Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number	Candidate Number

Physics

Unit: 4PH0
Paper: 2PR

Friday 12 June 2015 – Afternoon
Time: 1 hour

Paper Reference
4PH0/2PR

You must have:
Ruler, calculator

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.*
- Show all the steps in any calculations and state the units.
- 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 ☒.

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.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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PEARSON

EQUATIONS

You may find the following equations useful.

energy transferred = current × voltage × time $\quad E = I \times V \times t$

pressure × volume = constant $\quad p_1 \times V_1 = p_2 \times V_2$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

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

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}} \qquad v = \frac{2 \times \pi \times r}{T}$$

$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

$$\text{force} = \frac{\text{change in momentum}}{\text{time taken}}$$

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

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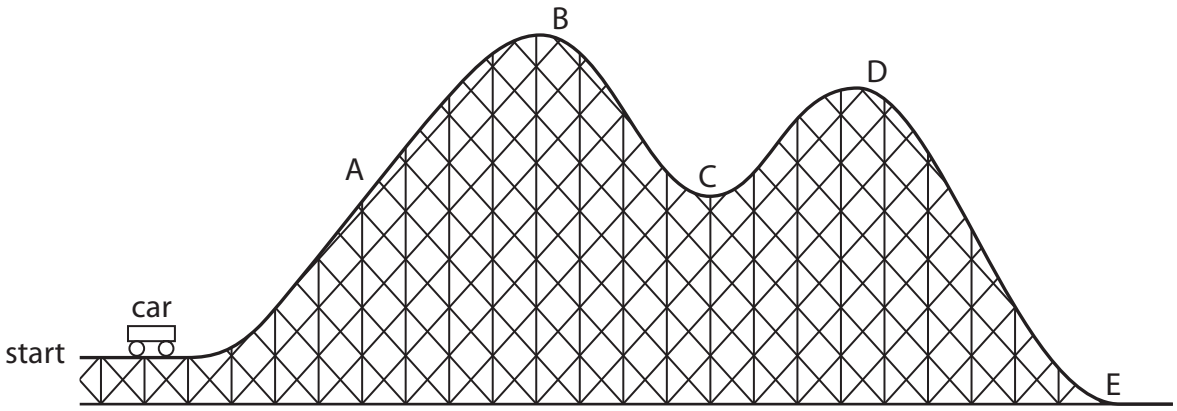
Answer ALL questions.

1 The diagram shows a roller-coaster ride.

The car is pulled slowly from the start to point B and then released.



(a) Choose letters from the diagram to complete this sentence.

(2)

The car has the most gravitational potential energy at point .....

and it goes fastest at point ..... .

(b) The mass of the car is 900 kg.

The maximum speed of the car is 15 m/s.

(i) State the relationship between momentum, mass and velocity.

(1)

(ii) Calculate the maximum momentum of the car.

Give the unit.

(3)

maximum momentum = ... unit .....

(iii) State the equation linking kinetic energy (KE), mass and speed.

(1)

(iv) Calculate the maximum KE of the car.

(2)

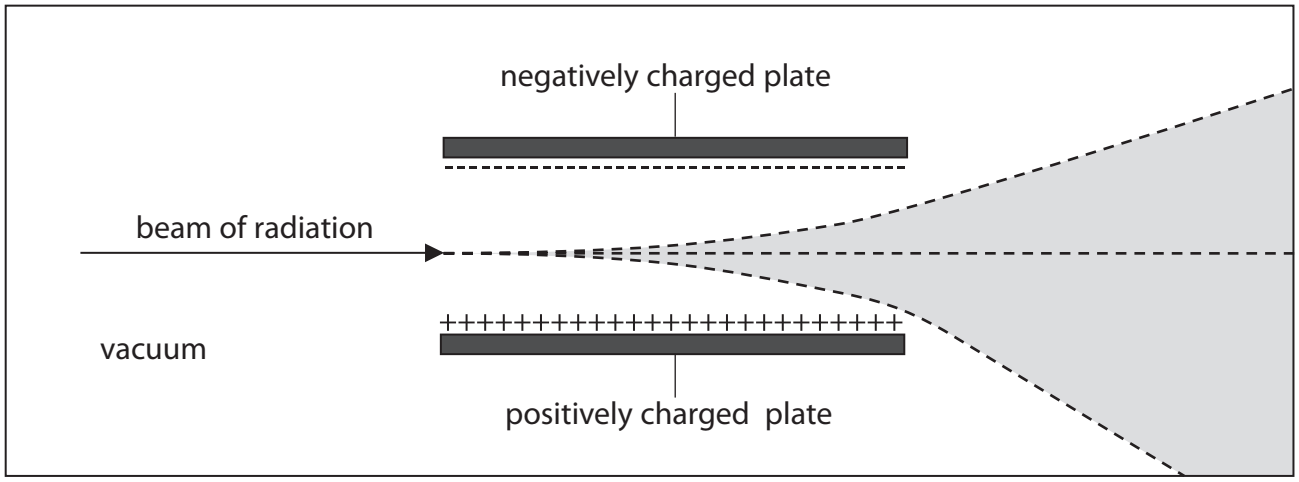
maximum KE = ... J

(Total for Question 1 = 9 marks)

2 (a) Scientists use deflection in an electric field to help distinguish between different radiations.

The diagram shows a beam containing several types of radiation. This beam travels in a vacuum between two charged plates.

Some of the radiations are deflected upwards, some are deflected downwards and some are not deflected at all.



Put one tick in each row to show the correct deflection for each type of radiation.

One has been done for you.

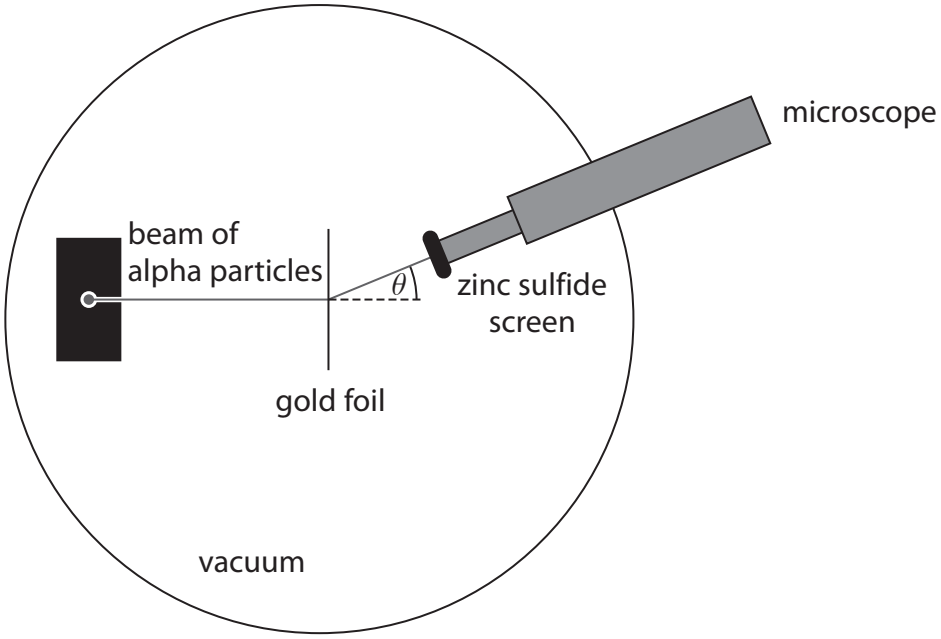
(4)

Type of radiation	Deflected upwards	Deflected downwards	Not deflected
alpha	✓		
beta			
gamma			
neutrons			
protons			

(b) The diagram shows the apparatus Geiger and Marsden used to investigate the structure of an atom.

They aimed a beam of alpha particles at a very thin sheet of gold foil.

They used a zinc sulfide screen to detect the alpha particles.



(i) Suggest why Geiger and Marsden removed the air from the apparatus.

(1)

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(ii) Describe Geiger and Marsden's results.

(2)

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(c) Rutherford produced a model of the atom.

Describe how Rutherford's model explains Geiger and Marsden's results.

You may draw a diagram to help your answer.

(4)

(Total for Question 2 = 11 marks)

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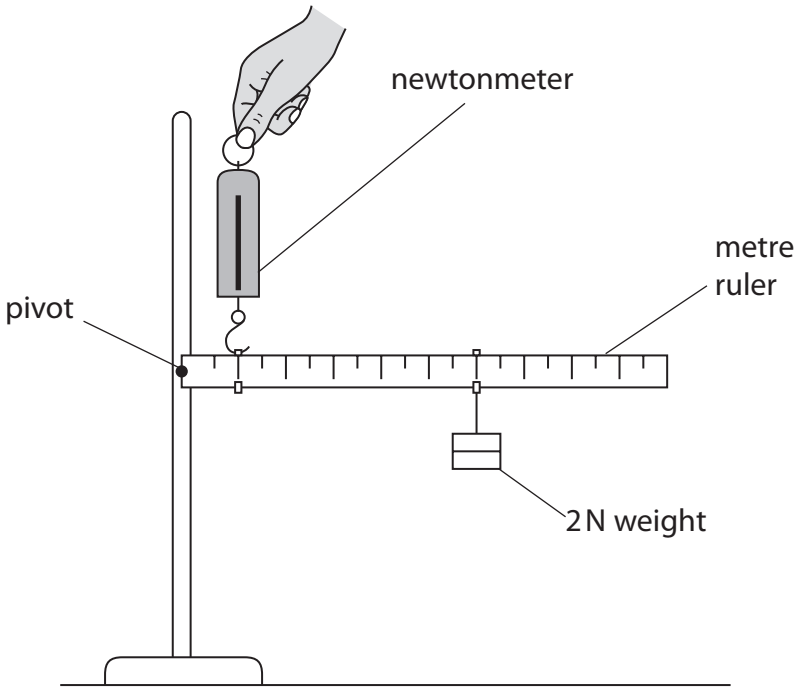
3 The diagram shows the apparatus used to investigate moments.



The 2 N weight is placed 60 cm from the pivot.

The newtonmeter is placed 10 cm from the pivot.

(a) (i) State the equation linking moment, force and perpendicular distance from the pivot.

(1)

(ii) Calculate the reading on the newtonmeter.

Ignore the weight of the ruler.

(3)

reading = ... N

(b) The metre rule is replaced by an iron bar.

The iron bar is 1 m long and has a weight of 10 N.

The newtonmeter and the 2 N weight stay in their original position.

Explain how this change affects the reading on the newtonmeter.

(3)

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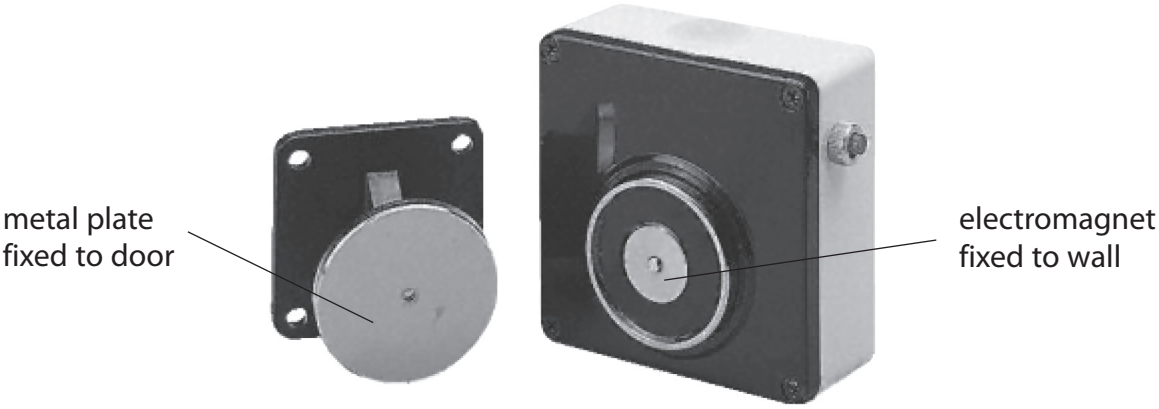
(Total for Question 3 = 7 marks)

4 This photograph shows an electromagnetic device used to keep a door open.



The electromagnet attracts the metal plate to hold the door open.

The electromagnet is connected to a fire alarm circuit.

When the fire alarm sounds, the door is released and it closes.

(a) State why the metal plate is made of iron.

(1)

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(b) Describe the construction of an electromagnet.

You may draw a diagram to help your answer.

(3)

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(c) Describe the changes that allow the electromagnet to release the door when the fire alarm sounds.

(2)

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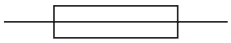
(Total for Question 4 = 6 marks)

5 A student investigates the resistance of a thermistor.

(a) Which of these is the correct symbol for a thermistor

(1)

☒	**A**	
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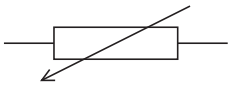
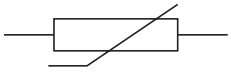
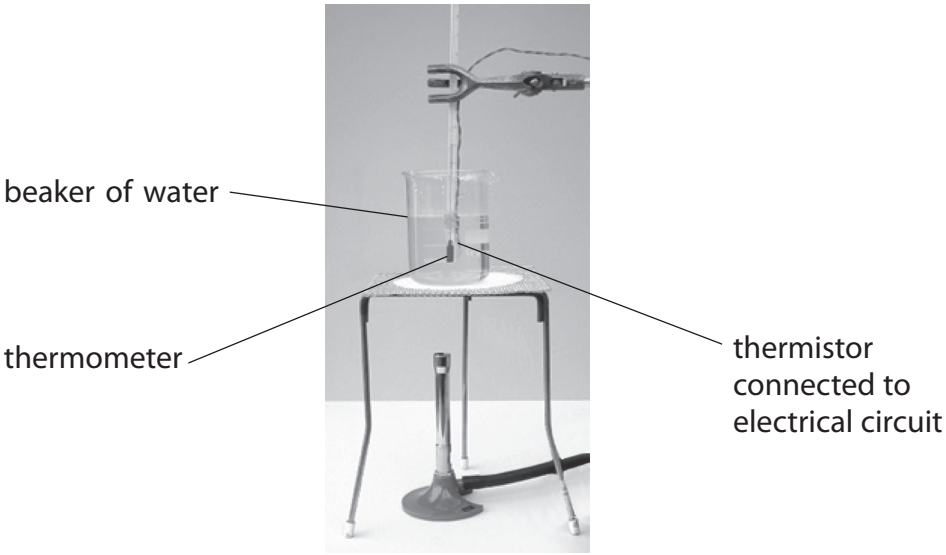
☒	**C**	
☒	**D**	

(b) The student uses this apparatus to investigate how the resistance of a thermistor changes with temperature.



(i) Explain why the student places the thermistor in a beaker of water.

(2)

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(ii) The student also uses a voltmeter and an ammeter.

How should the voltmeter and the ammeter be connected in his circuit?

(1)

	Voltmeter	Ammeter
☒ **A**	in parallel across the power supply	in parallel across the thermistor
☒ **B**	in parallel across the thermistor	in series with the thermistor
☒ **C**	in series with the power supply	in series with the thermistor
☒ **D**	in series with the thermistor	in parallel across the thermistor

(c) The table shows the student's results.

Temperature in °C	Resistance in Ω
0	10 000
10	7 060
20	5 000
40	2 670
60	2 350
80	1 080
100	609

(i) Plot a graph of these results on the grid.

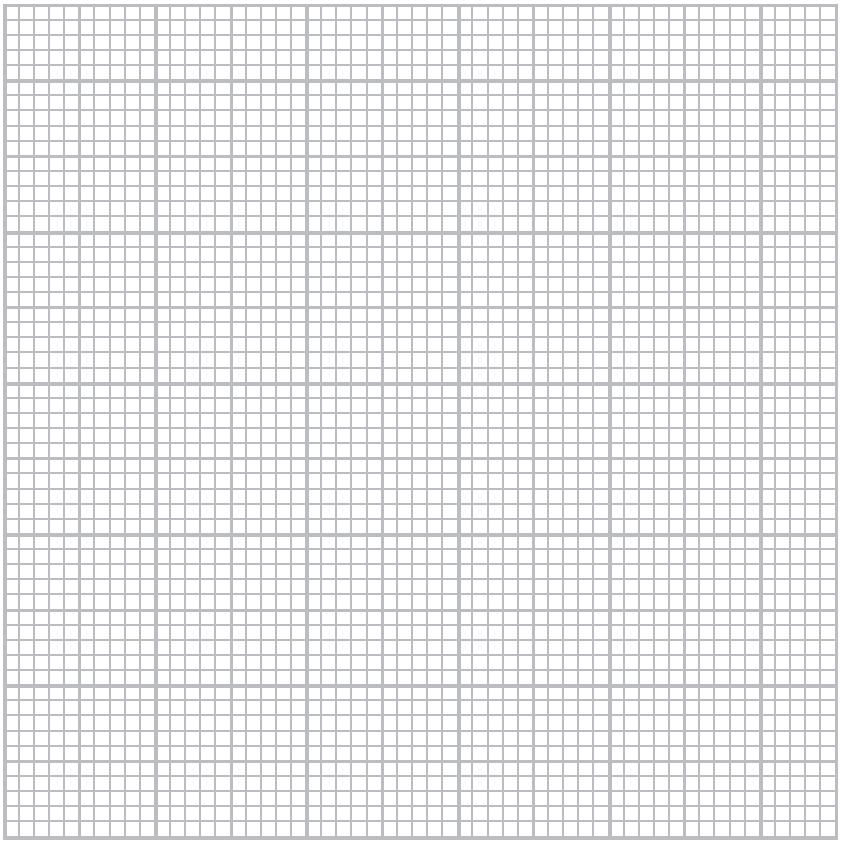
(4)

(ii) Circle the anomalous point on the graph.

(1)

(iii) Draw a curve of best fit.

(1)



(d) (i) Why is the maximum temperature in the student's investigation limited to 100 °C?

(1)

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(ii) Suggest how the student obtains readings below room temperature.

(1)

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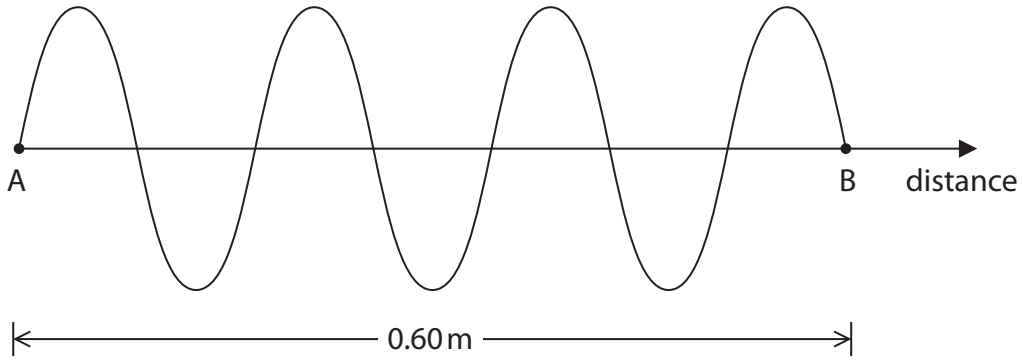
(Total for Question 5 =12 marks)

6 (a) The diagram represents a microwave travelling in free space from point A to point B.



(i) The distance from A to B is 0.60 m.

Calculate the wavelength of this microwave.

(2)

wavelength = ... m

(ii) State the equation linking wave speed, frequency and wavelength.

(1)

(iii) Calculate the frequency of this microwave.
[speed of microwave in free space = 3.0×10^8 m/s]

(3)

frequency = ... Hz

(b) The diagrams show what happens to radio waves and microwaves as they move past a hill.

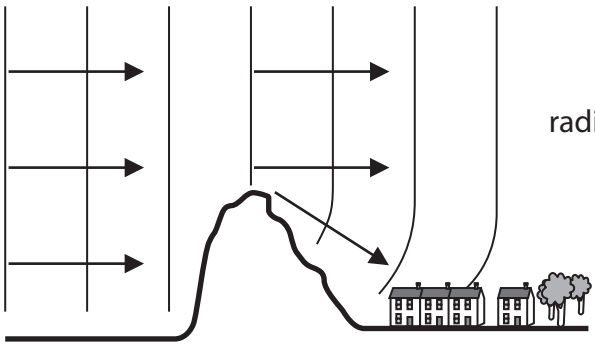


Diagram 1

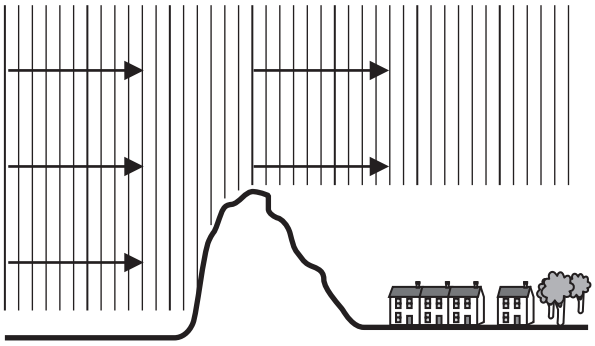


Diagram 2

(i) Name the effect shown by the radio waves in diagram 1.

(1)

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(ii) Suggest why this effect is not shown by the microwaves in diagram 2.

(2)

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(Total for Question 6 = 9 marks)

TURN OVER FOR QUESTION 7

7 In 2013, the UK Government decided to build another nuclear power station at Hinckley Point. Hinckley Point is in Somerset, a major agricultural area of the UK.
This will be the third nuclear power station at the site.

©guardian

Discuss the advantages and disadvantages of nuclear power stations and biomass power stations.

(6)

(Total for Question 7 = 6 marks)

TOTAL FOR PAPER = 60 MARKS