Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel International GCSE**

Centre Number | | | | | |

Candidate Number | | | | |

# Physics

## Unit: 4PH0
## Paper: 2PR

Friday 15 June 2018 – Morning
**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 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.
- 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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## 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** The passage is about static electricity.

Use words from the box to complete the passage.

Each word may be used once, more than once, or not at all.

**(4)**

| | | | |
|---|---|---|---|
| atoms | attract | electrons | friction |
| negatively | positively | protons | repel |

A student combs her hair with a plastic comb. Her hair and the comb become charged.

This happens because of the ..... between her hair

and the comb. The comb becomes positively charged so her hair becomes

..... charged.

The student's hair sticks out because like charges ..... .

When the student moves the comb through her hair, she can hear a crackling sound.

This is caused by ..... transferring from the comb to her hair.

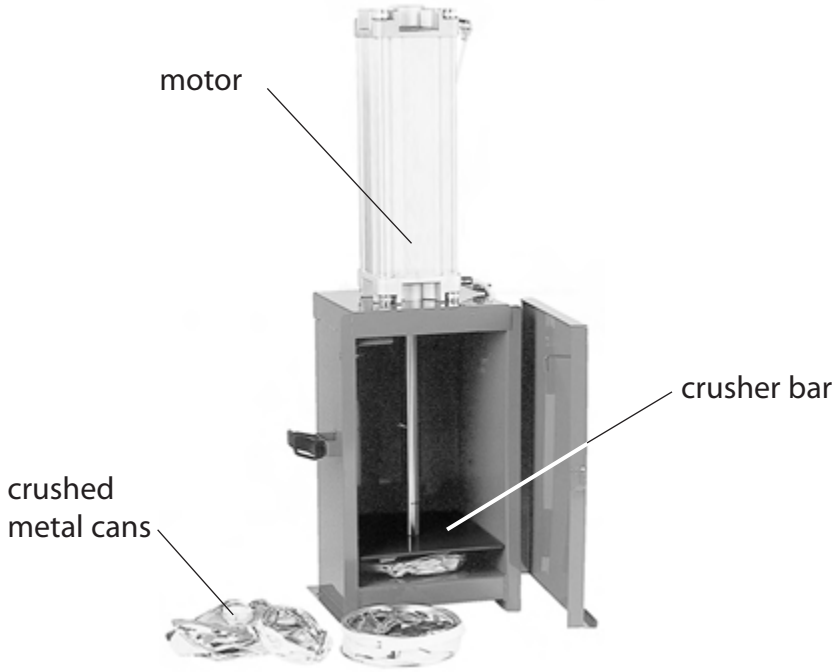
**(Total for Question 1 = 4 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

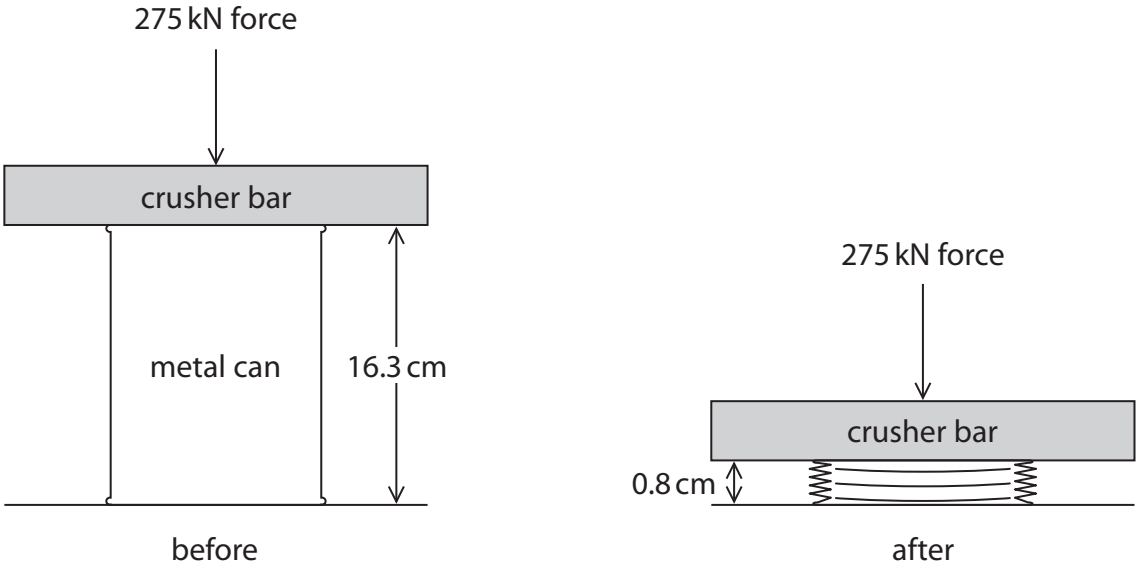
**2** The photograph shows a machine used to crush metal cans.




A metal can is placed under the crusher bar.

The motor pushes the crusher bar downwards.

The diagram shows what happens when a metal can is crushed.



(a) State the equation linking work done, force and distance moved in the direction of the force.

**(1)**

(b) Calculate the work done on the metal can by the force.

Give the unit.

**(3)**

work done = ..... unit .....

**(Total for Question 2 = 4 marks)**

**3** (a) Control rods and moderators are important parts of nuclear reactors.

Draw straight lines linking each part of the reactor with its correct function.

**(2)**

| **Part of reactor** | **Function** |
|---|---|
| control rod | releases neutrons |
| | cools neutrons |
| moderator | slows neutrons |
| | absorbs neutrons |

(b) Describe the process of nuclear fission.

**(4)**

**(Total for Question 3 = 6 marks)**

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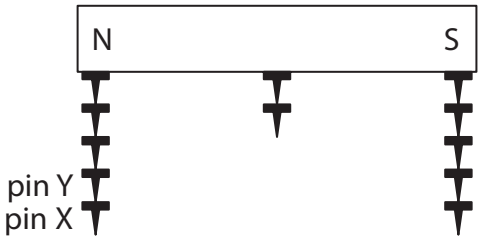
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**4** A student investigates magnetic fields.

(a) He places a bar magnet into a tray of steel pins, and then removes the magnet.

The diagram shows the magnet after it has been removed from the tray.




(i) Explain why pin X is attached to pin Y.

**(2)**

(ii) Write a conclusion for the student's investigation.

**(2)**

(iii) The student repeats his investigation, using soft iron pins instead of steel pins.

State what difference the student would observe.

**(1)**

(b) The student then uses an electromagnet made from an insulated coil of wire wound around a soft iron core to investigate this prediction.

The strength of an electromagnet increases with the current in the coil.

(i) Explain which is the independent variable in his investigation.

**(2)**

.....

.....

.....

.....

(ii) Name two control variables in his investigation.

**(2)**

1 .....

2 .....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(iii) Describe a method that the student could use to perform this investigation.

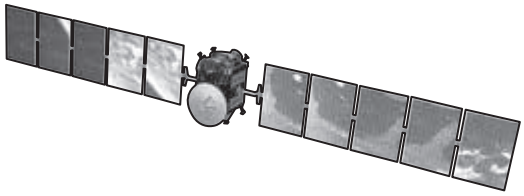
You should include a circuit diagram.

**(6)**

**(Total for Question 4 = 15 marks)**

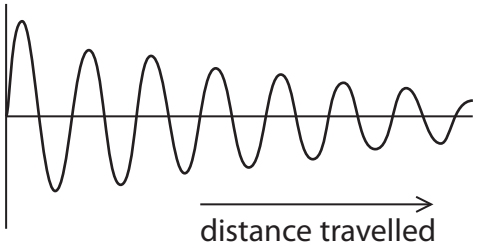
**5** A space probe was launched in 2007.

Its mission was to visit Ceres, a distant dwarf planet in the asteroid belt.



(a) The space probe sends data back to Earth as a radio wave.

The sketch graph shows how the radio wave changes as the radio wave travels in free space towards the Earth.




(i) State what happens to the amplitude, wavelength and speed of the radio wave as it travels in free space towards the Earth.

**(3)**

amplitude .....

.....

wavelength .....

.....

speed .....

.....

(ii) When the probe was near Ceres, it was difficult to steer the probe by remote control from Earth.

Why was it difficult to steer the probe by remote control?

**(1)**

☒ **A** there was a time delay for signals travelling to the probe from Earth

☒ **B** the distance between the asteroid and the Sun changed

☒ **C** there was a reduced gravitational pull of the Earth on the probe

☒ **D** the small size of the asteroid made the probe weightless

(iii) The radio signals sent to the probe are digital.

Which row of the table gives a correct comparison of digital radio signals with analogue radio signals?

**(1)**

| | Digital radio signals | Analogue radio signals |
|---|---|---|
| ☒ **A** | travel faster | easier to remove noise |
| ☒ **B** | travel faster | harder to remove noise |
| ☒ **C** | travel at the same speed | harder to remove noise |
| ☒ **D** | travel at the same speed | easier to remove noise |

(iv) Which of these is a digital signal?

**(1)**

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(b) The space probe has some solar cells to provide electrical energy.

The total area of the solar cells is 36.4 $m^2$.

When the space probe is near Earth, each 1.0 $m^2$ of solar cell generates 0.275 kW.

Calculate the electrical power generated by these solar cells.

**(2)**

electrical power = ..... kW

(c) The probe is propelled by an ion thruster which produces a force of 91 mN.

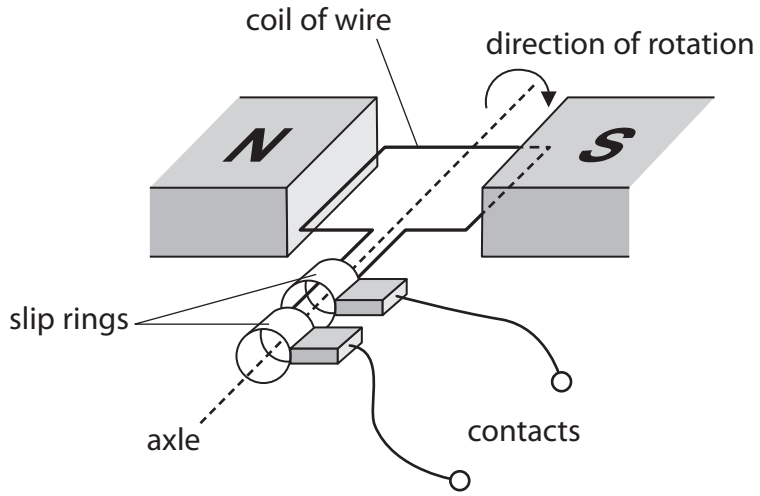
Calculate the change in momentum that this force produces in 25 minutes.

**(3)**

change in momentum = ..... kg m/s

**(Total for Question 5 = 11 marks)**

**6** The diagram shows a simple generator.

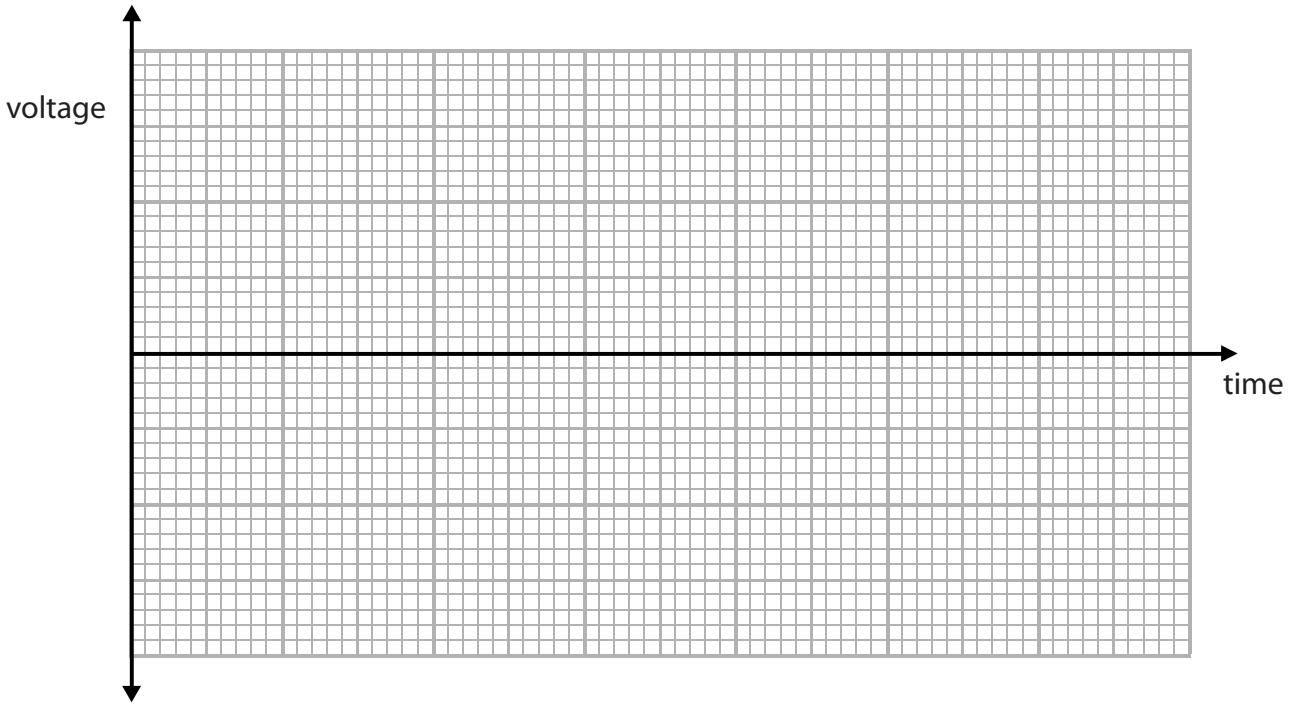



The coil of wire rotates at a constant rate.

When the coil of wire rotates, a voltage can be measured across the contacts.

Use the grid to sketch how the measured voltage varies as the coil of wire rotates.

**(4)**



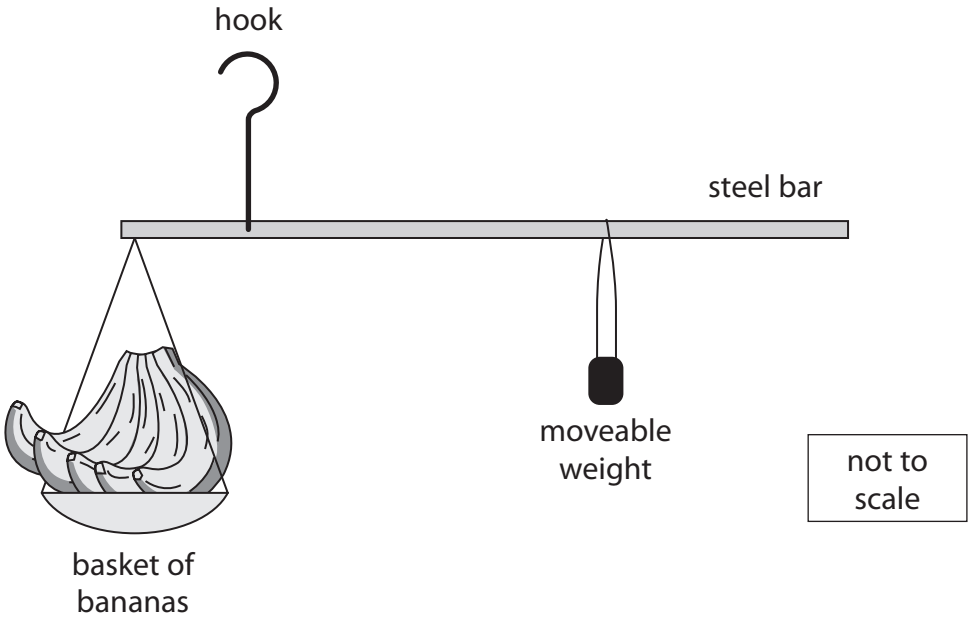

**(Total for Question 6 = 4 marks)**

**7** The photograph shows a fruit seller using a yard-arm to weigh fruit.

The yard-arm consists of a steel bar about 1 m long, with a basket at one end and a moveable weight at the other end.

It is held up by a hook which is fixed to the bar close to the basket.

The diagram shows a yard-arm being used to find the weight of five bananas.




(a) Draw an X on the diagram to show the pivot point.

**(1)**

(b) State the principle of moments.

**(1)**

.....

.....

.....

.....

(c) The support for the basket is 14.1 cm from the pivot.

The moveable weight is 84.6 cm from the pivot and weighs 1.25 N.

Calculate the weight of the five bananas.

[ignore weight of steel rod and basket]

**(3)**

weight of five bananas = ..... N

(d) Calculate the mass in grams of one banana.

**(3)**

mass of one banana= ..... g

(e) Suggest two ways that the fruit seller could alter his yard-arm so that he could measure larger weights.

**(2)**

1 .....

.....

2 .....

.....

**(Total for Question 7 = 10 marks)**

**TURN OVER FOR QUESTION 8**

**8** Electromagnetic radiation can affect the human body.

Discuss how excessive exposure to electromagnetic radiation may cause damage to the human body.

Refer to the different parts of the electromagnetic spectrum in your answer.

**(6)**

**(Total for Question 8 = 6 marks)**

**TOTAL FOR PAPER = 60 MARKS**