$$d = \frac{1}{2}\, a\, t^2$$

$$\vec{v} = \frac{d\vec{x}}{dt}$$

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{d^2\vec{x}}{dt^2}$$

$$\vec{a} = \frac{d\vec{v}}{dt} \quad \Longrightarrow \quad \vec{v} = \int \vec{a}\ dt$$

$$\vec{v} = \vec{a} \int dt$$

$$\vec{v} = \vec{v}_i + \vec{a}\, t$$

$$\vec{v} = \frac{d\vec{x}}{dt} \quad \Longrightarrow \quad \vec{x} = \int \vec{v}\ dt$$

$$\vec{x} = \int (\vec{v}_i + \vec{a}\, t)\, dt$$

$$\vec{x} = \int \vec{v}_i\ dt + \int \vec{a}\, t\ dt$$

$$\vec{x} = \vec{x}_i + \vec{v}_i\ t + \frac{1}{2}\vec{a}\ t^2$$

$$\vec{x} = \vec{x}_i + \frac{1}{2}(\vec{v}_i + \vec{v}_f)\ t$$

$$v_f^2 - v_i^2 = 2\ \vec{a}\ (\vec{x}_f - \vec{x}_i)$$

$$v(t) = 10\ \left(\frac{\text{mph}}{\text{hour}}\right)\ t = 10\ \left(\frac{\text{mile}}{\text{hour}^2}\right)\ t$$

$$(x - x_i) = v_i\, t + \frac{1}{2}\, a t^2$$

$$d = 0 + \frac{1}{2}\, a t^2$$

$$t^2 = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2\,(75\ \text{mile})}{10\ \text{mile/hour}^2}} = 3.9\ \text{hour}$$