

**A Level Physics A**  
**H556/01** Modelling physics

**Question Set 24**

- 1 (a) A car is travelling along a straight road at  $18 \text{ m s}^{-1}$ .  
The driver sees an obstacle and after 0.50 s applies the brakes.  
The **stopping** distance of the car is 38 m.

Calculate the magnitude of the deceleration of the car when the brakes are applied.

deceleration = .....  $\text{m s}^{-2}$  [3]

- (b)\* A student rolls a marble at different speeds on a carpet to model the braking of a car.

The student wishes to investigate how the total distance  $x$  travelled before the marble stops (braking distance) depends on its initial speed  $v$ .

The speed  $v$  and distance  $x$  are related by the equation  $\frac{1}{2}mv^2 = Fx$  where  $m$  is the mass of the marble and  $F$  is the constant frictional force acting on the marble.

- Describe how an experiment can be conducted in the laboratory to investigate the relationship between  $v$  and  $x$ .
- Explain how the data can be analysed to determine  $F$ .

[6]

**Total Marks for Question Set 24: 9**

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