Physics 2305 27 March, 2000
Quiz 11—Form A

1. Two children are swinging on two identical swings. Alicia has a mass of 20 kg, while her older sister Trudy has a mass of 40 kg. Treating them as simple pendula, what is the ratio of the periods of their oscillations?

A) 1 : 1.0
B) 1 : 1.4
C) 1 : 2.0
D) 1 : 4.0

2. A 1.5 kg mass is attached to a spring of spring constant 720 N/m and oscillates with a 0.05 m amplitude. What is the total mechanical energy?

A) 0.19 mJ
B) 0.90 J
C) 1.8 J
D) more information is needed

Useful equations:

$x = x_m \cos(\omega t + \phi)$ $\omega = 2\pi f = 2\pi / T$
$T = 2\pi (m/k)^{1/2}$ $E = \frac{1}{2} k x_m^2 = \frac{1}{2} m v_m^2$
$T = 2\pi (l/g)^{1/2}$ $K = \frac{1}{2} m v^2$
$T = 2\pi (I/mgh)^{1/2}$ $U = m g h$
$T = 2\pi (I/\kappa)^{1/2}$

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Quiz 11—Form B

1. If you wish to construct a simple pendulum which will have a period of 1.0 seconds on the surface of the Earth, how long should the cord be?

A) 0.25 m
B) 1.0 m
C) 1.6 m
D) more information is needed

2. Which of the following relations would result in simple harmonic motion in s?

A) $m\ \mathrm{d}^2s/\mathrm{d}t^2 = -\ k\ s^2$
B) $c\ \mathrm{d}^2s/\mathrm{d}t^2 + b\ \mathrm{d}s/\mathrm{d}t = -\ a\ s$
C) $l\ \mathrm{d}s/\mathrm{d}t = -\ g\ s$
D) $p\ \mathrm{d}^2s/\mathrm{d}t^2 = -\ q\ s$

Useful equations:

$x = x_m \cos(\omega t + \phi)$ $\omega = 2\ \pi\ f = 2\ \pi\ /\ T$
$T = 2\pi\ (m/k)^{1/2}$ $E = \frac{1}{2}\ k\ x_m^{\ 2} = \frac{1}{2}\ m\ v_m^{\ 2}$
$T = 2\pi\ (l/g)^{1/2}$ $K = \frac{1}{2}\ m\ v^2$
$T = 2\pi\ (I/mgh)^{1/2}$ $U = m\ g\ h$
$T = 2\pi\ (I/\kappa)^{1/2}$