

MA 140 - Quiz 3 - Spring 2008
Calculators Allowed

Hello, my name is _____

1. Let $s(t) = t^3 - \cos \pi t$ be the height in meters of an object after t seconds.

(a) Find the velocity and acceleration of the object at $t = 1$. Include units in your answers.

$$\begin{aligned}v(t) &= s'(t) \\ &= 3t^2 + \sin \pi t \cdot \pi \\ &= 3t^2 + \pi \sin \pi t \\ a(t) &= s''(t) \\ &= 6t + \pi \cos \pi t \cdot \pi \\ &= 6t + \pi^2 \cos \pi t\end{aligned}$$

$$\begin{aligned}v(1) &= 3(1)^2 + \pi \sin \pi(1) \\ &= 3 \text{ m/s} \\ a(1) &= 6(1) + \pi^2 \cos \pi(1) \\ &= 6 - \pi^2 \text{ m/s}^2\end{aligned}$$

(b) Is the object speeding up or slowing down at $t = 1$? Explain.

Since $v(1) > 0$ and $a(1) < 0$, the object is slowing down at $t = 1$.