

Name: \_\_\_\_\_

An object's position (in m) after  $t$  seconds is:

$$x = -0.7t^3 \qquad y = 0.2t^4$$

Find the object's acceleration after 4 seconds. Include the magnitude and the direction.

$$v_x = -2.1t^2$$

$$v_y = 0.8t^3$$

$$a_x = -4.2t$$

$$a_y = 2.4t^2$$

$$\text{At } t=4: \quad a_x = -16.8 \quad a_y = 38.4$$

$$\text{Magnitude of acceleration} \quad a = \sqrt{(-16.8)^2 + 38.4^2} \\ \approx 41.9 \quad \text{m/s}^2$$

$$\text{Direction of acceleration} \quad \theta = \tan^{-1}\left(\frac{a_y}{a_x}\right) \quad (+180^\circ?) \\ \text{Add } 180^\circ \text{ if } a_x \text{ is negative.}$$

$$\theta = \tan^{-1}\left(\frac{38.4}{-16.8}\right) + 180^\circ \\ \approx 114^\circ$$