

Answer on Question #43488, Physics, Mechanics | Kinematics | Dynamics

How much force is applied if a van which is 2500 kg. Gains a speed of 12.0 m/s after 6 seconds starting from rest.

Solution:

Data

$$m = 2500 \text{ kg}$$

$$V_{rest} = 0 \frac{\text{m}}{\text{s}}$$

$$V = 12.0 \frac{\text{m}}{\text{s}}$$

$$t = 6 \text{ s}$$

Second Newton's law

$$F = \frac{\Delta p}{t}$$

When the body standing at rest its momentum equals to zero

$$\begin{aligned} p &= mV_{rest} = 0 \\ \Delta p &= m\Delta V = m(V - V_{rest}) = mV \\ F &= \frac{mV}{t} = \frac{2500 \cdot 12.0}{6} = 5000 \text{ N} \end{aligned}$$

Answer: $F = 5000 \text{ N}$