Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2010

Additional Science
Unit Physics P2

PHY2F

F

Physics
Unit Physics P2

Friday 28 May 2010 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

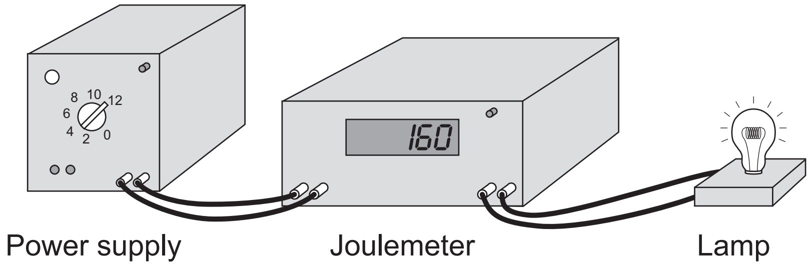
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

1 A student used a joulemeter to measure the energy transformed by a lamp.



The student set the joulemeter to zero, and then switched on the power supply.
After 120 seconds (2 minutes), the reading on the joulemeter had increased to 2880.

1 (a) In the space below, draw the circuit symbol used to represent a lamp.

(1 mark)

1 (b) (i) Use the equation in the box to calculate the power of the lamp.

$$\text{power} = \frac{\text{energy transformed}}{\text{time}}$$

Show clearly how you work out your answer.

....

....

Power = ...

(2 marks)

1 (b) (ii) Which **one** of the following is the unit of power?

Draw a ring around your answer.

joule **newton** **watt**

(1 mark)

1 (c) Complete the following sentence using one of the phrases from the box.

larger than	the same as	smaller than

If the lamp was left switched on for 10 minutes, the amount of energy transformed would be .... the amount of energy transformed in 2 minutes.

(1 mark)

5

Turn over for the next question

2 Complete each of the following sentences, **A**, **B**, **C**, **D** and **E**, by choosing the correct ending from **K**, **L**, **M**, **N** or **O**.

The first one has been done for you.

A The current through a resistor depends .... O

B A direct current ....

C In a series circuit, the potential difference ....

D An alternating current ....

E In a parallel circuit, the potential difference ....

K .... across each component is the same.

L .... is supplied by a cell or battery.

M .... is constantly changing direction.

N .... of the power supply is shared by the components.

O .... on the potential difference across the resistor.

(3 marks)

3

3 (a) The total stopping distance of a car has two parts. One part is the distance the car travels during the driver's reaction time. This distance is often called the 'thinking distance'.

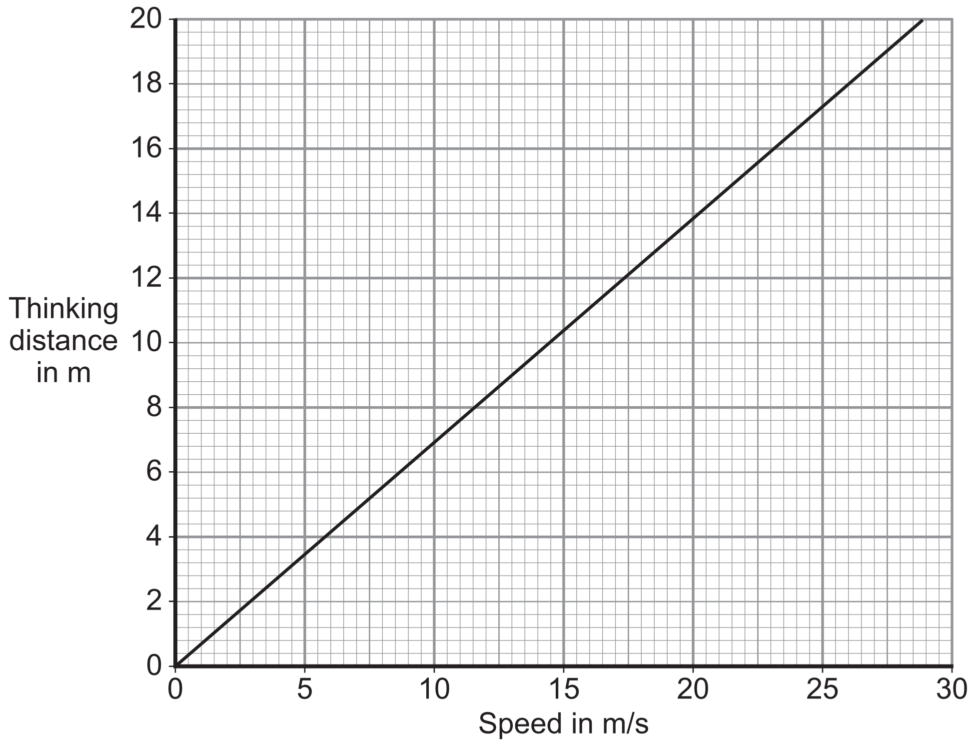
What distance is added to the 'thinking distance' to give the total stopping distance?

....

....

(1 mark)

3 (b) The graph shows the relationship between the speed of a car and the thinking distance.



Describe the relationship between speed and thinking distance.

....

....

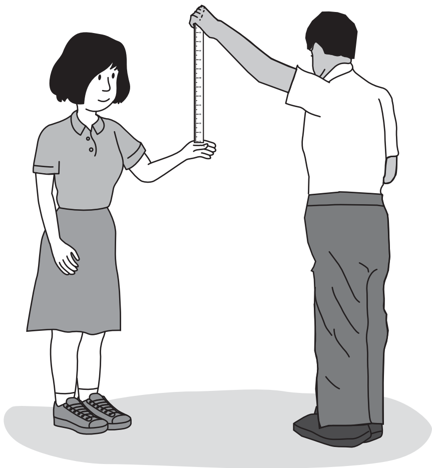
(2 marks)

Question 3 continues on the next page

Turn over ▶

Do not write outside the box

3 (c) The diagram shows two students investigating reaction time.



One student holds a 30 cm ruler, then lets go. As soon as the second student sees the ruler fall, she closes her hand, stopping the ruler. The further the ruler falls before being stopped, the slower her reaction time.

3 (c) (i) One student always holds the ruler the same distance above the other student's hand. In this experiment, what type of variable is this?

Put a tick (✓) in the box next to your answer.

independent variable ☐

dependent variable ☐

control variable ☐

(1 mark)

3 (c) (ii) Describe how this experiment could be used to find out whether listening to music affects reaction time.

....

....

....

....

(2 marks)

Do not write outside the box

3 (d) The following information is written on the label of some cough medicine.

WARNING: Causes drowsiness.
Do not drive or operate machinery.

How is feeling drowsy (sleepy) likely to affect a driver's reaction time?

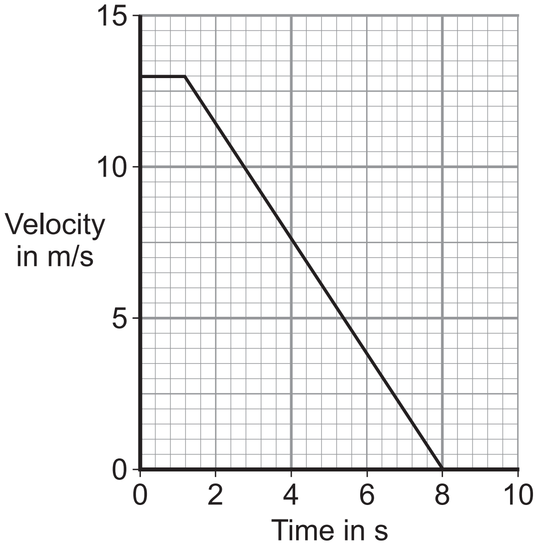
....

....

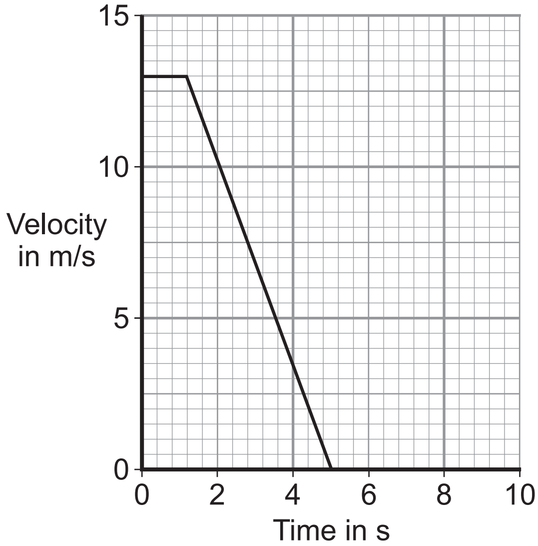
(1 mark)

3 (e) Three cars, **X**, **Y** and **Z**, are being driven along a straight road towards a set of traffic lights. The graphs show how the velocity of each car changes once the driver sees that the traffic light has turned to red.

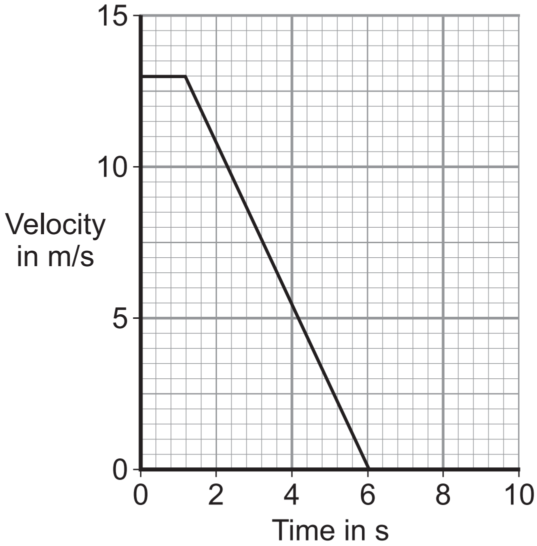
X



Y



Z



Which one of the cars, **X**, **Y** or **Z**, stops in the shortest distance?

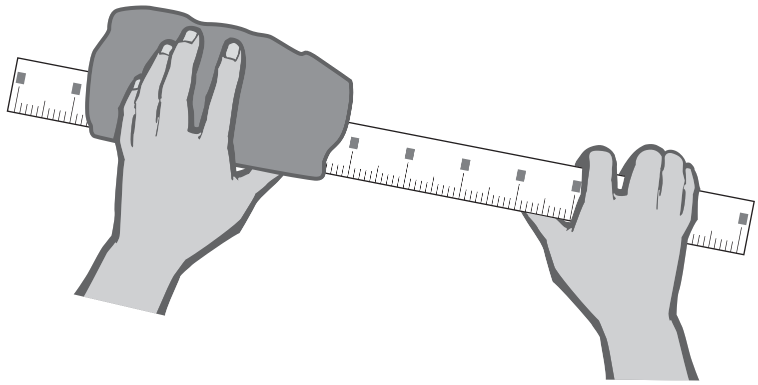
....

(1 mark)

8

Turn over ▶

4 (a) A plastic ruler is rubbed with a cloth.



Some electrons move from the cloth onto the ruler.

4 (a) (i) What type of charge does the ruler gain?

....

(1 mark)

4 (a) (ii) What type of charge is left on the cloth?

....

(1 mark)

4 (b) The following statement is **false**.

Objects carrying the same type of charge attract each other.

Change **one** word in this statement to make it **true**.

Write down your new statement.

....

....

(1 mark)

4 (c) Many devices use electrostatic charge to work.
The following sentences describe how a photocopier uses electrostatic charge to produce a photocopy.

Use words from the box to complete the sentences.

attracts	charge	insulating	light	photoconducting	repels

1 A roller coated with .... material is given a charge.

2 A strong light is used to form an image of the page to be copied onto the roller.

3 Where light hits the roller, the .... flows to earth.

4 The charge left on the roller .... particles of black toner powder.

5 The toner powder sticks to a sheet of paper, producing the photocopy.

(3 marks)

4 (d) Give **one** other use for electrostatic charge.

....

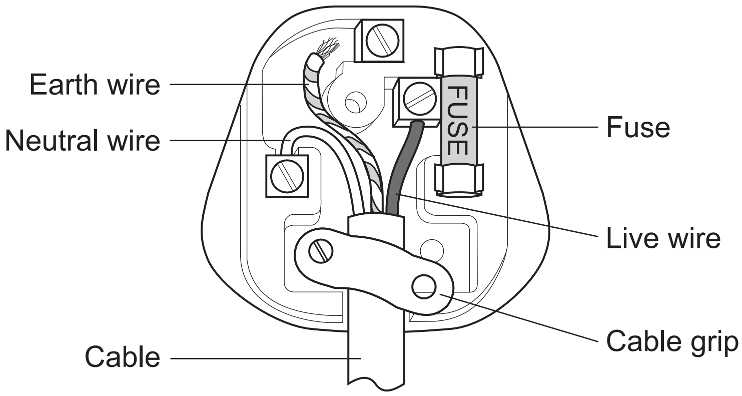
....

(1 mark)

7

Turn over for the next question

5 (a) The diagram shows the inside of an incorrectly wired three-pin plug.



5 (a) (i) What **two** changes need to be made so that the plug is wired correctly?

1 ....

....

2 ....

....

(2 marks)

5 (a) (ii) Which one of the wires inside a plug is there to make an appliance with a metal case safer to use?

....

(1 mark)

5 (a) (iii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

....

....

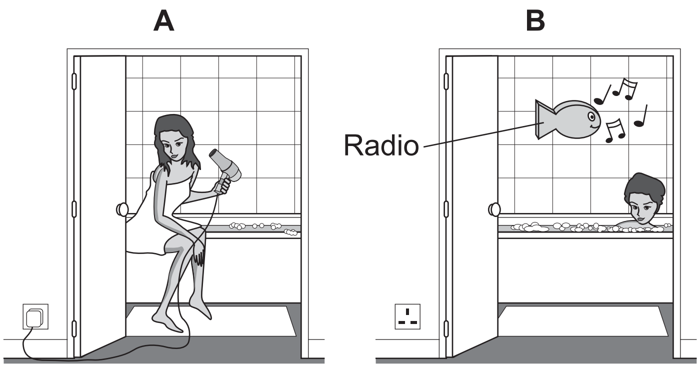
....

....

(2 marks)

Do not write outside the box

5 (b) Each of these pictures shows an electrical appliance being used in a bathroom.



Using the hairdryer in picture **A** is dangerous. However, it is safe to use the battery-operated radio in picture **B**.

Explain why.

....

....

....

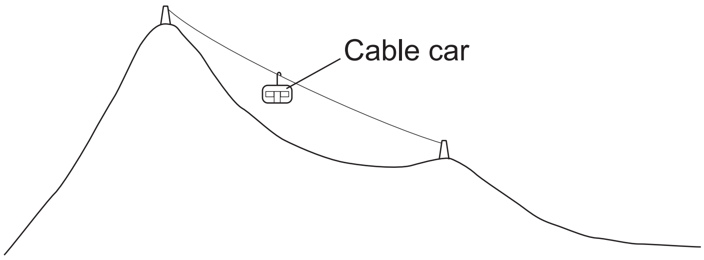
....

(2 marks)

7

Turn over for the next question

6 (a) The diagram shows a cable car used to take skiers to the top of a mountain.



6 (a) (i) The total mass of the cable car and skiers is 7500 kg.

Use the equation in the box to calculate the weight of the cable car and skiers.

weight = mass × gravitational field strength

gravitational field strength = 10 N/kg

Show clearly how you work out your answer and give the unit.

....

....

Weight = ...

(3 marks)

Do not write outside the box

6 (a) (ii) The cable car moves at a constant speed. It lifts skiers through a vertical height of 800 metres in 7 minutes.

Use the following equation to calculate the work done to lift the cable car and skiers.

work done = force applied × distance moved in the direction of force

Show clearly how you work out your answer.

....

....

Work done = ... J

(2 marks)

6 (b) The diagram shows a skier who is accelerating down a steep ski slope.

6 (b) (i) Draw an arrow on the diagram to show the direction of the resultant force acting on the skier.

(1 mark)

6 (b) (ii) How and why does the kinetic energy of the skier change?

....

....

....

....

(2 marks)

Question 6 continues on the next page

Turn over ▶

6 (c) Last year, 18 000 skiers suffered a head injury. It is thought that nearly 8000 of these injuries could have been avoided if the skier had been wearing a helmet. However, at present, there are no laws to make skiers wear helmets.

Suggest why skiers should be made aware of the benefits of wearing a helmet.

....

....

(1 mark)

9

Turn over for the next question

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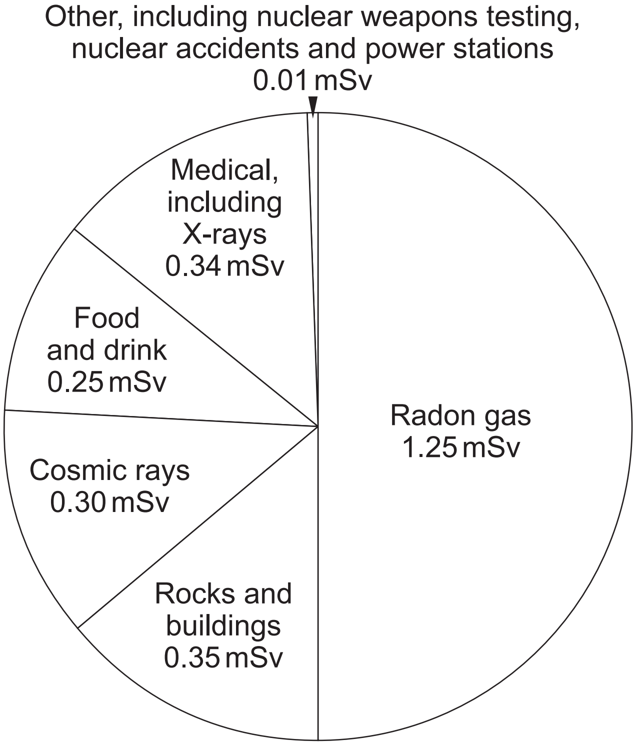
ANSWER IN THE SPACES PROVIDED

7 The pie chart shows the sources of the background radiation and the radiation doses that the average person in the UK is exposed to in one year.
Radiation dose is measured in millisieverts (mSv).



7 (a) (i) What is the total radiation dose that the average person in the UK receives?

....

....

Total radiation dose = ... mSv

(1 mark)

Do not write outside the box

7 (a) (ii) A student looked at the pie chart and then wrote down three statements.

Which **one** of the following statements is a correct conclusion from this data?

Put a tick (✓) in the box next to your answer.

In the future, more people will be exposed to a greater proportion of radon gas. ☐

People that have never had an X-ray get 50% of their radiation dose from radon gas. ☐

The radiation dose from natural sources is much greater than from artificial sources. ☐

(1 mark)

Question 7 continues on the next page

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7 (b) The concentration of radon gas inside a home can vary from day to day. In some homes, the level can build up to produce a significant health risk. It is estimated that each year 1000 to 2000 people die because of the effects of radiation from radon gas.

7 (b) (i) It is not possible to give an exact figure for the number of deaths caused by the effects of radiation from radon gas. Why?

....

....

(1 mark)

The table gives data for the radiation levels measured in homes in 4 different parts of the UK. The radiation levels were measured using two detectors, one in the living room and one in the bedroom. The measurements were taken over 3 months.

Area of the UK	Number of homes in the area	Number of homes in the sample	Average radiation level in Bq/m^3	Maximum radiation level in Bq/m^3
A	590 000	160	15	81
B	484 000	130	18	92
C	221 000	68 000	162	10 000
D	318 000	35 300	95	6 900

7 (b) (ii) Give **one** reason why the measurements were taken over 3 months using detectors in different rooms.

....

....

(1 mark)

7 (b) (iii) Use information from the table to suggest why a much higher proportion of homes were sampled in areas **C** and **D** than in areas **A** and **B**.

....

....

....

(2 marks)

6

END OF QUESTIONS

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