Write your name here

Surname	Other names

Pearson Edexcel Certificate
Pearson Edexcel
International GCSE

Centre Number	Candidate Number

Physics

Unit: KPH0/4PH0
Paper: 2P

Thursday 15 January 2015 – Morning **Time: 1 hour**	Paper Reference **KPH0/2P** **4PH0/2P**

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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P 4 4 2 5 1 A 0 1 1 6

PEARSON

EQUATIONS

You may find the following equations useful.

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

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

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

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

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

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

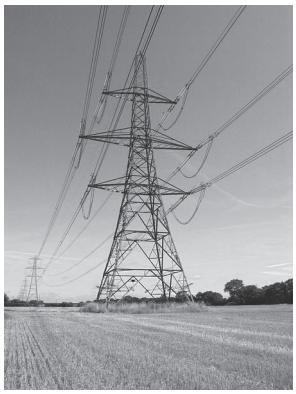
$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

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

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

Answer ALL questions.

1 Electrical energy can be transmitted using a high voltage of 132 kV.



(a) A voltage of 132 kV is the same as

(1)

☒ **A** 132 V

☒ **B** 1320 V

☒ **C** 132 000 V

☒ **D** 132 000 000 V

(b) Using a high voltage increases the

(1)

☒ **A** current in the wires

☒ **B** efficiency of transmission

☒ **C** energy lost as heat

☒ **D** resistance of the wires

(c) The high voltage can be reduced using a

(1)

☒ **A** generator

☒ **B** magnet

☒ **C** transformer

☒ **D** transmitter

(Total for Question 1 = 3 marks)

2 Planets and comets in our Solar System orbit the Sun.

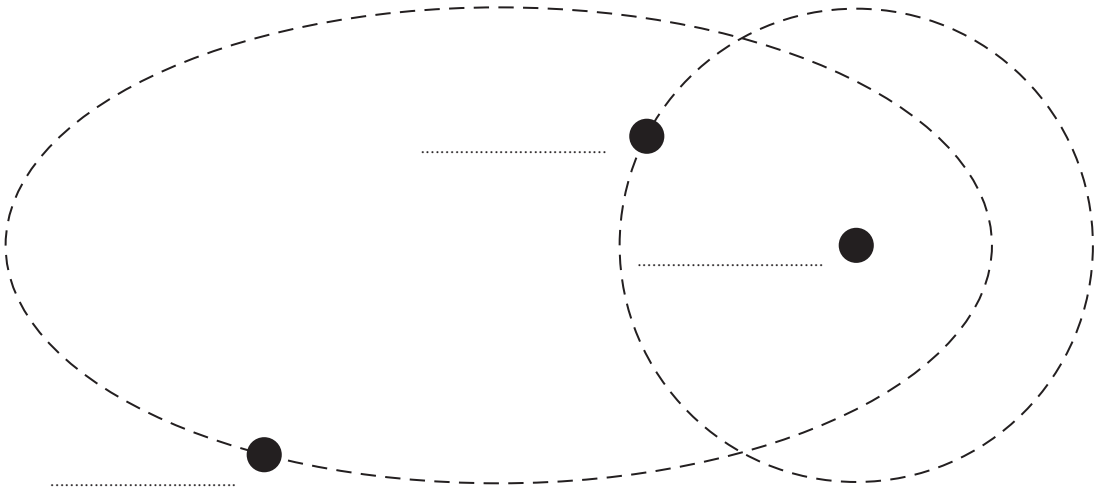
(a) Which force causes planets and comets to orbit the Sun?

(1)

.....

(b) The diagram shows the orbits of a planet and a comet around the Sun.

[not to scale]



(i) On the diagram, label the planet, the comet and the Sun.

(1)

(ii) Explain why it is possible for a planet and a comet in our Solar System to collide.

(2)

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.....

(Total for Question 2 = 4 marks)

3 The photograph shows a fuel delivery at a petrol station.

Source: Jeeferson Siegel, New York Daily News

(a) Explain how a fuel tanker can become electrically charged while it is moving.

(2)

(b) Pumping fuel from an electrically-charged tanker can be dangerous.

(i) Describe a possible danger of pumping fuel from an electrically-charged tanker.

(1)

(ii) The driver connects an earth wire to the fuel tanker before pumping fuel.

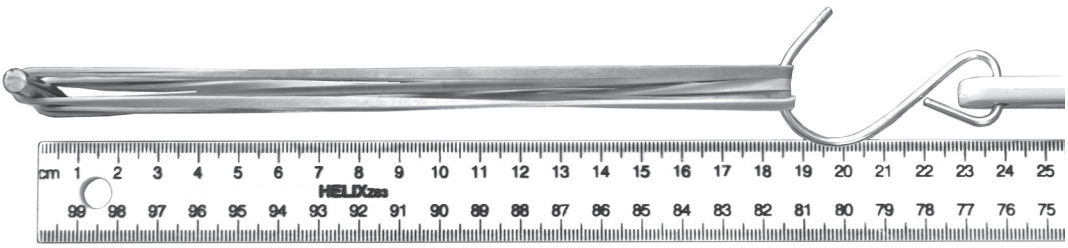
Explain how connecting the earth wire reduces the possible dangers.

(2)

(Total for Question 3 = 5 marks)

4 A student investigates the stretching of rubber bands.

She stretches four rubber bands as shown in the photograph.



She applies a force of 5.0 N and measures the length of the rubber bands.

She repeats the experiment with different numbers of rubber bands, using a force of 5.0 N each time.

The table shows her results.

Number of rubber bands	Stretched length in cm
1	43.2
2	28.0
3	21.5
4	
5	17.6
6	17.0

(a) (i) Estimate the length of the four rubber bands shown in the photograph and use your value to complete the table.

(1)

(ii) Suggest two reasons why your estimate may not be accurate.

(2)

1 .....

.....

2 .....

.....

(b) Suggest how the student made this investigation a fair test.

(1)

.....

.....

(c) (i) The number of rubber bands is a series of whole numbers.

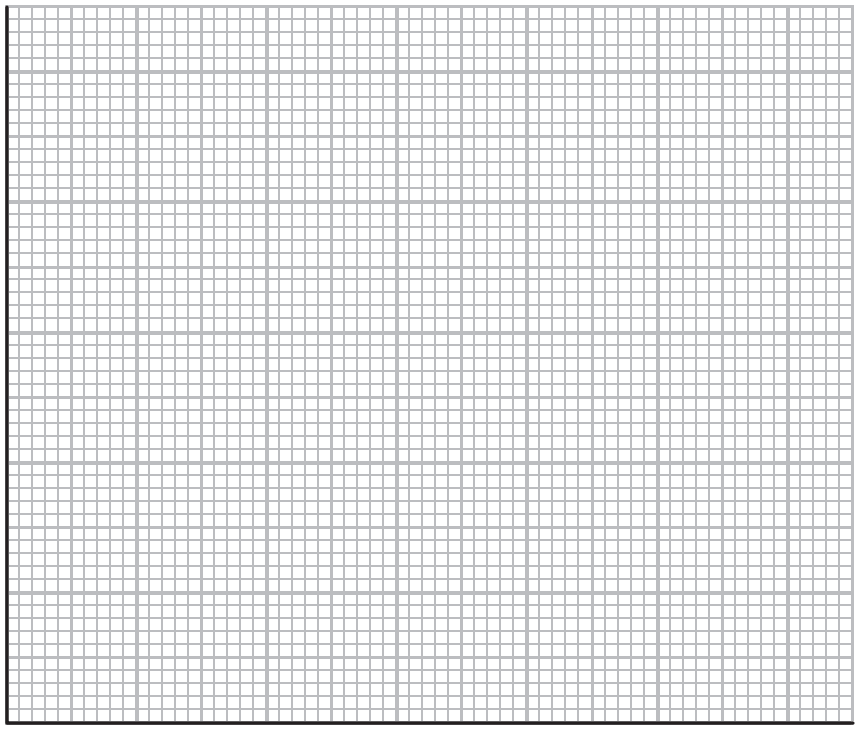
State the name of this type of variable.

(1)

.....

(ii) Display the results of the student's investigation on the grid.

(4)



(iii) Describe the relationship between the number of rubber bands and the stretched length.

(2)

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.....

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(Total for Question 4 = 11 marks)

5 Liquid helium boils at 4.2 K.

(a) Convert 4.2 K to a temperature in °C.

(1)

temperature = ... °C

(b) Liquid helium boils to form helium gas.

(i) State two ways in which the arrangement and motion of the molecules change as the helium becomes a gas.

(2)

1 .....

.....

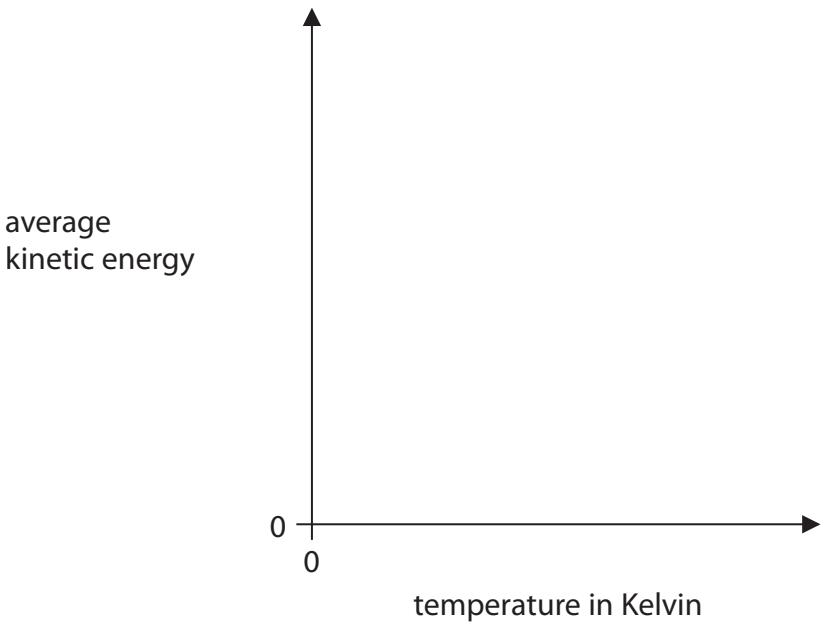
2 .....

.....

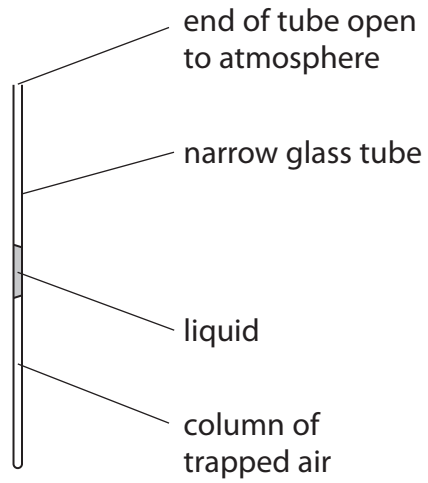
(ii) The average kinetic energy of the molecules in helium gas depends on its Kelvin temperature.

Sketch a graph on the axes below to show this relationship.

(2)



(c) Some air is trapped in a narrow glass tube so that its pressure remains constant.



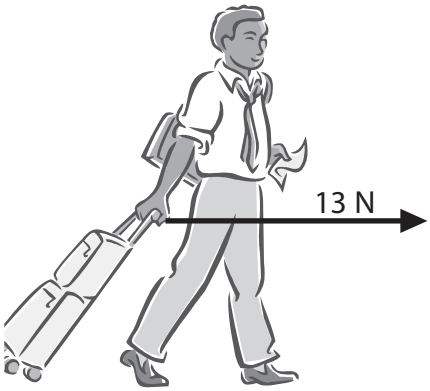
Describe how this apparatus can be used to investigate the relationship between the temperature and the volume of air at constant pressure.

You may add to the diagram to help your answer.

(4)

(Total for Question 5 = 9 marks)

6 A person has a suitcase with wheels.



(a) The person pulls the suitcase with a horizontal force of 13 N for 110 m.

(i) State the equation linking work done, force and distance moved.

(1)

(ii) Calculate the work done on the suitcase by the person.

(2)

work done = ... J

(iii) How much energy is transferred to the suitcase?

(1)

energy transferred = ... J

(b) The suitcase falls over.

Explain why it loses gravitational potential energy when it falls.

(2)

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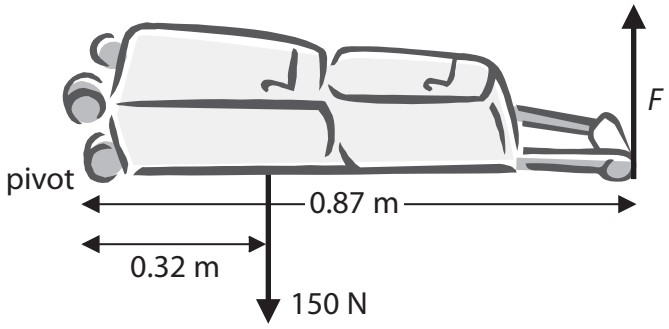
(c) The person starts to raise the suitcase again by pulling on the handle with force *F*.

The weight of the suitcase is 150 N.



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

(1)

.....

(ii) Calculate the force *F* that the person must apply on the handle to start raising the suitcase.

(3)

force *F* = ... N

(Total for Question 6 = 10 marks)

7 An unstable isotope of strontium has a half-life of 28.8 years.

It is a beta emitter and can be represented by this symbol.

$$^{90}_{38}\text{Sr}$$

(a) (i) What is the mass number of this isotope?

(1)

.....

(ii) Explain the meaning of the term **half-life**.

(2)

.....

.....

.....

.....

(iii) A person can absorb strontium atoms, which stay in their bones.

Explain why strontium-90 in the bones is a serious health hazard.

(2)

.....

.....

.....

.....

(b) When a strontium-90 nucleus emits a beta particle, it decays to form yttrium-90.

(i) Complete the equation for this decay.

(2)

$$\begin{matrix}90\\38\end{matrix}\mathrm{Sr} \rightarrow \begin{matrix}\square\\39\end{matrix}\mathrm{Y} + \begin{matrix}\square\\\square\end{matrix}\beta^-$$

(ii) Yttrium-90 is also an unstable isotope.

Explain why strontium-90 and yttrium-90 can both be described as isotopes, even though they have different numbers of protons.

(2)

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.....

(Total for Question 7 = 9 marks)

8 A pulsar is a type of star.

We receive radiation from a pulsar in regular short bursts called pulses.

(a) Some pulsars emit radio waves. Other pulsars emit x-rays.

(i) State a property of waves that is the same for radio waves and x-rays.

(1)

.....

.....

(ii) State two properties of waves that are different for radio waves and x-rays.

(2)

1 .....

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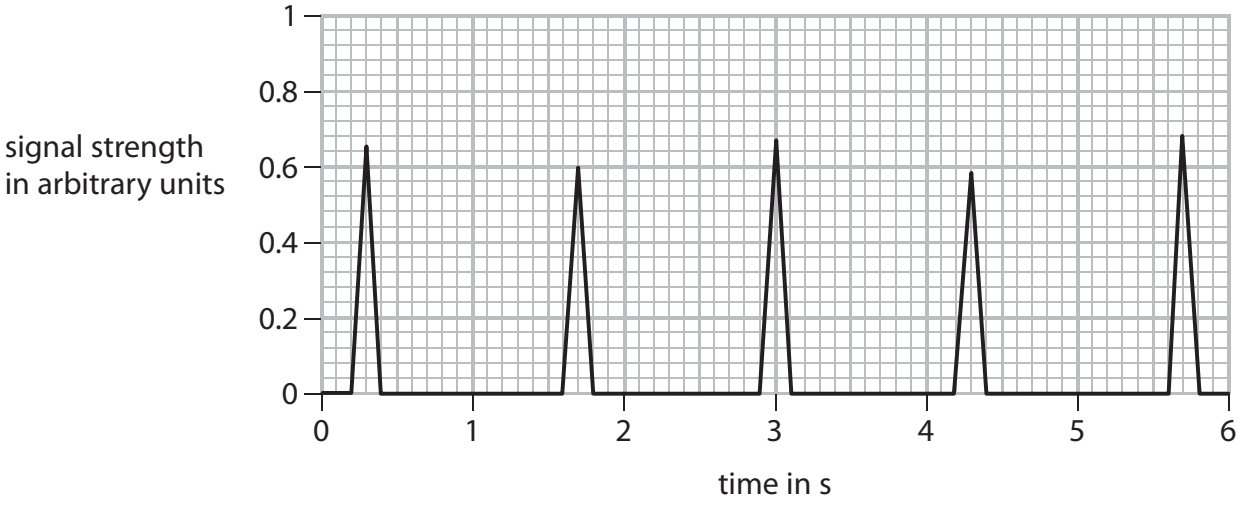
2 .....

.....

(b) The graph shows five pulses of the signal from a pulsar.



(i) Explain how the graph shows that the signal is not digital.

(2)

.....

.....

.....

.....

(ii) Use the graph to estimate the average time between each pulse.

(2)

time = ... s

(iii) Calculate the frequency of the pulses in the signal.

Give the unit.

(2)

frequency = ... unit .....

(Total for Question 8 = 9 marks)

TOTAL FOR PAPER = 60 MARKS

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