

A mass oscillates on a spring with period T and amplitude 0.48cm . The mass is at the equilibrium position $x=0$ at $t=0$ and is moving in the positive direction.

Where is the mass at

1) $t = \frac{T}{8}$

2) $t = \frac{T}{4}$

3) $t = \frac{T}{2}$

4) $t = \frac{3T}{4}$

* Since $x=0$ at $t=0$ use sine rather than cosine

$$x = A \cos\left(\frac{2\pi}{T} t\right)$$

$$x = A \sin\left(\frac{2\pi}{T} t\right)$$

1)

$$x = 0.48 \text{ E-}2 \text{ m} \sin\left(\frac{2\pi}{T} \frac{T}{4}\right) = 0.48 \text{ E-}2 \text{ m} \left(\sin \frac{\pi}{4}\right)$$

$$= \boxed{0.34 \text{ E-}2 \text{ m}}$$

$$2) x = 0.48 \text{ E-}2 \text{ m} \sin\left(\frac{2\pi}{T} \frac{T}{2}\right) = 0.48 \text{ E-}2 \text{ m} \left(\sin \frac{\pi}{2}\right)$$

$$= \boxed{0.48 \text{ E-}2 \text{ m}}$$

$$3) x = 0.48 \text{ E-}2 \text{ m} \sin\left(\frac{2\pi}{T} \frac{T}{2}\right) = 0.48 \text{ E-}2 \text{ m} \left(\sin \pi\right)$$

$$= \boxed{0 \text{ m}}$$

$$4) x = 0.48 \text{ E-}2 \text{ m} \sin\left(\frac{2\pi}{T} \frac{3T}{2}\right) = 0.48 \left(\sin \frac{3\pi}{2}\right)$$

$$= \boxed{-0.48 \text{ E-}2 \text{ m}}$$