Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Wednesday 5 June 2013 – Afternoon
Time: 1 hour

Paper Reference
5PH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 1 9 4 2 A 0 1 2 0

PEARSON

FORMULAE

You may find the following formulae useful.

wave speed = frequency × wavelength $v = f \times \lambda$

wave speed = $\dfrac{\text{distance}}{\text{time}}$ $v = \dfrac{x}{t}$

electrical power = current × potential difference $P = I \times V$

cost of electricity = power × time × cost of 1 kilowatt-hour

power = $\dfrac{\text{energy used}}{\text{time taken}}$ $P = \dfrac{E}{t}$

efficiency = $\dfrac{\text{(useful energy transferred by the device)}}{\text{(total energy supplied to the device)}} \times 100\%$

Answer ALL questions.

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 ☒.

Electromagnetic spectrum

1 The electromagnetic spectrum has many parts.

One of these parts is called visible light.

(a) (i) How many different colours are there in visible light?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** five
- ☒ **B** seven
- ☒ **C** nine
- ☒ **D** eleven

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Three colours of the spectrum of visible light in the correct order are

(1)

- ☒ **A** green, red, yellow
- ☒ **B** blue, red, green
- ☒ **C** red, orange, yellow
- ☒ **D** violet, orange, green

(b) Different parts of the electromagnetic spectrum have different uses.

Draw **one** straight line from each part to its use.

(2)

part	**use**
ultraviolet	detecting forged banknotes
gamma rays	cooking
microwaves	detecting cancer

(c) Images of hands can be made using different parts of the electromagnetic spectrum.

Infrared image

X-ray image

Both images give information about a hand.

(i) Suggest what information the infrared image gives about a hand.

(2)

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.....

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.....

(ii) Explain why taking an X-ray image of a hand is more dangerous than taking an infrared image.

(2)

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(Total for Question 1 = 8 marks)

Using waves

2 Ultrasound from a fishing boat is used to find fish.

(a) (i) Which of these is correct for ultrasound waves?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** ultrasound waves have a frequency above 20 000 Hz

☒ **B** ultrasound waves have a frequency below 20 Hz

☒ **C** ultrasound waves have a wavelength above 20 000 Hz

☒ **D** ultrasound waves have a wavelength below 20 Hz

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The system that uses ultrasound to find fish is called

(1)

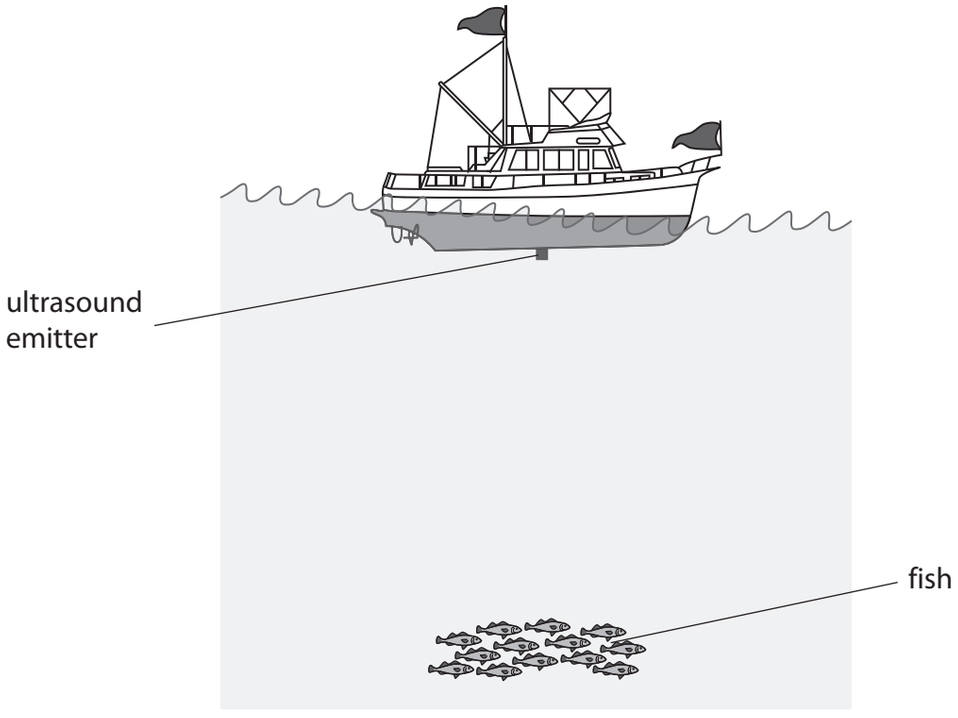
☒ **A** fibre optics

☒ **B** satellite transmission

☒ **C** sonar

☒ **D** thermal imaging

(iii) The diagram shows a fishing boat above some fish.



Describe how ultrasound waves are used to detect the fish.

You may add to the diagram to help with your answer.

(2)

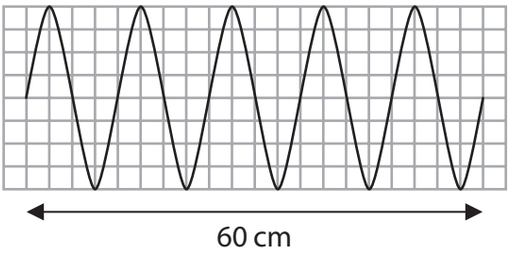
.....

.....

.....

.....

(b) Some students are investigating waves.
They produce waves by moving a piece of wood up and down in a tank of water.
The diagram shows the waves over a distance of 60 cm.



(i) State the number of wavelengths shown on the diagram.

(1)

number of wavelengths = ...

(ii) Calculate the wavelength of the waves.

(1)

wavelength of waves = ... cm

(c) The students produce a different wave.
This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

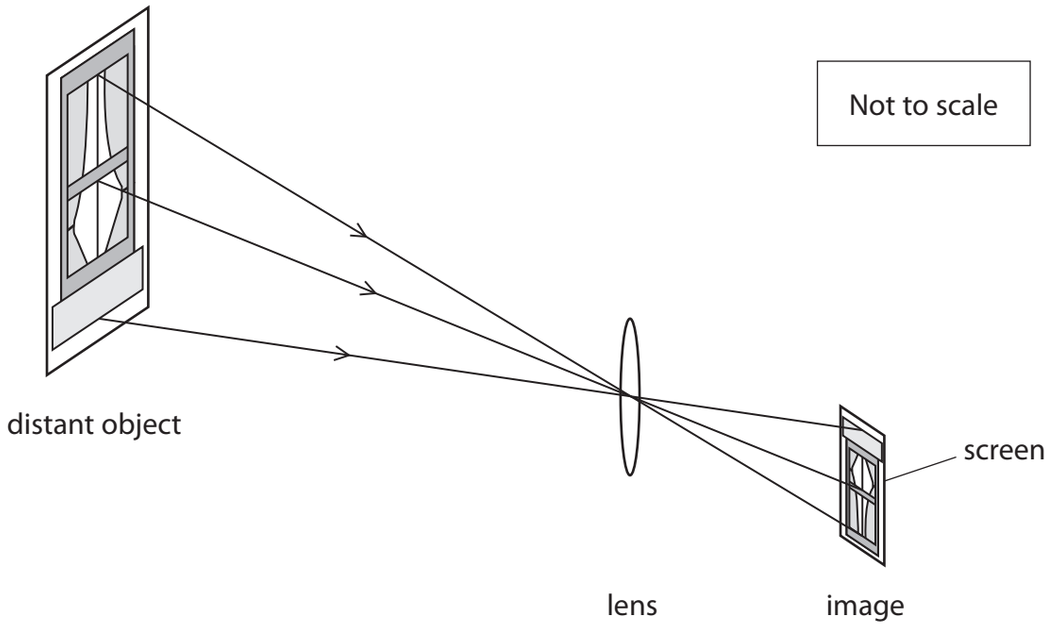
(2)

speed of wave = ... cm/s

(Total for Question 2 = 8 marks)

Behaviour of light and sound

3 A lens can be used to produce a clear image of a distant object on a screen.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The image produced is real because it is

(1)

☒ **A** in focus

☒ **B** magnified

☒ **C** on a screen

☒ **D** smaller

(ii) Describe how to measure the focal length of the lens.

(2)

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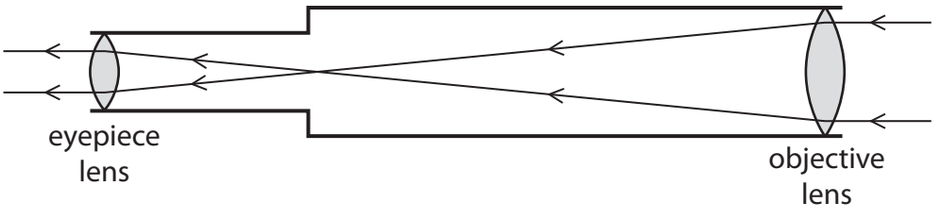
(b) The diagram shows a simple telescope which uses two lenses to look at stars.



(i) Explain what the eyepiece lens does.

(2)

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.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The light that travels from the stars transfers

(1)

☒ **A** charge

☒ **B** energy

☒ **C** mass

☒ **D** matter

(c) Light and sound waves are produced at the same time by an explosion on Earth.

(i) The sound of the explosion is heard 1920 metres away 6.0 seconds after the explosion has happened.

Calculate the speed of sound in air.

(2)

speed of sound in air = ... m/s

(ii) A scientist is standing a long way from the explosion.

Explain why he hears the explosion a few seconds after he sees it.

(2)

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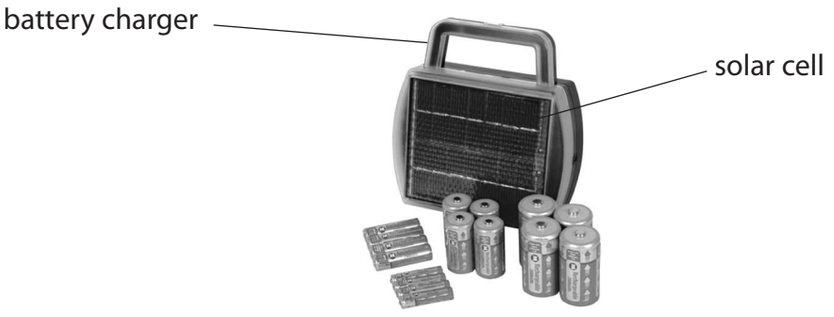
(Total for Question 3 = 10 marks)

Using solar energy

4 A student uses a solar powered battery charger to charge some batteries.



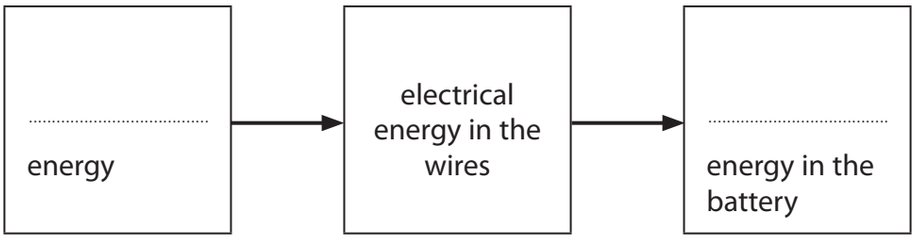
(a) The diagram is an energy transfer diagram for a battery being charged.

Use words from the box to complete the energy transfer diagram.

(2)

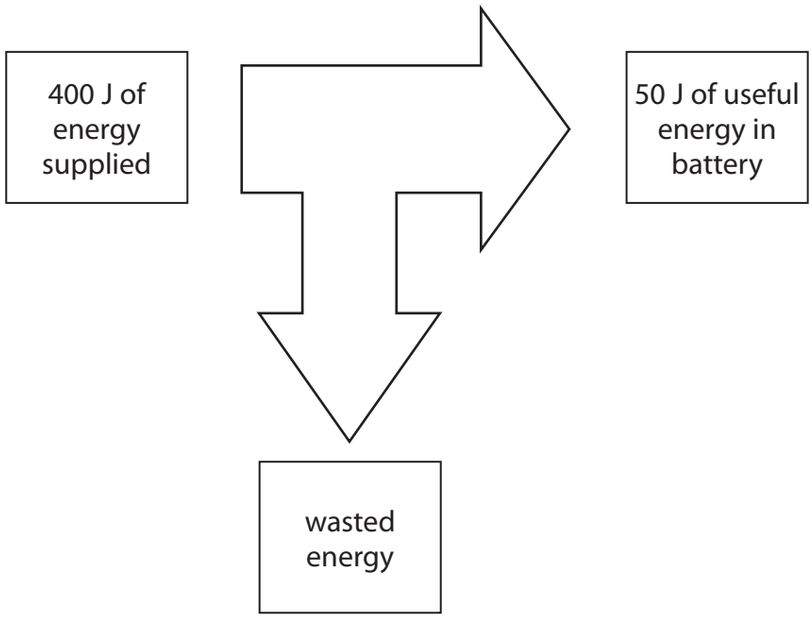
light	kinetic	sound
electrical	chemical	

Energy transfer diagram



(b) The diagram shows how much energy is usefully transferred by the battery charger.

Not to scale



(i) Calculate the amount of wasted energy.

(1)

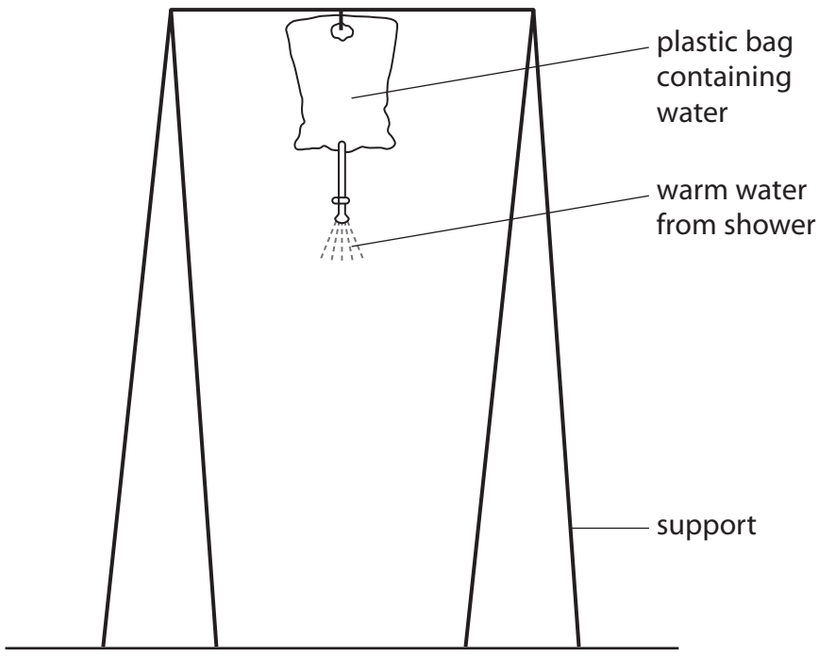
wasted energy = ... J

(ii) Calculate the efficiency of the battery charger.

(2)

efficiency of the battery charger = ... %

(c) The following arrangement is used as a solar powered shower.



The bag is left out in the sunlight during the day.

(i) Explain what colour the bag should be to heat the water to the highest temperature.

(2)

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.....

.....

.....

(ii) On a sunny day the bag is filled with cold water.
Explain why the temperature of the water increases and then stays constant.

(3)

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(Total for Question 4 = 10 marks)

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Using electricity

5 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

An electric current is the rate of flow of

(1)

- ☒ **A** atoms
- ☒ **B** charge
- ☒ **C** voltage
- ☒ **D** watts

(b) An electric kettle is connected to a mains voltage of 230 V.
The current in the kettle is 12 A.

Calculate the power of the kettle.

(2)

power of the kettle = ... W

(c) A television has a power of 400 W.
The cost of 1 kW h of electrical energy is 15p.

Calculate the cost of using the television for 10 hours.

(3)

cost of using the television for 10 hours = ... p

*(d) Some students found this information about an energy saving lamp and a filament lamp that give out almost the same amount of light.

energy saving lamp

power = 15 W

cost = £1.50

lifetime = 10 000 hours

produces 20 J of light energy for each 100 J of electrical energy supplied

filament lamp

power = 60 W

cost = £0.30

lifetime = 1 000 hours

produces 5 J of light energy for each 100 J of electrical energy supplied

Describe the advantages and disadvantages of each type of lamp.

(6)

(Total for Question 5 = 12 marks)

Solar System and beyond

6 (a) The Sun is at the centre of our Solar System.

(i) Complete the following sentence.

(1)

Our Solar System is near the edge of a galaxy called the .....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

When the Sun nears the end of its life it will become a

(1)

☒ **A** black hole

☒ **B** neutron star

☒ **C** supernova

☒ **D** white dwarf

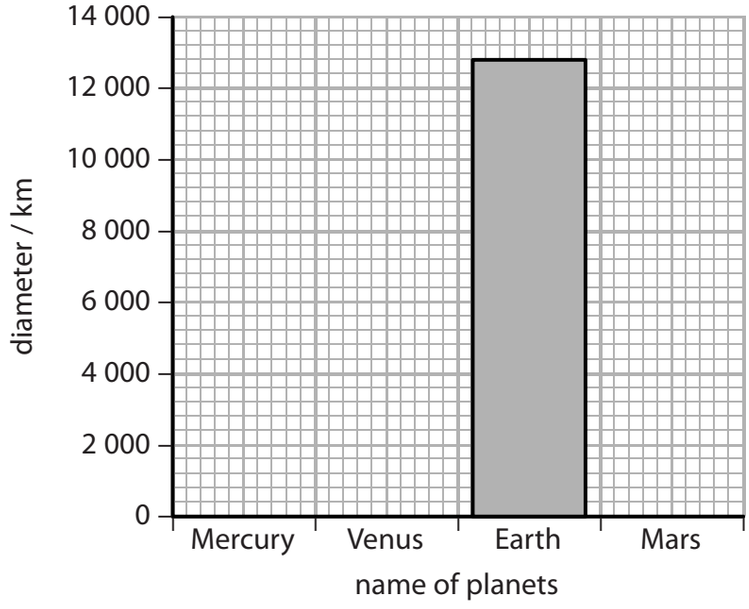
(b) The table gives information about the diameters and distances of the four planets closest to the Sun.

planet	distance from the Sun / AU	diameter of the planet / km
Mercury	0.39	4 900
Venus	0.72	12 100
Earth	1.00	12 800
Mars	1.52	6 800

(i) Put the information about the diameter of the planets on to the bar chart.

The diameter for Earth has been done for you.

(2)



(ii) The distance of the planets from the Sun has been given in Astronomical Units (AU).
1 AU is 150 000 000 km.
Calculate the distance of Mars from the Sun in kilometres.

(2)

distance of Mars from the Sun = ... km

*(c) For many years scientists have searched for evidence of intelligent life in our Solar System and in the rest of the Universe.

Describe the methods scientists have used to help with this search in both our Solar System and the rest of the Universe.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS