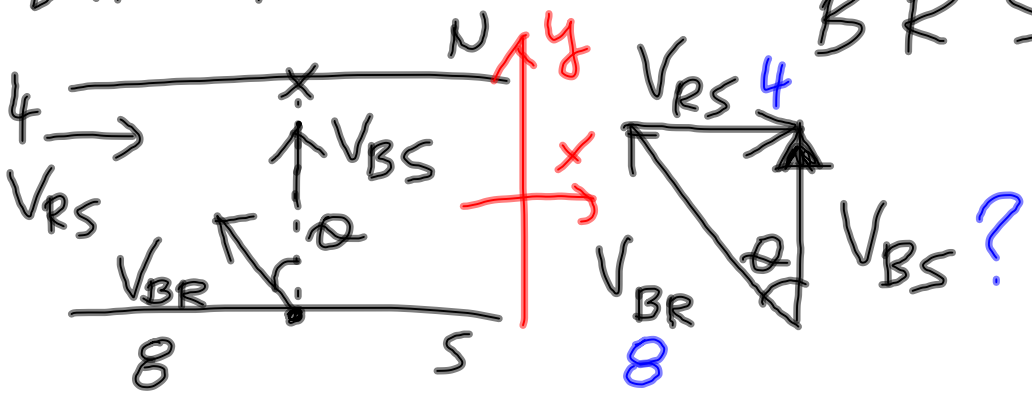
BOATS CROSSING RIVERS.

B R S



$$V_{BR}^2 = V_{RS}^2 + V_{BS}^2$$

$$V_{BS} = \sqrt{V_{BR}^2 - V_{RS}^2}$$

Nov 3-7:52 AM

$$\sin\theta = \frac{V_{RS}}{V_{BR}}$$

$$\theta = \sin^{-1}\left(\frac{4}{8}\right)$$

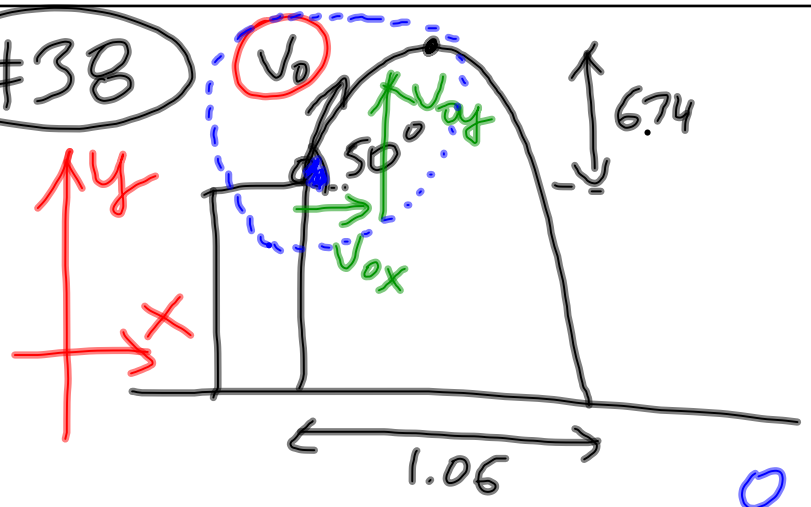
IF Δy IS KNOWN, CALC. t TO CROSS?

$$\Delta y = V_{BS} \cdot t$$

$$t = \frac{\Delta y}{V_{BS}}$$

Nov 3-8:02 AM

#38



$V_{ox} = V_0 \cdot \cos 50°$

$V_{oy} = V_0 \sin 50°$

(y) $\Delta y = \dfrac{V_y^2 - V_{oy}^2}{2 \cdot g}$

$V_y = 0$

$V_{oy} = \sqrt{\Delta y \cdot 2g}$

Nov 3-8:06 AM

$V_{oy} = V_0 \cdot \sin 50°$

$\sqrt{2g\Delta y} = V_0 \cdot \sin 50°$

$V_0 = \dfrac{\sqrt{2g\Delta y}}{\sin 50°}$

Nov 3-8:13 AM

b) Get total time from given Δx.

V_{0x} = known.

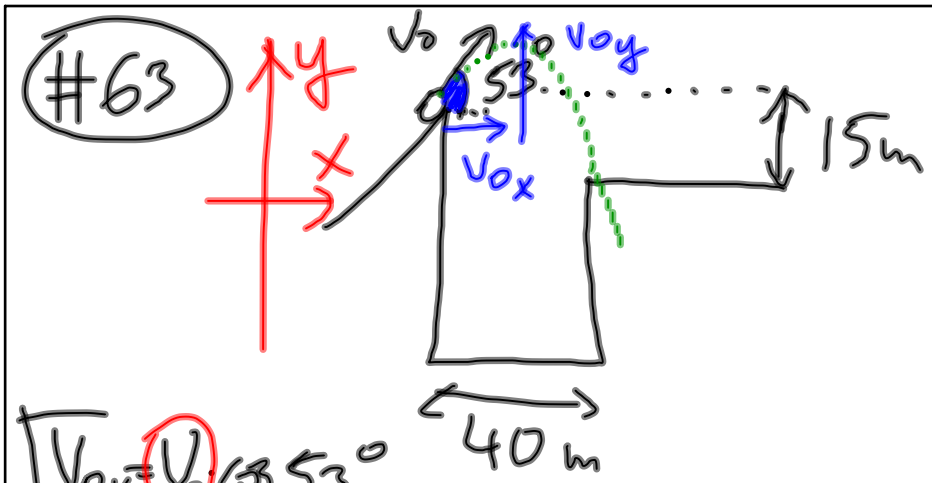
$\Delta x = V_{0x} \cdot t$

$t = \frac{\Delta x}{V_{0x}}$

$\Delta y = V_{0y} t + \frac{1}{2} g t^2$

Nov 3-8:15 AM

#63



$V_{0x} = V_0 \cos 53°$

$V_{0y} = V_0 \cdot \sin 53°$

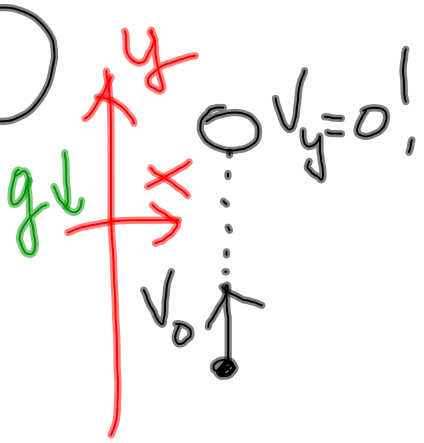
Nov 3-8:16 AM

An engineer calculated the theoretical maximum height of a ball shot straight up into the air. The initial velocity was known (v_0). An experiment was set up and the measured max. height was lower than the theoretical. List possible causes of the discrepancy with detailed explanation (derivations). There is no air resistance!

(1) $V_{0E} < V_{0T}$

$$\Delta y = \frac{V_{fy}^2 - V_{oy}^2}{2 \cdot g}$$

(2)



Nov 3-8:28 AM

$$\boxed{\Delta y = \frac{-V_{oy}^2}{2g}} \qquad \boxed{V_{oy} = V_0}$$

SHOT AT $\theta = 90^\circ$

$V_{0E} < V_{0T}$, SO

THE NUMERATOR IS SMALLER, SO

Δy IS LESS.

Nov 3-9:03 AM

(2) $\theta \neq 90^\circ$ (SAY: $\theta < 90^\circ$)

$V_{0x} = V_0 \cdot \cos\theta$

$V_{oy} = V_0 \cdot \sin\theta$

$\Delta y = \dfrac{V_y^2 - V_{oy}^2}{2 \cdot g}$ ($V_y = 0$)

$\Delta y = \dfrac{(V_0 \sin\theta)^2}{2 \cdot g}$

Nov 3-9:06 AM

IF $\theta = 90^\circ$, $\sin 90^\circ = 1$, so $\Delta y = MAX$.

IF $\theta < 90^\circ$, $\sin(\theta) < 1$, so Δy IS LESS.

Nov 3-9:09 AM