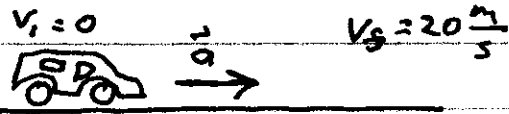


20080213-1240

How much force is needed to accelerate a 1000 kg car from rest to 20.00 m/s in 5.000 sec?

1<sup>st</sup> Find acceleration needed.



$$v_f = v_i + at \quad \text{or} \quad a = \frac{v_f - v_i}{t} = \frac{20.00 \frac{m}{s} - 0 \frac{m}{s}}{5.000 s}$$

$$a = 4.000 \frac{m}{s^2}$$

2<sup>nd</sup> Use  $F = ma$  to determine Force

$$F = ma$$

$$F = (1000. \text{kg})(4.000 \frac{m}{s^2})$$

$$F = 4000. \frac{\text{kg} \cdot \text{m}}{\text{s}^2}$$

$$F = 4000. \text{ newtons} = 4.000 \times 10^3 \text{ n}$$

Note: This is the net force that must be applied to the mass to accelerate it. Additional force may be needed to overcome friction or to move it uphill.

This assumed a horizontal acceleration with no friction.