Newton's 2nd Law with Constant Mass Word Problems Worksheet

$$\bar{v} = \frac{\Delta x}{\Delta t}, \quad \bar{v} = \frac{v_o + v_f}{2}, \quad \bar{a} = \frac{\Delta v}{\Delta t}, \quad v_f = v_o + at, \quad x = V_o t + \frac{1}{2}at^2, \quad v_f^2 = v_o^2 + 2a\Delta x, \; g = -9.8\frac{m}{s^2} \approx -10\frac{m}{s^2}$$

$$\sin\theta = \frac{opp}{hyp}, \cos\theta = \frac{adj}{hyp}, \tan\theta = \frac{opp}{adj}, a^2 + b^2 = c^2,$$

$$F = ma, \quad p = mv, \quad m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$$

Round to one decimal place with at least one significant digit.

1. A 30 kg mass on a level, frictionless ramp is connected by a string to a 10 kg mass which is hanging off the end of the ramp. The string goes over a frictionless pulley. Jesse is holding the 30 kg mass. What will the acceleration of the 10 kg mass be when Jesse lets go?

2. A block on a level, frictionless ramp is connected by a string to a 25 kg mass which is hanging off the end of the ramp. The string goes over a frictionless pulley. Shelby is holding the block. When she lets go of the block it has an acceleration of 5 $\frac{m}{s^2}$. What is the mass of the block?

3. Logan is sitting on a hovercraft on the rooftop holding a rope which has a bowling ball attached to the other end. David greases the edge of the roof and hangs the bowling ball over the edge. If Logan has a mass of 90 kg and the bowling ball has a mass of 5 kg and Logan is 20 m from the edge of the roof, what would his velocity be when he reached the edge of the roof if David released the bowling ball?