Answer on Question #74107 Physics / Mechanics | Relativity

A car starts at rest and acquires a velocity of 70 km per hour in 30 min. Find the car's acceleration and find the distance traveled in the first 20 min and find the distance traveled in the next 20 more min.

Solution:

The acceleration

$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{70\ \text{km/hr} - 0\ \text{km/hr}}{0.5\ \text{hr}} = 140\ \text{km/hr}^2$$

The distance traveled in the first 20 min

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

$$s = 0 \times \frac{1}{3} + \frac{140 \times \left(\frac{1}{3}\right)^2}{2} = 7.78\ \text{km}$$

The distance traveled in the first 30 min

$$s = 0 \times \frac{1}{2} + \frac{140 \times \left(\frac{1}{2}\right)^2}{2} = 17.50\ \text{km}$$

So, the distance traveled in the next 20 more min

$$17.50\ \text{km} - 7.78\ \text{km} = 9.72\ \text{km}$$

Answers:

$140\ \frac{\text{km}}{\text{hr}^2}$

7.78 km

9.72 km