1. A body is suspended vertically from an ideal spring. The spring is initially in its relaxed (unstretched) position. The body is then released and oscillates about its equilibrium position. The acceleration is greatest in magnitude and is directed downward when
   (a) the spring is relaxed      (b) the body is at the equilibrium point
   (c) the spring is at its maximum extension  (d) the body is somewhere between the equilibrium position and the maximum of the spring extension

\[ F = ma \rightarrow a = F/m, \text{ but } F = -kx \rightarrow a = -kx/m, \text{ where } x \text{ is measured from equilibrium} \]
\[ \rightarrow \text{Maximum } |a| \text{ when } x \text{ is maximum, which is either (a) or (c). At (a), the acceleration is downwards, at (c) the acceleration is upward } \rightarrow \text{ correct answer is (a)} \]

2. A 20 Kg object on a frictionless floor is attached to a wall by a spring. A 5 N force horizontally displaces the object 1 m from its equilibrium position. The period of oscillation of the object is
   (a) 2 sec      (b) 6.08 sec      (c) 12.6 sec      (d) 16.4 sec

\[ k = F/x = 5/1 \text{ N/m} = 5 \text{ N/m} \]
\[ \omega^2 = k/m, \text{ but } \omega = 2\pi/T \rightarrow 4\pi^2/T^2 = k/m \rightarrow T^2 = 4\pi^2m/k = 4\pi^2 \cdot 20 /5 \text{ sec}^2 = 158 \text{ sec}^2 \]
\[ \rightarrow T = 12.6 \text{ sec} \rightarrow \text{ correct answer is (c)} \]

(Note: this question is from an MCAT test)
3. A force F applied to each end of a steel wire (length L, diameter d) stretches it by 1 mm. How much does F stretch another steel wire of length 2L and diameter 2d?
(a) 0.5 mm (b) 1 mm (c) 2 mm (d) 4 mm (e) 0.25 mm

Stress/Strain = $Y$ → Strain = Stress/Y → $\Delta L/L = F/(Y \pi \frac{1}{4} d^2)$ →
$\Delta L = (4F/\pi Y) L/d^2$ → If L doubles and d doubles, $\Delta L$ is halved. Correct answer is (a)

4. The unit for spring constant are
(a) N (b) J (c) N/s (d) N/m (e) Nm/s$^2$

F = -$kx$ → $[k] = [F]/[x] = N/m$ → Correct answer is (d)

5. A mass m is attached to a spring of spring constant k. The spring is stretched by a certain amount and then released. The mass then oscillates, and its maximum velocity is found to be $V_1$. The experiment is repeated in exactly the same way, but with a new spring of spring constant 2k. The maximum velocity is found to be $V_2$.
(a) $V_1 = V_2$ (b) $V_1 = 2V_2$ (c) $V_1 = \frac{1}{2}V_2$ (d) $V_1 = \sqrt{2}V_2$ (e) $V_1 = \frac{1}{\sqrt{2}}V_2$

$E = \frac{1}{2}k A^2 = \frac{1}{2}m V_{max}^2$ → $V_{max}^2 = A^2 k/m$
If k is doubled, $V_{max}^2$ is doubled → Correct answer is (e)
## Summer 2007
### Standard Item Analysis Report On Quiz1 Version A

**Course #:** Phys 6B  
**Course Title:** Phys 6B  
**Instructor:** Campagnari  
**Description:** Summer 2007  
**Term/Year:**

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<th><strong>Median Score:</strong></th>
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<th><strong>Highest Score:</strong></th>
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08/08/07
Summer 2007
Score Distribution Histogram Report On QUIZ1

Course #: Phys 6B
Course Title: Phys 6B
Day/Time:

Instructor: Campagnari
Description: Summer 2007
Term/Year:

No. of students in this group: 80
Student group from: All Students
Total Possible Points: 5.00 Highest Score: 4.00 Mean Score: 2.24
Standard Deviation: 0.88 Lowest Score: 0.00 Median Score: 2.21

No. of Students

Percent

0 10 20 30 40 50 60 70 80 90 100