

Candidate forename		Candidate surname	
--------------------	--	-------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

A215/01

**TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A**

Unit 1: Modules B4 C4 P4 (Foundation Tier)

MONDAY 30 JANUARY 2012: Afternoon

DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**Candidates answer on the Question Paper.
A calculator may be used for this paper.**

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The total number of marks for this paper is 42.**
- **A list of physics equations is printed on pages 4–5.**
- **The Periodic Table is provided.**

BLANK PAGE

TWENTY FIRST CENTURY SCIENCE EQUATIONS

USEFUL RELATIONSHIPS

EXPLAINING MOTION

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

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$\text{change of momentum} = \text{resultant force} \times \text{time for which it acts}$$

$$\text{work done by a force} = \text{force} \times \text{distance moved in the direction of the force}$$

$$\text{change in energy} = \text{work done}$$

$$\text{change in GPE} = \text{weight} \times \text{vertical height difference}$$

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times [\text{velocity}]^2$$

ELECTRIC CIRCUITS

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

$$\frac{\text{voltage across primary coil}}{\text{voltage across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$$

$$\text{energy transferred} = \text{power} \times \text{time}$$

$$\text{power} = \text{potential difference} \times \text{current}$$

$$\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

THE WAVE MODEL OF RADIATION

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

Answer ALL the questions.

1 Charlotte feels hot.

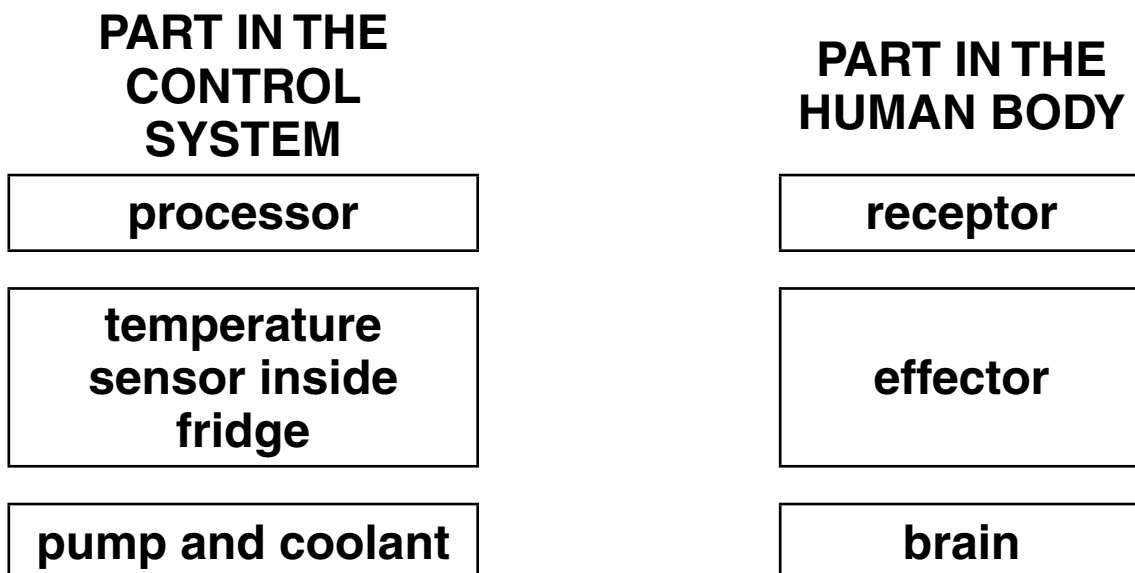
She goes to the fridge for a cold drink.

(a) The fridge has a control system to keep the temperature constant.

Parts of the temperature control system in the fridge act like parts of the human body.

Draw a straight line from each PART IN THE CONTROL SYSTEM to the PART IN THE HUMAN BODY that does the same job.

You should draw THREE lines.



[2]

(b) Charlotte has a cold drink to cool down.

Her body cools down in other ways as well.

How else might her body cool down?

Put ticks (✓) in the boxes next to the TWO correct answers.

Blood transfers heat to her skin surface.

Blood transfers heat to her brain.

Sweat evaporates.

Sweat condenses.

She shivers.

[2]

(c) Charlotte goes outside into the heat.

Her body reacts to the heat in a number of stages.

The stages shown below are in the wrong order.

- A Sweat glands produce sweat.**
- B The brain triggers the sweat glands to be more active.**
- C The brain receives information from the receptors.**
- D Temperature receptors detect the increased temperature.**

Fill in the boxes to show the correct order of the stages. Use the letters A, B, C and D.

--	--	--	--

[2]

[Total: 6]

BLANK PAGE

TURN OVER FOR QUESTION 2

2 Cole does an experiment with enzymes.

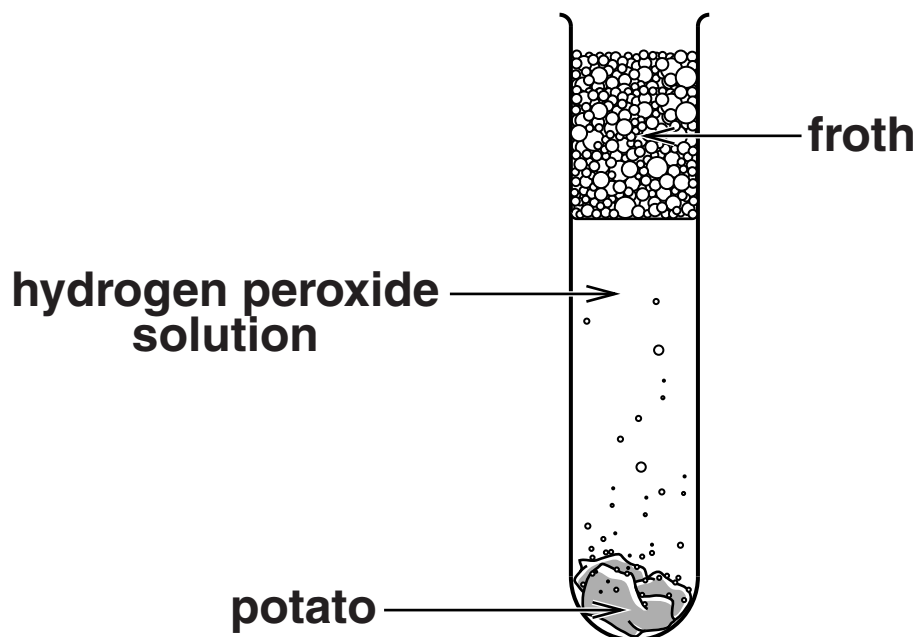
He places some raw potato at the bottom of a test tube.

He pours some hydrogen peroxide solution on top of it.

An enzyme in the potato causes oxygen to be released.

Bubbles are produced which form a layer of froth on top of the hydrogen peroxide solution.

Cole measures the height of the froth after five seconds.



When he uses hydrogen peroxide solution at 30 °C, Cole gets 3 cm of froth.

(a) He repeats the experiment at 20 °C.

What will the height of the froth most likely be?

Put a ring around the BEST answer.

0 cm

1 cm

3 cm

5 cm

6 cm

[1]

(b) Cole now uses boiled potato instead of raw potato.

What will the height of the froth most likely be?

Put a ring around the BEST answer.

0 cm

1 cm

3 cm

5 cm

6 cm

[1]

(c) Cole does the experiment using only water instead of hydrogen peroxide.

There is no froth.

He asks people in his class to suggest why.

AYESHA
Water and the enzymes in potato don't mix.

MARK
Water molecules are the wrong shape to fit in the enzymes in potato.

LESLEY
Water weakens the enzymes in potato.

SIMON
The water is denatured.

Who gives the best explanation?

answer _____ **[1]**

[Total: 3]

3 Lucien runs a race.

(a) Oxygen and water move between his blood and his muscle cells.

Describe and explain the PROCESSES that move oxygen and water between his blood and muscle cells.

[3]

(b) As Lucien runs his body loses water.

This makes his blood plasma more concentrated.

Put a ring around the correct words to complete each sentence.

Lucien's kidneys will now produce urine that is

MORE DILUTE

MORE CONCENTRATED

THE SAME CONCENTRATION.

This is an example of

HOMEOSTASIS

EVAPORATION

HYPOTHERMIA.

[1]

(c) At the end of the race Lucien has an alcoholic drink.

Draw one line from the correct EFFECT OF ALCOHOL ON URINE to the correct CONSEQUENCE.

EFFECT OF ALCOHOL ON URINE

increased volume

decreased volume

CONSEQUENCE

could lead to dehydration

could lead to rehydration

[1]

[Total: 5]

4 The element helium was discovered in the Sun before it was found on Earth.

Suggest what astronomers on Earth can do to find out what elements are in the Sun.

[3]


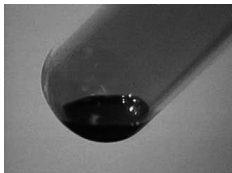

[Total: 3]

5 Tony studies the halogens.

(a) He takes photographs of three of the halogens at room temperature and pressure.

(i) Draw a line from each PHOTOGRAPH of a halogen to its NAME.

Draw another line from the NAME of each halogen to its COLOUR.

PHOTOGRAPH	NAME	COLOUR
 gas	bromine	green
 liquid	chlorine	grey/ black
 solid	iodine	red/ brown

[3]

(ii) Chlorine reacts with a coloured dye.

It makes the dye colour fade away.

What does the chlorine do to the dye?

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

bleaches it

burns it

evaporates it

neutralises it

[1]

(iii) Chlorine is also used to treat drinking water.

How does it do this?

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

It attracts bacteria.

It kills bacteria.

It neutralises bacteria.

It repels bacteria.

[1]

(b) Sodium reacts with bromine to make sodium bromide.

(i) Fill in the boxes to write a word equation for this reaction.



[1]

(ii) Put a ring around the formula of sodium bromide.

NABR

NaBr

NabR

nABr

[1]

(iii) Tony knows that sodium chloride melts at 800 °C, and that sodium iodide melts at 660 °C.

Suggest the melting point of sodium bromide.

melting point _____ °C [1]

[Total: 8]

6 Atoms are made of protons, neutrons and electrons.

(a) Which of the following is most important when deciding which element an atom belongs to?

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

The number of protons in the atom.

The number of neutrons in the atom.

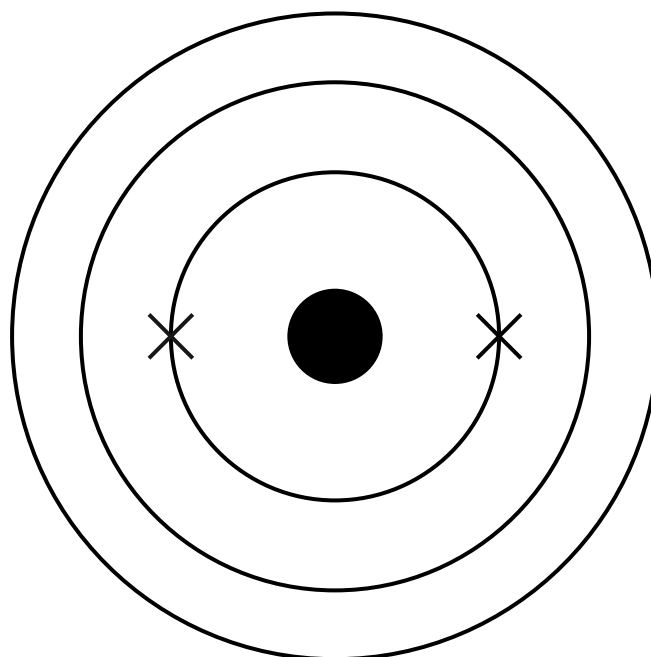
The relative atomic mass of the atom.

The size of the atom.

[1]

(b) A sulfur atom has 16 protons, 16 neutrons and 16 electrons.

Complete the diagram to show the electron arrangement of a sulfur atom.



[1]

(c) The element to the right of sulfur in the Periodic Table is chlorine.

Chlorine forms a chloride ion, Cl^- .

What is the difference between a chloride ion and a chlorine atom?

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

The ion has one electron more than the atom.

The ion has one electron less than the atom.

The ion has one electron shell more than the atom.

The ion has one electron shell less than the atom.

[1]

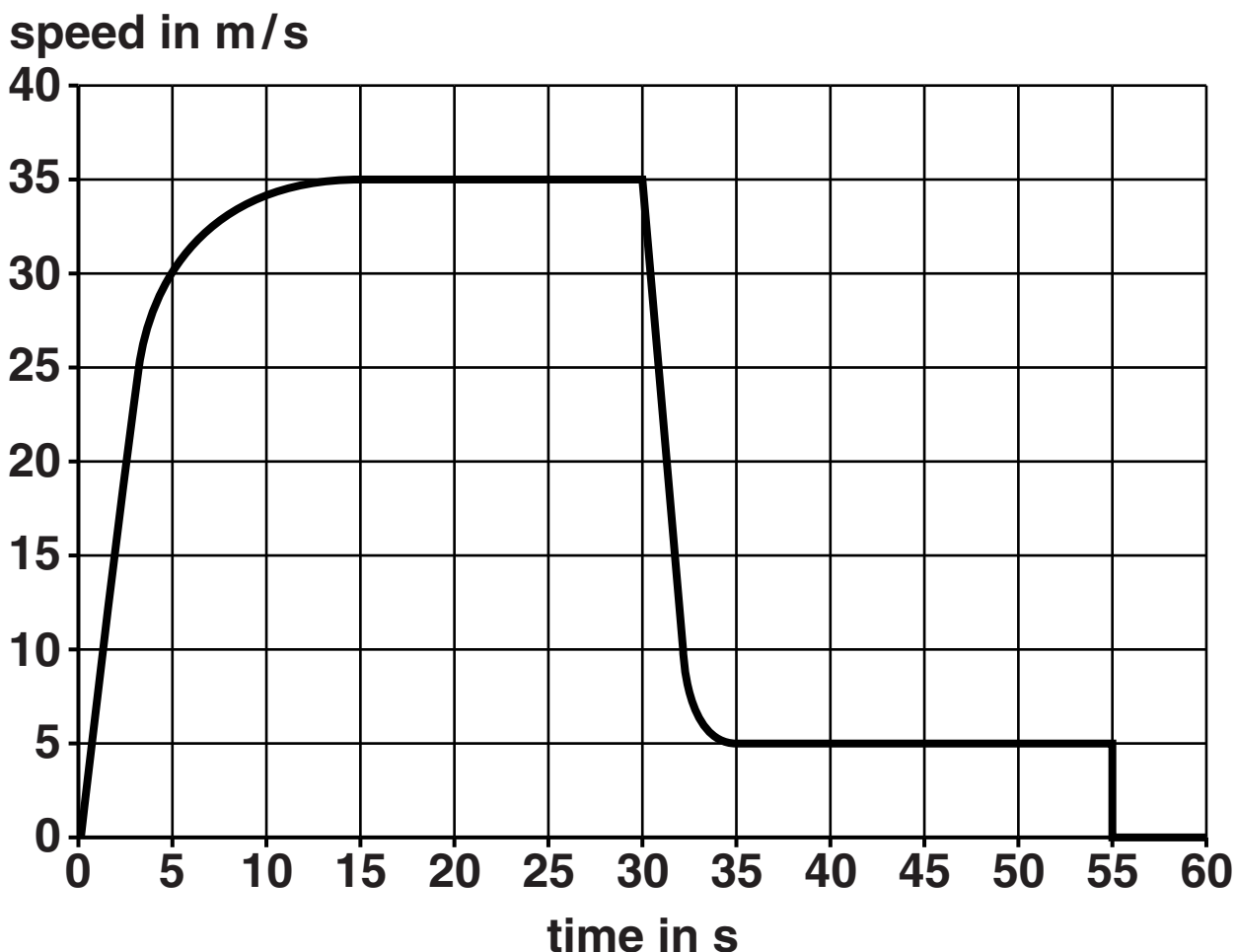
[Total: 3]

7 Jim jumps out of an aeroplane.

He opens his parachute on the way down and lands safely.

Jim uses a speed sensor to measure his speed as he falls towards the ground.

He uses the data from the sensor to draw a speed–time graph.



(a) Jim jumps out of the aeroplane when the time is 0 s.

What is the maximum speed that he reaches on his way down to the ground?

maximum speed = _____ m/s [1]
22

(b) When Jim first jumps out of the aeroplane, his speed increases as he falls.

What happens to Jim's ENERGY in the first 5 s of his fall?

Your answer should include

- **gravitational potential energy**
- **kinetic energy**
- **total energy.**

[3]

(c) When Jim opens his parachute he slows down.

Why does the parachute slow him down?

Put a tick (✓) in the box next to the correct reason.

His weight increases.

His weight decreases.

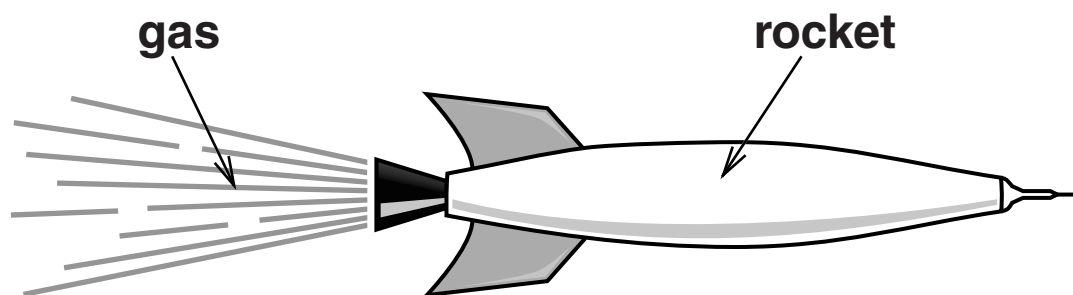
Air resistance increases.

Air resistance decreases.

[1]

[Total: 5]

- 8 A small rocket in space switches on its engine for 10 seconds.**



High speed gas comes out of the engine.

This exerts a force of 1000 N on the rocket in the forward direction.

- (a) What is the size and direction of the force on the GAS?**

Give a reason for your answer.

[3]

(b) The force of 1000 N on the rocket is exerted for 10 s.

What is the correct way of calculating the increase in momentum of the rocket?

Put a **ring** around the correct calculation.

$$\frac{1000}{10}$$

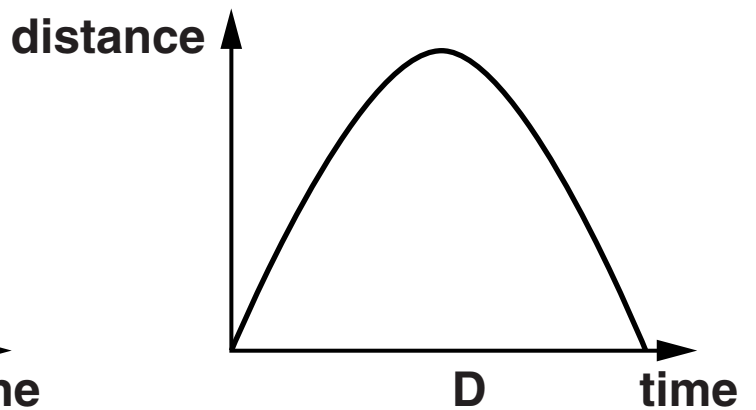
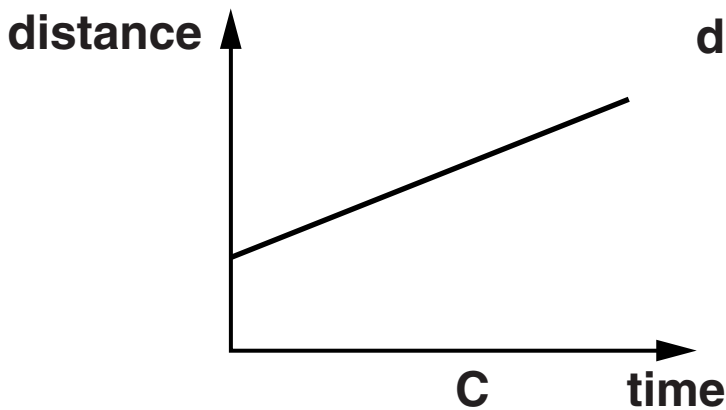
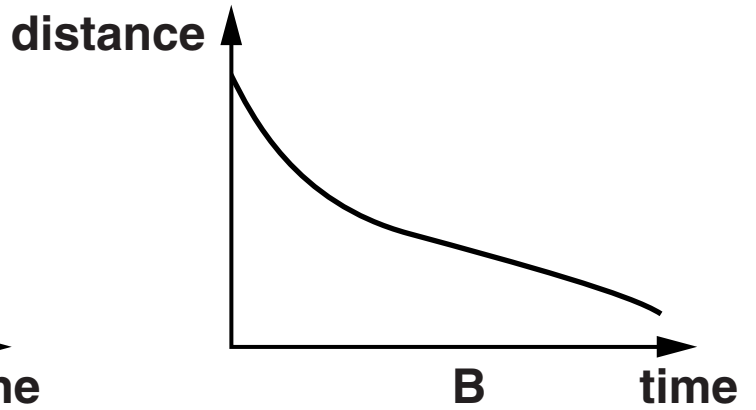
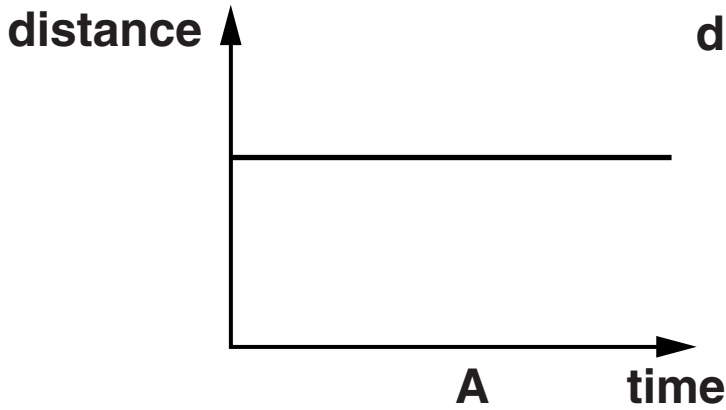
$$1000 \times 10$$

$$\frac{10}{1000}$$

[1]

(c) The rocket has a steady speed after the engine is switched off.

Here are some distance–time graphs for the rocket.

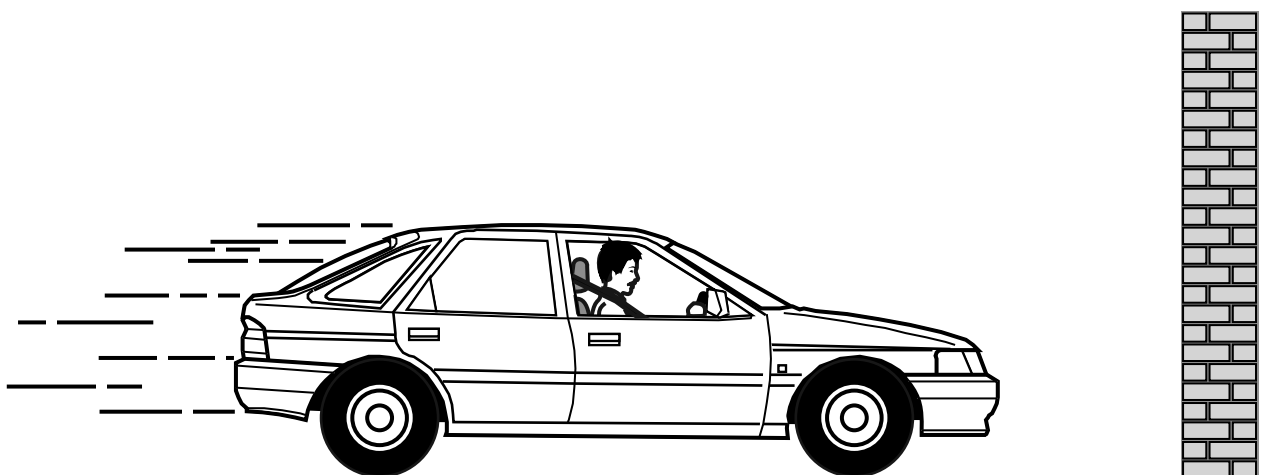


Which graph, A, B, C or D, shows the rocket moving at a steady speed?

graph _____ [1]

[Total: 5]

9 Jack has a car accident.



He drives his car into a wall.

The seat-belt and crumple zone of the car stop Jack getting hurt.

(a) Here are some possible reasons why the crumple zone protects Jack.

Put a tick (✓) in the box next to the correct reason.

It transfers kinetic energy from the car to Jack.

It increases the time for which forces act on Jack.

It provides a counter force to the force from the wall.

It redirects the force from the wall towards the ground.

[1]

(b) The speed of the car drops from 15 m/s to zero as it collides with the wall.

This takes a time of 0.1 s. The car moves 0.75 m in that time.

Calculate the average speed of the car during its collision with the wall.

average speed = _____ m/s [1]

(c) Complete the following sentences.

Choose words from this list.

FORCE

FRICTION

MASS

MOMENTUM

WEIGHT

WORK

Jack has to replace the car seat-belt after the accident.

This is because it has become permanently stretched.

During the accident, a _____ acts on the seat-belt.

This does _____ on the seat-belt.

[2]

[Total: 4]

END OF QUESTION PAPER

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

