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**kickstart
tutors**

Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE PHYSICS

Topic Paper: 1.1 & 5.6 Energy changes, power, work done, forces and motion
Part 3

Time allowed: 40 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

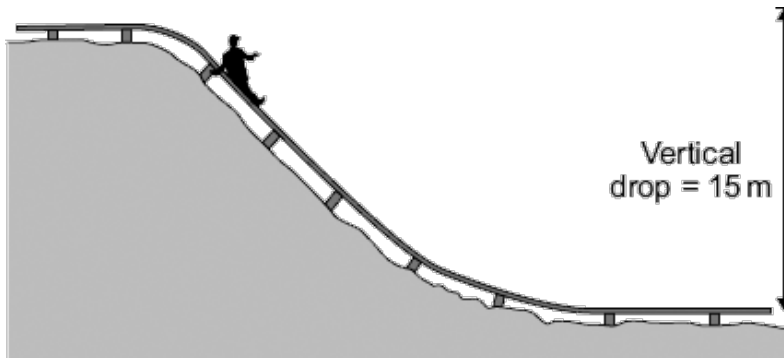
- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



35 Marks



Q8. The miners working in a salt mine use smooth wooden slides to move quickly from one level to another.



(a) A miner of mass 90 kg travels down the slide.

Calculate the change in gravitational potential energy of the miner when he moves 15 m vertically downwards.

gravitational field strength = 10 N/kg

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

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Change in gravitational potential energy = J

(2)

(b) Calculate the **maximum** possible speed that the miner could reach at the bottom of the slide.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

Give your answer to an appropriate number of significant figures.

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Maximum possible speed = m/s

(3)



- (c) The speed of the miner at the bottom of the slide is much less than the calculated maximum possible speed.

Explain why.

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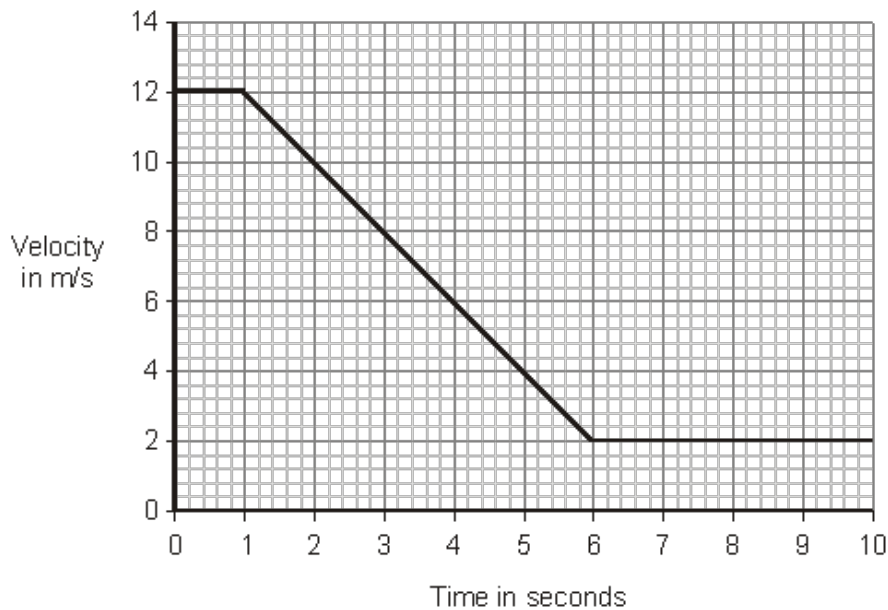
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(3)
(Total 8 marks)

- Q9.** A car is driven along a straight, snow covered, road. The graph shows how the velocity of the car changes from the moment the driver sees a very slow moving queue of traffic ahead.



- (a) Use the graph to calculate the distance the car travels while it is slowing down.

Show clearly how you work out your answer.

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Distance = m

(3)



- (b) The car has a mass of 1200 kg.

Calculate the kinetic of the car when it travels at a speed of 12 m/s.

Write down the equation you use, and then show clearly how you work out your answer.

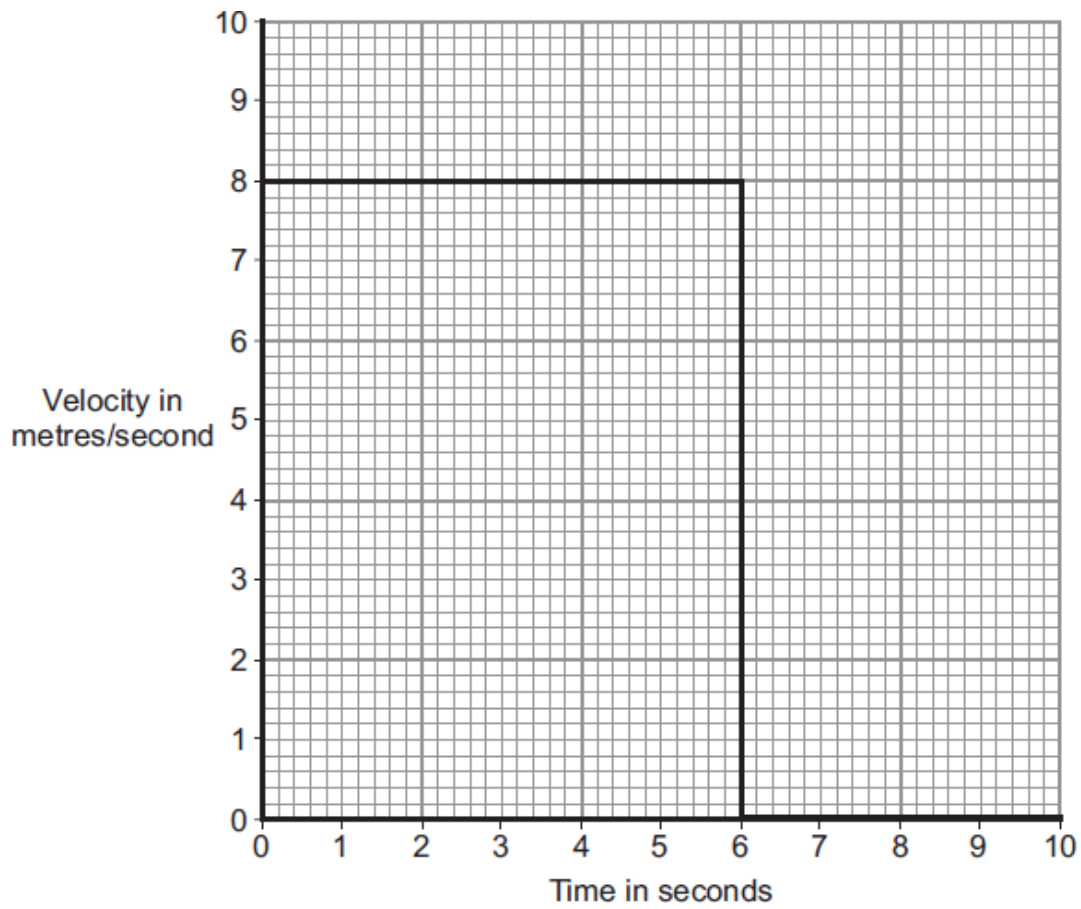
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Kinetic energy = J

(2)
(Total 5 marks)



Q10. The diagram shows the velocity-time graph for an object over a 10 second period.



(a) Use the graph to calculate the distance travelled by the object in 10 seconds.

Show clearly how you work out your answer.

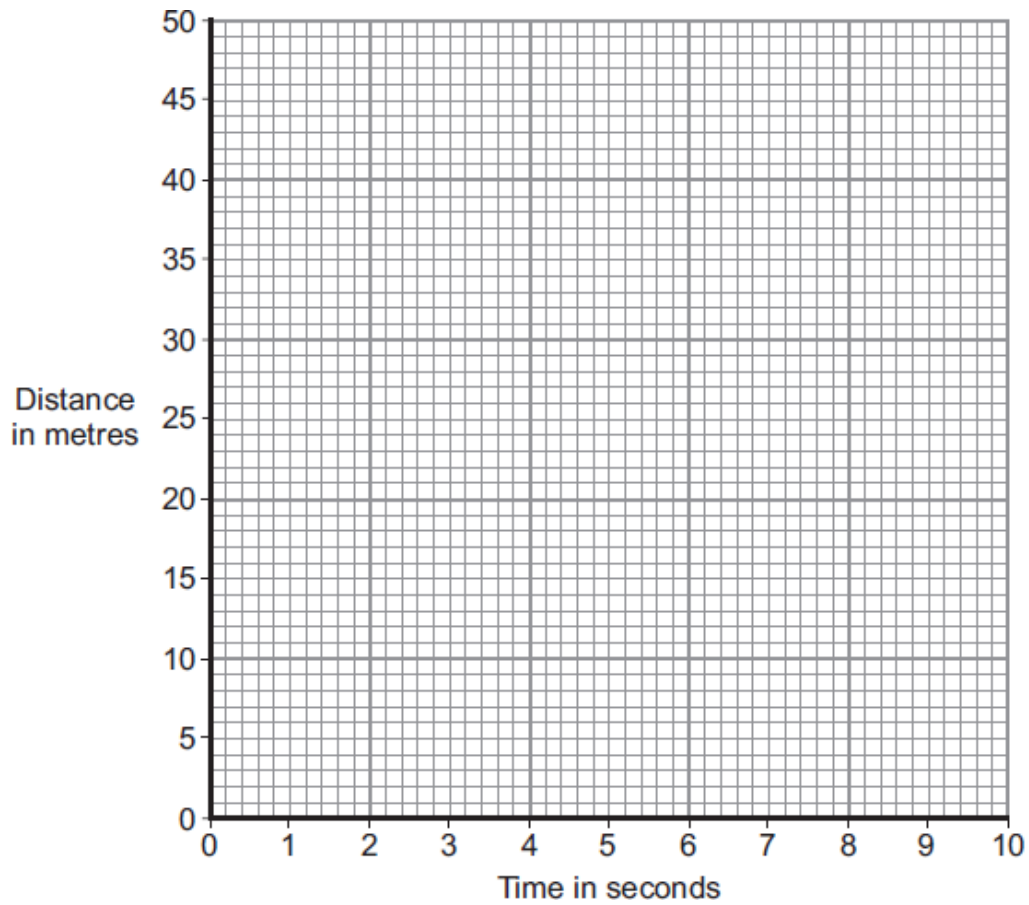
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Distance = m

(2)



(b) Complete the distance-time graph for the object over the same 10 seconds.



(2)
(Total 4 marks)

Q11. The diagram shows the horizontal forces acting on a car of mass 1200 kg.





- (a) Calculate the acceleration of the car at the instant shown in the diagram.

Write down the equation you use, and then show clearly how you work out your answer and give the unit.

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Acceleration =

(4)

- (b) Explain why the car reaches a top speed even though the thrust force remains constant at 3500 N.

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(3)



(c) The diagram shows a car and a van.



The two vehicles have the same mass and identical engines.

Explain why the top speed of the car is higher than the top speed of the van.

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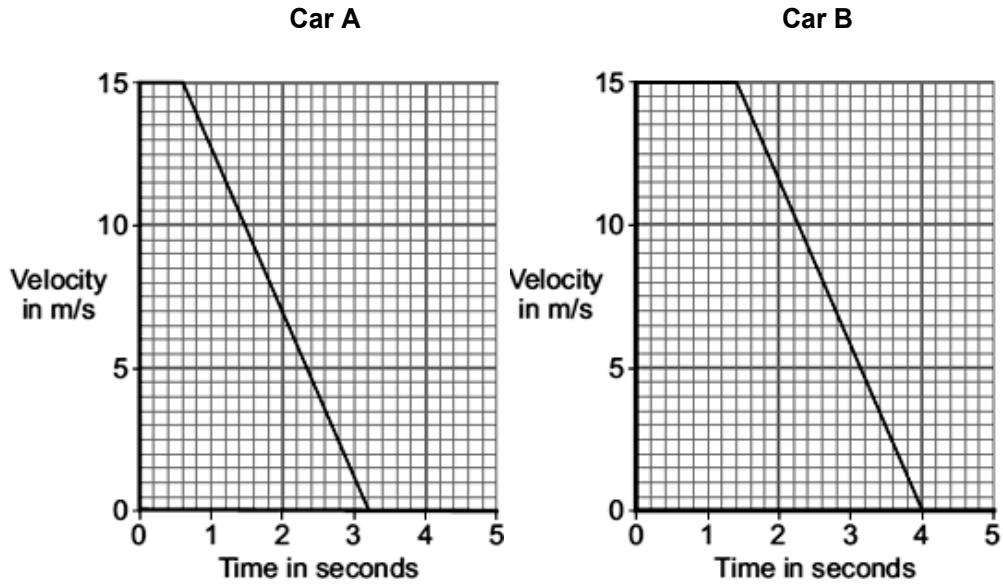
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(4)
(Total 11 marks)



Q12. (a) The graphs show how the velocity of two cars, **A** and **B**, change from the moment the car drivers see an obstacle blocking the road.



One of the car drivers has been drinking alcohol. The other driver is wide awake and alert.

(i) How does a comparison of the two graphs suggest that the driver of car **B** is the one who has been drinking alcohol?

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(1)

(ii) How do the graphs show that the two cars have the same deceleration?

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(1)

(iii) Use the graphs to calculate how much further car **B** travels before stopping compared to car **A**.

Show clearly how you work out your answer.

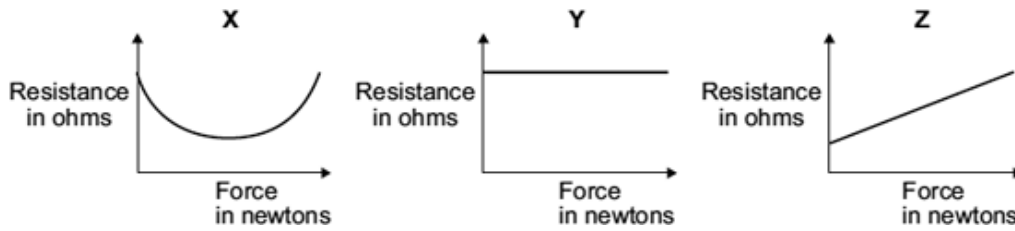
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Additional stopping distance = m

(3)



- (b) In a crash test laboratory, scientists use sensors to measure the forces exerted in collisions. The graphs show how the electrical resistance of 3 experimental types of sensor, **X**, **Y** and **Z**, change with the force applied to the sensor.



Which of the sensors, **X**, **Y** or **Z**, would be the best one to use as a force sensor?

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Give a reason for your answer.

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(2)
(Total 7 marks)