

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

A car has an oil leak. Every 5 seconds an oil drop falls from the bottom of the car onto the road.

- (a) What force causes the oil drop to fall towards the road?

(1)

- (b) The diagram shows the spacing of the oil drops left on the road during part of a journey



Describe the motion of the car as it moves from **A** to **B**.

Explain the reason for your answer.

(3)

- (c) When the brakes are applied, a braking force slows down and stops the car.

- (i) The size of the braking force affects the braking distance of the car.

State **one** other factor that affects the braking distance of the car.

(1)

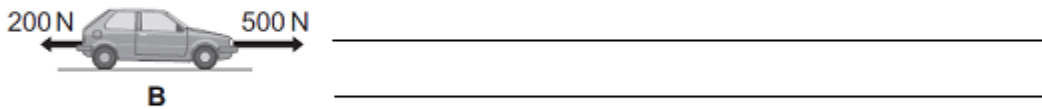
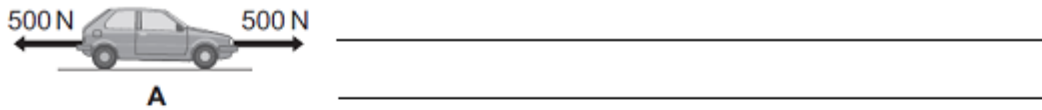
- (ii) A braking force of 3 kN is used to slow down and stop the car in a distance of 25 m.

Calculate the work done by the brakes to stop the car and give the unit.

Q2.

- (a) A car is being driven along a straight road. The diagrams, **A**, **B** and **C**, show the horizontal forces acting on the moving car at three different points along the road.

Describe the motion of the car at each of the points, **A**, **B** and **C**.

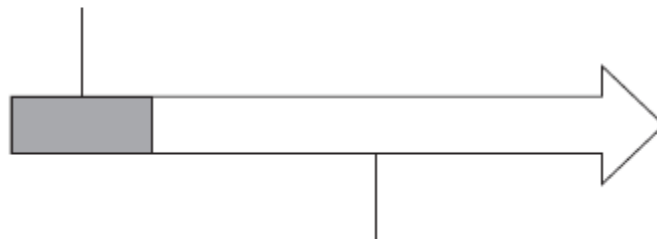


(3)

- (b) The diagram below shows the stopping distance for a family car, in good condition, driven at 22 m/s on a dry road. The stopping distance has two parts.

- (i) Complete the diagram below by adding an appropriate label to the second part of the stopping distance.

The distance the car travels during
the driver's reaction time

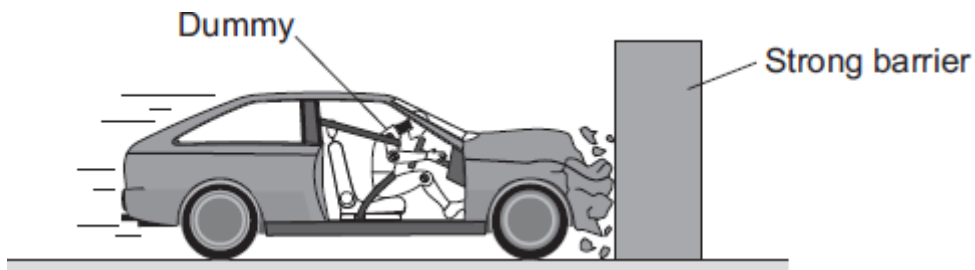


(1)

- (ii) State **one** factor that changes both the first part **and** the second part of the stopping distance.

(1)

- (c) The front crumple zone of a car is tested at a road traffic laboratory. This is done by using a remote control device to drive the car into a strong barrier. Electronic sensors are attached to the dummy inside the car.



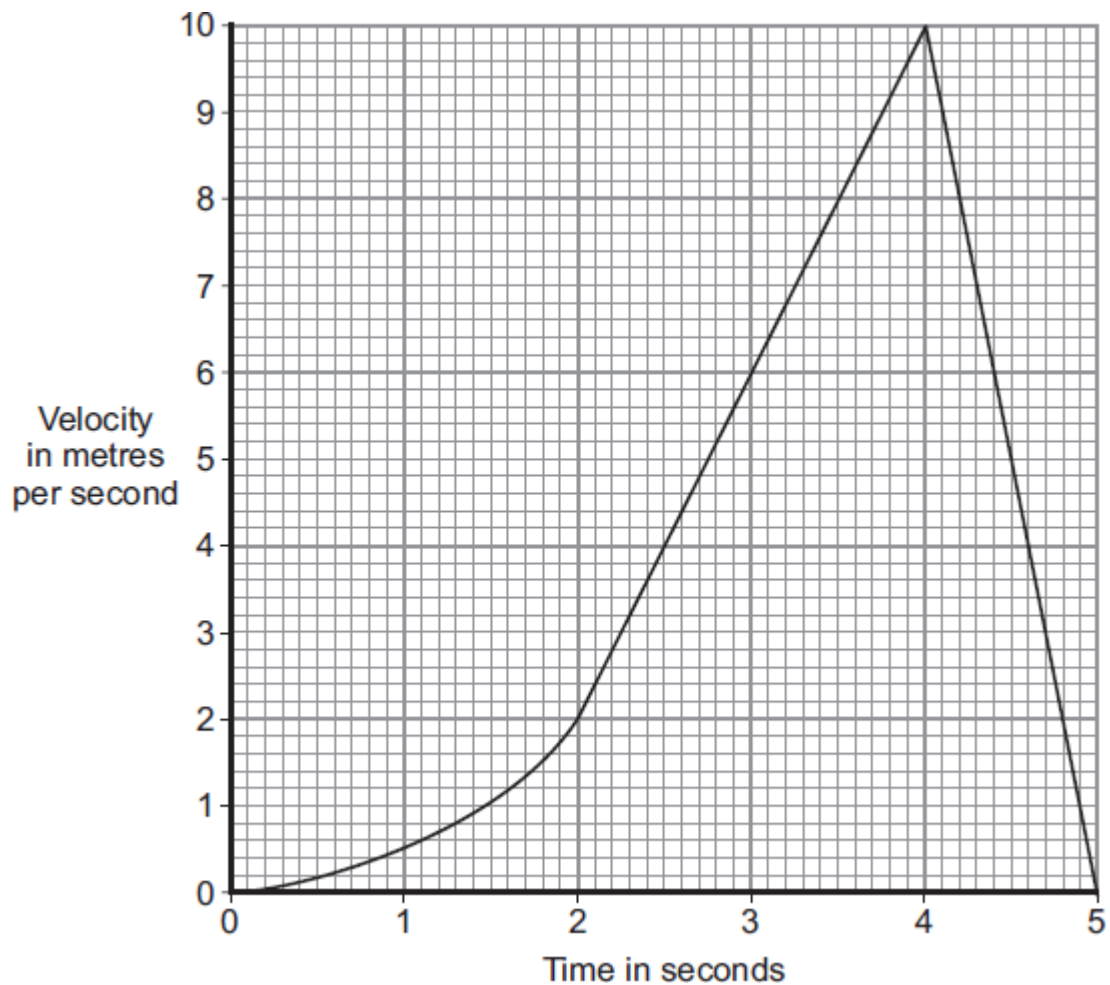
- (i) At the point of collision, the car exerts a force of 5000 N on the barrier.
State the size and direction of the force exerted by the barrier on the car.

(1)

- (ii) Suggest why the dummy is fitted with electronic sensors.

(1)

- (iii) The graph shows how the velocity of the car changes during the test.



Use the graph to calculate the acceleration of the car just before the collision with the barrier.

Show clearly how you work out your answer, including how you use the graph, and give the unit.

Acceleration = _____

(3)

(Total 10 marks)