Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number	Candidate Number

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Wednesday 24 January 2018 – Morning
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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 5 7 5 8 4 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 = $\dfrac{\text{(useful energy transferred by the device)}}{\text{(total energy supplied to the device)}} \times 100\%$

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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

(i) Use words from the box to complete the chart.

(2)

infrared	infrasound	seismic waves	ultrasound	X-rays

(ii) State which of the seven parts of the electromagnetic spectrum has the highest frequency.

(1)

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(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)

.....

.....

.....

.....

(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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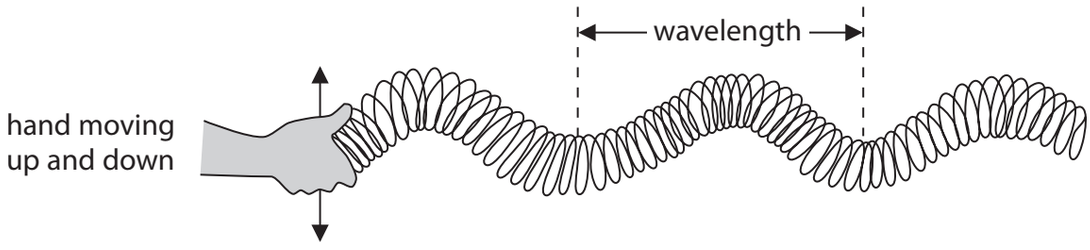
Waves and rays

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)

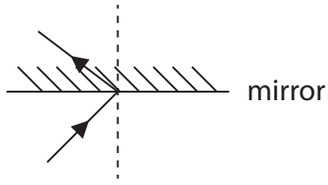
speed of the wave = ... m/s

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

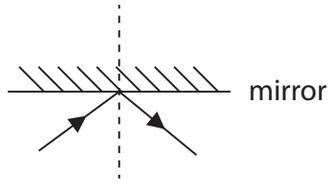
(i) Which diagram best shows what happens to a ray of light when it hits a plane mirror?

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

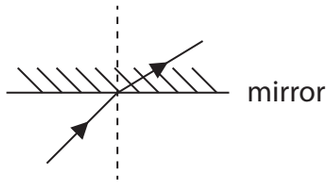
(1)



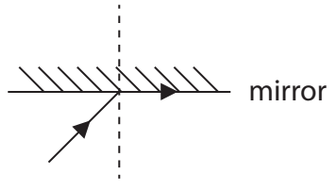
☒ **A**



☒ **B**

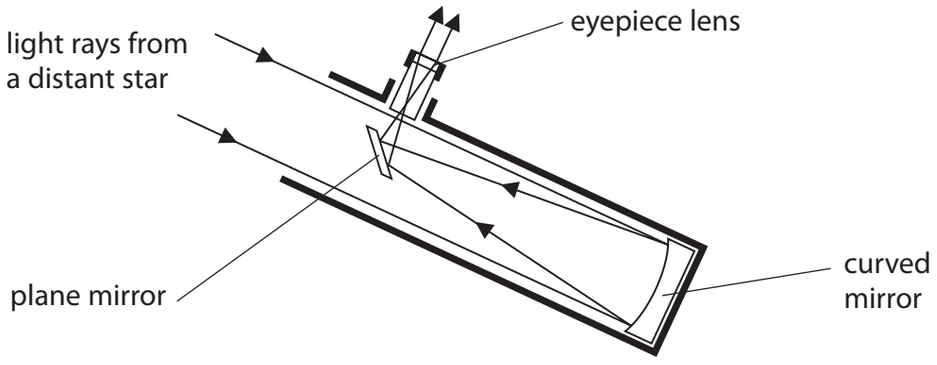


☒ **C**



☒ **D**

(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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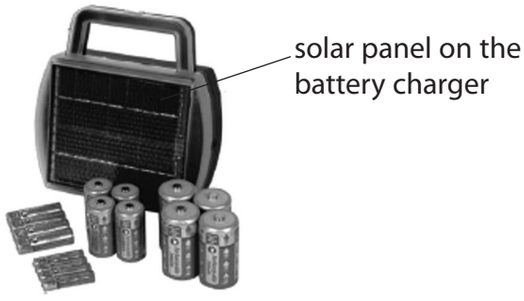
(Total for Question 2 = 8 marks)

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.

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

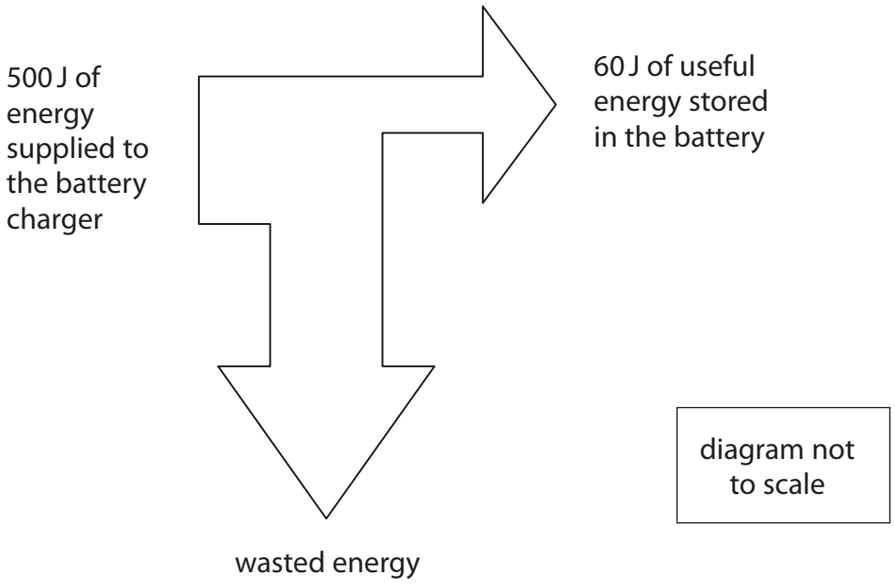


diagram not to scale

(i) Calculate the amount of wasted energy.

(1)

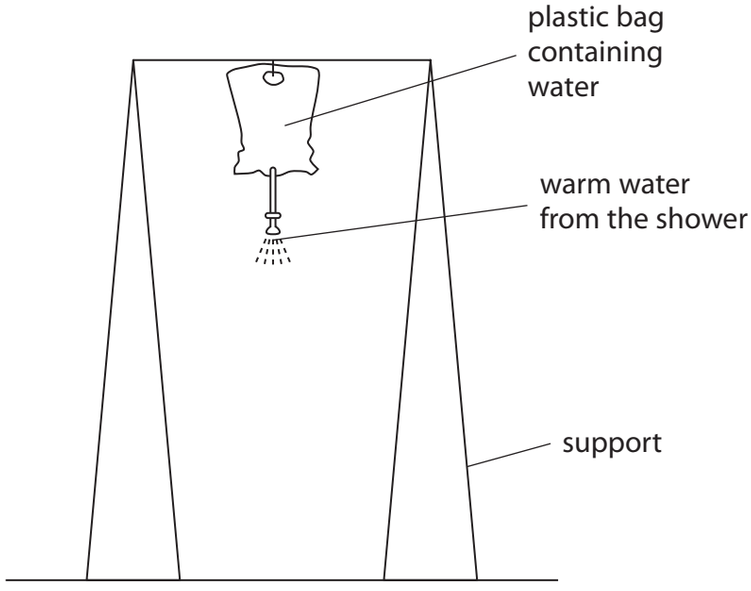
wasted energy = ... J

(ii) Calculate the efficiency of the battery charger.

(2)

efficiency of the battery charger .....

(c) The 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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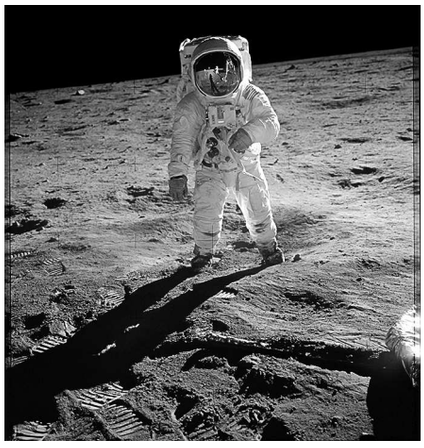
(Total for Question 3 = 10 marks)

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)

.....

.....

(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

distance = speed × time

(3)

distance = ... unit .....

(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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.....

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.....

(Total for Question 4 = 10 marks)

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 350 W.

The cost of 1 kW h 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

*(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)

(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

(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)

Question 6 continues on page 20

*(d) Ultrasound and X-rays are used for medical scans.

Compare and contrast the use of ultrasound and X-rays for medical scans.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS