

**Answer on Question #39802, Physics, Mechanics | Kinematics | Dynamics**

**Question:**

An applied force of 200.0N gives a sled an acceleration of 2.00m/s<sup>2</sup>. If you place an additional 60kg mass on the sled, what will the acceleration be?

**Answer:**

Newton's second law of motion can be expressed in equation form as follows:

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

Therefore:

$$F = m_s a_0$$

where  $m_s$  is mass of sled,  $a_0$  is initial acceleration

With additional mass:

$$F = (m_s + m)a$$

From first equation:

$$m_s = \frac{F}{a_0}$$

And from second:

$$a = \frac{F}{m_s + m} = \frac{F}{\frac{F}{a_0} + m} = \frac{a_0}{1 + \frac{ma_0}{F}} = \frac{2}{1 + \frac{60 \cdot 2}{200}} = 1.25 \frac{m}{s}$$

Answer:  $1.25 \frac{m}{s}$