

1. A rocket powered sled accelerates from rest, after time 10s it has traveled a distance x=400m. What is the speed in km/hour?

Solution.

$$\sum F = ma$$

$$a = \frac{\sum F}{m}$$

$$a = v'$$

$$v = at + v_0$$

$$v = s'$$

$$s = \frac{at^2}{2} + v_0 t + s_0$$

$$a = \frac{(v - v_0)}{t}$$

$$s = \frac{\frac{(v - v_0)}{t} t^2}{2} + v_0 t + s_0$$

$$\text{Given: } s_0 = 0 \text{ km, } t = \frac{1}{360} \text{ hour, } s = 0.4 \text{ km, } v_0 = 0 \frac{\text{km}}{\text{hour}}$$

Find: $v - ?$

$$0.4 \text{ km} = \frac{v \cdot \frac{1}{360} \text{ hour}}{2}$$

$$v = 0.4 \cdot 2 \cdot 360 \frac{\text{km}}{\text{hour}} = 288 \frac{\text{km}}{\text{hour}}$$

Answer:

$$v = 288 \frac{\text{km}}{\text{hour}}$$