

Write your name here

Surname	Other names
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Pearson Centre Number Candidate Number

Edexcel GCSE

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Wednesday 24 January 2018 – Morning Time: 1 hour	Paper Reference 5PH1F/01
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You must have: Calculator, ruler	Total Marks
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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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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FORMULAE

You may find the following formulae useful.

wave speed = frequency \times wavelength

$$v = f \times \lambda$$

$$\text{wave speed} = \frac{\text{distance}}{\text{time}}$$

$$v = \frac{x}{t}$$

electrical power = current \times potential difference

$$P = I \times V$$

cost of electricity = power \times time \times cost of 1 kilowatt-hour

$$\text{power} = \frac{\text{energy used}}{\text{time taken}}$$

$$P = \frac{E}{t}$$

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

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Questions begin on next page.



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 (a) The chart shows the electromagnetic spectrum.

Most of the parts have been labelled.

gamma rays		ultraviolet	visible light		microwaves	radio waves
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(i) Use words from the box to complete the chart.

(2)

infrared	infrasound	seismic waves	ultrasound	X-rays
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(ii) State which of the seven parts of the electromagnetic spectrum has the highest frequency.

(1)

(b) A special ink cannot be seen when visible light shines on it.

The ink glows when ultraviolet radiation shines on it.

Describe how this ink could be used.

(2)

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

One harmful effect of microwave radiation is

(1)

- A burning of the skin
- B internal heating of body cells
- C mutation of cells in the body
- D skin cancer

(d) Describe **one** use of gamma radiation.

(2)

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(Total for Question 1 = 8 marks)

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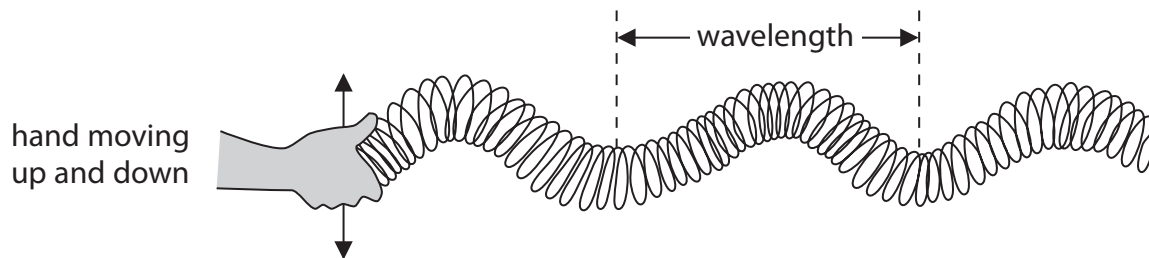


Waves and rays

- 2 (a) Light travels through space as a wave.

A model of this type of wave can be made using a Slinky spring.

A Slinky spring is a long coil of wire like the one shown in the diagram.



- (i) State the name of this type of wave.

(1)

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

The amplitude of this wave can be made bigger by moving the hand up and down

(1)

- A by a bigger distance
- B by a smaller distance
- C at a faster rate
- D at a slower rate

- (iii) The wave shown in the diagram has a wavelength of 0.71 m and the frequency is 3.2 Hz.

Calculate the speed of the wave.

(2)

speed of the wave = m/s

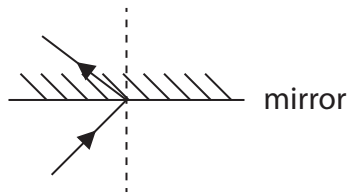


(b) Mirrors and lenses can be used in telescopes.

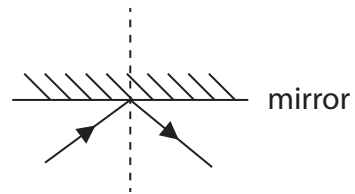
(i) Which diagram best shows what happens to a ray of light when it hits a plane mirror?

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

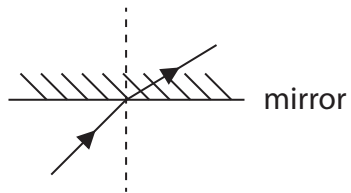
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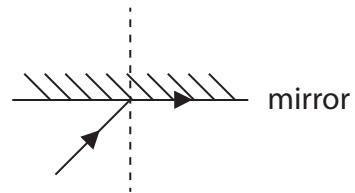
A



B



C



D

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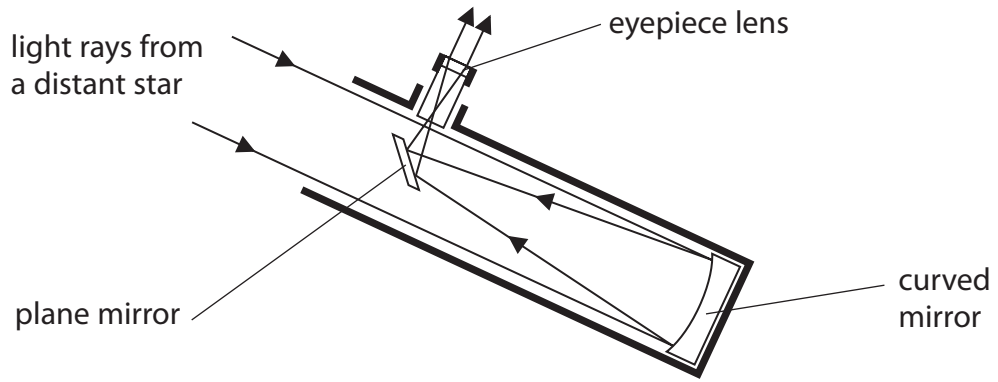
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(ii) The diagram shows light rays in a reflecting telescope.



The telescope is forming an image of a distant star.

Describe what the mirrors and the eyepiece lens do to the light rays from the distant star.

(3)

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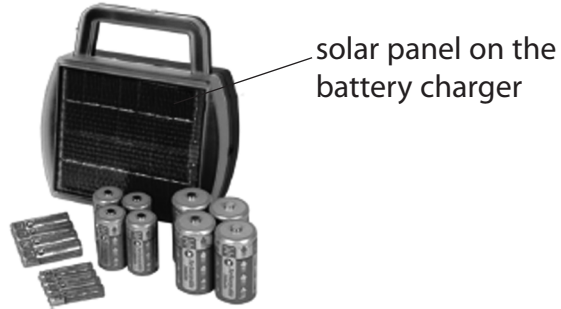
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(Total for Question 2 = 8 marks)



Energy

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



- (a) Use words from the box to complete the following sentences.

(2)

chemical kinetic sound the mains the Sun

- (i) The source of energy for the battery charger is
- (ii) Energy is stored in the batteries as energy.

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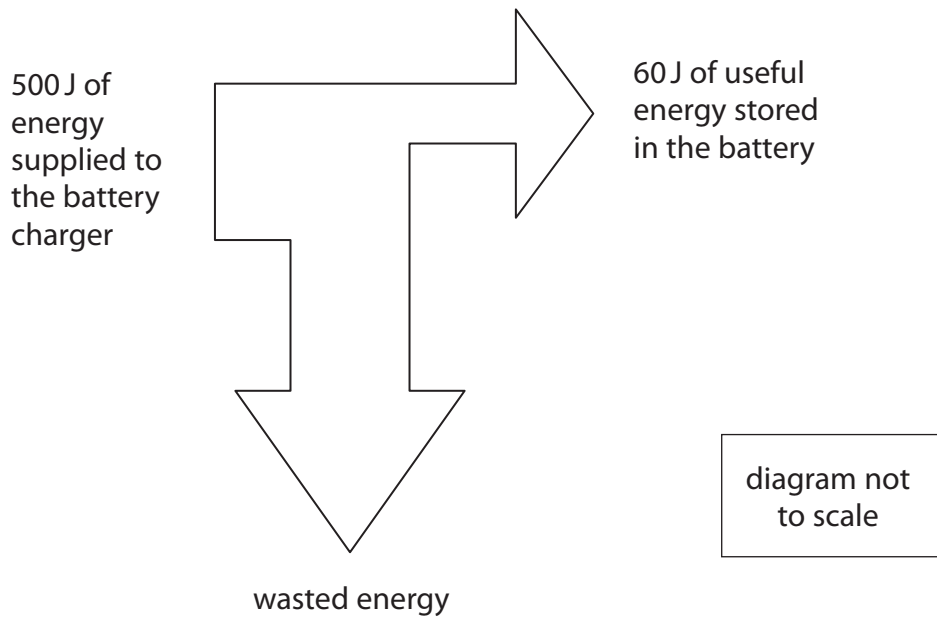
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(b) The diagram shows the energy transferred by the battery charger in one second.



(i) Calculate the amount of wasted energy.

(1)

wasted energy = J

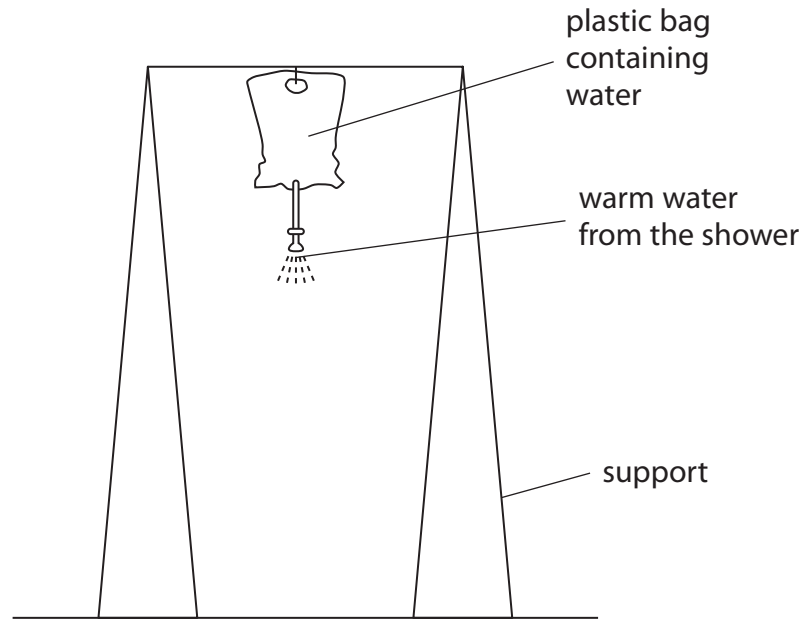
(ii) Calculate the efficiency of the battery charger.

(2)

efficiency of the battery charger



(c) The diagram shows a solar-powered shower.



The bag is in bright 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) Early on a sunny day, the water in the bag is cold.

Explain why the temperature of the water increases during the morning and then stays constant.

(3)

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(Total for Question 3 = 10 marks)



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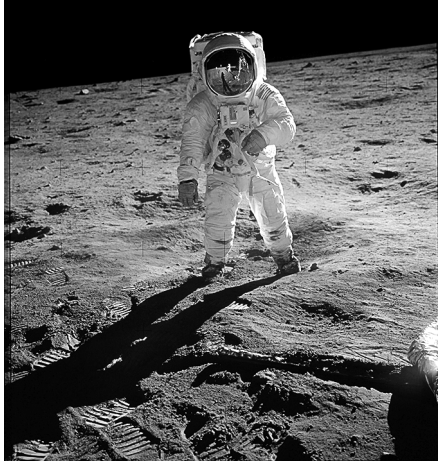
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Space

- 4 (a) The photograph is taken from a manned mission to the Moon.



(Source © NASA)

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

People have walked on the Moon but have not yet walked on Mars.
One of the reasons is because

(1)

- A Mars is nearer to the Earth than the Moon is
- B Mars is nearer to the Sun than the Moon is
- C Mars is further from the Earth than the Moon is
- D Mars is further from the Sun than the Moon is

- (b) Which of these is the smallest?

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

(1)

- A the Milky Way galaxy
- B the Moon
- C the Sun
- D the Universe



(c) Scientists have looked for evidence of water on the Moon.

Suggest why the scientists have done this.

(1)

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(d) Light takes 1.3 s to get from the Moon to the Earth.

The speed of light is 300 000 km/s.

Calculate the distance between the Moon and the Earth.

State the unit.

Use the equation

$$\text{distance} = \text{speed} \times \text{time}$$

(3)

$$\text{distance} = \dots\dots\dots \text{unit} \dots\dots\dots$$

(e) Some telescopes are now located in space.

Explain why some telescopes are deliberately located in space.

(2)

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(f) A nebula is a cloud of gas and dust.

A star forms when gas and dust in a nebula come together to form a hot object.

Explain why the gas and dust come together and why the object formed is hot.

(2)

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(Total for Question 4 = 10 marks)

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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 molecules
- D voltage

- (b) An electric heater is connected to a mains voltage of 230 V.

The current in the heater is 9.2 A.

Calculate the power.

(2)

power = W

- (c) The power supplied to a desktop computer is 350W.

The cost of 1 kWh of electricity is 20 p.

Calculate the cost of using the computer for 4 hours.

(3)

cost of using the computer for 4 hours = p

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* (d) The diagrams give some information about an LED lamp and a filament lamp.
The two different lamps give out the same amount of light.



LED lamp
cost = £3.00
power = 9W
lifetime = 15000 hours
useful output energy
is 25J for every 100J of
input energy



filament lamp
cost = £0.60
power = 60W
lifetime = 1000 hours
useful output energy is
5J for every 100J of
input energy

Using the information above, compare the advantages and disadvantages of each type of lamp.

(6)

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(Total for Question 5 = 12 marks)



Waves in action

- 6 (a) P-waves and S-waves are seismic (earthquake) waves.

The table has six statements about P-waves and S-waves.

Put a tick (✓) in the box next to the three correct statements.

(2)

statement	(✓)
P-waves are transverse waves	
S-waves are transverse waves	
P-waves travel faster than S-waves in the Earth's crust	
S-waves travel faster than P-waves in the Earth's crust	
P-waves can travel through the liquid core of the Earth	
S-waves can travel through the liquid core of the Earth	

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

The frequency of ultrasound is

(1)

- A more than 20 000 Hz
- B between 2000 Hz and 20 000 Hz
- C between 20 Hz and 2000 Hz
- D less than 20 Hz

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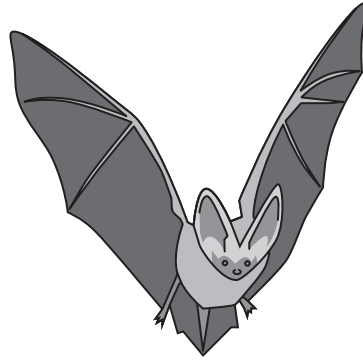
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(c) Describe how bats use ultrasound to locate their prey.
You may add to the diagram to help with your answer.

(3)



bat



moth (prey)

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Question 6 continues on page 20



