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$$x = 20 + \frac{1}{4}t^2, \quad \dot{x} = \frac{1}{2}t, \quad \ddot{x} = \frac{1}{2} \text{ mm/s}^2$$

$$y = 15 - \frac{1}{6}t^3, \quad \dot{y} = -\frac{1}{2}t^2, \quad \ddot{y} = -t \text{ mm/s}^2$$

For  $t = 2 \text{ s}$ ,  $\dot{x} = 1 \text{ mm/s}$

$$\dot{y} = -2 \text{ mm/s}$$

$$\ddot{x} = \frac{1}{2} \text{ mm/s}^2$$

$$\ddot{y} = -2 \text{ mm/s}^2$$

$$v = \sqrt{\dot{x}^2 + \dot{y}^2} = \sqrt{1^2 + (-2)^2} = 2.24 \text{ mm/s}$$

$$a = \sqrt{\ddot{x}^2 + \ddot{y}^2} = \sqrt{(\frac{1}{2})^2 + (-2)^2} = 2.06 \text{ mm/s}^2$$

