Candidate Name	Centre Number	Candidate Number
		0

General Certificate of Secondary Education

241/01

ADDITIONAL SCIENCE
FOUNDATION TIER (Grades G-C)
PHYSICS 2

P.M. MONDAY, 21 January 2008
(45 minutes)

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**3**	
3.	**5**	
4.	**8**	
5.	**7**	
6.	**7**	
7.	**5**	
8.	**7**	
9.	**5**	
Total	**50**	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

A list of equations is printed on page 2 of the examination paper. In calculations you should show all your working.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

EQUATIONS

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

$$\text{current} = \frac{\text{power}}{\text{voltage}}$$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

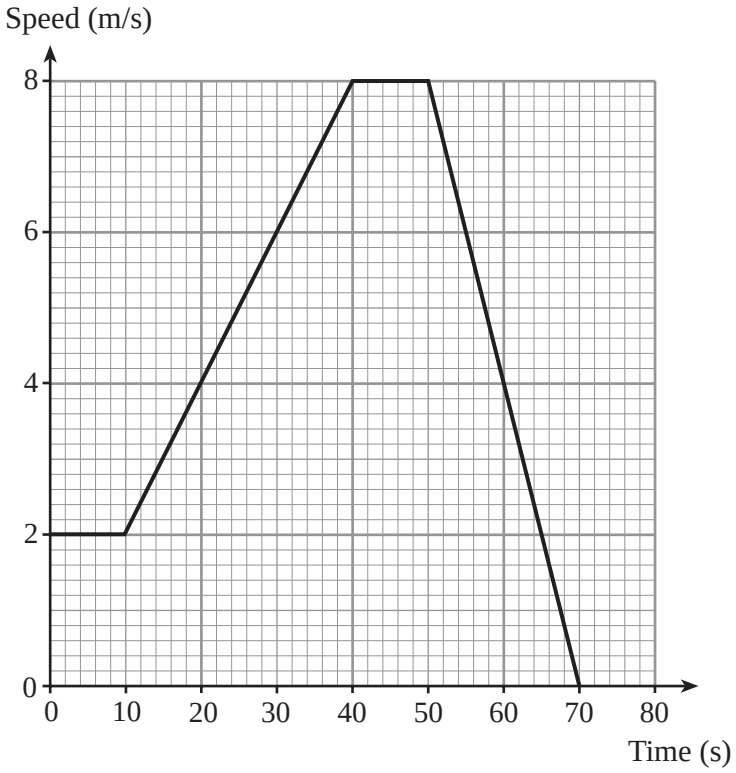
$$\text{acceleration} = \frac{\text{change in speed}}{\text{time}}$$

$$\text{resultant force} = \text{mass} \times \text{acceleration}$$

$$\text{work} = \text{Force} \times \text{distance}$$

Answer **all** *questions.*

1. The graph shows part of the journey of a car.



(i) What was the starting speed of the car? ..... [1]

(ii) What was the maximum speed of the car? ..... [1]

(iii) For how long was the car speeding up? ..... [1]

3

2. Use words from the box to complete the sentences that follow.

residual	live	copper	neutral	earth	insulation	miniature

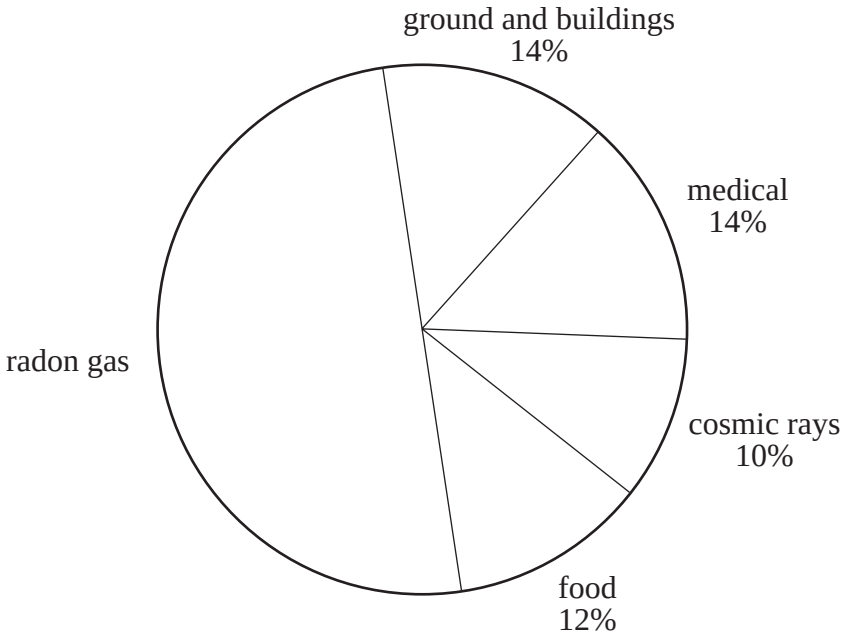
(i) Cables are covered in ..... to stop us having an electric shock. [1]

(ii) The ..... lead stops us having electric shocks when there is a fault. [1]

(iii) ..... circuit breakers protect a circuit from too big a current. [1]

3

3. The pie chart shows information about the main sources of background radiation.



(a) (i) What percentage of background radiation is due to radon gas? ..... % [1]

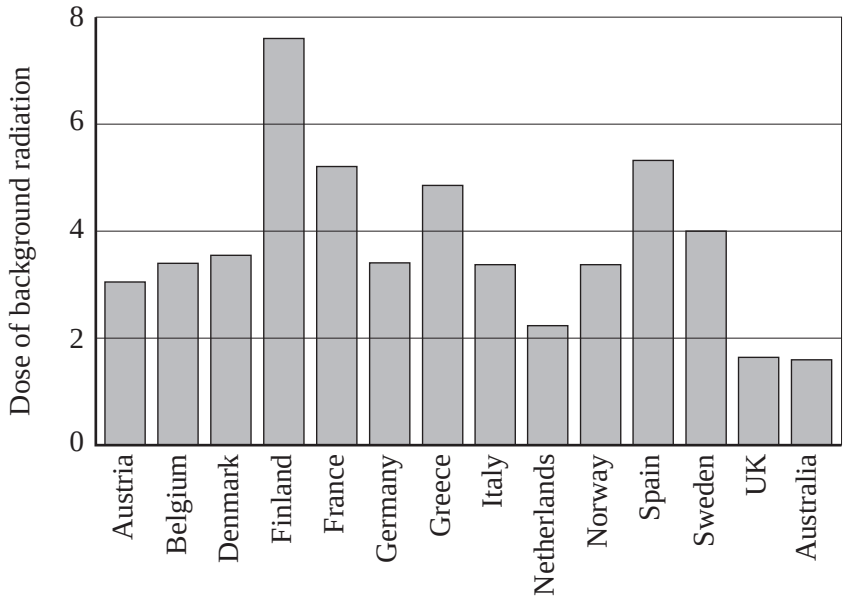
(ii) From the chart, name the background radiation that comes from space. [1]

.....

(iii) From the chart, name the source of background radiation that is easily breathed in. [1]

.....

(b) The dose of background radiation people receive in a year depends upon the country where they live.



(i) In which country does a person receive the largest dose of radiation? [1]

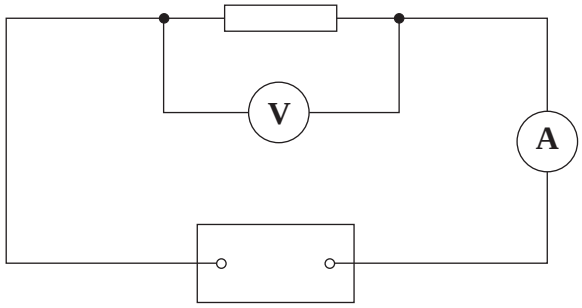
.....

(ii) In which country does a person receive an average dose of 4 units per year? [1]

.....

5

4. The diagram shows the circuit that was set up to find the resistance of a resistor.



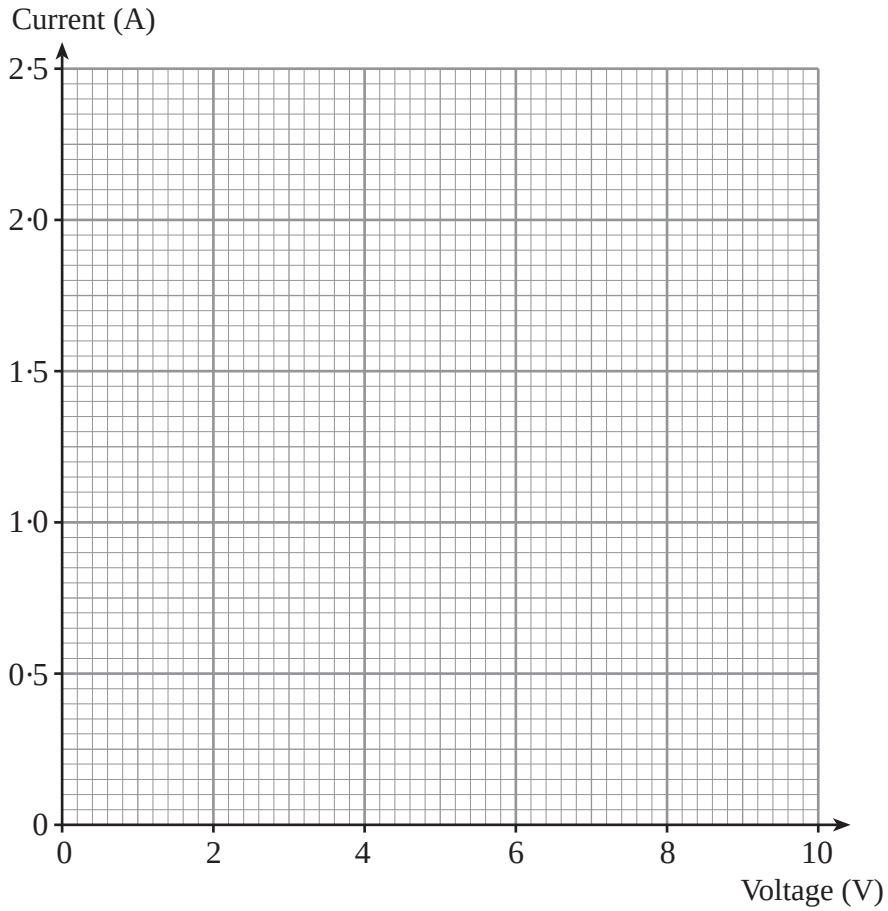
(a) (i) Name the meter **V**. ..... [1]

(ii) Name the meter **A**. ..... [1]

(b) The results from the experiment are shown in the table below.

Voltage (V)	0·0	2·0	6·0	8·0	10·0
Current (A)	0·0	0·5	1·5	2·0	2·5

(i) Plot these points on the grid below and join them with a straight line. [3]



(ii) Use the graph to find the voltage when the current is 1·0 A. ..... [1]

(iii) Use the equation

$$\text{Resistance} = \frac{\text{Voltage}}{\text{Current}}$$

to calculate the resistance of the resistor, when the current through it is 1·0 A. [2]

Resistance = ... Ω

8

5. The table gives information about some radioactive sources.

Source	Radiation emitted	Half-life
Polonium	alpha	138 days
Bismuth	beta	61 minutes
Iodine	gamma	8 days
Technetium	gamma	6 hours

(a) (i) Name the source with the shortest half-life. ..... [1]

(ii) Name **one** source that emits radioactive **particles**. ..... [1]

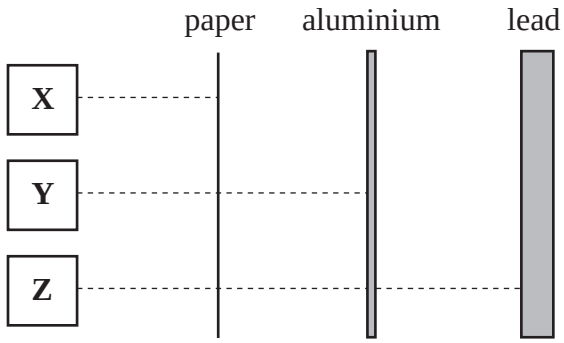
(iii) Name the source that stays radioactive for the longest time. ..... [1]

(b) The diagram shows three radioactive sources **X**, **Y** and **Z**.

The diagram shows that radiation from **X** is blocked by paper.

Radiation from **Y** is blocked by aluminium.

Radiation from **Z** is blocked by lead.



(i) Which source, **X**, **Y** or **Z**, could be bismuth? ..... [1]

(ii) Which source, **X**, **Y** or **Z**, could be polonium? ..... [1]

(c) The table shows how the activity of a sample of technetium drops as time passes.

Radioactivity (units)	400	200	.....	50	25
Time (hours)	0	6	12	18	.....

Fill in the gaps in the table. [2]

7

Examiner only

6. A sprinter accelerates at the start of a race.

(a) He has a forward force of 420 N.

The sprinter has a mass of 70 kg.

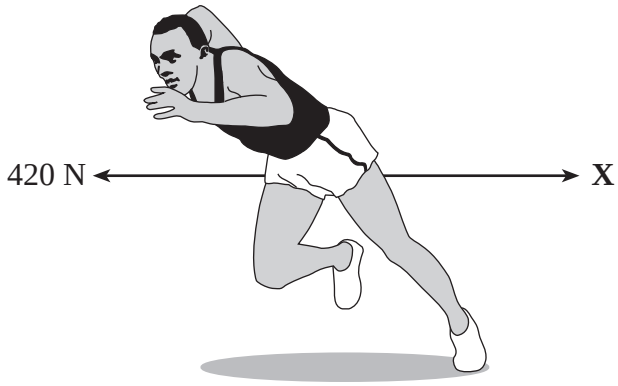
Use the equation

$$\text{Acceleration} = \frac{\text{Force}}{\text{Mass}}$$

to find his acceleration at the start of the race. [2]

Acceleration = ... m/s^2

(b) The sprinter is also acted on by another force **X**.



(i) Name force **X**. ..... [1]

(ii) At the start of the race **X** is zero.

State what happens to force **X** as the sprinter speeds up. [1]

.....

(iii) Describe the motion of the sprinter when force **X** is 420 N. [1]

.....

Examiner only

(c) The forward force of 420 N does not change during the race.

Use the equation

Work = Force × distance

to find the work done by the sprinter during the 100 m race. [2]

Work done = ... J

7

7. The lighting circuit in a house is protected by a 5 A fuse and connected to **230 V**.
The table shows the current taken by different lamps.

Power of lamp (W)	Current (A)
40	0·17
60	.....
100	0·43

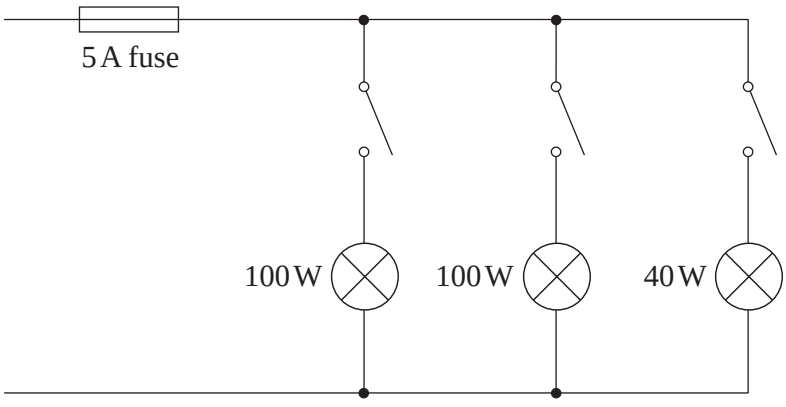
(a) Use the equation

$$\text{Current} = \frac{\text{Power}}{\text{Voltage}}$$

to find the current through a 60 W lamp. [1]

Current = ... A

(b) The circuit shows three lamps in a household lighting circuit connected to a 5 A fuse.
We can calculate the current through the fuse by adding up the currents through each of the lamps.



Use the information in the table to find the current flowing through the fuse when all these lamps are switched on. [2]

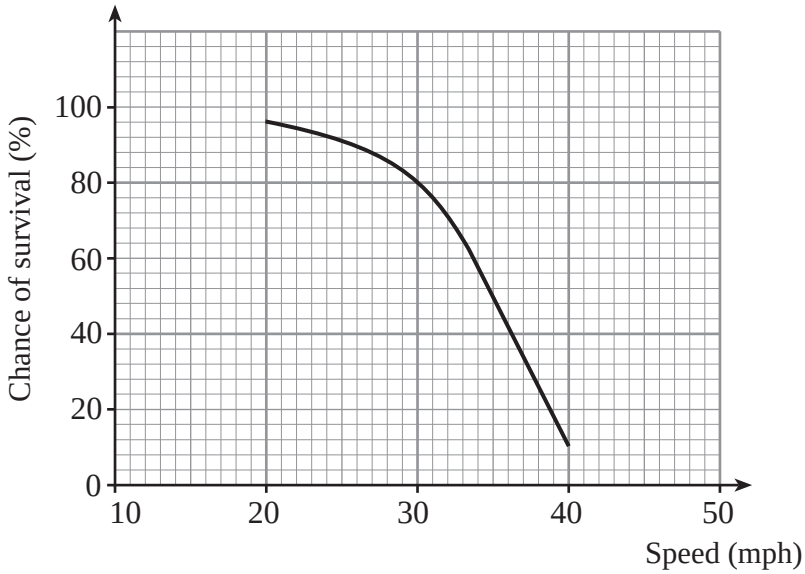
Current = ... A

(c) Find the maximum number of 100 W lamps that could be connected in a 5 A household lighting circuit. [2]

Number of lamps = ...

5

8. *(a)* In 2003 over 3000 people were killed and 33 000 seriously injured in collisions on Britain's roads.
The chances of a pedestrian surviving a collision depends upon how fast the vehicle is travelling. This is shown on the graph.



Give a reason why some people think that there should be a 20 mph speed limit outside schools instead of the present limit of 30 mph. [1]

.....

.....

(b) Speed cameras have been placed around Britain to encourage drivers to stay within the speed limit, to reduce the number of deaths and serious injuries.
The photograph shows a car passing a camera in a 30 mph speed limit area.

A speed camera detects a speeding car and it takes two photographs.
The white road markings are painted 1·5 m apart.
From the first to the second photograph the car has moved forward 5 spaces.

(i) Calculate the distance travelled by the car in the time it took to take the two photographs. [1]

Distance = ... m

(ii) The second photograph is taken 0·5 seconds after the first one.
Write down in words an equation as it appears on page 2, and use it to find the speed of the car.

Equation: .....

..... [1]

Calculation: [2]

Speed = ... m/s

(iii) Use information in the table to estimate the speed of the car in mph. [1]

speed in m/s	speed in mph
9·0	20
13·5	30
18·0	40
22·5	50

Speed = ... mph

(iv) If the car hits a pedestrian at this speed, what is the percentage chance of the pedestrian surviving? [1]

.....

TURN OVER FOR QUESTION 9

Examiner only

9. (i) Give **two** reasons why it is important to dispose of radioactive waste safely. [2]

1. .....

.....

2. .....

.....

(ii) Several disposal methods are being considered.

These include:

1. Leaving the radioactive waste where it is.
2. Burying it deep underground.
3. Sealing it in steel barrels which will be dumped in the sea.
4. Firing it into space by rocket.
5. Burying it in ice sheets at the poles.
6. Burying it under remote unpopulated islands.

Choose **three** of these methods and give **one different** disadvantage for **each**. [3]

Complete the table with your answers.

Method number	Disadvantage of this method
.....	.....
.....	.....
.....	.....