Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel IGCSE

Physics

Unit: 4PH0
Paper: 2P

Friday 17 June 2011 – Afternoon **Time: 1 hour**	Paper Reference **4PH0/2P**

Materials required for examination.
Ruler, protractor, 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 3 8 7 6 0 A 0 1 2 0

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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, $g = 10\ \text{m/s}^2$.

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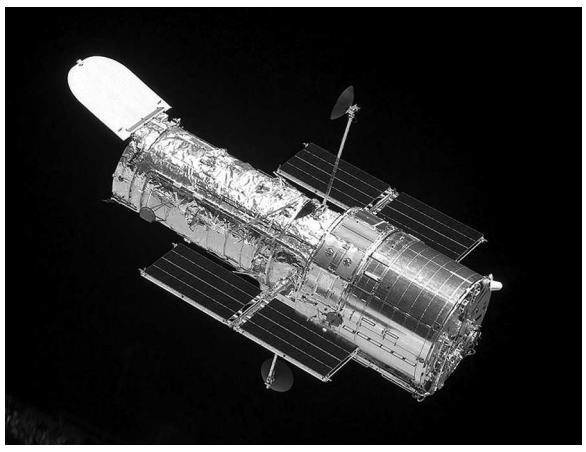
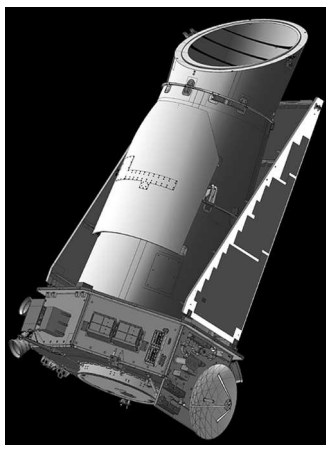
Answer ALL questions.

1 Hubble and Kepler are the names of two space telescopes.



Hubble telescope



Kepler telescope

(a) The Hubble telescope is in a circular orbit around the Earth.

The Kepler telescope is in a circular orbit around the Sun.

(i) The orbit of the Hubble telescope is most like the orbit of a

(1)

☒ **A** comet

☒ **B** moon

☒ **C** planet

☒ **D** star

(ii) The orbit of the Kepler telescope is most like the orbit of a

(1)

☒ **A** comet

☒ **B** moon

☒ **C** planet

☒ **D** star

(iii) The force that keeps space telescopes in orbit is

(1)

☒ **A** friction

☒ **B** gravity

☒ **C** lift

☒ **D** upthrust

(b) Space telescopes are used to study galaxies.

Use words from the box to complete the sentences below.

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

Milky Way	**Solar System**	**Sun**	**Universe**

(i) There are billions of stars in the galaxy called the .....

(1)

(ii) There are billions of galaxies in the .....

(1)

(c) Which of these is nearest to the Earth?

(1)

☒ **A** the surface of the Moon

☒ **B** the surface of the Sun

☒ **C** the centre of the Solar System

☒ **D** the centre of the Universe

(d) Gravitational field strength is measured in

(1)

☒ **A** kg/N

☒ **B** kg/N^2

☒ **C** N/kg

☒ **D** N/kg^2

(Total for Question 1 = 7 marks)

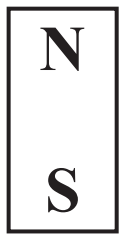
2 The photograph shows a plotting compass and a small bar magnet.

(a) Describe how you should use this apparatus to investigate the magnetic field pattern of the bar magnet.

(3)

(b) Add the magnetic field pattern of the bar magnet to the diagram below.

(3)



(Total for Question 2 = 6 marks)

3 The photograph shows a worker fuelling an aircraft.

Fuelling an electrically-charged aircraft can be dangerous.

The worker connects a safety wire to the aircraft before adding the fuel.

(a) Explain how an aircraft can become electrically charged while it is flying.

(2)

(b) Describe a possible danger of fuelling an electrically-charged aircraft.

(1)

(c) What electrical connection is made by the safety wire?

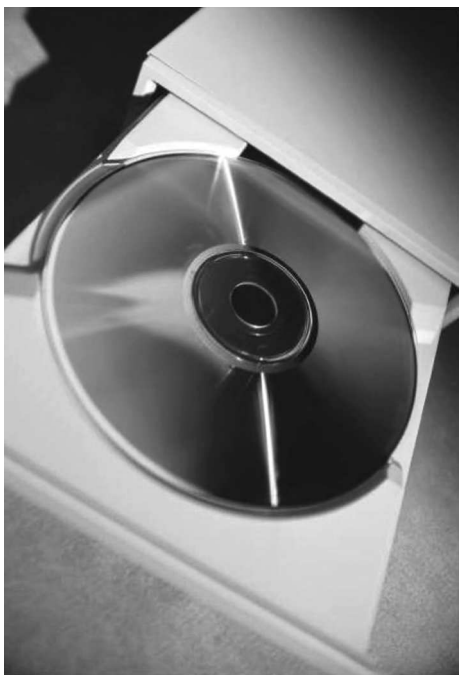
(1)

(d) Explain how connecting the safety wire reduces the possible dangers when fuelling an electrically-charged aircraft.

(2)

(Total for Question 3 = 6 marks)

4 CD players use digital signals to transfer information.



Earlier systems using vinyl discs produced analogue signals.

(a) Describe the difference between digital signals and analogue signals.

(2)

(b) Give **one** advantage of using digital signals.

(1)

(c) A CD player is connected to this loudspeaker system.

The sound produced has a range of frequencies.

Use ideas about diffraction to explain why different frequencies require different sizes of loudspeaker.

(3)

(Total for Question 4 = 6 marks)

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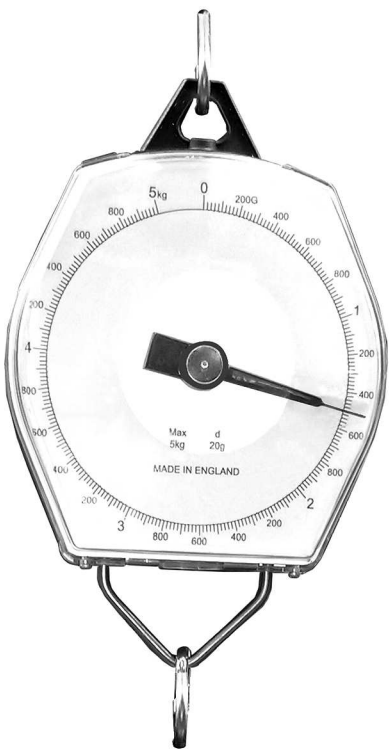
5 A student wants to use a weighing scale to find the weight of her school bag.

She has a weighing scale marked in kilograms instead of newtons.

The weighing scale is not working properly.

With nothing hanging from it, the weighing scale shows 1.5 kg.



(a) What is the weight of a 1.5 kg mass?

(1)

Weight = ... N

(b) The student decides to check the weighing scale.

She has no accurate weights.

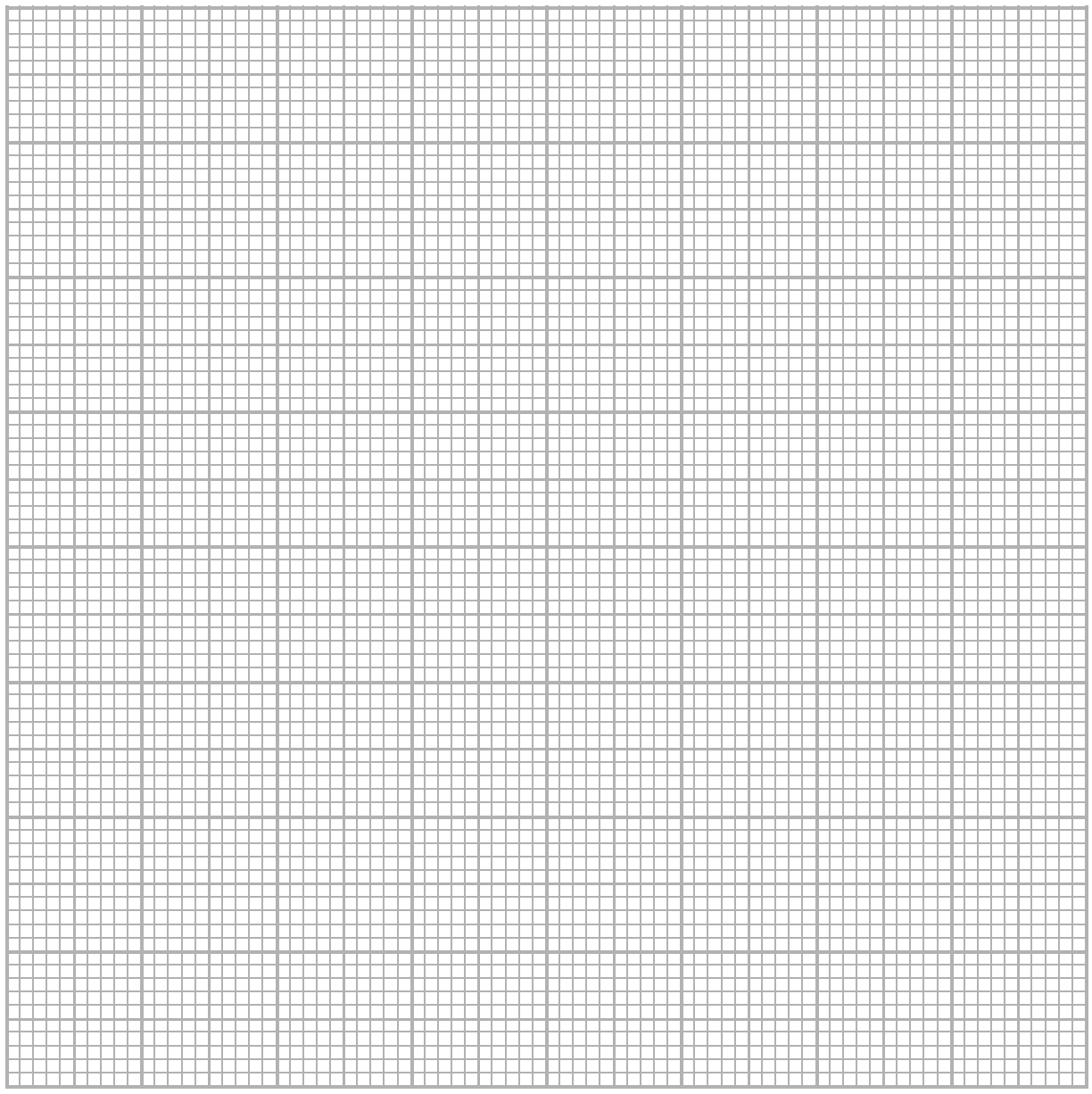
Instead, she puts some tins of beans in a plastic bag and hangs it from the scale.

Her readings are shown in the table.

Number of tins of beans	0	1	2	3	4	5	6
Scale reading (in kg)	1.5	2.0	2.3	2.8	3.7	3.5	3.9

(i) Draw a graph to show how the scale reading varies with the number of tins of beans.

(5)



(ii) Circle the anomalous point on your graph.

(1)

(c) The student notices that the label on each tin says ‘contains 0.4 kg of beans’.

She remembers that six tins of beans gave a scale reading of 3.9 kg.

She thinks:

Six tins of beans, so…
mass = 6 x 0.4 = 2.4 kg
and…
3.9 – 1.5 = 2.4 kg

She concludes:

I can use this scale as normal! All I need to do is to subtract 1.5 kg from each reading to get the right answer.

She hangs her school bag from the weighing scale.
The scale reading is 5.0 kg.
She also concludes that her school bag must have a mass of exactly 3.5 kg.

Suggest reasons why the student’s conclusions might be **incorrect**.

(4)

(Total for Question 5 = 11 marks)

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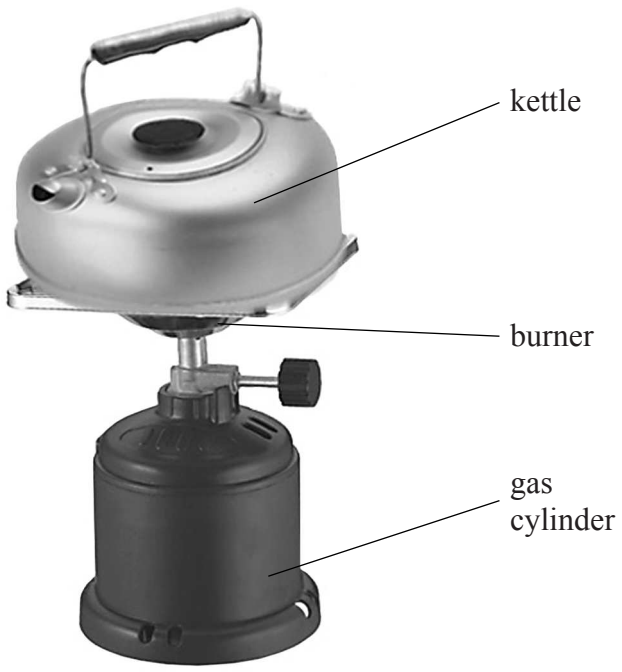
6 The photograph shows a kettle on a camping stove.

The cylinder contains some gas.



(a) Water in the kettle boils at a temperature of 100 °C and steam is produced.

(i) Convert this to a temperature on the Kelvin scale.

(1)

100 °C = ... K

(ii) State **one** way in which the molecules in steam are different from the molecules in water.

(1)

.....

.....

(iii) Explain how the molecules of steam exert a pressure on the inside of the kettle.

(3)

(b) The wind blows the flame out and 820 cm^3 of gas, at a pressure of 130 kPa, escapes from the cylinder.

As the gas escapes, its pressure decreases to 101 kPa.

Calculate the volume of the escaped gas at a pressure of 101 kPa.

(2)

Volume = ... cm^3

(c) The cylinder is turned off to stop more gas escaping.

The temperature of the gas in the cylinder decreases.

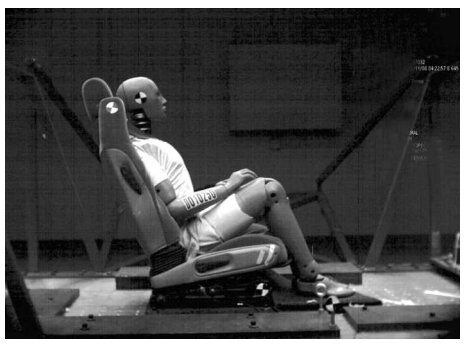
Explain what happens to the pressure of the gas in the cylinder.

(2)

(Total for Question 6 = 9 marks)

7 Scientists test the safety features of a car by crashing it into a large block of concrete.

A dummy is placed in the driver's seat and the scientists video the crash.



(a) In one test, the dummy and the car travel at 8 m/s.

The mass of the dummy is 72 kg.

Calculate the momentum of the dummy.

(2)

Momentum = ... kg m/s

(b) In another test, the momentum of the dummy changes by 920 kg m/s in a time of 0.17 s.

Calculate the average horizontal force acting on the dummy during this time.

(2)

Average force = ... N

(c) These tests help to make our roads safer.

(i) State **two** factors that affect the stopping distance of a car driven on a road.

(2)

1 .....

.....

2 .....

.....

(ii) Use ideas about momentum to explain how the crumple zone of a car helps to reduce injuries during a crash.

(3)

.....

.....

.....

.....

.....

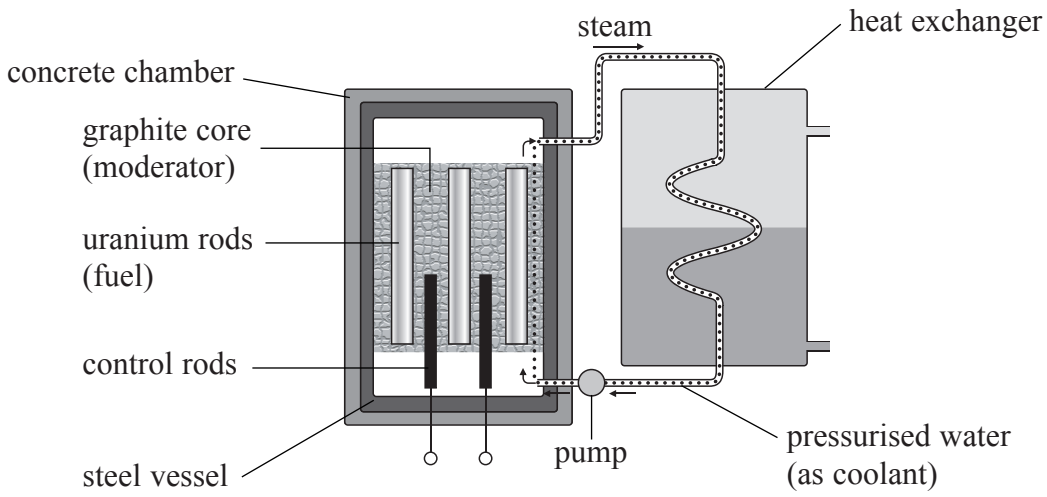
.....

.....

.....

(Total for Question 7 = 9 marks)

8 The diagram shows some of the parts of a nuclear power station.



Describe the process of controlled fission of U-235 in the nuclear reactor.

(6)

(Total for Question 8 = 6 marks)

TOTAL FOR PAPER = 60 MARKS