Name QUIZ – KEY SP211

1. A particle begins from rest and accelerates at 5.00 m/s^2.

a. How long does it take to travel 100. m?

$$x = \cancel{x_0}^{0} + \cancel{v_0 t}^{0} + \tfrac{1}{2} a t^2$$

$$100\,m = \tfrac{1}{2}(5\,m/s^2)t^2$$

$$\frac{200\,m}{5\,m/s^2} = 40\,s^2 = t^2 \quad \Rightarrow \quad t = \sqrt{40\,s^2}$$

$$= \boxed{6.32\,s}$$

b. What is its velocity when it has traveled 100. m?

$$v = \cancel{v_0}^{0} + at = (5\,m/s^2)(6.32\,s) = \boxed{31.6\,m/s}$$

Or

$$v^2 = \cancel{v_0^2}^{0} + 2a(x - x_0) = 2(5\,m/s^2)(100\,m) = 1000\,\frac{m^2}{s^2}$$

$$v = \sqrt{1000\,\frac{m^2}{s^2}} = \boxed{31.6\,m/s}$$

2. The Barringer meteor crater in northern Arizona is 180m deep. The fragments of the meteor lie just below the bottom of the crater. If these fragments decelerated at a constant 4.0x10^5 m/s^2 as they ploughed the 180 m through the earth while creating the crater, what was the velocity of the meteor just prior to impact? Assume the meteor stuck the earth normal to the surface. Have you made upward or downward the positive direction?

DOWNWARD (+) $\Rightarrow$ v_0 ↓ (+)

Δy ↓ (+)

a ↑ (−)

$$v^2 = 0 = v_0^2 + 2a(y - y_0)$$

$$v_0^2 = -2a\Delta y$$

$$v_0 = \sqrt{-2(-4\times10^5\,\frac{m}{s^2})(180\,m)} = \sqrt{1.44\times10^8\,\frac{m^2}{s^2}}$$

$$= \boxed{12{,}000\,m/s}$$

$v = v_0 + at \qquad x = x_0 + v_0 t + \frac{1}{2}at^2 \qquad v^2 = v_0^2 + 2a(x - x_0) \qquad \bar{v} = \frac{v_0 + v}{2}$

Extra Credit: What establishment in Buffalo, NY was the first to serve Buffalo Style Chicken Wings? What is the correct dipping sauce?

ANCHOR BAR

BLEU CHEESE