| Candidate Name | Centre Number | Candidate Number |
|---|---|---|
| | | 0 |

WJEC CBAC

# GCSE

241/01

# ADDITIONAL SCIENCE
## FOUNDATION TIER
## PHYSICS 2

A.M. MONDAY, 19 January 2009

45 minutes

| For Examiner's use only | |
|---|---|
| **Total Mark** | |

**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

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

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

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

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

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

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

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

**1.** Two things happen when a car driver does an emergency stop:

(I) The driver sees the problem and thinks what to do.
The distance travelled by the car in this time is called the **thinking distance**.

(II) The driver's foot presses the brake to stop the car.
The distance travelled by the car in this time is called the **braking distance**.

| | | |
|---|---|---|
| using a telephone | worn tyres | high speed |
| old age | wet road | |

(i) Choose **one** thing from the box that would affect both the thinking and braking distances. [1]

.....

(ii) Choose **one** thing from the box that would affect the thinking distance only. [1]

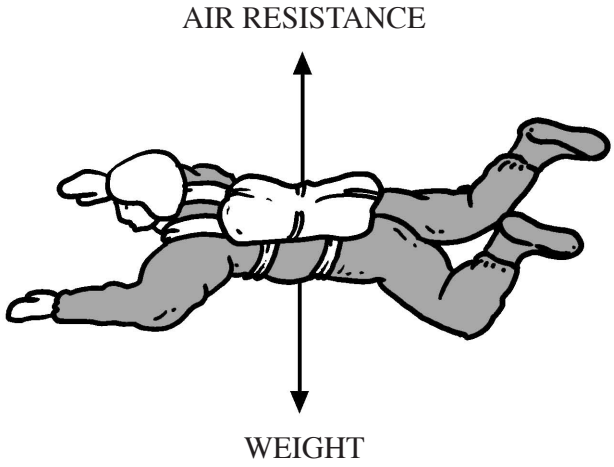
.....

(iii) Choose **one** thing from the box that would affect the braking distance only. [1]

.....

3

**2.** The diagram shows two forces acting on a skydiver.




Underline the correct phrase in each bracket below

(i) When the skydiver speeds up, the air resistance is (bigger than / equal to / smaller than) the weight. [1]

(ii) When the skydiver falls at the terminal speed, the air resistance is (bigger than / equal to / smaller than) the weight. [1]

(iii) When the parachute is opened, the air resistance (gets bigger / stays the same / gets smaller) and the skydiver (goes back up / stays in the same place / continues to fall). [2]

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Examiner only

**3.** The picture shows a car that was damaged in a head-on collision.

The front of the car was designed to collapse to protect the driver and passengers.

(i) What is the name given to the front part of the car that collapses in this way? [1]

.....

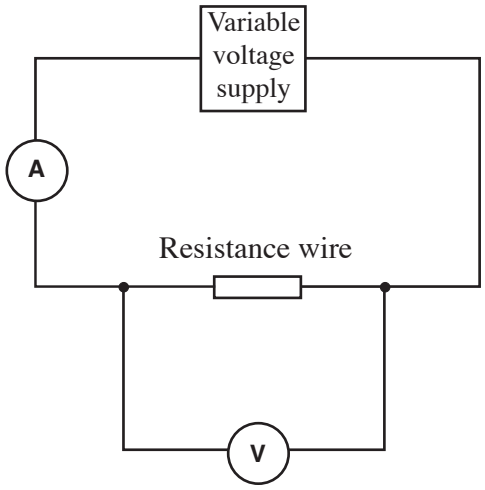
(ii) Name **two** other safety features to protect the passengers in this collision. [2]

1. .....

2. .....

3

**4.** The circuit below allows the current through a resistance wire to be investigated when the voltage across it is changed.




*(a)* The meters shown in the diagram give the following readings: 0·5 A, 8 V.

(i) Which meter gives a reading of 0·5 A? ..... [1]

(ii) Use these readings and the equation

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

to calculate the resistance of the resistance wire. [2]

Resistance = ..... **Ω**

*(b)* Complete the sentences below, choosing a phrase from the box.
Each phrase can be used once, more than once or not at all.

| increases | decreases | stays the same |
|---|---|---|

(i) When the voltage of the supply is made smaller, the current in the circuit

.....

(ii) When the voltage of the supply is made smaller, the voltage across the resistance wire

.....

(iii) When the voltage of the supply is made smaller, the resistance of the wire [3]

.....

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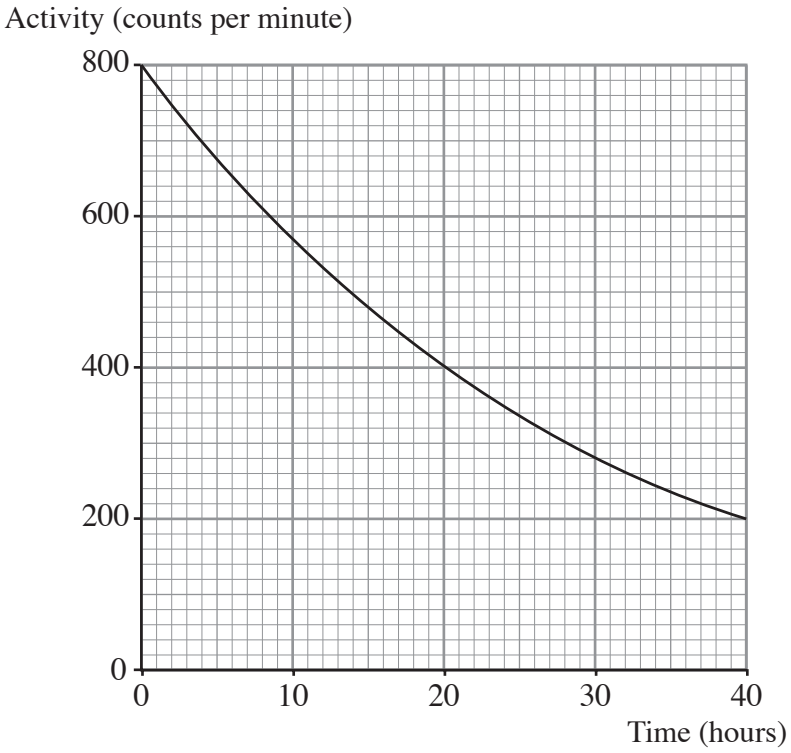
**5.** The graph shows how the activity of a radioactive source changes with time.




(i) What is the drop in the activity over the first 20 hours? .....

(ii) What is the half life of the source? .....

(iii) At what time is the activity equal to 200 counts per minute? .....

(iv) What would the activity be at 60 hours? ..... [4]

4

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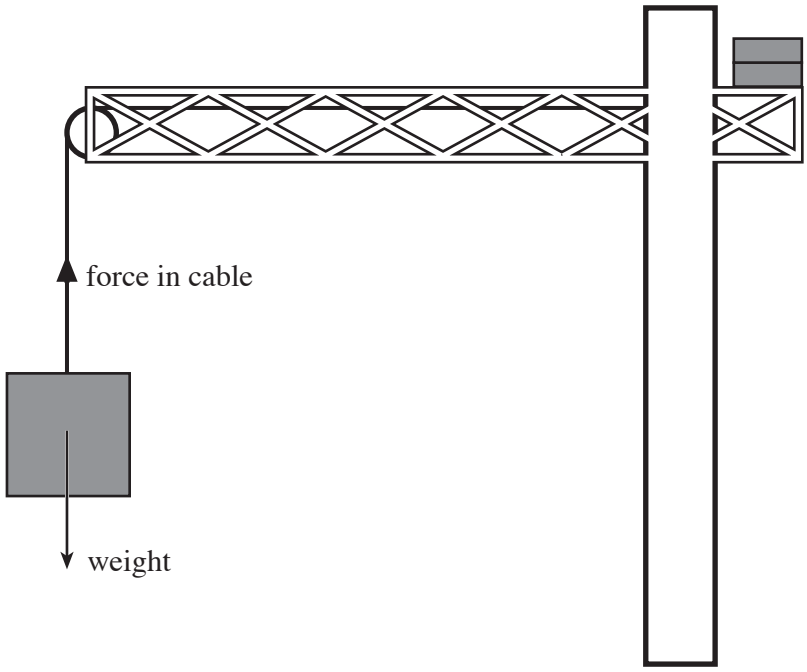
**6.** The diagram shows a weight being lifted by a crane.




Four cranes are used to lift different weights through the distances shown in the table.

| Crane | Weight lifted (N) | Distance moved (m) | Work done (J) |
|---|---|---|---|
| A | 20 000 | 6 | 120 000 |
| B | 20 000 | 9 | 180 000 |
| C | 50 000 | 3 | ..... |
| D | 30 000 | 4 | 120 000 |

Use the information in the table to answer the following questions.

*(a)* (i) Which crane lifts the biggest weight? ..... [1]

(ii) Which **two** cranes transfer the same amount of energy?

..... and ..... . [1]

*(b)* Use the equation

$$\text{Work} = \text{force} \times \text{distance}$$

to complete the missing value in the table. [1]

*(c)* If crane D holds its weight at rest, what is the value of the force in the cable? [1]

..... N

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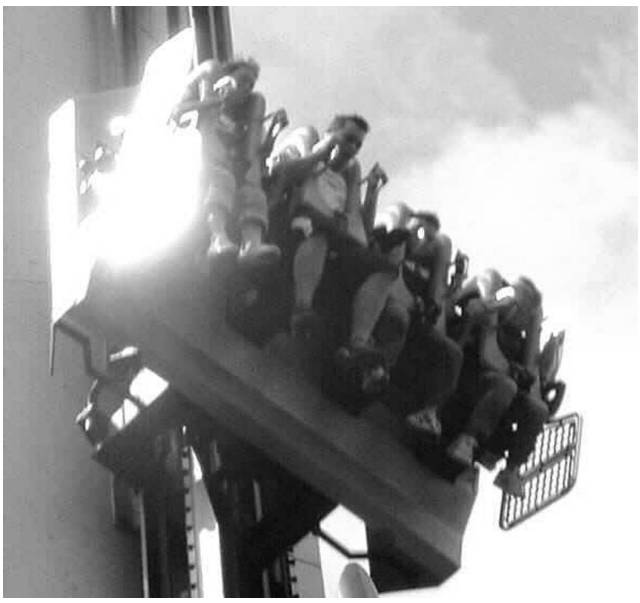
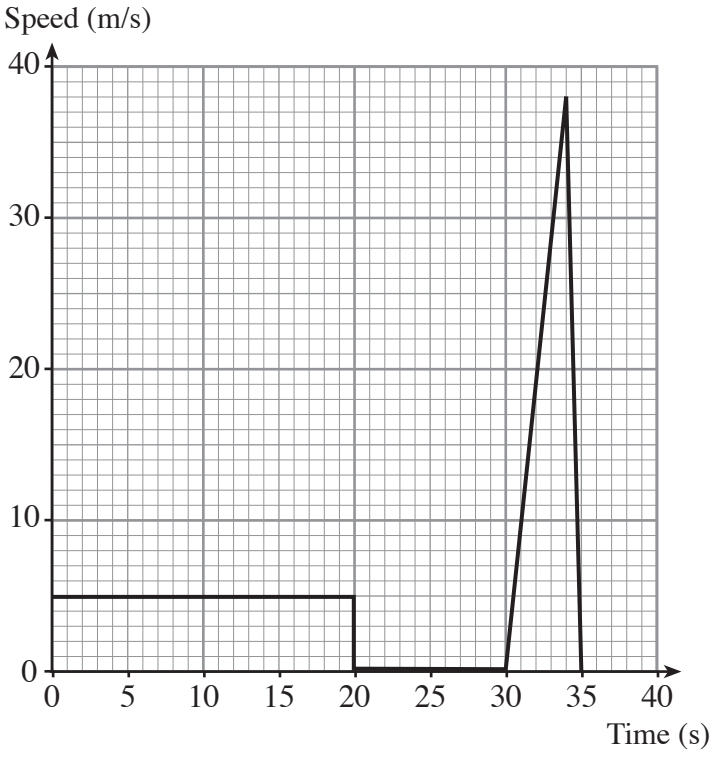
**7.** A theme park ride involves a group of people being lifted in a carriage and then dropped from a height.



[Source: Drayton Manor]

The graph shows the motion of such a ride.




*(a)* What was the speed of the carriage in the first 20s? ..... m/s [1]

*(b)* For how long was the carriage held at rest? ..... s [1]

*(c)* What was the total time for the ride? ..... s [1]

*(d)* Between what times did the carriage accelerate? ..... s and ..... s [1]



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Examiner only

**8.** Read the passage and answer the questions that follow.

Radioactive waste comes from a variety of sources ranging from homes to nuclear power stations. Some of it is very dangerous because it is very active and has a long half life. The waste is graded as low level (such as waste from smoke alarms), intermediate level or high level. The high-level waste is the most dangerous.

None of this waste can be dumped with household rubbish, but ideas on how to store high-level waste for many thousands of years include converting it into glass and storing it in deep mines. In that way it will not be touched by humans or other animals in the time taken for it to become safe.

*(a)* Why is it unsafe to throw smoke alarms away in the household bin? [1]

.....

.....

*(b)* Give **two** reasons why high-level waste is more dangerous than low-level waste. [2]

1. .....

.....

2. .....

.....

*(c)* (i) State **one** advantage of storing waste in deep mines. [1]

.....

.....

(ii) Explain **one** disadvantage of storing waste in deep mines. [1]

.....

.....

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**9.** Read the information in the box and answer the questions below.

One type of background nuclear radiation is cosmic radiation.

Cosmic radiation gets to airline pilots and passengers through the aircraft's aluminium frame.

Airline pilots are thought to be at more risk from it compared with the rest of the population because they spend more time high above the Earth.
The higher they fly, the greater the cancer risk.
The greater the time that they spend flying, the bigger is the risk.

There is evidence that airline pilots and cabin crew suffer more skin cancers than the rest of us, but that may be due to them sunbathing in hot countries for example.

INFORMATION ABOUT FLIGHTS TO AMERICA (USA)

| | Ordinary aeroplanes | Concorde |
|---|---|---|
| Aeroplane speed from U.K. to U.S. | 800 km/h | 1600 km/h |
| Time to fly from U.K. to U.S. | 6 hours | 3 hours |
| Height of the flight from U.K. to U.S. | 30 000 feet | 60 000 feet |

*(a)* State where cosmic radiation comes from. ..... [1]

*(b)* State why the background radiation that gets to pilots cannot be alpha or beta. [1]

.....

*(c)* Write down an equation as it appears on page 2 and use it with information from the table to find the distance from the U.K. to the U.S.

Equation: .....

..... [1]

Calculation [2]

Distance = ..... km

*(d)* (i) State **one** reason why existing pilots are at less risk from cancer than Concorde pilots were in the past. [1]

.....

.....

(ii) State **one** reason why existing pilots are at greater risk from cancer than Concorde pilots were in the past. [1]

.....

.....

*(e)* Put a tick in the box ✓ alongside the correct statement below. [1]

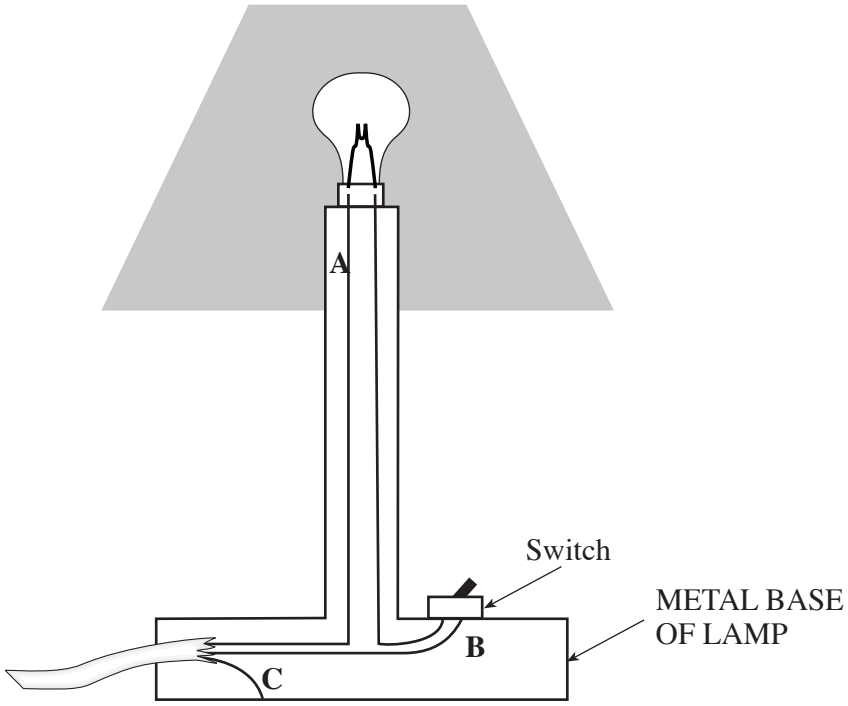
Compared with ordinary people, pilots suffer more skin cancers because they are exposed to more cosmic radiation. ☐

More research has to be done to be sure of the causes of pilots' skin cancers. ☐

It is certain that pilots' skin cancers are due to sunbathing. ☐

8

**10.** The diagram shows the wiring to a metal-based lamp.




*(a)* State why the lamp needs an earth lead. [1]

.....

*(b)* The lead has a 3 pin plug on the end of it. Explain the job of the fuse in the plug. [2]

.....

.....

.....

*(c)* If wire **B** becomes loose and touches the base, a residual current device (r.c.d.) breaks the circuit and stops the user from being electrocuted. Explain how an r.c.d. breaks the circuit. [2]

.....

.....

.....

*(d)* The base of the lamp has the following label stuck to it.

**A.C. only**
**230 V**
**100 W**

(i) Write down an equation as it appears on page 2 and use it to find the current flowing through the lamp.

Equation: .....

..... [1]

Calculation [2]

Current = ..... A

(ii) Given a choice of a 3 A, 5 A or 13 A fuse to fit in the plug, which one would you choose? [1]

.....

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