Quiz 1
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Physics 2010, Adam Johnston
As always, show all your work and circle your final answer (both numerical and multiple choice). All numeric values are good to 3 significant figures. Potentially useful info:

1 inch = 2.54 cm, 1 foot = 0.3048 m, 1 mile = 5280 feet, 1 hour = 3600 s, 1 year = 3.16x10^7 s

1. [3 pts] Each year in the state of Utah, approximately how much ice cream is sold?
   A. 10^6 gallons  B. 10^4 gallons  C. 10^7 gallons  D. 10^{10} gallons

2. [3 pts] Later in this course you will study something called "gravitational potential energy," which can be expressed with the following equation:
   \[ U = mgh \]
   Where \( m \) is measured in kg, \( g \) is measured in m/s^2, and \( h \) is measured in meters. What are the units for \( U \)?
   A. kg m/s^2  B. kg m^2/s  C. kg m/s^2  D. kg m/s

3. [3 pts] Time, \( t \), is measured in seconds (s). Position, \( x \), is measured in units of meters (m). Velocity, \( v \), is measured in units of m/s. Acceleration, \( a \), is measured in units of m/s^2. Which of the following are possibly valid equations?
   A. \( v = 2ax \)  B. \( v^2 = 2ax \)  C. \( v^2 = 2a^2x \)  D. None of these

4. [6 pts] On his way to school today, Adam rode on his bicycle, averaging 12.0 miles/hour. (There are a lot of hills on his ride!) What is this speed in meters per second (m/s)?

\[
12.0 \frac{\text{miles}}{\text{hr}} \left( \frac{5280 \text{ ft}}{1 \text{ mile}} \right) \left( \frac{0.3048 \text{ m}}{1 \text{ ft}} \right) \left( \frac{1 \text{ hr}}{3600 \text{ s}} \right) = 5.360 \frac{\text{m}}{\text{s}}
\]

5. [5 pts] You have a square whose sides you increase in size by 50%. By what percentage does the area of this square increase?

\[
\begin{align*}
A_1 &= l_1^2 \\
A_2 &= l_2^2 \\
\frac{A_2}{A_1} &= \frac{l_2^2}{l_1^2} = \left( \frac{1.50 l_1}{l_1} \right)^2 = 2.25 \\
\text{increases by a factor of 2.25 or } 125\%
\end{align*}
\]