The Safe $S$ has a weight of 200 lb and is supported by the rope and pulley arrangement shown. If the end of the rope is given to a boy $B$ of weight 90 lb, determine his acceleration if in the confusion he doesn’t let go of the rope.

**Equations of Motion**

From FBD$_2$ and MAD$_1$:

\[ + \sum F_y = ma_y \]

\[ T - 90 = -\left(\frac{90}{32.2}\right)a_B \]  \hspace{1cm} EQ. (1)

From FBD$_2$ and MAD$_2$:

\[ + \sum F_y = ma_y \]

\[ 2T - 200 = -\left(\frac{200}{32.2}\right)a_S \]  \hspace{1cm} EQ. (2)

**Kinematic**

\[ 2s_s + s_B = l \]

Take time derivative twice:

\[ \frac{d^2 s}{dt^2} = a \]

\[ (t^2) \]

\[ 2a_s + a_B = 0 \]  \hspace{1cm} EQ. (3)

3 equations, 3 unknowns \hspace{1cm} Solve

\[ a_B = -2.30 \text{ ft/s}^2 \]

\[ a_S = 1.15 \text{ ft/s}^2 \]

\[ T = 96.43 \text{ lb} \]