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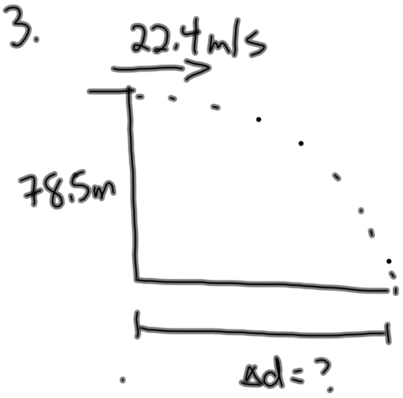
3.



Vertically:

$v_1 = 0$

$\Delta d = -78.5m$

$a = -9.81 m/s^2$

$\Delta t = ?$

$\Delta d = \overset{0}{\cancel{v_1 \Delta t}} + \frac{1}{2}a(\Delta t)^2$

$\Delta d = \frac{1}{2}a(\Delta t)^2$

$\frac{2\Delta d}{a} = (\Delta t)^2$

$(\Delta t)^2 = \frac{2(-78.5m)}{-9.81m/s^2}$

$\boxed{\Delta t \doteq 4.00s}$

Horizontally:

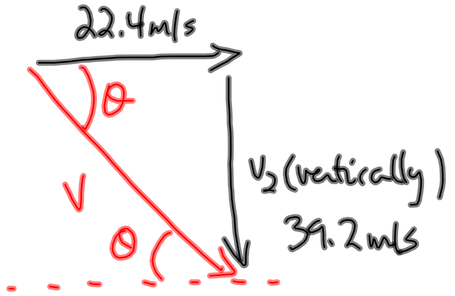
$v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\Delta t$

$\Delta d = (22.4m/s)(4.00s)$

$\boxed{\Delta d \doteq 89.6m}$

b) The skier's velocity when landing:



Vertically:

$a = \frac{\Delta v}{\Delta t}$

$a = \frac{v_2 - v_1}{\Delta t}$

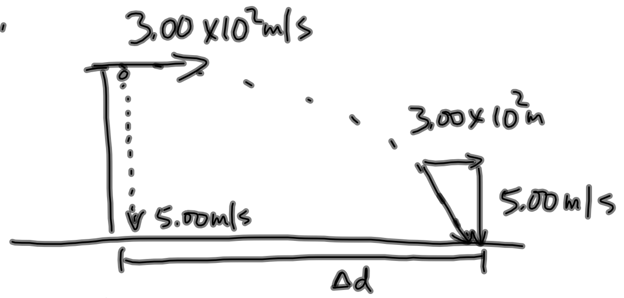
$a\Delta t = v_2 - v_1$

$\boxed{v_2 = v_1 + a\Delta t}$

$v_2 = 0 - 9.81\frac{m}{s^2}(4.00s)$

$v_2 \doteq 39.2\frac{m}{s}$

8.



Vertically

a) $V_1 = 0$

$V_2 = -5.00\,m/s$

$a = -9.81\,m/s^2$

$\Delta t = ??$

$a = \frac{\Delta V}{\Delta t}$

$\Delta t = \frac{\Delta V}{a}$

$\Delta t = \frac{-5.00\,m/s - 0}{-9.81\,m/s^2}$

$\boxed{\Delta t \doteq 0.510\,s}$

Horizontally

$V = \frac{\Delta d}{\Delta t}$

$\Delta d = V \Delta t$

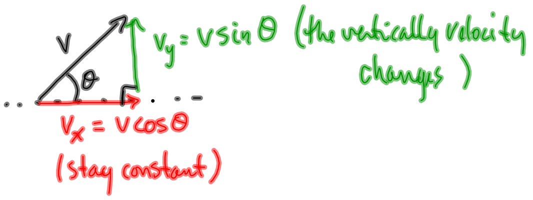
$\Delta d = (3.00 \times 10^2 \frac{m}{s})(0.510\,s)$

$\boxed{\Delta d \doteq 153\,m}$

b) $V_2(\text{vertically}) = -5.00\,m/s$

5.00 m/s [down]

Projectiles Launched at an Angle



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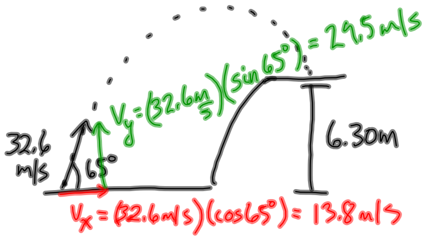


a) $\Delta t = ?$

b) $\Delta d_x = ?$

c) $\vec{v}_{impact} = ?$

a) vertically:

$v_1 = 29.5 m/s$

$a = -9.81 m/s^2$

$\Delta d = +6.30 m$

$\Delta t = ?$

$$\Delta d = v_1\Delta t + \frac{1}{2}a(\Delta t)^2$$

$$6.30 = (29.5)\Delta t - \frac{9.81}{2}(\Delta t)^2$$

$$\frac{9.81}{2}(\Delta t)^2 - (29.5)\Delta t + 6.30 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{29.5 \pm \sqrt{(29.5)^2 - 4(\frac{9.81}{2})(6.30)}}{9.81}$$

$$x = \frac{29.5 \pm 27.3}{9.81}$$

(a) $x = \boxed{5.79 s}$ or $0.224 s$

b) horizontally:

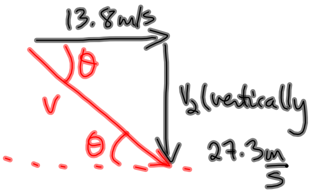
$$v_x = \frac{\Delta d_x}{\Delta t}$$

$\Delta d_x = v_x \Delta t$

$\Delta d_x = (13.8\frac{m}{s})(5.79s)$

$\boxed{\Delta d_x = 79.9m}$

c)



vertically

$v_1 = 29.5 m/s$

$a = -9.81 m/s$

$\Delta t = 5.79 s$

$v_2 = ?$

$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{v_2 - v_1}{\Delta t}$$

$v_2 = v_1 + a\Delta t$

$v_2 = 29.5\frac{m}{s} - 9.8\frac{m}{s^2}(5.79$

$v_2 = -27.3\frac{m}{s}$

$v^2 = (13.8)^2 + (27.3)^2$

$\boxed{v = 30.6\frac{m}{s}}$

$$\tan\theta = \frac{27.3}{13.8}$$

$\boxed{\theta = 63.2°}$

The velocity just before impact is 30.6m [13.2° to the horizontal]

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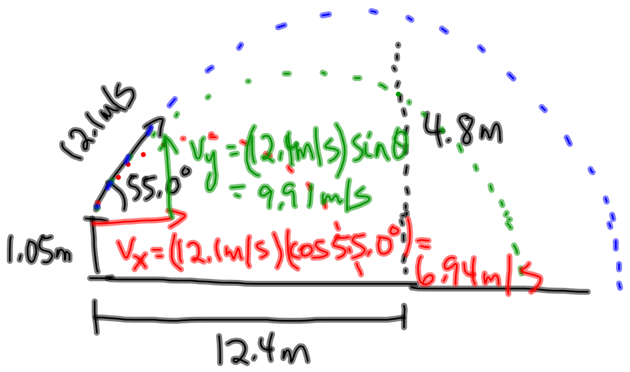

* Showing that $\Delta d_x > 12.4\,m$ <u>DOES</u> <u>NOT</u> show that the ball goes over the fence. You need to find the <u>height</u> of the ball when it has travelled 12.4m horizontally

Horizontally:

$$v = \frac{\Delta d}{\Delta t}$$

$$\Delta t = \frac{\Delta d}{v}$$

$$\Delta t = \frac{12.4\,m}{6.94\,m/s}$$

$$\boxed{\Delta t \doteq 1.79\,s}$$

Vertically

$v_1 = 9.91\,m/s$

$\Delta d = ??$

$a = -9.81\,m/s^2$

$\Delta t = 1.79\,s$

$$\Delta d = v_1 \Delta t + \frac{1}{2} a (\Delta t)^2$$

$$\Delta d = (9.91\,m/s)(1.79\,s) - \frac{9.81}{2}\,m/s^2 (1.79\,s)^2$$

$$\Delta d = 2.08\,m$$

(how high above the launch level of 1.05m)

$\boxed{h = 2.08\,m + 1.05\,m = 3.13\,m}$ above ground.

Since 3.13m < 4.8m, the ball hits the fence!

OR

$$\begin{array}{r} 4.8 \\ -\ 1.05 \\ \hline 3.75\ m \end{array}$$

since 2.08m < 3.75m the ball hits the fence.

$\boxed{PP|543}$