

Answer on question #56692, Physics / Other

Question A 1100kg car accelerates from 48 km/hr to 59 km/hr over 100m. What was the magnitude of the net force acting on it?

Solution Let us first find acceleration from equation of motion and equation of velocity:

$$s = v_0 t + at^2/2$$

$$v_f = v_0 + at$$

where $s = 100$, $v_0 = 48 \text{ km/hr} = 13.3 \text{ m/s}$, $v_f = 59 \text{ km/h} = 16.4 \text{ m/s}$. From second

$$t = \frac{v_f - v_0}{a}$$

Then first transforms to

$$s = v_0 \frac{v_f - v_0}{a} + \frac{(v_f - v_0)^2}{2a}$$

From this

$$a = \frac{v_0(v_f - v_0) + (v_f - v_0)^2}{s} = \frac{13.3(16.4 - 13.3) + (16.4 - 13.3)^2}{100} \approx 0.5 \text{ m/s}^2$$

Hence, the force is

$$F = ma = 1100 \cdot 0.5 = 550 \text{ N}$$