Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0241/01

ADDITIONAL SCIENCE
FOUNDATION TIER
PHYSICS 2

A.M. THURSDAY, 24 May 2012

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**5**	
2.	**5**	
3.	**4**	
4.	**7**	
5.	**5**	
6.	**4**	
7.	**5**	
8.	**4**	
9.	**5**	
10.	**6**	
Total	**50**	

0241 010001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

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

Voltage = current × resistance

Power = current × voltage

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

Resultant force = mass × acceleration

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

$$\text{Force} = \frac{\text{work done}}{\text{distance}}$$

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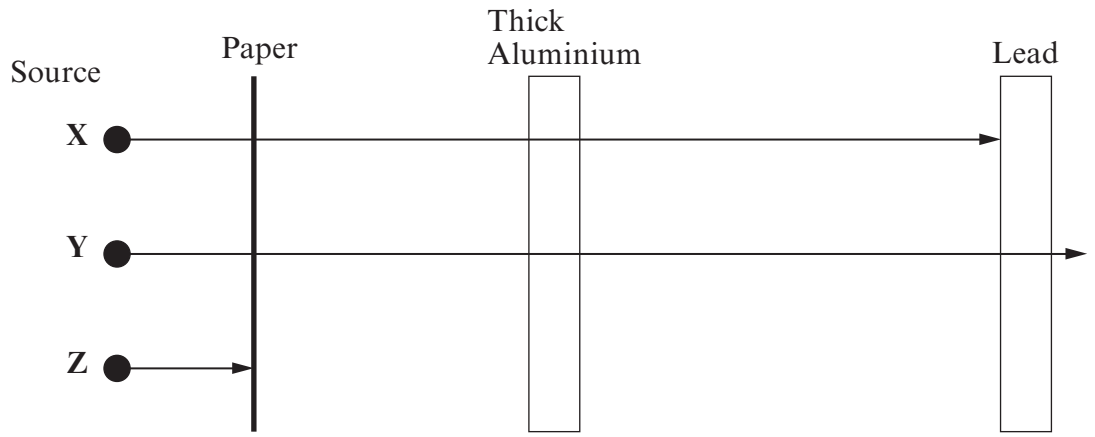
Answer **all** *questions.*

1. *(a)* Radiations from three sources **X**, **Y** and **Z** pass through the substances shown below. Each source emits only **one** type of radiation, which could be alpha, beta or gamma.



(i) Name the radiation emitted by source **X**. .....

(ii) Name the radiation emitted by source **Y**. .....

(iii) Name the radiation emitted by source **Z**. ..... [3]

(b) State **two** precautions that are taken to protect staff who work with radioactive materials. [2]

1. .....

.....

2. .....

.....

5

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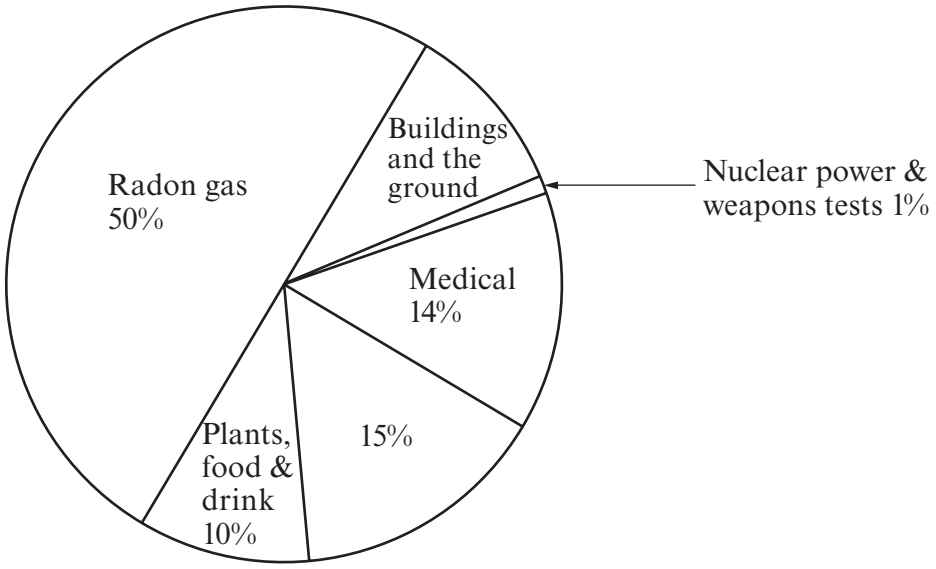
2. The pie chart shows the sources of natural and man-made radiations in the U.K.



(a) Use the information in the pie chart to answer the following questions.

(i) What percentage of radiation is due to buildings and the ground? ..... % [1]

(ii) One natural source of radiation, supplying 15% of the total, is not named. Suggest what it may be. [1]

.....

(iii) Give a reason why doubling the number of nuclear power stations would hardly affect the level of background radiation. [1]

.....

.....

.....

(iv) In a school, the total background radiation is measured as 60 counts per minute (cpm). How many cpm are due to radon gas? [1]

..... cpm

(b) Give a reason why background radiation varies from place to place. [1]

.....

.....

5

Examiner only

3. The table gives information about four household appliances.

Appliance	Voltage (V)	Power (W)	Current (A)	Fuse value (A)
Toaster	230	920		
Kettle	230	2000	8.7	.....
Lamp	230	60	0.3	.....
Washing machine	230	2500	10.9	.....

(a) State which appliance converts energy at the rate of 60 J/s. ..... [1]

(b) Use the equation

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

to calculate the current in the **toaster**. [2]

Current = ... A

(c) The following fuses are available.

3 A 5 A 13 A

Complete the final column in the table to show the most suitable fuse for each appliance. Each value may be used once, more than once or not at all. [1]

4

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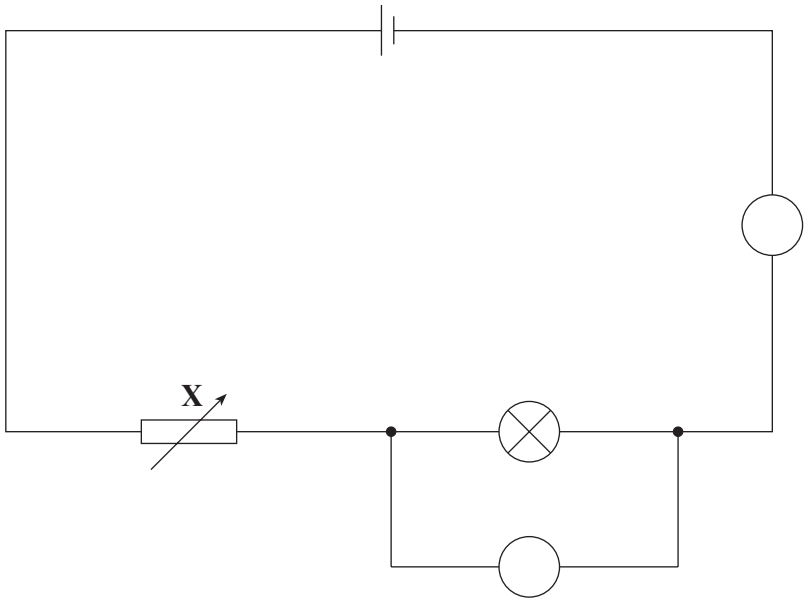
4. The diagram shows a circuit used to find the resistance of a lamp.



(a) Write the letters A and V in the meters on the diagram to show which is the ammeter and which the voltmeter. [1]

(b) The voltmeter reads 2 V and the ammeter reads 4 A.
Use the equation

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

to calculate the resistance of the lamp in the circuit. [2]

Resistance = ... Ω

(c) (i) Name component **X**. ..... [1]

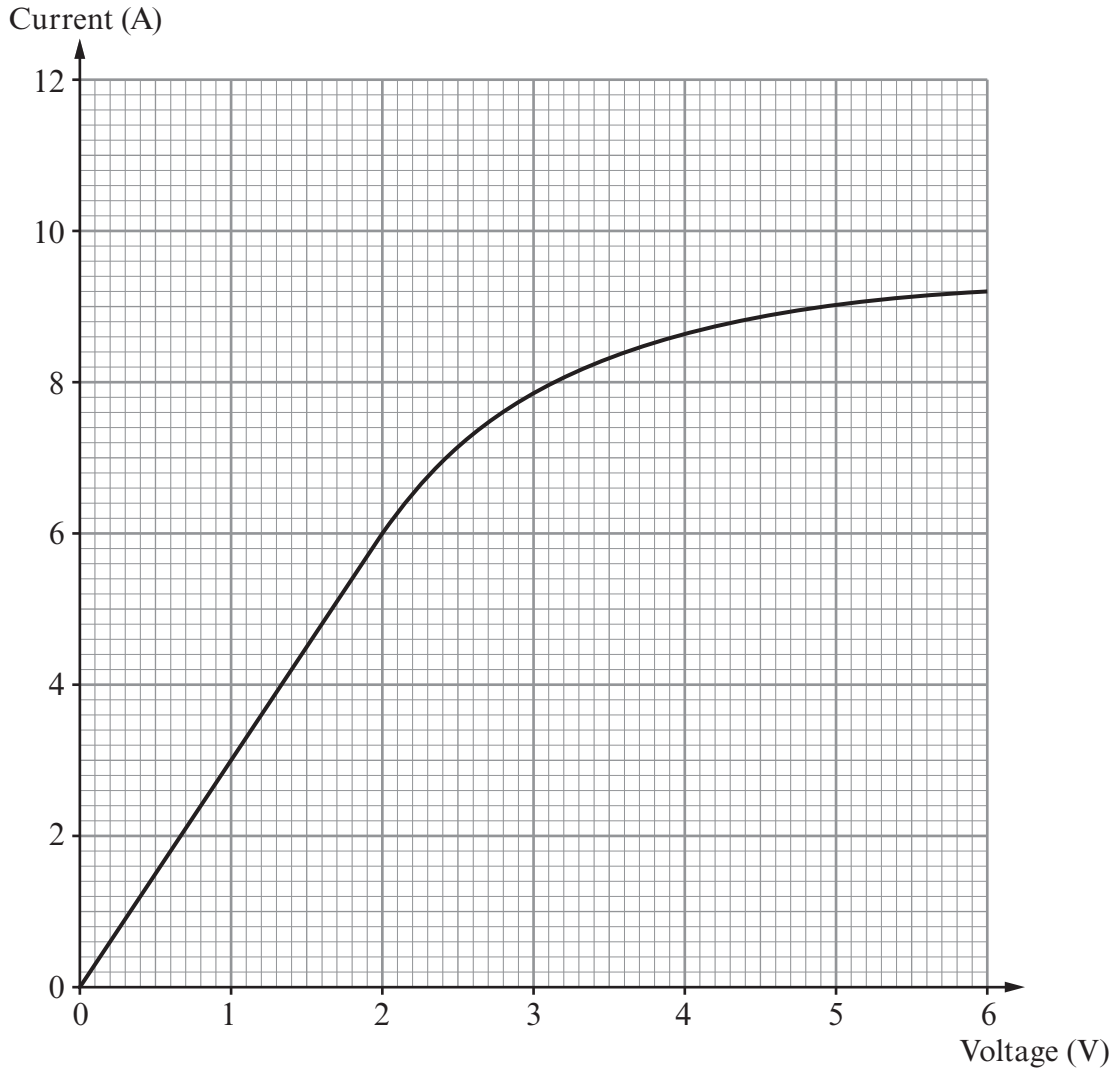
(ii) State how a series of readings of voltage and current is obtained from the circuit. [1]

.....

.....

Examiner only

(d) The following graph was obtained by taking a series of readings.



(i) State the voltage value at the point where the resistance of the lamp starts to change. [1]

..... V

(ii) Use the graph to give a reason for your answer to *(d)*(i). [1]

.....

.....

7

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5. An athlete of mass 90 kg runs a 100 m sprint race.
He starts from rest and increases his speed to 12 m/s in 4 s.

(a) Use the equation

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

to calculate his acceleration.
Write down the unit with your answer. [3]

Acceleration = ...

Unit .....

(b) Use your answer to part *(a)* and the equation

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

to calculate the force used to accelerate. [2]

Force = ... N

5

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6. In a test run on a car, it was crashed into a concrete wall at a speed of 25 m/s. A force of 500 000 N brought it to a stop in 0.9 m.

(a) Use the equation

work done = force × distance

to calculate the work done in stopping the car. [2]

Work done = ... J

(b) Name **two** safety features (other than a seat belt) that are built into modern cars to help keep the driver safe in such a crash. [2]

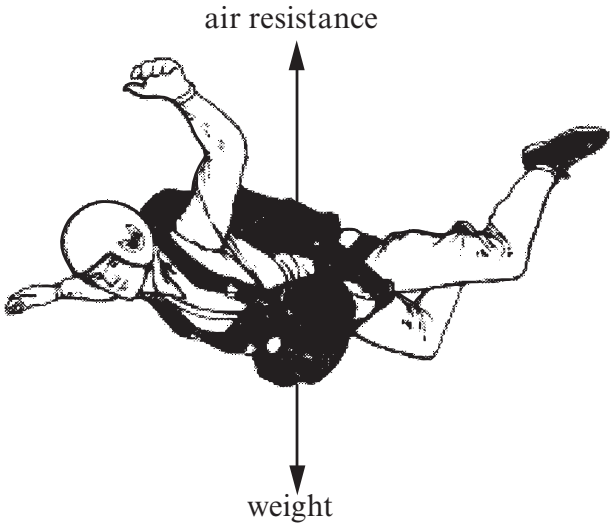
1. .....

2. .....

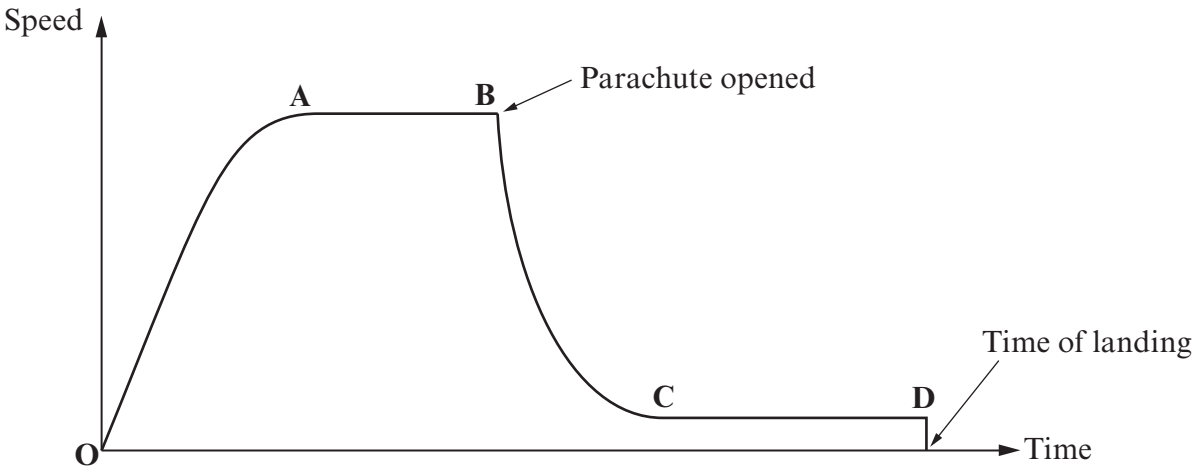
4

Examiner only

7. The diagram shows a skydiver falling through the air, acted upon by two forces.



The graph OABCD shows the motion of the skydiver before and after opening the parachute.



(a) Complete the following sentences by choosing words or phrases from the box.

increases	decreases	stays the same	greater than	less than	equal to

(i) Between **O** and **A**, the weight ..... and the air resistance ..... .

(ii) Between **A** and **B** the weight is ..... the air resistance.

[3]

Examiner only

(b) Use the graph to describe the motion of the skydiver between **B** and **D**. [2]

.....

.....

.....

.....

5

Turn over.

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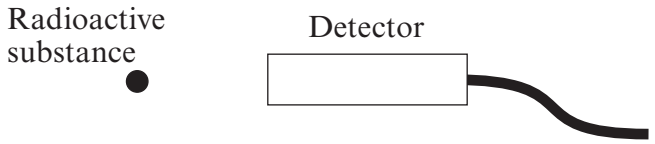
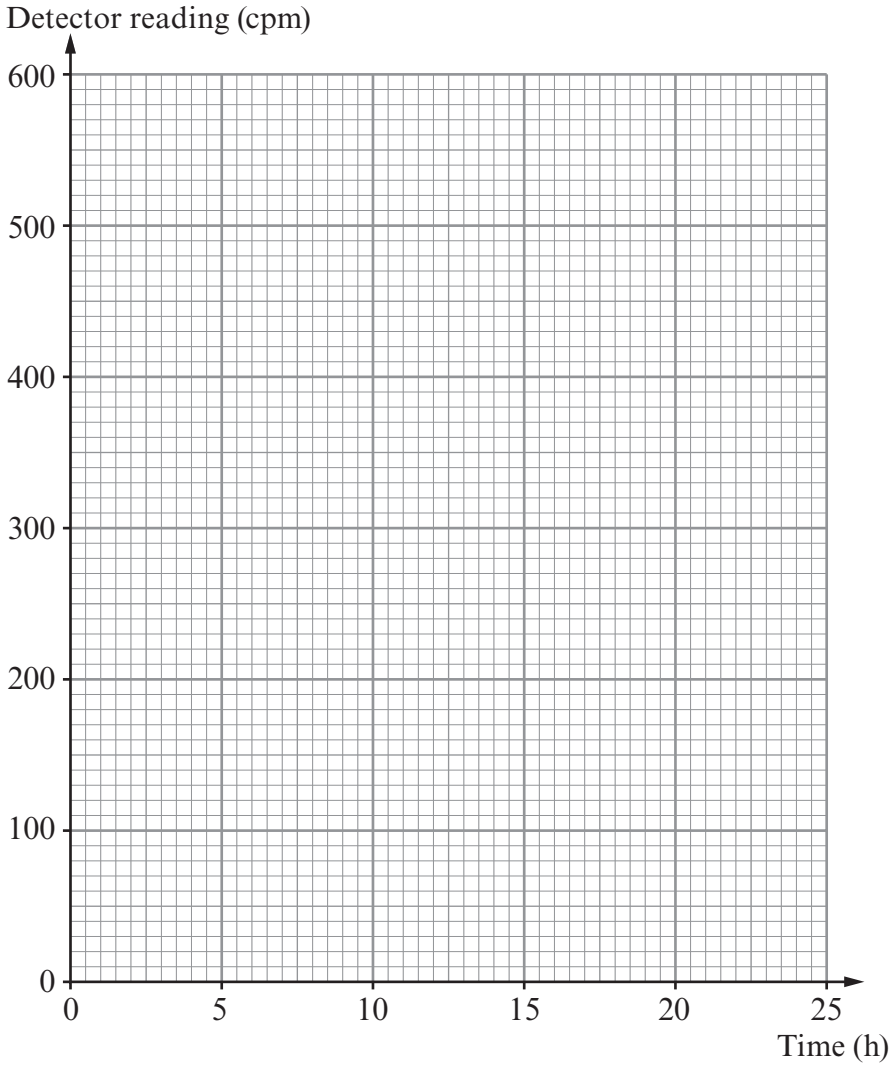
8. A radioactive substance which decays by gamma emission was placed in front of a detector.



The reading on the detector, corrected for background radiation, changed in the way shown in the table.

Time (h)	0	5	10	15	20
Reading on the detector (counts per minute)	480	290	180	110	70

(a) On the grid below, plot the points and draw a decay curve for this substance. [3]



(b) Use your graph to find the half life of this substance. [1]

Half life = ... hours

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9. Electrical appliances and their users are protected in the home by fuses in plugs, earth wires, residual current devices (r.c.d.) and miniature circuit breakers (m.c.b.).

(a) State how the earth wire protects the user. [1]

.....

.....

(b) Explain how an r.c.d. protects household circuits when a fault causes a current to flow to earth. [2]

.....

.....

.....

(c) One advantage of miniature circuit breakers over fuses in circuits is they can be reset after breaking a circuit.
State **two** *other* advantages. [2]

1. .....

.....

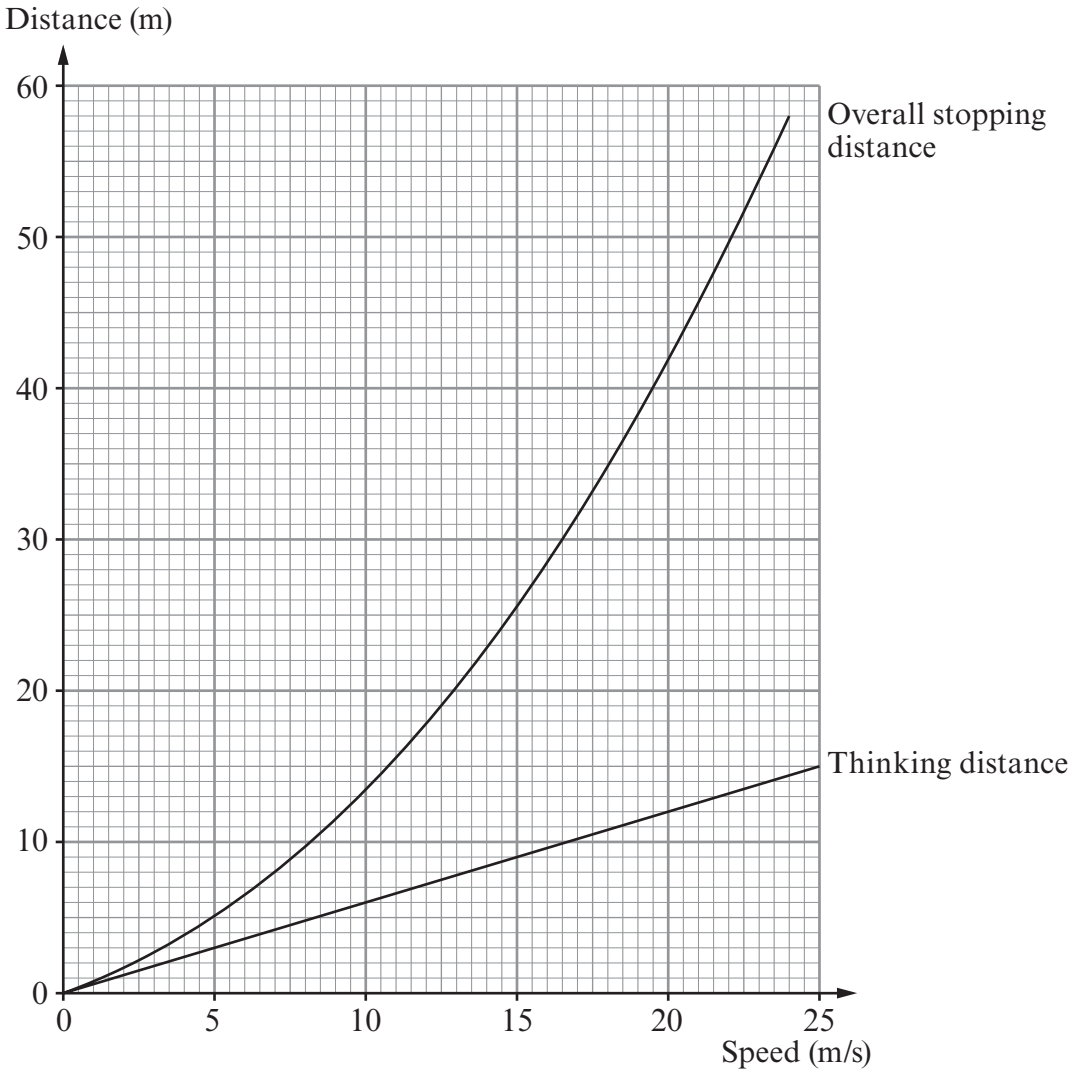
2. .....

.....

5

Examiner only

10. The graph below shows how the **overall stopping distance** for a car and the **driver's thinking distance** change with the speed of the car.



(a) Use information from the graph and the equation

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

to calculate the **thinking time** for the driver of a car travelling at 15 m/s. [2]

Time = ... s

Examiner only

(b) (i) Use information from the graph to find the braking distance when the car travels at 20 m/s. [2]

Braking distance = ... m

(ii) Use the graph to give a reason why the braking distance at 10 m/s is not half of your answer to *(b)*(i). [1]

.....

.....

(c) Name **one** factor that could make the thinking distance graph steeper. [1]

.....

6

THERE ARE NO MORE QUESTIONS IN THE EXAMINATION.