

PHY 2043 Homework Chapter 14
Return by Monday, April 7, 2008

(Return homework after lecture or put into mailbox "Dodel" in BS, 301)

Name (print): _____

DIRECTIONS:

1. Each of the homework problems is worth 1 point, if the result is correct and the work shown. You will not get any credit if you do not show the work needed to arrive at an answer.
2. For every problem show the work needed to arrive at your answer **AND write the letter of the answer corresponding to your solution into the table below.**

	(a)	(b)	(c)	(d)	(e)
14-A					
14-B					
14-C					
14-D					
14-E					
14-F					

3. **WRITE LEGIBLY.** With pen only, no pencils!

Choose the correct answer for each of the problems below:

(14-A)

A particle moving with simple harmonic motion has a maximum displacement of +12.0 cm. The particle moves from its maximum positive to its maximum negative displacement in 2.25 s. The motion starts when the displacement is $x = +12.0$ cm. Find the period of the oscillation and the speed of the particle when it is at $x = -6.00$ cm.

- (a) 1.16 s and $29.0 \frac{\text{cm}}{\text{s}}$
- (b) 4.50 s and $14.5 \frac{\text{cm}}{\text{s}}$
- (c) 2.25 s and $7.26 \frac{\text{cm}}{\text{s}}$
- (d) 2.25 s and $-7.26 \frac{\text{cm}}{\text{s}}$
- (e) 4.50 s and $-14.5 \frac{\text{cm}}{\text{s}}$

(14-B)

The equation for the period T of a mass m oscillating with simple harmonic motion at the end of a spring with a force constant k is

$$T = 2\pi\sqrt{\frac{m}{k}}$$

A mass m that is oscillating on a spring with a force constant of $0.52 \frac{\text{N}}{\text{m}}$ has a period of 2.1 s. On a second spring, the same mass has a period of 3.5 s. Determine the force constant of the second spring and the mass m .

- (a) $0.16 \frac{\text{N}}{\text{m}}$ and 48 g
- (b) $0.19 \frac{\text{N}}{\text{m}}$ and 58 g
- (c) $0.20 \frac{\text{N}}{\text{m}}$ and 0.062 kg
- (d) $0.31 \frac{\text{N}}{\text{m}}$ and 96 g
- (e) $0.75 \frac{\text{N}}{\text{m}}$ and 0.023 kg

(14-C)

A simple way to test if a device can withstand high “g-force” is to attach the device to a vibrating platform. Suppose a device has to withstand up to $5g$'s, and the amplitude of the oscillation is 5 cm, the frequency of the vibration should be

- (a) 4.98 Hz
- (b) 981 Hz
- (c) 31.3 Hz
- (d) 44.3 Hz
- (e) 62.6 Hz

(14-D)

A mass on a spring oscillates with an amplitude of 5.0 cm. (a) At what position of the mass are the kinetic and potential energies equal? (b) How often does equality of kinetic and potential energy occur in one cycle?

- (a) (a) 2.50 cm (b) 2 times
- (b) (a) 3.54 cm (b) 2 times
- (c) (a) 2.50 cm (b) 4 times
- (d) (a) 3.54 cm (b) 4 times
- (e) (a) 3.82 cm (b) 2 times

(14-E)

The equation of a body in simple harmonic motion is

$$y = 8.0 \cos\left(20t + \frac{1}{4}\pi\right)$$

where y is in centimeters and t is in seconds. The frequency of the oscillations is

- (a) $\frac{\pi}{10}$ Hz
- (b) $\frac{\pi}{4}$ Hz
- (c) $\frac{10}{\pi}$ Hz
- (d) 8 Hz
- (e) 20 Hz

(14-F)

A light spring stretches 0.13 m when a 0.35-kg mass is hung from it. The mass is pulled down from this equilibrium position an additional 0.12 m and is released. Determine (a) the spring constant k , (b) the amplitude of the oscillation, and (c) the frequency of the oscillation.

- (a) (a) $26.4 \frac{\text{N}}{\text{m}}$ (b) 0.12 m (c) 1.38 Hz
- (b) (a) $26.4 \frac{\text{N}}{\text{m}}$ (b) 0.25 m (c) 1.38 Hz
- (c) (a) $2.69 \frac{\text{N}}{\text{m}}$ (b) 0.13 m (c) 0.44 Hz
- (d) (a) $28.6 \frac{\text{N}}{\text{m}}$ (b) 0.12 m (c) 1.44 Hz
- (e) (a) $28.6 \frac{\text{N}}{\text{m}}$ (b) 0.25 m (c) 1.44 Hz