Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Wednesday 25 May 2016 – 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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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PEARSON

FORMULAE

You may find the following formulae useful.

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

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

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

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

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{E}{t}$$

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

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Questions begin on next page.

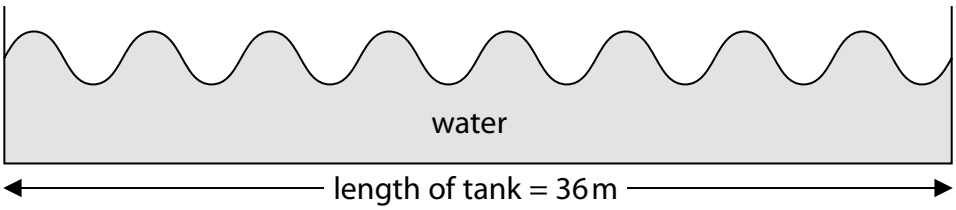
Answer ALL questions.

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 ☒.

Water waves and light

1 (a) Scientists use wave tanks to show the behaviour of waves.

The diagram shows a wave tank from the side.



(i) Calculate the wavelength of the waves.

(1)

wavelength = ... m

(ii) A crest of the wave takes 20 s to travel the whole length of the tank.

Calculate the speed of the wave.

State the unit.

(3)

speed of wave = ... unit = ...

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(b) When light passes through a lens it can change direction.

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

(1)

The change in direction that occurs when light passes through a lens is called

☐ **A** inversion

☐ **B** magnification

☐ **C** reflection

☐ **D** refraction

(c) (i) A converging lens is used to form a real image of the Moon on a screen.

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

The image produced by this lens is real because it is

(1)

☐ **A** bigger than the object

☐ **B** in colour

☐ **C** on a screen

☐ **D** the right way up

(ii) Describe how to estimate the focal length of a converging lens by using a distant object like the Moon.

(2)

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(Total for Question 1 = 8 marks)

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Radiation

2 This question is about the following radiations

- microwave
- infrared
- ultraviolet
- ultrasound.

(a) One of these radiations is used to scan a fetus.

State which one of these radiations is used to scan a fetus.

(1)

.....

(b) Describe one use of ultraviolet radiation.

(2)

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(c) State which one of these radiations is both electromagnetic and has the shortest wavelength.

(1)

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(d) State **two** of these radiations that travel at the same speed as light in a vacuum.

(2)

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(e) High frequency electromagnetic radiation is potentially more dangerous to humans than low frequency electromagnetic radiation.

Infrared radiation has a higher frequency than microwave radiation.

However, microwave radiation can be more dangerous to humans than infrared radiation.

Explain why microwave radiation can be more dangerous to humans.

(2)

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(Total for Question 2 = 8 marks)

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Energy

3 The photograph shows a pirate boat in a theme park.

© James Salter 2006

At the bottom of its swing the pirate boat passes over a roller that transfers some energy to the pirate boat.

(a) The photograph shows the pirate boat at the top of its swing.

State the main form of energy that the pirate boat has gained by the time it reaches the top of the swing.

(1)

.....

(b) The roller is powered by an electric motor.
The roller pushes the pirate boat for 2.3 s.
During this time 190 000 J of energy is supplied to the motor.

Calculate the power supplied to the electric motor.

(2)

power = ... W

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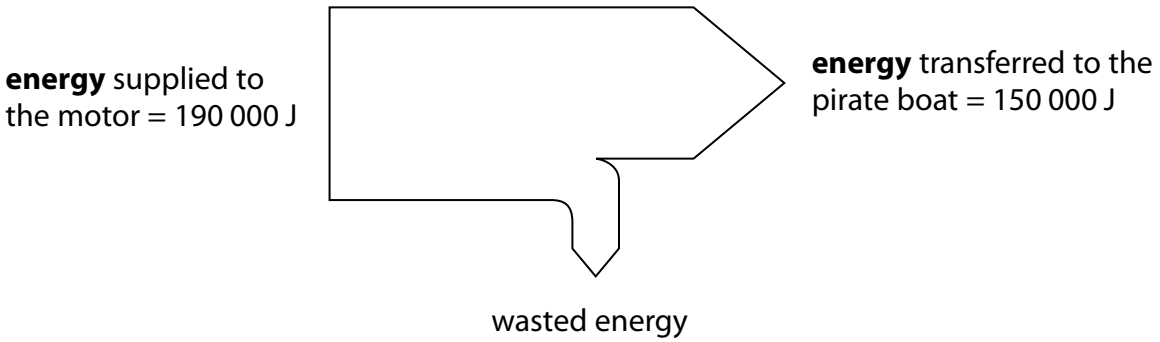
(c) The diagram shows the energy transferred by the motor in 2.3 s.



(i) Calculate the energy wasted in the 2.3 s.

(1)

wasted energy = ... J

(ii) Calculate the efficiency of the electric motor.

(3)

efficiency = ...

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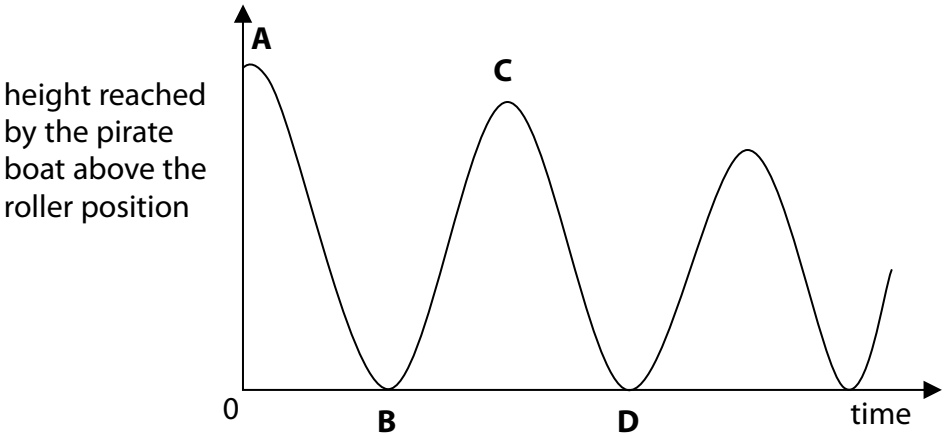
(d) The roller is lowered and the pirate boat swings freely.

The graph shows how the height reached by the pirate boat changes with time.



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

The pirate boat will have maximum kinetic energy at point

(1)

☐ **A**

☐ **B**

☐ **C**

☐ **D**

(ii) Explain why the maximum height reached by the pirate boat is less at point **C** than at point **A**.

(2)

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(Total for Question 3 = 10 marks)

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The Sun and the Moon

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

The Sun is part of

(1)

- ☐ **A** the Milky Way only
- ☐ **B** the Solar System only
- ☐ **C** the Solar System and the Milky Way only
- ☐ **D** the Milky Way, the Solar System and the Universe

(ii) Which of these has been used for exploration of the Moon but not Mars?

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

(1)

- ☐ **A** a rover
- ☐ **B** a telescope
- ☐ **C** a manned mission
- ☐ **D** an orbiting satellite

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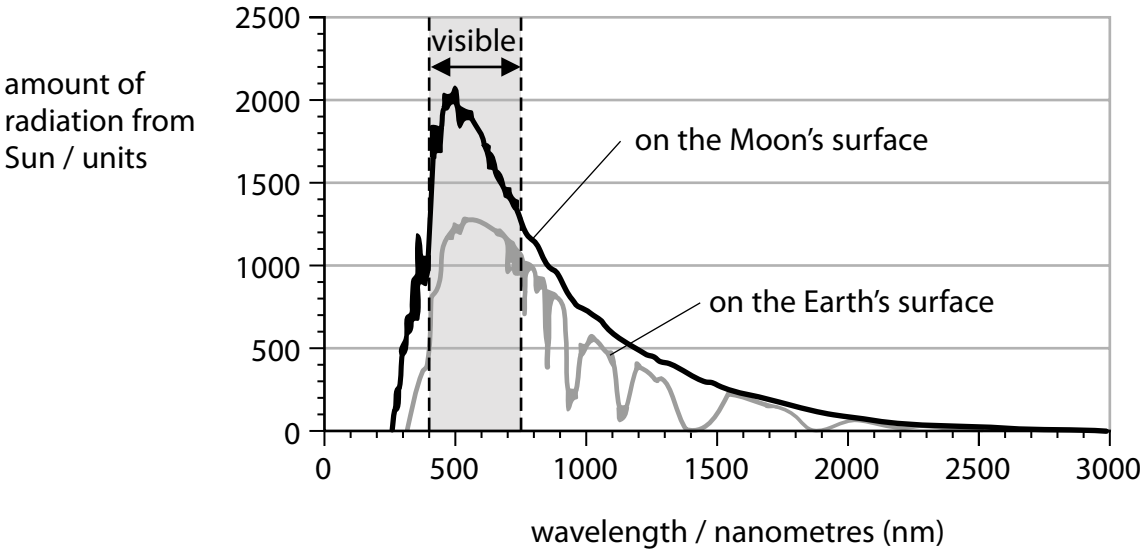
(b) The graph shows the amounts of radiation from the Sun, at different wavelengths, falling on the Moon and the Earth.



(i) State the value of the shortest wavelength of radiation falling on the Moon's surface.

(1)

shortest wavelength of radiation = ... nm

(ii) Name the type of radiation which has a wavelength of 800 nm.

(1)

.....

(iii) The amount of radiation of wavelength 500 nm falling on the Earth on an area of 1 m^2 in 1 second is about 1250 J.

Estimate the amount of radiation of wavelength 500 nm falling on the Earth on an area of 10 m^2 in 60 s.

(2)

total amount of radiation = ... J

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(iv) Explain why the radiation from the Sun reaching the Earth's surface is different from the radiation reaching the Moon's surface.

(2)

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(c) Explain why some telescopes are sent into space instead of being used on the surface of the Earth.

(2)

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(Total for Question 4 = 10 marks)

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Electricity in the home

5 (a) An electric kettle is plugged into the 230 V mains.
The current in the heating element of the kettle is 11 A.

Calculate the power supplied to the kettle.

(2)

power = ... W

(b) An electric toothbrush is powered by a rechargeable battery.

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

Energy is stored in the battery as

(1)

☐ **A** kinetic energy

☐ **B** thermal energy

☐ **C** chemical energy

☐ **D** gravitational potential energy

(ii) One part of the battery charger changes the 230 V mains voltage to 9.0 V.

State the name of this part of the battery charger.

(1)

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(c) The current in the kettle is alternating current (a.c.).

The current in the toothbrush is direct current (d.c.).

Explain the difference between alternating current and direct current.

You may draw a diagram to help your answer.

(2)

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*(d) An electric fridge is kept cool by a compressor.

The compressor clicks on and off during the day to keep the inside of the fridge at a constant low temperature.

The table shows some information about two different fridges.

	Fridge A	Fridge B
cost	£ 500	£ 800
lifetime	3 years	6 years
power of compressor	0.15 kW	0.25 kW
time the compressor is on in one day	9 hours	7 hours
cost of 1 kWh of electrical energy	13.6 p	13.6 p

Describe the advantages and disadvantages of each fridge.

(6)

(Total for Question 5 = 12 marks)

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Making models of earthquakes

6 (a) (i) Describe how readings from two seismic stations, M and N, can be used to help find the position of an earthquake.

You may add to the diagram to help your answer.

(2)

(ii) Scientists recommend that results from three seismic stations are used.

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

Scientists recommend this because

(1)

- ☐ **A** three results will give a good average for the distance
- ☐ **B** three results will eliminate anomalies in measurements
- ☐ **C** all experiments need at least three results to be accurate
- ☐ **D** three results will pinpoint the exact position of the earthquake

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(b) The frequency of a wave is given by the equation:

frequency = wave speed / wavelength

A seismic wave has a speed of 6 km/s.

Its wavelength is 10 m.

Calculate the frequency of this wave.

(3)

frequency = ... Hz

*(c) Syrup and biscuit pieces can model parts of the Earth.

The photograph shows pieces of broken biscuit floating on some syrup.

The syrup is in a large deep container.

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There are two heaters at different places underneath the container.

These heaters affect the positions of the biscuit pieces.

The syrup, biscuit pieces and heaters can be used to model what happens inside the Earth and at the crust.

Explain how this model relates to the different parts of the Earth.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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