Physics 2305 21 February, 2000
Quiz 7—Form A

A leaf of mass 5.0 g falls from a tree straight to the ground 5.5 m below.

1. In the absence of air resistance, what would its velocity be when it hits the ground?

A) 3.5 m/s
B) 5.2 m/s
C) 7.3 m/s
D) 10.4 m/s

2. If its velocity is actually 1.4 m/s when it lands, what is the average force of air resistance during its fall?

A) 0.037 N
B) 0.049 N
C) 0.098 N
D) 0.27 N

Useful constants and equations:

$U_g = m\ g\ h$ $\quad K = (\tfrac{1}{2})\ m\ v^2$ $\quad F_g = m\ g$

$U_e = (\tfrac{1}{2})\ k\ x^2$ $\quad F_e = -\ k\ x$

$g = 9.8\ \text{m/s}^2$ $\quad W = \int \mathbf{F}(x) \cdot d\mathbf{x}$ $\quad f = \mu\ N$

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Quiz 7—Form B

1. Albert attempts to drive his car up an icy (frictionless) driveway 12 m long inclined 30° from the horizontal. How fast must he start to reach the flat parking area above the sloped driveway?

A) 7.7 m/s
B) 11 m/s
C) 14 m/s
D) 15 m/s

2. A mass *m* moves in a vertical circle of radius *r*. The only forces acting on it are gravity and the tension in the string. What is the difference in kinetic energy of the mass between the top and bottom of the circle?

A) $m\ g\ r$
B) $2\ m\ g\ r$
C) $\frac{1}{2}\ m\ v_{top}^{2}$
D) $\frac{1}{2}\ m\ v_{bottom}^{2}$

Useful constants and equations:

$U_g = m\ g\ h$ $\quad K = (\frac{1}{2})\ m\ v^2$ $\quad F_g = m\ g$
$U_e = (\frac{1}{2})\ k\ x^2$ $\quad F_e = -\ k\ x$
$g = 9.8\ \text{m/s}^2$ $\quad W = \int \mathbf{F}(x) \cdot d\mathbf{x}$ $\quad f = \mu\ N$

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Quiz 7—Form C

1. Tony slips at the top of an icy (frictionless) loading ramp inclined 75° from the horizontal. If he starts at rest, how fast is he moving after sliding 2.5 m along the ramp?

A) 4.9 m/s
B) 6.9 m/s
C) 7.0 m/s
D) 25 m/s

2. Two identical masses are dropped vertically onto two identical springs. If one mass is dropped from a height (h) twice as great as the other, what is the ratio of the compression distance (d) of the two springs? (Assume $h >> d$.)

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

Useful constants and equations:

$U_g = m\ g\ h$ $\quad K = (\tfrac{1}{2})\ m\ v^2$ $\quad F_g = m\ g$

$U_e = (\tfrac{1}{2})\ k\ x^2$ $\quad F_e = -\ k\ x$

$g = 9.8\ \text{m/s}^2$ $\quad W = \int \mathbf{F}(x) \cdot d\mathbf{x}$ $\quad f = \mu\ N$