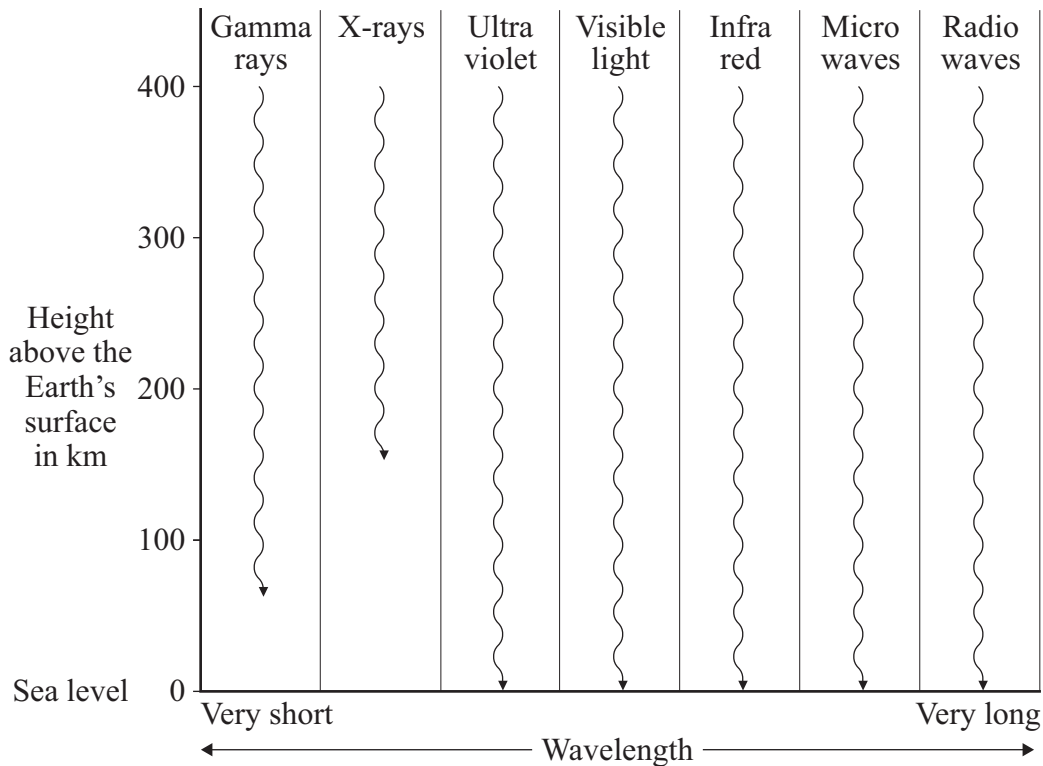
To test the design to make sure it will work

To measure the power needed by the telescope

(1 mark)



4 (d) The diagram shows how far different types of electromagnetic wave can travel through the Earth's atmosphere before being absorbed.



Name **two** types of electromagnetic wave that can be detected by a space telescope but cannot be detected by a telescope positioned on Earth.

- 1
 - 2
- (2 marks)

4 (e) Observations of distant galaxies have given evidence to support the theory that the universe began from a very small point.

What name is given to this theory?

.....

(1 mark)

7

Turn over ►



- 5 A householder was out shopping when her electricity meter reading should have been taken. The electricity company estimated the reading and sent the following bill. Unfortunately, the bill was damaged in the post.

AQA electricity

Customer reference: 2634724983
Date sent out: 18 September 2007

Your electricity bill

Present reading: 62740 (e) taken on 13 September
Previous reading: 62580 taken on 12 June

Used: 160 kWh

Cost per kWh = 12p (e) = estimated reading

Cost of electricity used = _____

- 5 (a) Use the equation in the box to calculate the cost of the electricity used between 12 June and 13 September.

$$\text{total cost} = \text{number of kilowatt-hours} \times \text{cost per kilowatt-hour}$$

Show clearly how you work out your answer.

.....

.....

Total cost =
(2 marks)

- 5 (b) The estimated reading shown on the bill was not very accurate. The correct reading was 62920.

How many kilowatt-hours of electricity had the householder actually used between the 12 June and the 13 September?

.....

.....

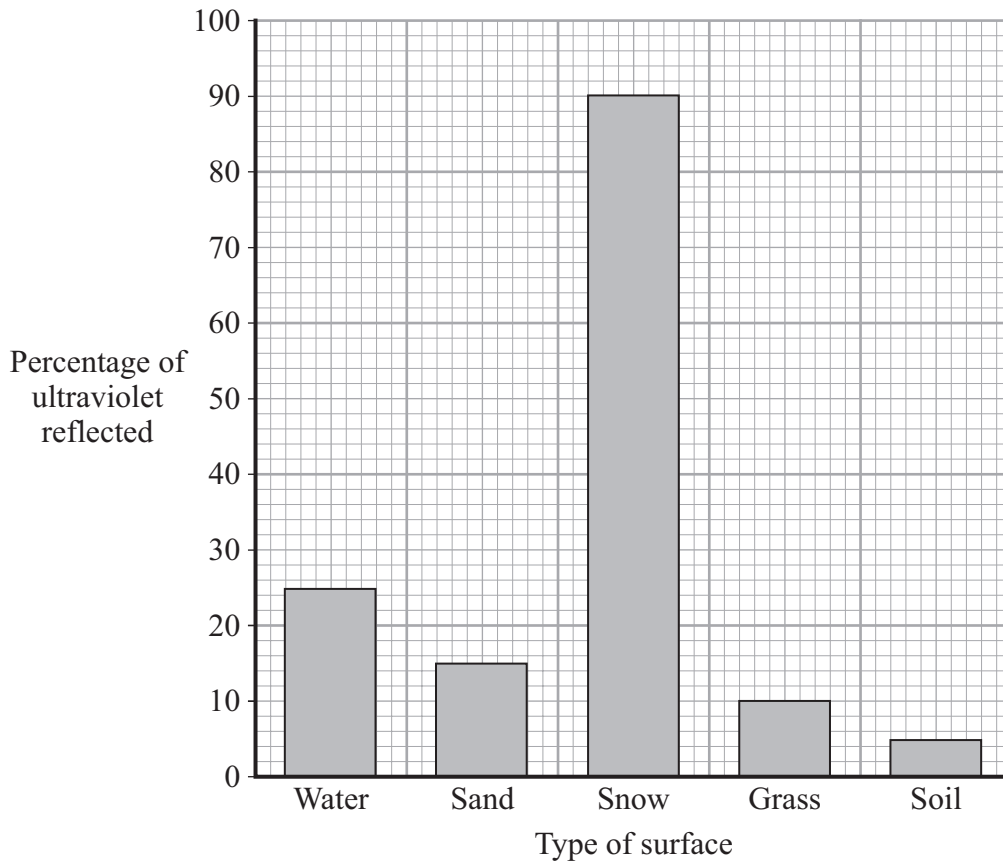
(2 marks)

4



6 (a) Ultraviolet (UV) radiation can be reflected or absorbed by a surface.

The percentage of ultraviolet radiation reflected by various surfaces is shown in the bar chart.



6 (a) (i) Which of these surfaces is the best **absorber** of ultraviolet radiation?

..... (1 mark)

6 (a) (ii) Why has the data been shown as a bar chart rather than a line graph?

.....
 (1 mark)

6 (a) (iii) Who is likely to be exposed to more ultraviolet radiation, a skier or a golfer?

Draw a ring around your answer. **skier golfer**

Give a reason for your answer.

.....
 (1 mark)

Question 6 continues on the next page

Turn over ►



6 (a) (iv) State **one** harmful effect that ultraviolet radiation has on skin.

.....
(1 mark)

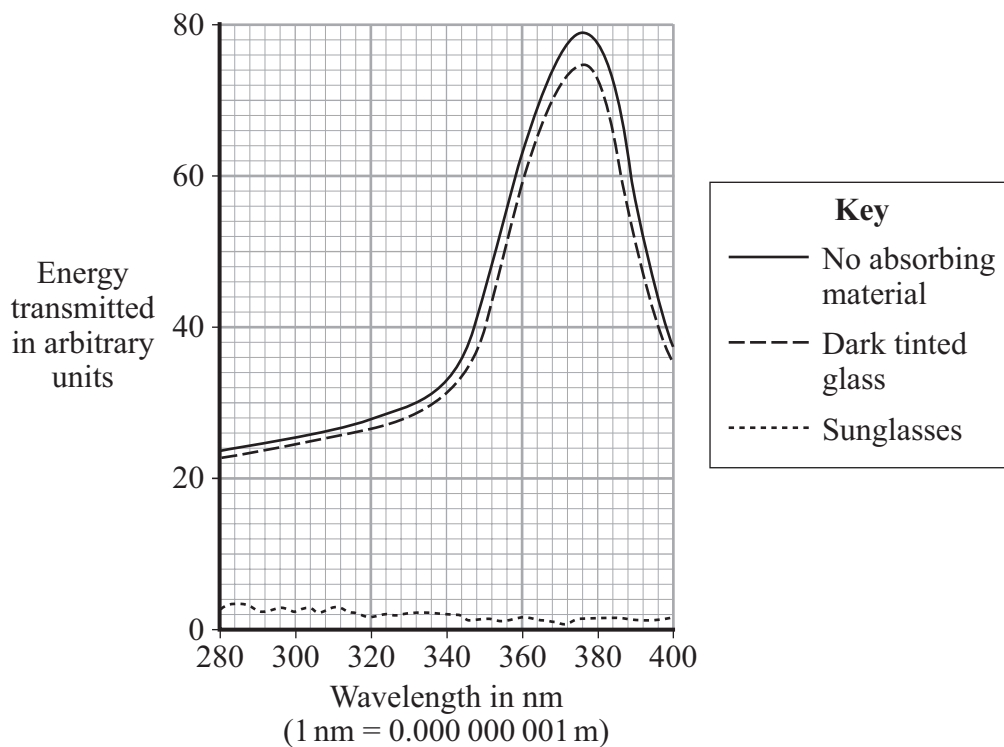
6 (b) This is a label from a pair of sunglasses.

Sportswear Budget	£5
<ul style="list-style-type: none"> • plastic lenses • blocks 95% of ultraviolet rays • UV absorbing up to wavelengths of 400 nm 	

A student tested the sunglasses by measuring the energy transmitted by the lenses for ultraviolet waves with a range of different wavelengths.

For comparison, the student also measured the transmission of ultraviolet waves through a piece of dark tinted glass.

The results of the tests are shown in the graph.



6 (b) (i) Explain how the student’s results support the claims made on the label.

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

(2 marks)

6 (b) (ii) Ultraviolet radiation can cause permanent eye damage.

Why should the lenses for sunglasses **not** be made from the dark tinted glass used in the student’s tests?

.....
.....

(1 mark)

6 (c) An eye care charity predicts that within 10 years, everyone, when outside, will wear UV protection sunglasses most of the time. This is because the potential damage from ultraviolet radiation is so serious.

6 (c) (i) Which **one** of the following statements is the most likely reason for the prediction made by the eye care charity?

Put a tick (✓) in the box next to your answer.

Publicity and education will make people aware of the dangers.

The price of UV blocking sunglasses will fall dramatically.

The level of UV in the atmosphere will increase.

(1 mark)

6 (c) (ii) Several manufacturers of sunglasses have said that the research they have carried out supports the view of the eye care charity.

Suggest why the research conducted by the manufacturers could be biased.

.....
.....

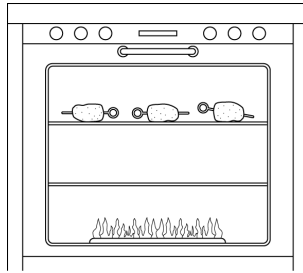
(1 mark)

9

Turn over ►



7 The diagram shows potatoes being baked in a gas oven. Each potato has a metal skewer pushed through it.



7 (a) Explain how heat is transferred by the process of convection from the gas flame at the bottom of the oven to the potatoes at the top of the oven.

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

(3 marks)

7 (b) The metal skewers help the potatoes to cook by transferring heat to the inside of the potatoes.

By what method is heat transferred through a metal skewer?

.....

(1 mark)

7 (c) When the potatoes are taken from the oven, they start to cool down.

Suggest **one** factor that will affect how fast a potato cools down.

.....

(1 mark)

7 (d) If the potatoes need to be kept hot, they may be wrapped in shiny aluminium foil.

Why does this help to keep the potatoes hot?

.....

(1 mark)

END OF QUESTIONS

6



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