1. A child rides a pony on a circular track of radius 5.0 m. The displacement after the child has gone halfway around the track is
   (a) 15.7 m   (b) 10.0 m   (c) 5.0 m   (d) 31.4 m   (e) 0.0 m

2. Which graph represents a body at rest
   (a) \[ \text{constant} \]   (b) \[ \text{constant} \]   (c) \[ \text{constant} \]   (d) \[ \text{constant} \]   (e) \[ \text{constant} \]

3. An important physics equation is \( U = mgh \). If the units of \( U \) are kg \( \cdot \) m\(^2\) \( \cdot \) s\(^{-2}\), the units of \( m \) are kg, and the units of \( g \) are m\( \cdot \)s\(^{-2}\), what are the units of \( h \)?
   (a) s   (b) s\(^2\)   (c) m\(^{-1}\)   (d) m   (e) kg
   \[ h = \frac{U}{mg} \rightarrow [h] = \frac{[U]}{[m][g]} = \frac{kg \cdot m^2 \cdot s^{-2}}{kg \cdot m/s^2} = m \]

4. A car is traveling at 45 km/h. The application of the brakes results in a constant deceleration of 5 m/s\(^2\). How long will it take the car to stop?
   (a) 0.4 s   (b) 2.5 s   (c) 5 s   (d) 9 s
   \[ v_0 = 45 \text{ km/h} = \frac{45 \text{ km}}{h} \times \frac{1000 \text{ m}}{\text{km}} \times \frac{1 \text{ h}}{3600 \text{ s}} = 12.5 \text{ m/s} \]
   Given: \( v_0 = 12.5 \text{ m/s} \), \( a = -5 \text{ m/s}^2 \), \( v = 0 \text{ m/s} \) (stop)
   \[ t = \frac{v - v_0}{a} \]
   \[ t = \frac{0 - 12.5}{-5} = 2.5 \text{ s} \]

5. If the position of a body is zero, its speed
   (a) must be zero   (b) can be anything   (c) is zero only if the time is zero
   (d) is zero only if the acceleration is zero
   because its position may be only instantaneously at 0.
Physics 6A Discussion Quiz 18

1. A child travels 60 meters north and then 120 meters south. What is the displacement?
   (a) 20 m south  (b) 60 m south  (c) 120 m south  (d) 180 m south  
   (e) 60 m north

2. Which graph represents constant positive acceleration
   (a)    (b)    (c)    (d)    
   Acceleration is the slope of a v versus t graph

3. Kinetic Energy is given by the formula $KE = \frac{1}{2}mv^2$, where $m$ is the mass and $v$ is its velocity. The SI unit of energy is the Joule (J) which is equivalent to what combination of basic units?
   (a) kg m/s²  (b) g cm²/s²  (c) kg m/s²  (d) kg m²/s
   Units of $\frac{1}{2} mv^2$ are kg (m²/s²) = kg m²/s² same as J (Joule)

4. A car accelerating from rest at 2.0 m/s² for 5.0 s
   (a) covers a distance of 10 m  (c) has a final speed of 10 m/s
   (b) covers a distance of 50 m  (d) has an average velocity of 10 m/s
   Given: $v_0 = 0 \text{ m/s}$ (from rest), $a = 2.0 \text{ m/s}^2$, $t = 5.0 \text{ s}$
   $x-x_0 = v_0 t + \frac{1}{2} at^2 = 25 \text{ m}$ so (a) and (b) not correct
   $v = v_0 + at = 0 + 2 \text{ m/s} \times 5 \text{ s} = 10 \text{ m/s}$. Speed $= |v|$ so C correct

5. If a car accelerates from rest in the positive direction
   (a) its final velocity is zero  (b) its acceleration is negative
   (c) its final velocity is positive  (d) its displacement is negative
   $x$, $v$, $a$ are all sensed positive in same direction.
   Thus $a$ is positive, $v_0 = 0$ so $a > 0 \rightarrow v > 0$