AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.5.6.1.5 ACCELERATION (PACK 2)

SCORE	PERCENTAGE
/83	%

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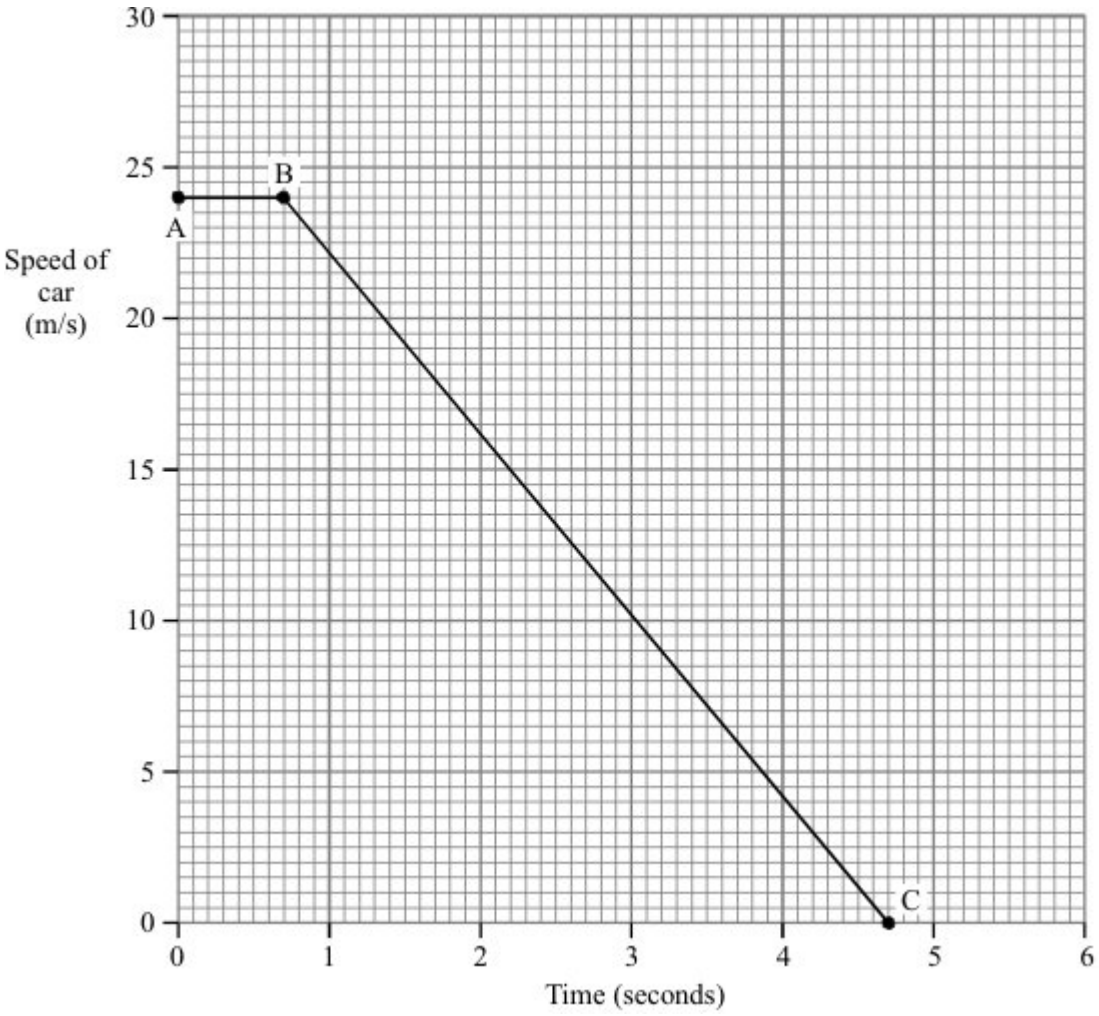
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Q1.

A car driver sees a dog on the road ahead and has to make an emergency stop.

The graph shows how the speed of the car changes with time after the driver first sees the dog.



(a) Which part of the graph represents the "reaction time" or "thinking time" of the driver?

_____

(1)

(b) (i) What is the thinking time of the driver?

Time _____ seconds

(1)

(ii) Calculate the distance travelled by the car in this thinking time.

_____

_____

_____

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Distance _____ m

(3)

(c) Calculate the acceleration of the car after the brakes are applied.

_____

_____

_____

_____

_____

Acceleration _____

(4)

(d) Calculate the distance travelled by the car during braking.

_____

_____

_____

_____

_____

Distance _____ m

(3)

(e) The mass of the car is 800 kg. Calculate the braking force.

_____

_____

_____

_____

_____

Braking force _____ N

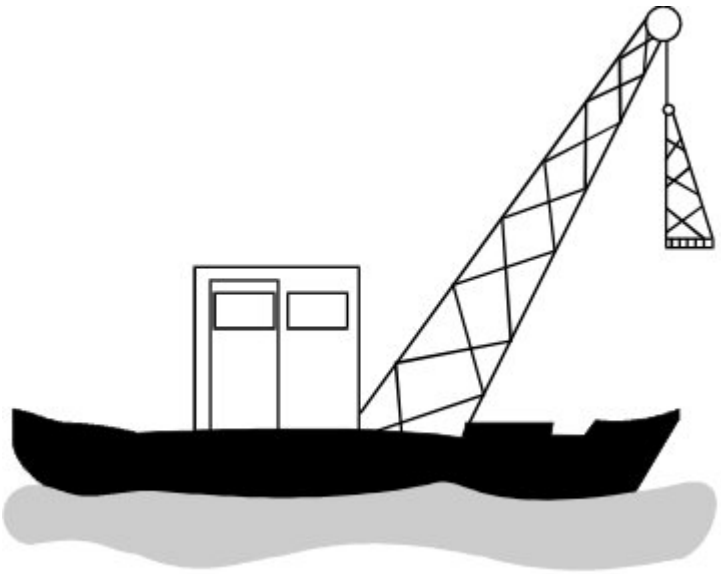
(3)

(Total 15 marks)

Q3.

A crane on a barge lifts a girder and then carries it along the river.

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The girder has a weight of 1 000 000 N and is lifted to a height of 1500 cm.

(a) Complete the sentence.

The weight of the girder is caused by the Earth's gravitational field strength acting on its _____ .

(1)

(b) Calculate the work done in lifting the girder.

Write the equation you are going to use.

_____

(1)

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

_____

_____

_____

_____

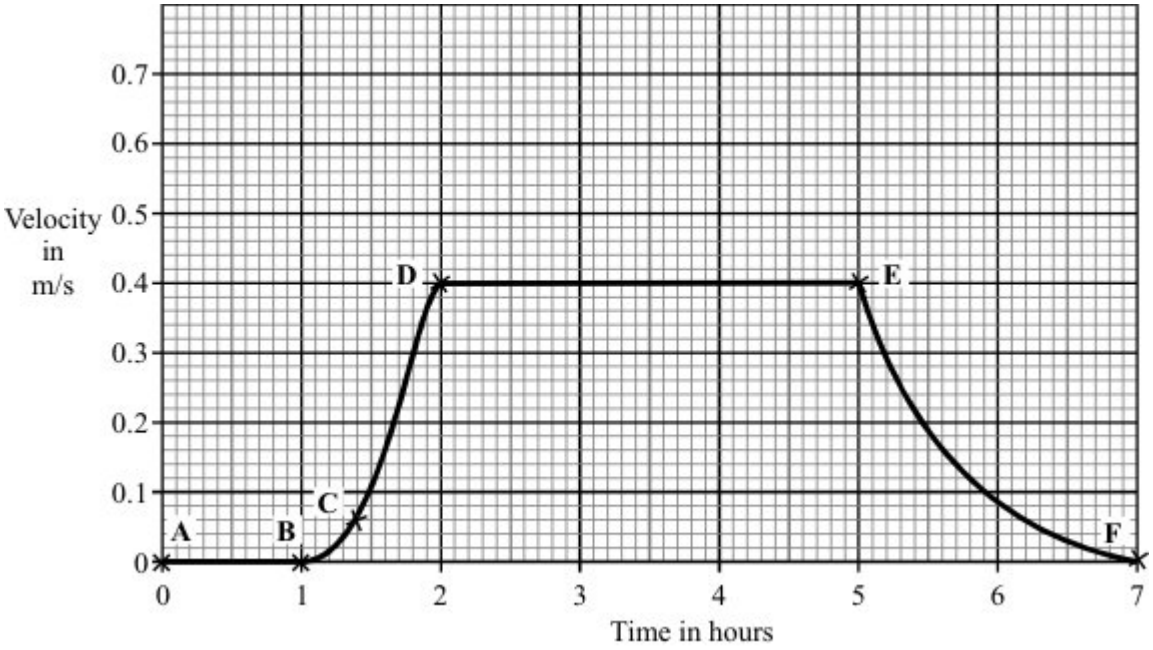
_____

Work done = _____

(3)

(c) The velocity–time graph represents the motion of the barge after the girder had been lifted.

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To gain full marks in this question you should write your ideas in good English. Put them in a sensible order and use the correct scientific words.

Describe the motion of the barge over this period of seven hours. You must refer to the points **A**, **B**, **C**, **D**, **E** and **F** in your description.

_____

_____

_____

_____

_____

_____

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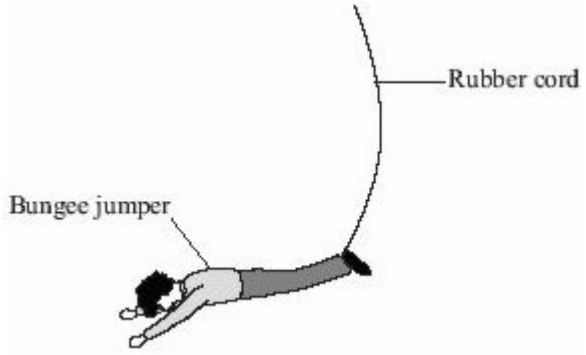
(5)

(Total 10 marks)

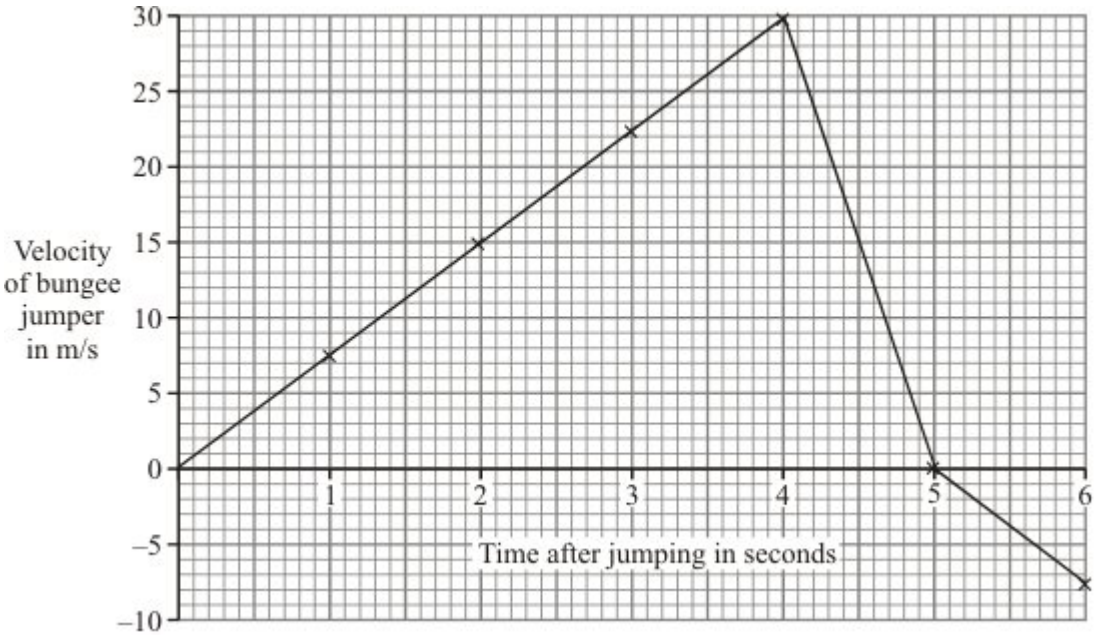
Q4.

In bungee jumping, a fixed rubber cord is fastened to the jumper's ankles.

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The graph shows how the bungee jumper's velocity changes during part of the jump.



(a) Calculate the acceleration of the bungee jumper between 2 and 4 seconds. Show your working.

_____

_____

_____

_____

Acceleration = _____ m/s^2

(3)

(b) Describe, in as much detail as you can, what happens to the bungee jumper after 4 seconds.

_____

_____

_____

_____

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_____

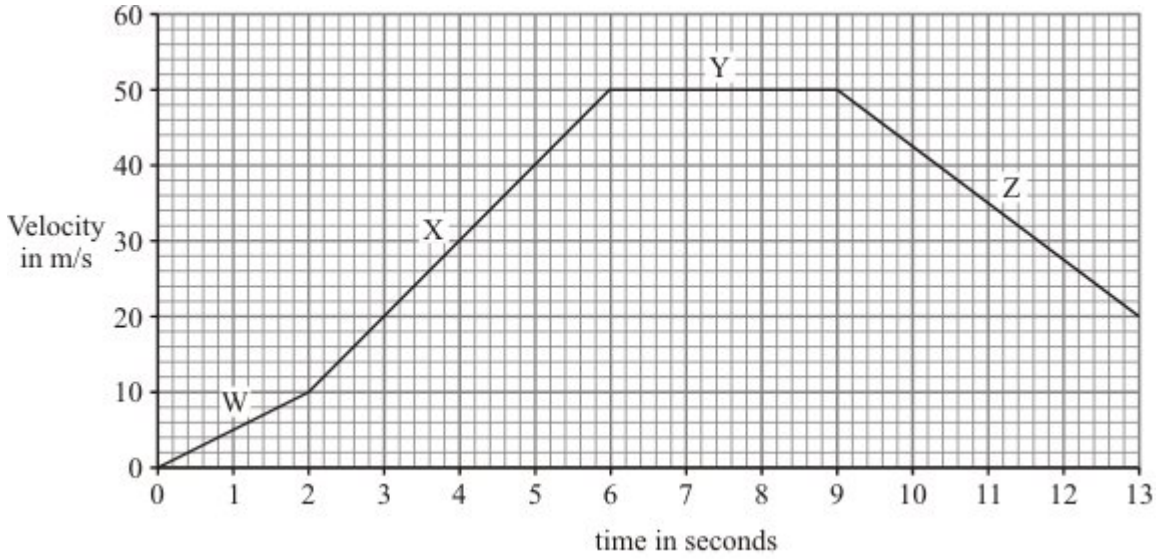
_____

(3)

(Total 6 marks)

Q5.

The graph shows changes in the velocity of a racing car.



(a) Describe the motion of the racing car during:

(i) the period labelled **W**; _____

_____

(1)

(ii) the period labelled **Y**. _____

_____

(1)

(b) Calculate the acceleration of the racing car during the period labelled **X**.
Show clearly how you work out your answer and give the unit.

_____

_____

_____

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Acceleration = _____

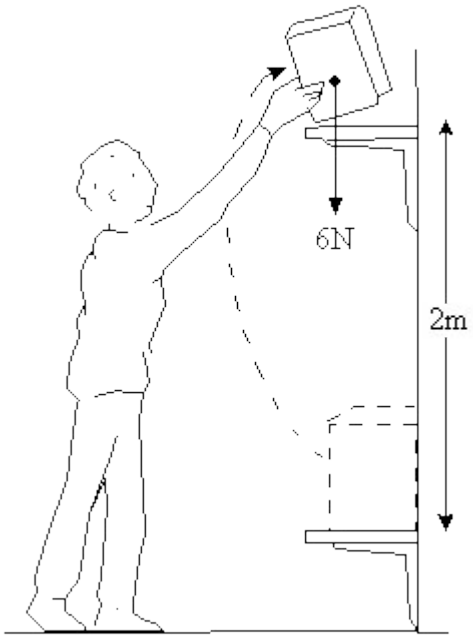
(4)

(Total 6 marks)

Q6.

A book weighs 6 newtons.

A librarian picks up the book from one shelf and puts it on a shelf 2 metres higher.



(a) Calculate the work done on the book. [Show your working].

_____

_____

_____

(3)

(b) The next person to take the book from the shelf accidentally drops it.

The book accelerates at 9.8m/s².

Use this information to calculate the mass of the book. [Show your working].

_____

_____

_____

Answer _____ kg.

(3)

(c) If the book was dropped from an aeroplane high in the sky, it would accelerate to begin with. Eventually it would fall at a steady speed.

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Explain, in as much detail as you can, why this happens.

_____

_____

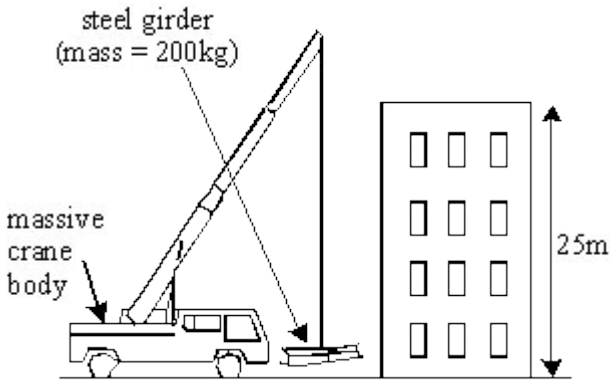
_____

(3)

(Total 9 marks)

Q7.

A crane is used to lift a steel girder to the top of a high building.



When it is lifted by the crane:

- the girder accelerates from rest to a speed of 0.6 m/s in the first 3 seconds;
- it then rises at a steady speed.

(a) Calculate the **acceleration** of the girder.

(Show your working.)

_____

_____

_____

_____

(3)

(b) (i) What is the **weight** of the steel girder?

Answer _____ N

(1)

(ii) Calculate the **power** of the crane motor as it lifts the girder at a steady speed of 0.6 m/s.

(*Show your working. You can ignore the weight of the cable and hook which is small compared to the weight of the girder.*)

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_____

_____

_____

Answer _____ W

(2)

(c) A new motor is fitted to the crane. This motor accelerates the girder at 0.3 m/s^2.

Calculate the **force** which the crane applies to the girder to produce this acceleration.

(Show your working.)

_____

_____

_____

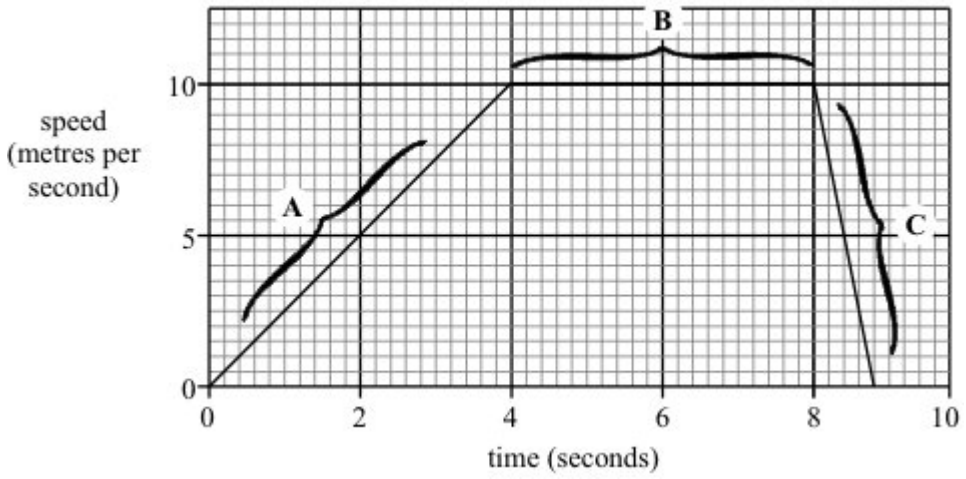
Answer _____ N

(3)

(Total 9 marks)

Q8.

The graph shows the speed of a runner during an indoor 60 metres race.



(a) Choose words from this list to complete the sentences below.

moving at a steady speed **slowing down**

speeding up **stopped**

Part **A** of the graph shows that the runner is _____

Part **B** of the graph shows that the runner is _____

Part **C** of the graph shows that the runner is _____

(3)

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(b) Calculate the acceleration of the runner during the first four seconds.
(Show your working.)

_____

_____

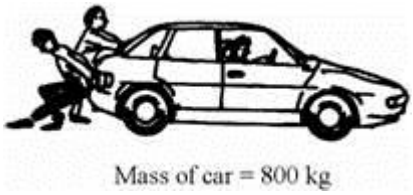
_____

(3)

(Total 6 marks)

Q9.

A man's car will not start, so two friends help him by pushing it.



By pushing as hard as they can for 12 seconds they make the car reach a speed of 3 metres per second.

(a) Calculate the acceleration they give to the car.

_____

_____

_____ Answer _____ m/s^2

(2)

(b) Whilst pushing the car the two friends together do a total of 2400 joules of work.
Calculate their total power.

_____

_____

_____ Answer _____ watts

(2)

(c) Another motorist has the same problem. The two friends push his car along the same stretch of road with the same force as before.

It takes them 18 seconds to get the second car up to a speed of 3 metres per second.

What does this tell you about the mass of the second car?
(You can ignore forces of friction.)

_____

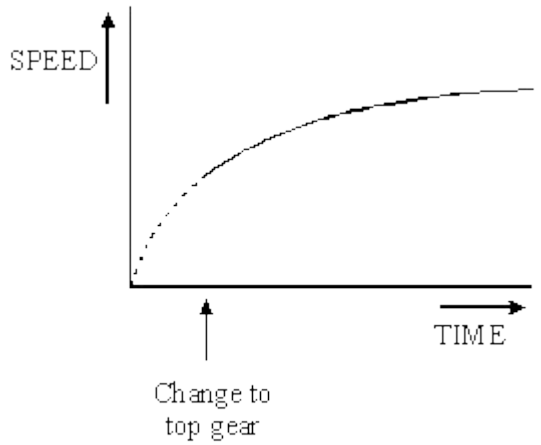
_____

(2)

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(d) On a flat stretch of a motorway a lorry driver changes into top gear. He then makes the lorry go as fast as he can.

The graph shows what happens to the speed of the lorry.



Explain why the speed of the lorry increases at first but then levels out.

_____

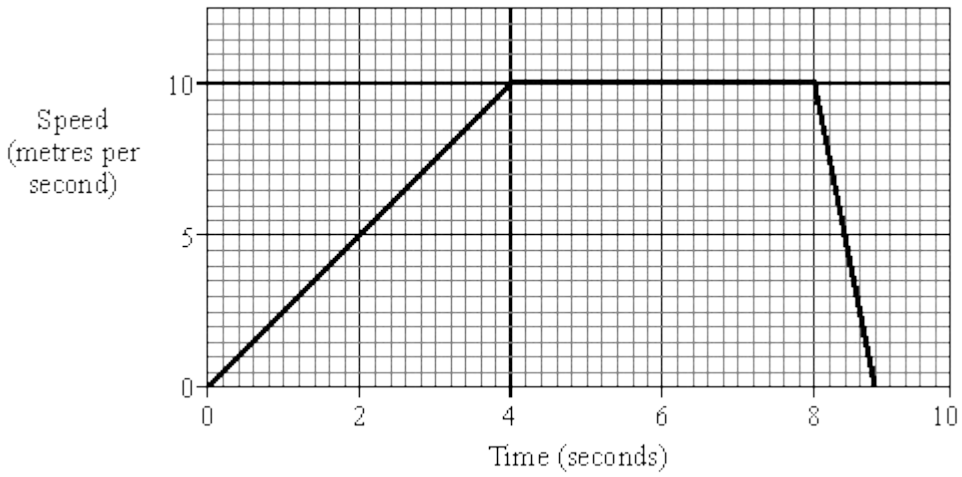
_____

(3)

(Total 9 marks)

Q10.

The graph shows the speed of a runner during an indoor 60 metres race.



(a) Calculate the acceleration of the runner during the first four seconds.
(Show your working.)

_____

_____

_____

(3)

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(b) How far does the runner travel during the first four seconds?
(Show your working.)

_____

_____

_____

(3)

(c) At the finish, a thick wall of rubber foam slows the runner down at a rate of 25 m/s^2.
The runner has a mass of 75kg.
Calculate the average force of the rubber foam on the runner.
(Show your working.)

_____

_____

_____

Answer _____ newtons (N)

(2)

(Total 8 marks)

Q11.

The diagram shows a shuttlecock that is used for playing badminton.



The shuttlecock weighs very little.
When you drop it from a height of a few metres, it accelerates at first but soon reaches a steady speed.

Explain, as fully as you can:

(a) why the shuttlecock accelerates at first,

_____

_____

_____

(2)

(b) why the shuttlecock reaches a steady speed.

_____

_____

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_____

_____

(3)

(Total 5 marks)

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