Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

GCSE

241/01

ADDITIONAL SCIENCE

FOUNDATION TIER

PHYSICS 2

P.M. WEDNESDAY, 10 June 2009

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark awarded**
1.	**3**	
2.	**4**	
3.	**3**	
4.	**4**	
5.	**5**	
6.	**4**	
7.	**5**	
8.	**3**	
9.	**4**	
10.	**4**	
11.	**6**	
12.	**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.

EQUATIONS

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

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

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

$$\text{acceleration (or deceleration)} = \frac{\text{change in speed}}{\text{time}}$$

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

$$\text{distance} = \frac{\text{work}}{\text{force}}$$

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

1. **List A** gives three statements about forces acting on a skydiver when falling through the air.
List B gives 5 possible effects on the motion of the skydiver.
Draw **one** line from each statement in list A to the correct effect it would have in list B. [3]

List A	**List B**
	The skydiver moves upwards.
The forces are equal.	The skydiver speeds up.
The weight is greater than the air resistance.	The skydiver stops.
The air resistance is greater than the weight.	The skydiver slows down.
	The skydiver falls at constant speed.

3

2. The table shows how the thinking distance, braking distance and overall stopping distance depend upon the speed of a car.

Speed (m/s)	Thinking distance (m)	Braking distance (m)	Overall stopping distance (m)
9	6	6	12
13·5	9	.....	23
18	12	24	.....
27	18	56	74

(a) Use the equation

$$\text{overall stopping distance} = \text{thinking distance} + \text{braking distance}$$

to complete the table. [2]

(b) (i) Underline the word or phrase in the brackets that correctly completes the following sentence. [1]

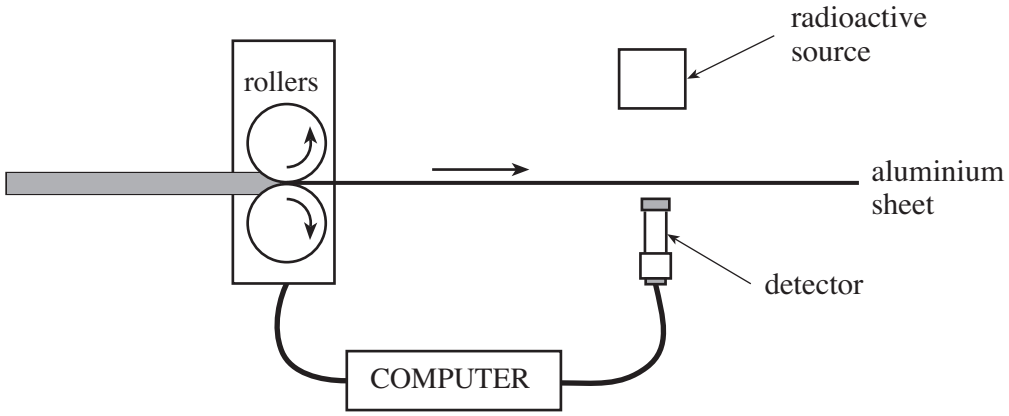
As the speed is doubled from 9 m/s to 18 m/s, the braking distance is (twice, three times, four times) as big.

(ii) How does the thinking distance increase when the speed doubles? [1]

.....

4

3. A beta source and computer are used in rolling mills to control the thickness of aluminium as it is rolled into thin foil.



When the thickness changes, the following steps occur.
The steps are not in the correct order.

A	The count rate goes higher.
B	A computer processes the information from the detector.
C	The rollers squeeze with less force.
D	The aluminium gets thinner than usual.
E	The aluminium gets thicker again.

Place the letters A to E in the correct order below. [3]
The first box has been completed for you.

D				

3

4. The table shows information about two types of bulb used in a car.
They are powered by a 12 V battery.

Type of bulb	Bulb power (W)	Current through bulb (A)
headlight bulb	.....	4·5
sidelight bulb	6	0·5

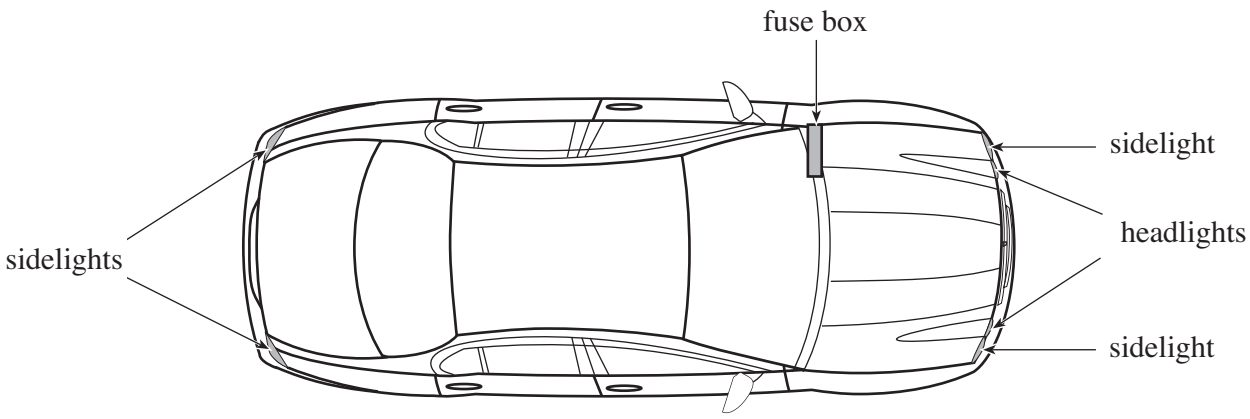
(a) Use the equation

power = current × voltage

to calculate the power of the headlight bulb. [1]

power = ... W

(b) This car has 2 headlights and 4 sidelights.



(i) Use the information in the table to calculate the total current flowing when all 6 lights are in use. [2]

total current = ... A

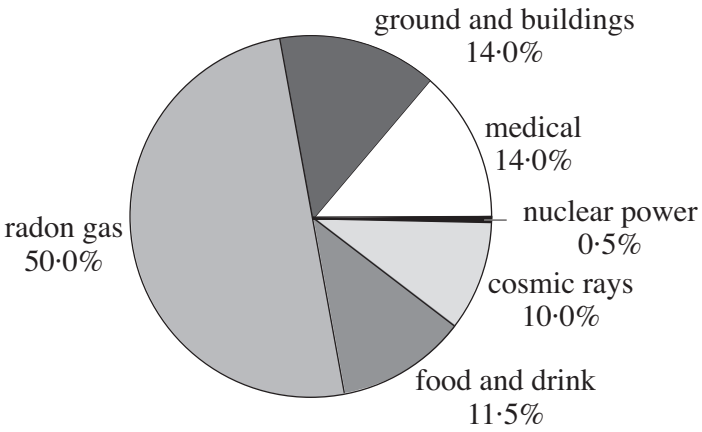
(ii) A single fuse in the car protects this circuit.
State which size fuse should be used given a choice between 5 A, 10 A, 15 A and 20 A fuses. [1]

.....

4

5. The pie chart shows the average background radiation that comes to us from all sources.

Background Radiation in the UK



Use the information in the pie chart to answer the following questions.

(a) Name the radiation which comes from space. ..... [1]

(b) Which radiation source has a percentage that is equal to all the rest put together? [1]

.....

(c) Name a natural radiation source, the percentage of which depends upon where you live. [1]

.....

(d) What is the total percentage from man made sources? ..... [1]

(e) What evidence is there that nuclear power stations are safe places to work? [1]

.....

.....

5

6. A small car, moving at 10 m/s, has 50 000 J of energy.

Work is done to reduce the car's energy to zero.

(a) A braking force of 2 500 N is applied.

Use the equation

$$\text{distance} = \frac{\text{work}}{\text{force}}$$

to calculate the distance the car travels until it stops. [2]

distance = ... m

(b) A heavier lorry moving at 10 m/s needs to stop in the same time as the car.
Underline the **two** things in the box which are bigger for the lorry than the car. [2]

its speed	its energy	the stopping distance	the stopping force

4

Examiner only

7. The following are safety features used in mains electrical circuits.

Miniature circuit breaker (mcb)	fuse
residual current device (rcd)	plastic covering on wires

Choose a word or phrase that answers each of the sentences that follow.
Each may be used once, more than once or not at all. [5]

(i) Name a safety feature that breaks a circuit when a wire inside it gets too hot.

.....

(ii) Name a safety feature that can easily be reset.

.....

(iii) Name a safety feature that breaks a circuit very quickly when too much current flows.

.....

(iv) Name **two** safety features that protect the user from having an electric shock.

1. .....

2. .....

5

8. The table shows information about the mains electricity supplies and hairdryers that can be bought in three different countries.

Country	Mains voltage (V)	Hairdryer Power (W)
U.K.	230	1 500
Japan	100	1 600
U.S.A.	110	1 300

Use only the information from the table to answer the following questions:

(a) (i) Give a reason why a mains electric shock in the U.K. is likely to be worse than one in the U.S.A. or Japan. [1]

.....

.....

(ii) Give a reason why it is likely to take longer to dry your hair in the U.S.A. than in the U.K or Japan. [1]

.....

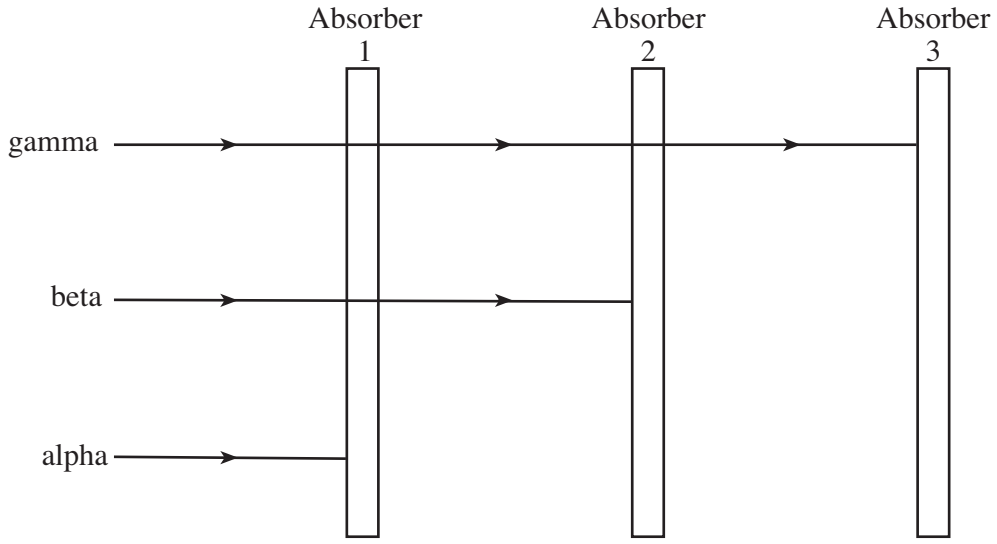
.....

(b) Which country's hairdryer transfers the most energy every second? ..... [1]

3

9. *(a)* The diagram shows radiation from three radioactive sources.
One of them emits alpha (α) particles, another beta (β) particles and another gamma (γ) waves.

Three absorbers are placed in the way of the radiations.
They are made of **thick aluminium**, **thick lead** and **thin card**.



Complete the table below to show which substance is used for which absorber. [2]

Absorber	Substance used for the absorber
1	.....
2	.....
3	.....

(b) People working with radioactive substances wear protective clothing, e.g. face masks and lead aprons.
State **two other** precautions that can be taken to safeguard their health. [2]

1. .....

.....

2. .....

.....

10. Radon is a radioactive gas. It emits alpha particles which have a very short range in air. It occurs naturally and rises through small cracks in the Earth's rocks. It enters buildings through the floor.

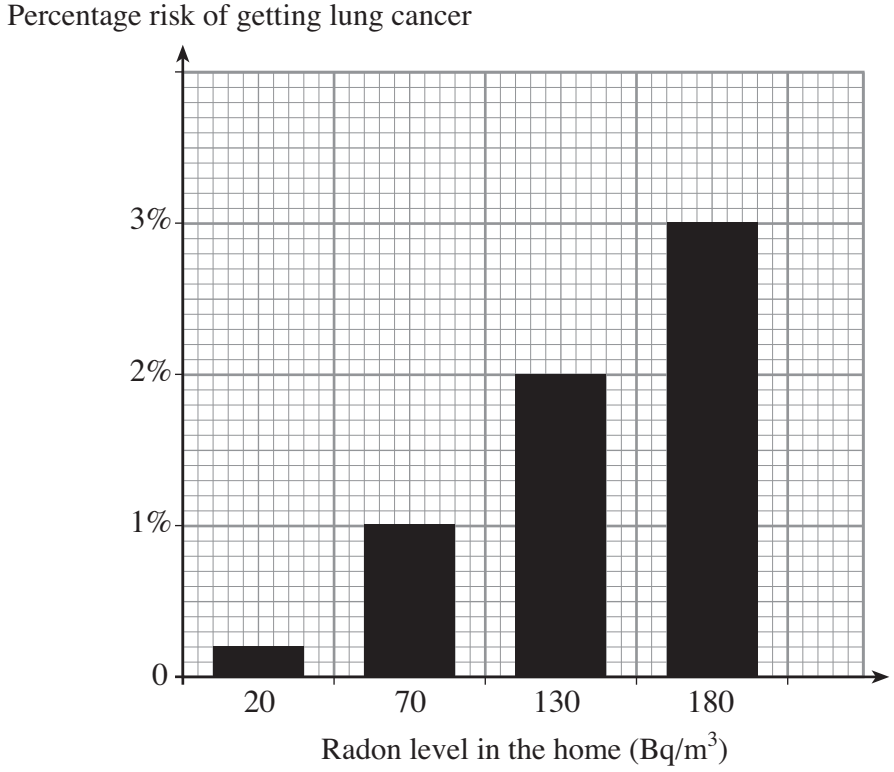
(a) Radon is a danger to our health and can cause lung cancer.
Explain why. [2]

.....

.....

.....

(b) The graph below shows the Health Protection Agency's assessment of the risk of a person getting lung cancer from radon gas and how it depends on the radon level in the home.



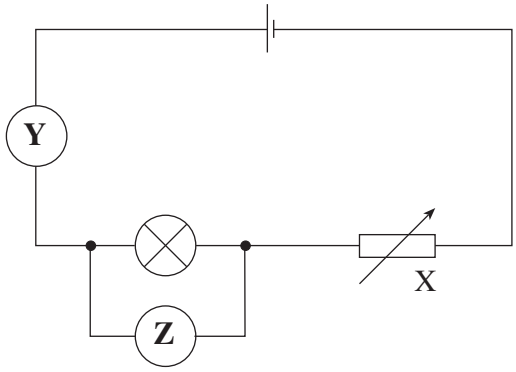
Use only the information in the graph to find:

(i) the percentage risk to health from a radon level of 20 Bq per m^3? ..... % [1]

(ii) the radon level that gives a 2% risk of getting lung cancer? ..... Bq/m^3 [1]

4

11. The circuit diagram below is used to investigate how the current passing through a lamp changes with the voltage across it.



(a) (i) Which component, X, Y or Z measures the current through the lamp? ..... [1]

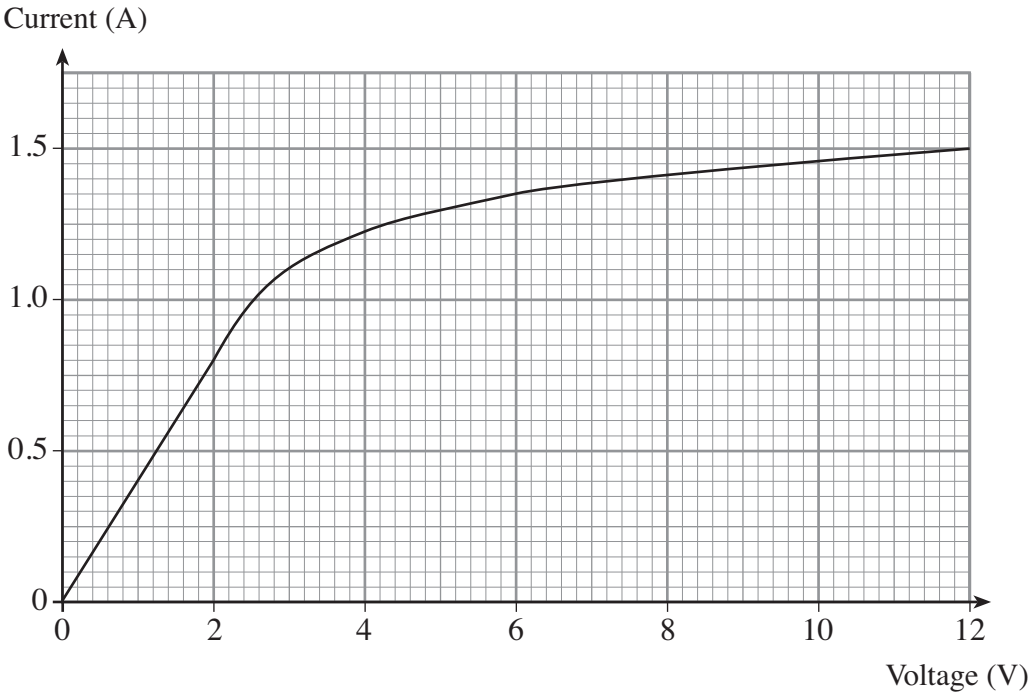
(ii) I. Which of X, Y or Z can be used to adjust the current through the lamp?

..... [1]

II. What adjustment will **decrease** the current? [1]

.....

(b) Results obtained from using the above circuit produced the following graph.



(i) The resistance of the lamp at 2 V is 2·5 Ω .
Use the equation

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

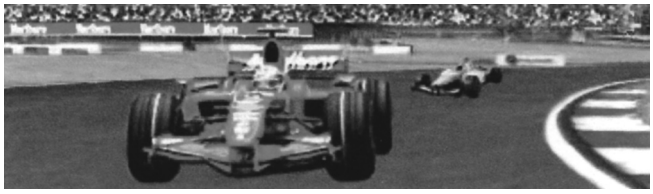
to find the resistance of the lamp at 12 V. [2]

Resistance = ... Ω

(ii) At what voltage does the resistance of the lamp start to increase? ..... V [1]

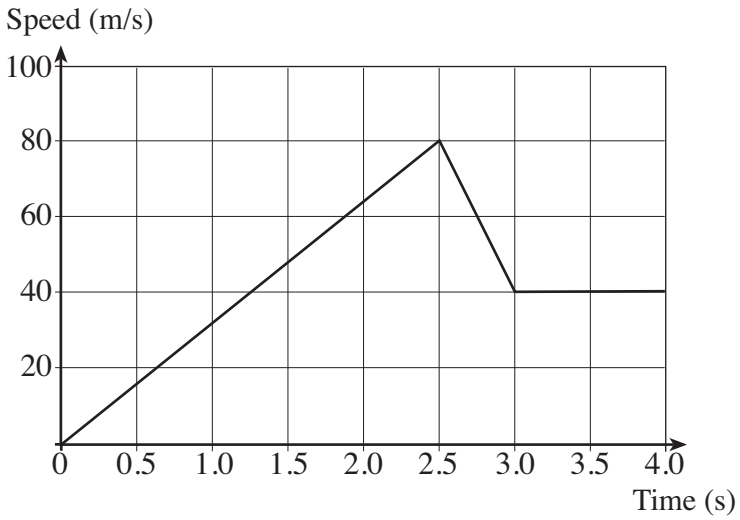
6

12.



(Courtesy of indiaserver.com)

The graph below shows the speed of a formula 1 racing car in the first 4 seconds of a race as it accelerates and slows down to go around the first bend.



(a) Write down an equation as it appears on page 2 and use it to calculate the acceleration of the car.

Equation: .....

..... [1]

Calculation: [2]

Acceleration = ... m/s^2

(b) The average speed of the car is 42·5 m/s **for the part of the race shown**. Use the equation

$$\text{distance} = \text{average speed} \times \text{time}$$

to calculate the distance travelled by the car [2]

Distance travelled = ... m