Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Monday 19 May 2014 – 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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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

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

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

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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 ☒.

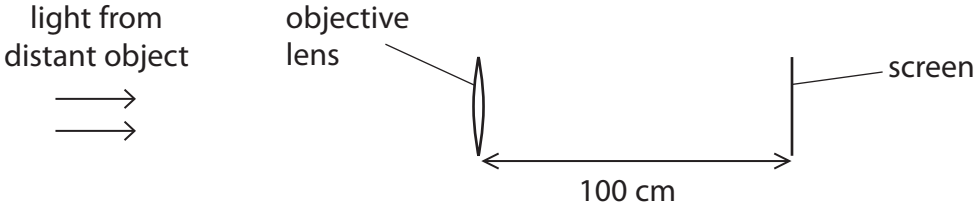
Telescopes

1 (a) This picture shows Galileo holding a telescope.



A student starts to make a similar telescope.

She places the objective lens near a screen to form a sharp image of a distant object.



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

(2)

bigger than the object	the right way up	the same size as the object
smaller than the object	upside down	

The sharp image formed is

..... and .....

(ii) State how you can tell that the image formed is real.

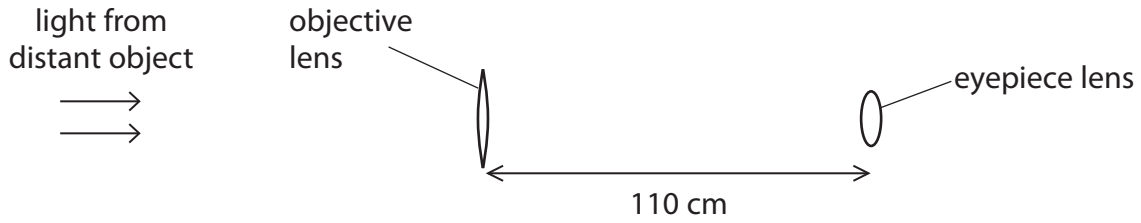
(1)

.....

.....

(iii) She then removes the screen and replaces it with an eyepiece lens.
She moves the eyepiece lens until she can see a sharp, magnified image through it.

The diagram shows the position of the lenses.



The lenses are now separated by 110 cm.

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

The focal length of the eyepiece is about

(1)

☒ **A** 10 cm

☒ **B** 55 cm

☒ **C** 90 cm

☒ **D** 100 cm

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

At the eyepiece of this telescope there is

(1)

☒ **A** refraction by a converging lens

☒ **B** refraction by a converging mirror

☒ **C** reflection by a converging lens

☒ **D** reflection by a converging mirror

(b) State how the invention of the telescope improved the way scientists observed the Universe.

(1)

.....

.....

(c) The invention of the telescope helped to change ideas about the Solar System.
The heliocentric model replaced the geocentric model.
Describe the difference between the geocentric model and the heliocentric model.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

Stars and planets

2 (a) Our Sun is a star.

(i) The life cycle of a star has several stages.
The Sun is in its main sequence stage.

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

The next stage in the life cycle of the Sun will be

(1)

☒ **A** a nebula

☒ **B** a red giant

☒ **C** a white dwarf

☒ **D** a black hole

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

The galaxy which contains our Sun is called

(1)

☒ **A** Andromeda

☒ **B** Orion

☒ **C** the Milky Way

☒ **D** the Solar System

(iii) Which of these is furthest from the Sun?

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

(1)

☒ **A** Earth

☒ **B** The Moon

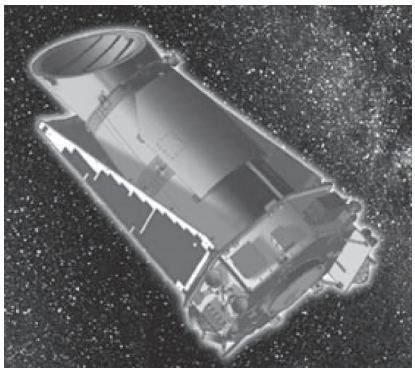
☒ **C** The planet Jupiter

☒ **D** The star Proxima Centauri

(b) Scientists search for signs of life on the planet Mars.
Describe **one** method they use to search for signs of life on the planet Mars.

(2)

(c) Scientists search for new planets orbiting distant stars.
The photograph shows the Kepler space telescope.



The Kepler space telescope records the brightness of light from distant stars.
When a planet passes in front of a distant star, there is a tiny dip in the brightness of the light from the star.

(i) Many telescopes are used on the Earth but the Kepler space telescope orbits above the Earth's atmosphere.
Explain why telescopes that search for planets are not on the Earth's surface.

(2)

(ii) The Kepler space telescope was pointed towards one star.
It detected the same dip in the brightness of the star every 150 days.

Suggest what information this gives about the planet that orbits this star.

(1)

.....

.....

.....

(Total for Question 2 = 8 marks)

Energy

3 (a) A wind generator is used as the source of energy for a remote farmhouse.



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

If the farmhouse is about 7 m high, the height of the axle of the generator is

(1)

☒ **A** 20 m

☒ **B** 50 m

☒ **C** 100 m

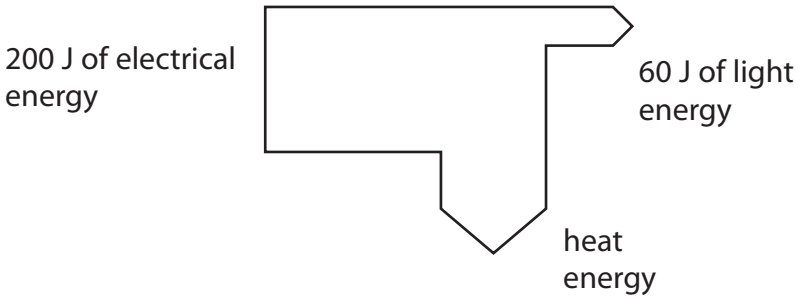
☒ **D** 150 m

(ii) Complete the flow chart to show the energy transfers that take place from the wind to light a lamp.

(2)

wind	→	generator	→	lamp
..... energy		..... energy		light energy

(b) A student produced a diagram to show energy changes in a lamp.



(i) Calculate the amount of heat energy produced by the lamp.

(1)

heat energy = ... J

(ii) Calculate the efficiency of the lamp.

(2)

efficiency = ...

(iii) When the lamp is first switched on, it heats up.
It then reaches a constant temperature.

Explain why the temperature of the lamp remains constant.

(2)

.....

.....

.....

.....

(c) A wind power system costs £6000 to install.
It saves £250 each year.

Calculate the payback time.

(2)

payback time = ...

(Total for Question 3 = 10 marks)

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Silent waves

4 (a) A man uses a dog whistle to call his dog.
The whistle uses ultrasound.

(i) The dog can hear the whistle but the man cannot.
Explain why the dog can hear the whistle but the man cannot hear the whistle.

(2)

.....

.....

.....

.....

(ii) The dog is 140 m away from the man.
The ultrasound takes 0.42 s to travel from the man to the dog.
Calculate the speed of ultrasound.
State the unit.

(3)

speed of ultrasound = ... unit = ...

(b) (i) An earthquake P-wave has a frequency of 15 Hz.

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

The earthquake P-wave is

(1)

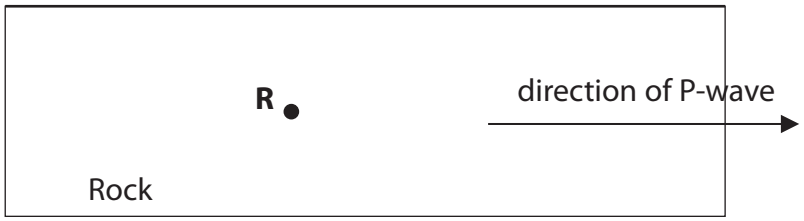
☒ **A** an infrasound wave

☒ **B** an ultrasound wave

☒ **C** an electromagnetic wave

☒ **D** a transverse wave

(ii) The diagram shows the direction of an earthquake P-wave in some rock.



Draw arrows on the diagram to show how the piece of rock, labelled **R**, moves.

(2)

(c) Earthquakes occur when two tectonic plates move against each other.
Explain what causes the tectonic plates to move.

You may draw a diagram if it helps your answer.

(2)

(Total for Question 4 = 10 marks)

Electromagnetic spectrum

5 (a) The table shows most of the waves in the electromagnetic spectrum.
One type of wave is missing.

gamma rays
.....
ultraviolet
visible light
infrared
microwaves
radio waves

(i) Write the missing wave in the space in the table.

(1)

(ii) State which type of wave can be split into different colours.

(1)

.....

(iii) State which type of wave has the longest wavelength.

(1)

.....

(iv) State **one** type of wave that is ionising.

(1)

.....

(b) The Sun emits all the waves in the electromagnetic spectrum.
Explain why all these waves take the same time to travel to Earth from the Sun.

(2)

*(c) Infrared and ultraviolet waves have different frequencies.
Both types of wave can have harmful effects on human beings.

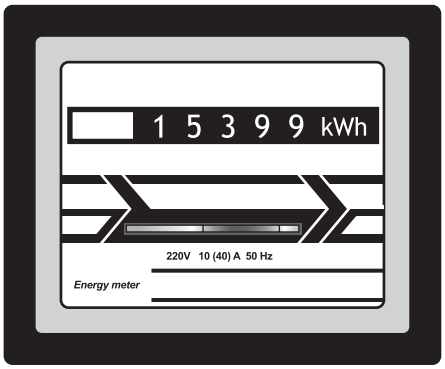
Describe the harmful effects of infrared and ultraviolet waves, relating them to the frequencies of the waves.

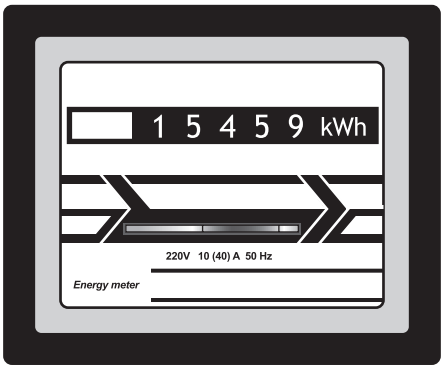
(6)

(Total for Question 5 = 12 marks)

Electrical power

6 (a) Electricity costs 20 p for each kW h.
The pictures show a domestic electricity meter at two different times.





(i) Calculate the cost of the electricity used between the two readings.

(2)

cost = ... p

(ii) The time between these two readings is 15 hours.

Calculate the average power supplied.

(2)

average power = ... kW

(b) Explain why step-up transformers are used in the transmission of electricity in the National Grid.

(2)

.....

.....

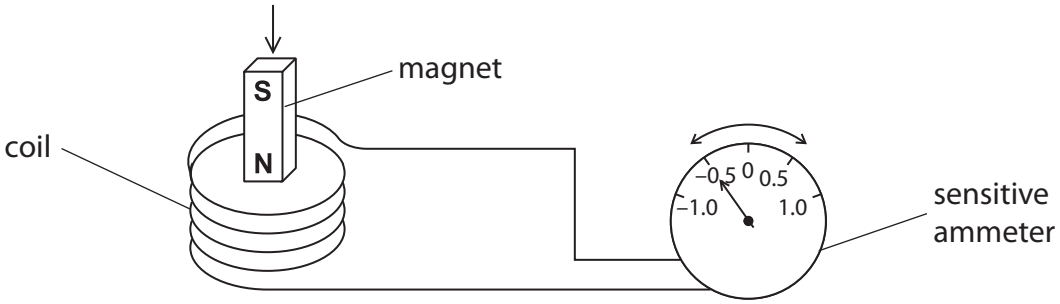
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Question 6 continues on the next page.

*(c) The diagram shows a magnet moving into a coil of wire.

The coil of wire is attached to a sensitive ammeter.



The moving magnet and the coil of wire are producing an electric current.

The size and direction of the current can be changed in a number of ways.

Describe changes that can be made to produce different currents and the effect of each change.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS