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

$$d \quad = \quad (x_f - x_i) \quad = \quad v_i\, t \; + \; \frac{1}{2}\, a\, t^2$$

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

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

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

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

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

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

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

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

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

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

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

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

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

$$d \quad = \quad 0 \; + \; \frac{1}{2}\, at^2$$

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