

## Kinematics

(15)

### Motion & Force

A car of mass 1000 kg travelling at  $72 \text{ kmh}^{-1}$  is uniformly brought to rest over a distance of 40 m. Find (a) the average acceleration (b) the average braking force.

DATA:-

$$\text{Mass} = 1000 \text{ kg}$$

$$\begin{aligned} \text{Initial velocity} &= 72 \text{ kmh}^{-1} \\ &= \frac{72 \times 1000}{3600} = 20 \text{ ms}^{-1} \end{aligned}$$

$$\text{Final velocity} = 0 \text{ ms}^{-1}$$

$$\text{Distance} = s = 40 \text{ m}$$

$$\text{Acceleration} = ?$$

$$\text{Force} = ?$$

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SOLUTION:-

(a) for average acceleration

$$2as = v_f^2 - v_i^2$$

$$a = \frac{v_f^2 - v_i^2}{2s}$$

$$a = \frac{(0)^2 - (20)^2}{2(40)}$$

$$a = \frac{-400}{80} = -5 \text{ ms}^{-2}$$

(Deceleration)

(b) for force

$$F = ma$$

$$F = (1000)(-5)$$

$$F = -5000 \text{ N}$$