An air-track glider is attached to a spring. At time t = 0-s, the glider is pulled to the right and released from rest . Then the time period of oscillation is determined to be 3.0-s and a maximum speed is determined to be of 35 cm/s.

a) Calculate is the amplitude of the oscillation?
b) Calculate is the glider's position at t = 0.25 s?

Given:

Time period of oscillation: $T = 3.0\text{-s}$

Maximum speed of oscillation: $v_{max} = 35 \text{ cm/s} = 0.35 \text{ m/s}$

Determine:

a) Amplitude of oscillation: A

Use formula:

$$v_{max} = \omega A \text{ ----------(1)}$$

"ω" is the angular velocity of the oscillation in rad /s. It is calculated as $2\pi / T$.

Rearranging (1) & substituting for v_{max} & T in (1):

$$\mathbf{A = v_{max} \times (T / 2\pi) = (0.35) \times [\, 3.0 / (\, 2 \times 3.14\,)\,] = 0.17 \text{ m} = 17 \text{ cm}}$$

b) Glider's position at t = 0.25-s: $x_{0.25}$

Use formula:

$$x_{0.25} = A[\, \cos(\omega t)\,] = A[\, \cos\{\,(2\pi / T) \times t\,\}\,] \text{ ----------(2)}$$

Substituting for A, T and t in (2):

$$\mathbf{x_{0.25} = 0.17 \times [\, \cos\{\,(2 \times 3.14 / 3.0) \times 0.25\,\}\,] = 0.15 \text{ m} = 15 \text{ cm}}$$