

## Oscillation Problems I

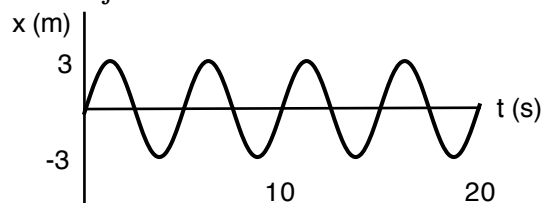
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1. The position as a function for a 0.5 kg mass on the end of a spring is given by  $x = 1.5\cos(3t)$ .
  - a. What is the maximum displacement of the mass from the equilibrium position?
  
  
  
  
  
  
  
  
  
  
  - b. What is the period of this motion?
  
  
  
  
  
  
  
  
  
  
  - c. What is the maximum speed of the mass?
  
2. A mass on a spring has an angular frequency of 5 rad/s and a maximum speed of 3 m/s.
  - a. What is its maximum displacement?
  
  
  
  
  
  
  
  
  
  
  - b. What is its maximum acceleration?
  
3. A mass on a spring has a maximum speed of 1.5 m/s and a maximum displacement of 25 cm.  
What is the period of oscillation?

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4. A mass on a spring is oscillating with a frequency of 20 rpm. It also has a maximum acceleration of  $1.5 \text{ m/s}^2$ . What is the amplitude of the oscillation?

5. The position as a function of time for an oscillating object is shown. What is the maximum speed of the object?



Answers:

1. a)  $1.5 \text{ m}$     b)  $2/3 \pi \text{ s}$     c)  $4.5 \text{ m/s}$     2. a)  $0.6 \text{ m}$     b)  $15 \text{ m/s}^2$   
3)  $1/3 \pi \text{ s}$     4)  $0.34 \text{ m}$     5)  $6\pi/5 \text{ m/s}$