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

$$p = mV_{rest} = 0$$

$$\Delta p = m\Delta V = m(V - V_{rest}) = mV$$

$$F = \frac{mV}{t} = \frac{2500 \cdot 12.0}{6} = 5000\ \text{N}$$

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