

Tutorial Quiz-3

PHYS 101 : Week of October 1, 2007

Two problems to be done during the first hour on the black board and two to be handed in for marking

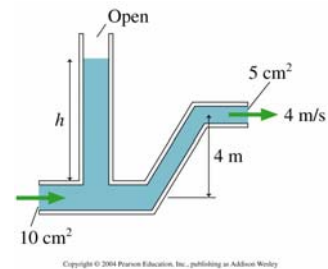
For the problems to be marked each problem is worth 10 points

A student may discuss the problems with other students but may not copy from others.

Problem 15.61

Water flows from the pipe shown in the figure with a speed of 4.0 m/s.

- What is the water pressure as it exists into the air?
- What is the height h of the standing column of water?

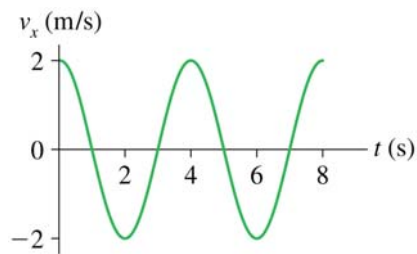


Problem 14.32

An object oscillating on a spring has the velocity graph shown in figure P14.32. Draw a velocity graph if the following changes are made.

- The amplitude is doubled and the frequency is halved.
- The mass is quadrupled.

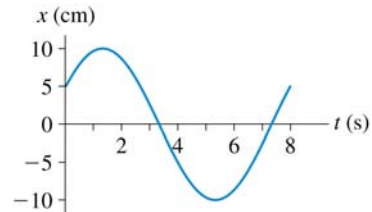
Parts a and b are independent questions each starting from the graph shown.



Problem 14.33

Fig. 14.33 is the position versus time graph of a particle in simple harmonic motion.

- What is the phase constant?
- What is the velocity at $t = 0$ s?
- What is v_{\max} ?

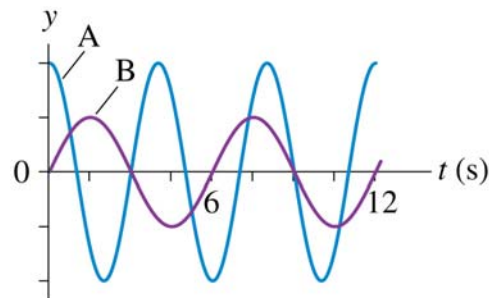


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Problem 14.35

Two graphs in Figure P14.35 are for two different vertical mass-spring systems.

- What is the frequency of system A? What is the first time the mass has maximum speed while traveling in the upward direction?
- What is the period of the system B? What is the first time at which the energy is all potential?
- If both systems have the same mass, what is the ratio k_A/k_B of their spring constants?



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Problem 14.37

A 1.0 kg block oscillates on a spring with spring constant 20 N/m. At $t = 0$ s the block is 20 cm to the right of the equilibrium position and moving to the left at a speed of 100 cm/s. Determine the period of oscillation and draw a graph of position versus time.

Problem 14.38

An object in SHM oscillates with a period of 4.0 s and amplitude of 10 cm. How long does the object take to move from $x = 0.0$ cm to $x = 6.0$ cm?

Problem 14.43

A 100 g ball attached to a spring with spring constant 2.5 N/m oscillates horizontally on a frictionless table. Its velocity is 20 cm/s when $x = -5.0$ cm.

- (a) What is the amplitude of oscillations?
- (b) What is the ball's maximum acceleration?
- (c) What is the ball's position when the acceleration is maximum?
- (d) What is the speed of the ball when $x = 3.0$ cm?