

Paper Reference(s) 5PH1F/01

Edexcel GCSE

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Wednesday 5 June 2013 – Afternoon

Time: 1 hour plus your additional time allowance

INSTRUCTIONS TO CANDIDATES

Write your centre number, candidate number, surname, initials and your signature in the boxes below. Check that you have the correct question paper.

Centre No.							
Candidate No.							
Surname							
Initial(s)							
Signature							
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Use **BLACK** ink or ball-point pen.

Answer **ALL** questions.

Answer the questions in the spaces provided – there may be more space than you need.

MATERIALS REQUIRED FOR EXAMINATION

Calculator, ruler

ITEMS INCLUDED WITH QUESTION PAPERS

Nil

INFORMATION FOR CANDIDATES

- 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 TO CANDIDATES

- 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)

FORMULAE

You may find the following formulae useful.

$$\text{wave speed} = \text{frequency} \times \text{wavelength} \quad v = f \times \lambda$$

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

$$\text{electrical power} = \text{current} \times \text{potential difference} \quad P = I \times V$$

$$\text{cost of electricity} = \text{power} \times \text{time} \times \text{cost of 1 kilowatt-hour}$$

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

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

(Turn over)

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? (1 mark)

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

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

(Question continues on next page)

(Turn over)

- (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

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

(1 mark)

(Question continues on next page)

(Turn over)

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

Draw ONE straight line from each part to its use.
(2 marks)

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

(Question continues on next page)

(Turn over)

(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 marks)

(Question continues on next page)

(Turn over)

- (ii) Explain why taking an X-ray image of a hand is more dangerous than taking an infrared image. (2 marks)

(TOTAL FOR QUESTION 1 = 8 MARKS)

(Questions continue on next page)

(Turn over)

USING WAVES

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

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

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

- 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

(Question continues on next page)

(Turn over)

(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

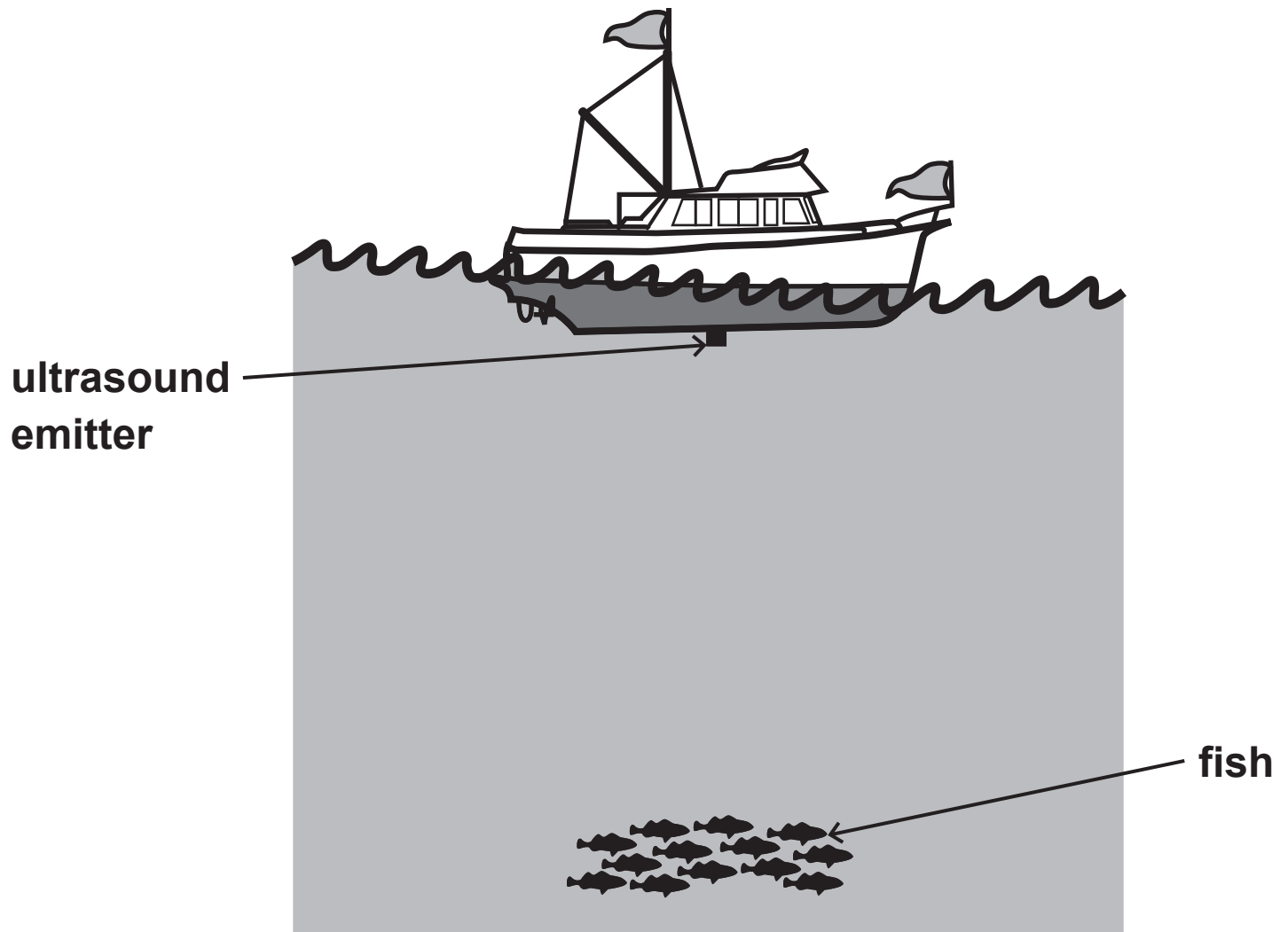
- A fibre optics
- B satellite transmission
- C sonar
- D thermal imaging

(1 mark)

(Question continues on next page)

(Turn over)

(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 marks)

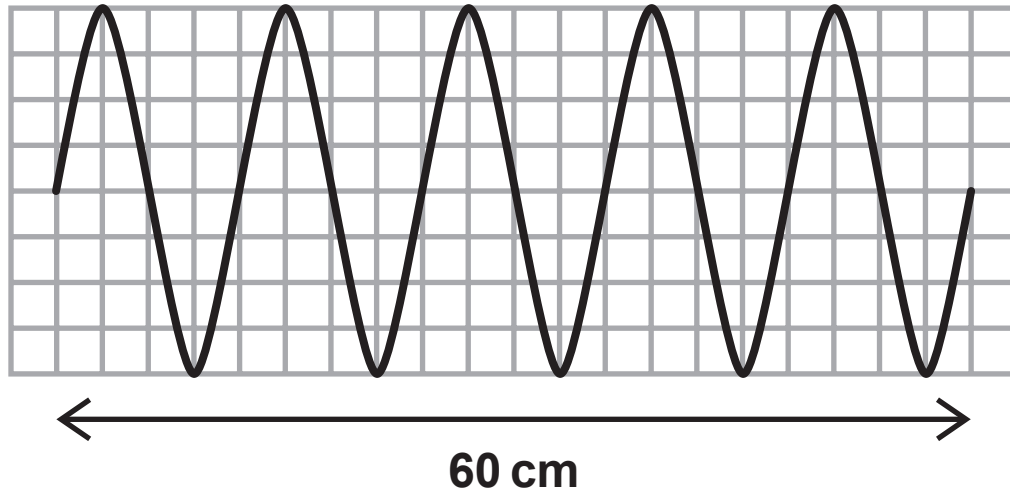
(Continue your answer on next page)

(Turn over)

(Question continues on next page)

(Turn over)

- (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 mark)

number of wavelengths = _____

(Question continues on next page)

(Turn over)

- (ii) Calculate the wavelength of the waves.
(1 mark)

wavelength of waves = _____ cm

(Question continues on next page)

(Turn over)

- (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 marks)

speed of wave = _____ cm/s

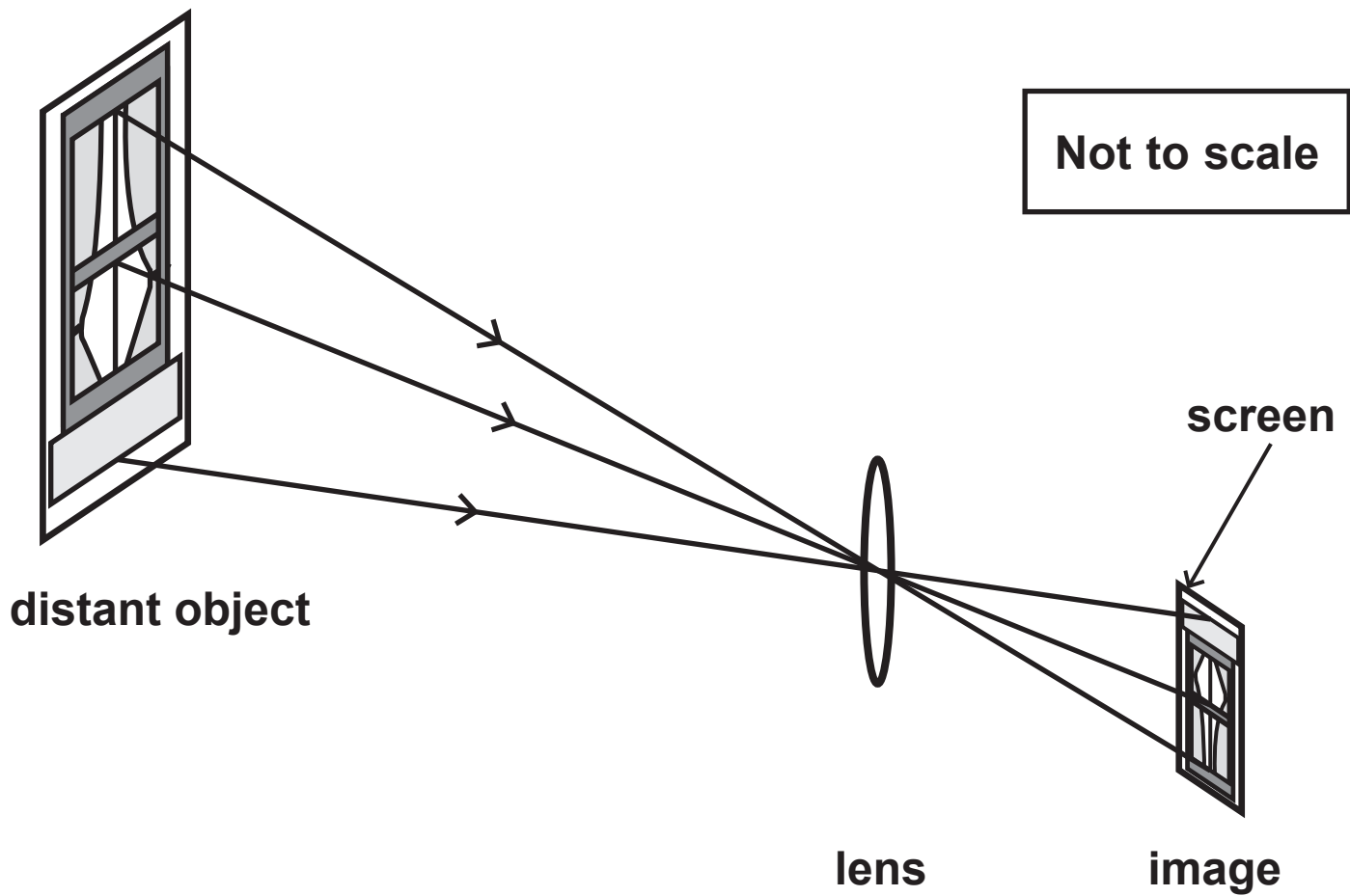
(TOTAL FOR QUESTION 2 = 8 MARKS)

(Questions continue on next page)

(Turn over)

BEHAVIOUR OF LIGHT AND SOUND

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



(Question continues on next page)

(Turn over)

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

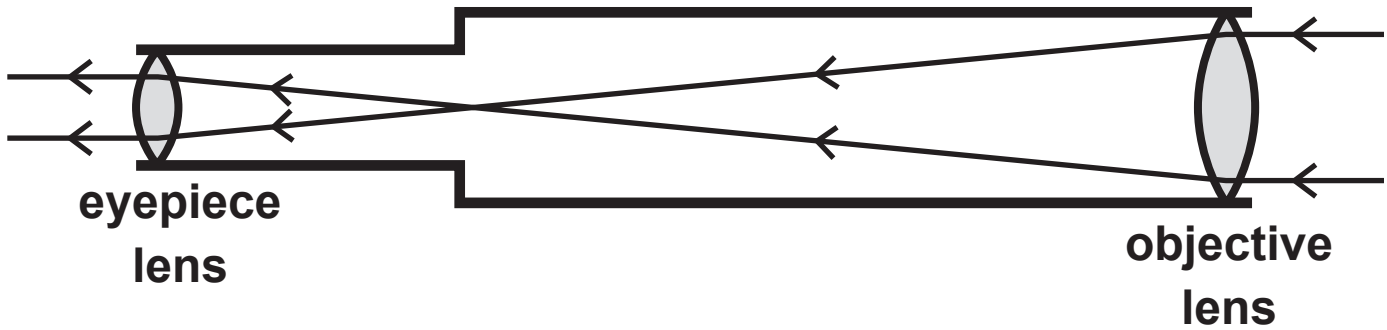
The image produced is real because it is

- A in focus
- B magnified
- C on a screen
- D smaller

(1 mark)

- (ii) Describe how to measure the focal length of the lens. (2 marks)

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



(i) Explain what the eyepiece lens does. (2 marks)

(Question continues on next page)

(Turn over)

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

The light that travels from the stars transfers

A charge

B energy

C mass

D matter

(1 mark)

(Question continues on next page)

(Turn over)

(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 marks)

speed of sound in air = _____ m/s

(Question continues on next page)

(Turn over)

(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 marks)

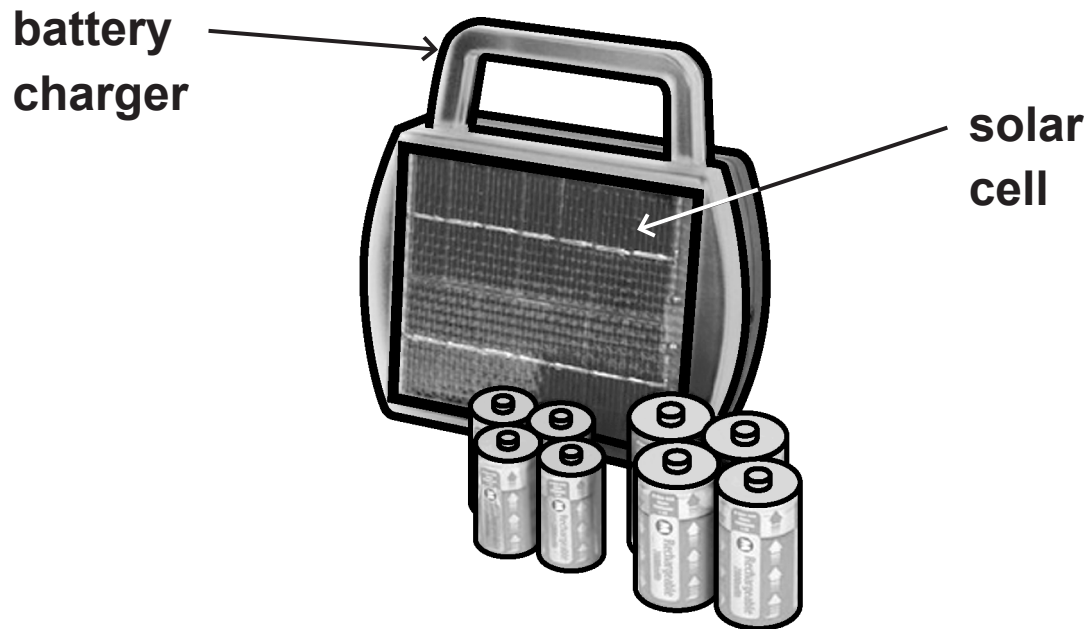
(TOTAL FOR QUESTION 3 = 10 MARKS)

(Questions continue on next page)

(Turn over)

USING SOLAR ENERGY

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

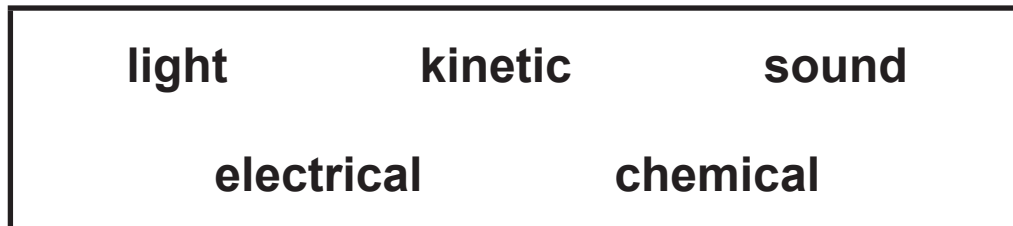


(Question continues on next page)

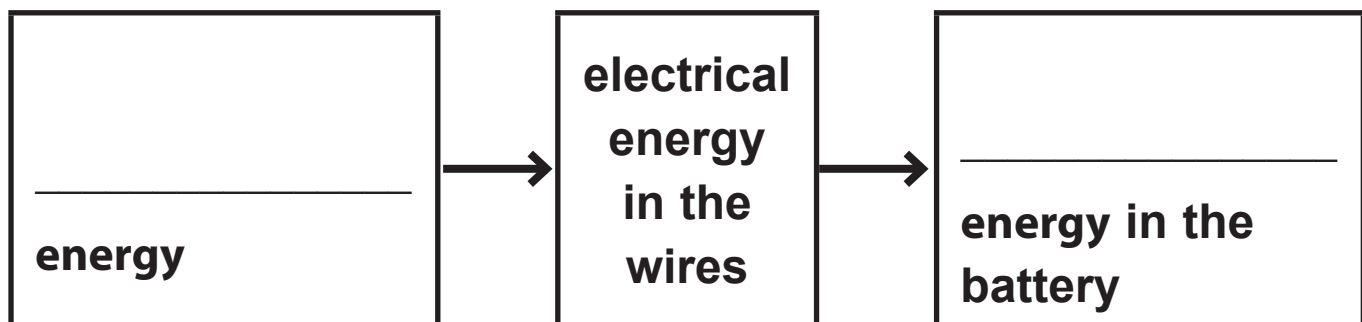
(Turn over)

- (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 marks)



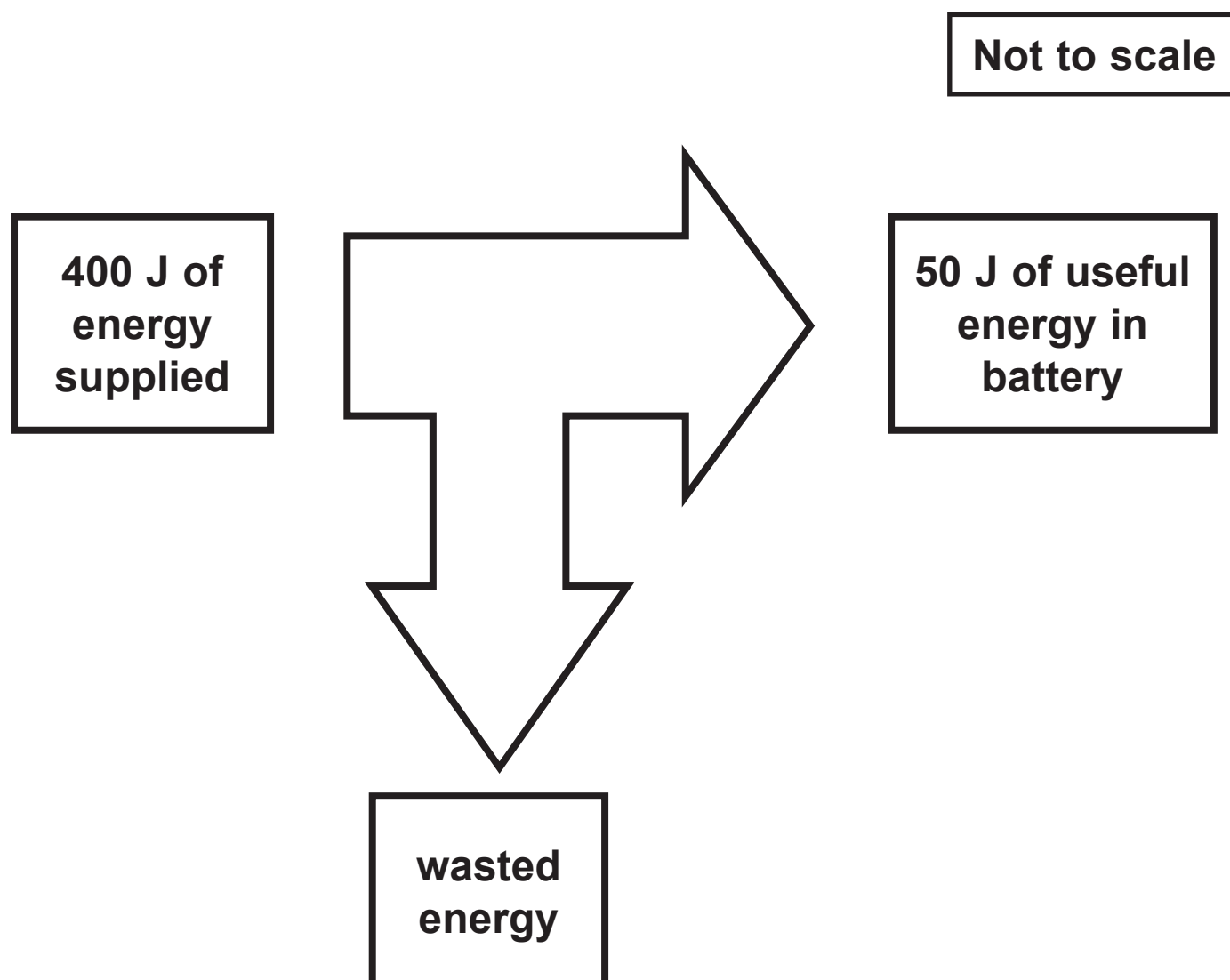
Energy transfer diagram



(Question continues on next page)

(Turn over)

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



(Question continues on next page)

(Turn over)

- (i) Calculate the amount of wasted energy.
(1 mark)

wasted energy = _____ J

(Question continues on next page)

(Turn over)

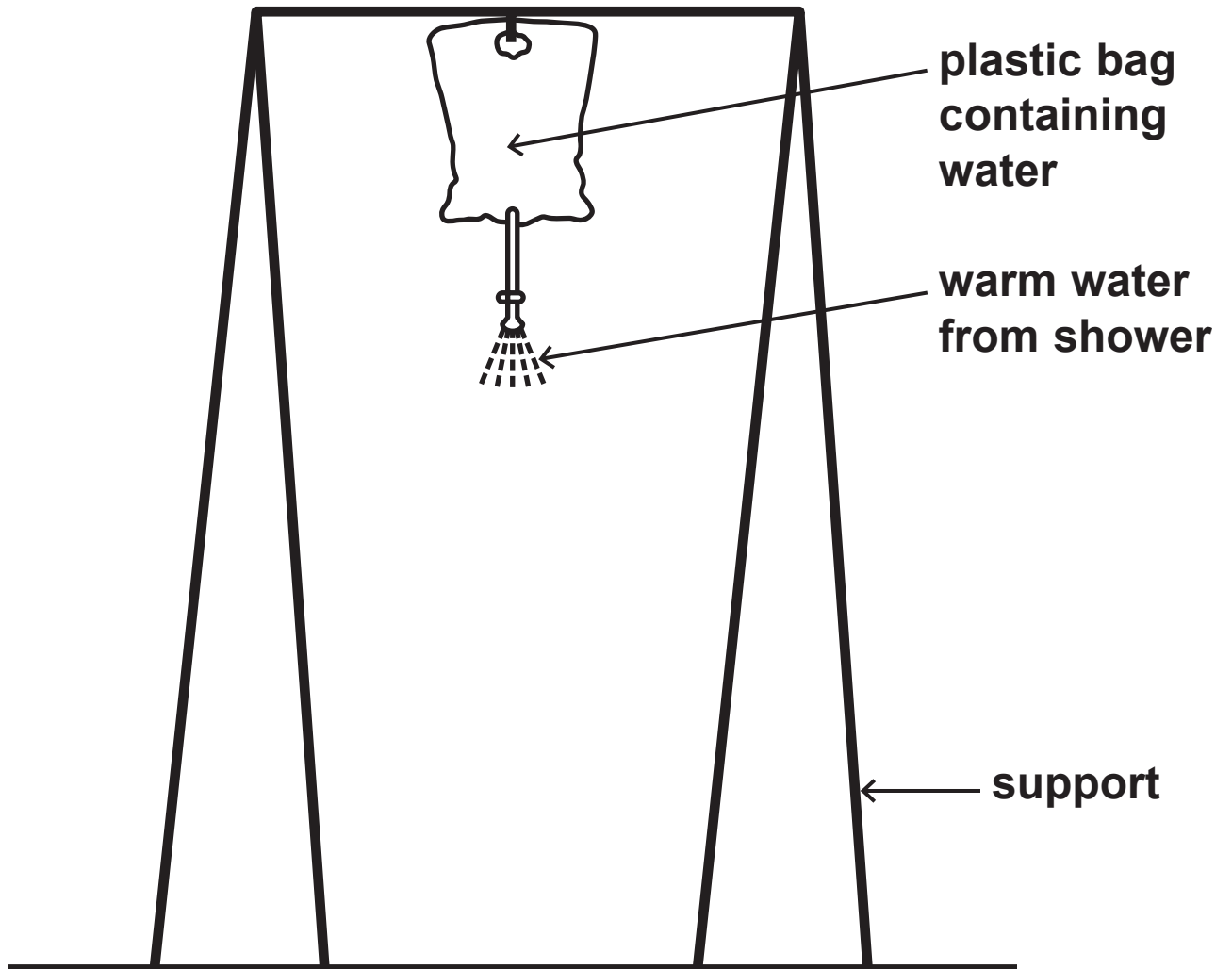
- (ii) Calculate the efficiency of the battery charger.
(2 marks)

efficiency of the battery charger = _____ %

(Question continues on next page)

(Turn over)

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



(Question continues on next page)

(Turn over)

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 marks)

(Question continues on next page)

(Turn over)

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

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

(1 mark)

(Question continues on next page)

(Turn over)

(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 marks)

power of the kettle = _____ W

(Question continues on next page)

(Turn over)

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

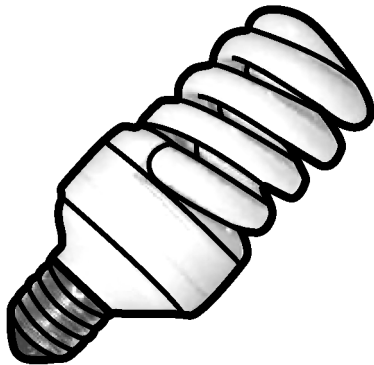
Calculate the cost of using the television for
10 hours. (3 marks)

cost of using the television for 10 hours = _____ p

(Question continues on next page)

(Turn over)

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

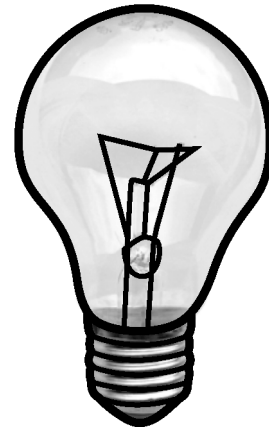
ENERGY SAVING LAMP

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 marks)

(Continue your answer on next page)

(Turn over)

SOLAR SYSTEM AND BEYOND

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

(i) Complete the following sentence. (1 mark)

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

A black hole

B neutron star

C supernova

D white dwarf

(1 mark)

(Question continues on next page)

(Turn over)

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

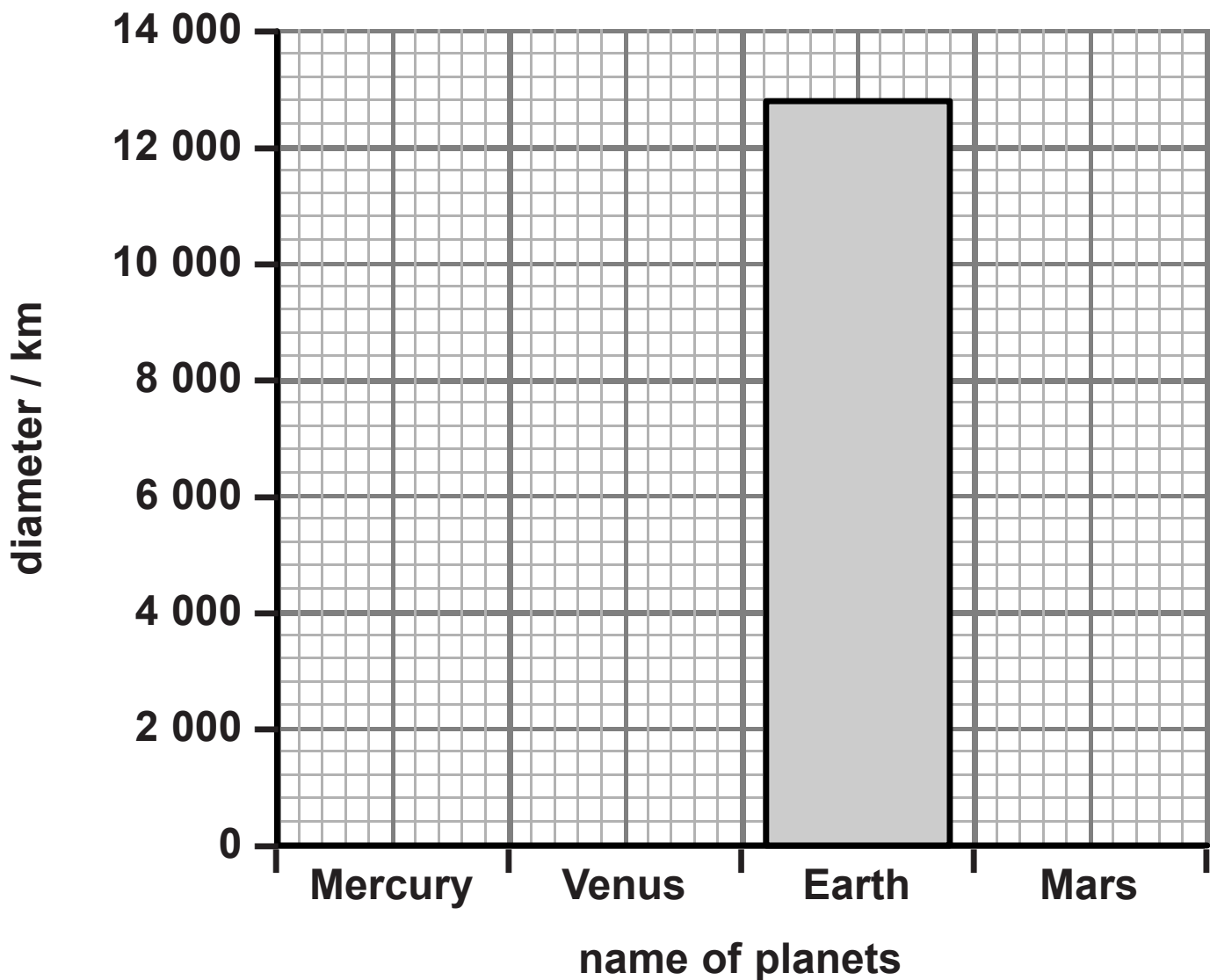
PLANET	DISTANCE FROM THE SUN / AU	DIAMETER OF THE PLANET / km
Mercury	0.39	4 900
Venus	0.72	12 100
Earth	1.00	12 800
Mars	1.52	6 800

(Question continues on next page)

(Turn over)

- (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 marks)



(Question continues on next page)

(Turn over)

- (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 marks)

distance of Mars from the Sun = _____ km

(Question continues on next page)

(Turn over)

(TOTAL FOR QUESTION 6 = 12 MARKS)

TOTAL FOR PAPER = 60 MARKS

END