Frequency and wave cycle

1. A ball bounces 5 times in 4s. Find the frequency.

2. A pendulum is released from the right. it passes through the equilibrium six times in 6 seconds.
   a) Represent the motion as a transverse wave
   b) determine the frequency

3. Find the velocity of a wave that has a frequency of 10Hz and a wavelength of 2m

4. Cell phones operate in the 900MHz range. Determine the wavelength of a 900MHz carrier. (Remember, Electromagnetic waves travel at the speed of light)

Harmonic Motion Questions

1. A mass on a spring is oscillating at a frequency of 5.0Hz. Find the acceleration of the mass when it's
   a) 5cm from equilibrium
   b) 2.5cm from equilibrium
   c) 0 cm from equilibrium

2. If the mass in question 1 has a mass of 50g, determine the force constant.

3. A pendulum on a very light string has a oscillation frequency of the 0.02Hz. Determine the length of the pendulum.

4. Determine the equation for the position of mass exhibiting simple harmonic motion based on the following specifics

   Amplitude= 5cm
   Period=0.5s

5. Determine the position of the mass in 4. if
   a) t=0s
   b) t=0.125s
   c) t=0.25s
   d) t=0.375s
   e) t=0.5s

6. Determine time it takes for the mass in 4. to reach a position of
   a) 1cm
   b) 2cm
   c) 3cm
   d) 4cm
   e) 5cm

7. Determine the time and position of the mass in 4. to reach the following phase angles.

   (Convert the angles to radians $Rad = \frac{2\pi}{180} \times \deg$

   a) 0^0
   b) 30^0
   c) 90^0
   d) 150^0
   e) 180^0
   f) 210^0
   g) 270^0

More Problems

Practice

1. Calculate the period for a spring whose force constant is 15 N/m, if the mass on the spring is 1.0 kg. (1.6 s)
2. What is the period of a pendulum suspended from the CN tower in Toronto by a light string 4.96×10^2 m long? (44.7 s)
3. You are designing a pendulum clock. How far must the centre of mass of the simple pendulum be located from the pivot point of rotation to give the pendulum a period of 1.0 s? (25 cm)
4. A 2.5 kg object, vibrating with simple harmonic motion, has a frequency of 1.0 Hz and an amplitude of 0.50 m. What is the restoring force on the object at the ends of the swing? (49 N)
5. A 0.020 kg cart is held between two identical, stretched springs on the air track illustrated. A force of 2.0 N is employed to hold the cart in a position 0.10 m from equilibrium. The cart is then released and allowed to vibrate from the 0.10 m position.
   (a) What is the force constant for the springs/cart system?
   (b) What is the frequency of vibration?
   (c) What is the maximum kinetic energy of the cart?
   (d) Where does (c) occur?
   (e) What is the cart speed in (c)?
   (20 N/m, 5.0 Hz, 0.10 J, 3.2 m/s)