$\vec{N} = 5m @ 35^\circ$

$\vec{K} = 7m @ 22^\circ$

$\vec{N} + \vec{K} = ?$

Two vectors, $\vec{A}$ and $\vec{B}$ have ~~maximum~~ magnitude 4 and 5, and unknown direction.

what is the maximum possible value of $\vec{A} + \vec{B}$?

Minimum?

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* A ball is launched at some angle. when is the X-component of velocity the largest?

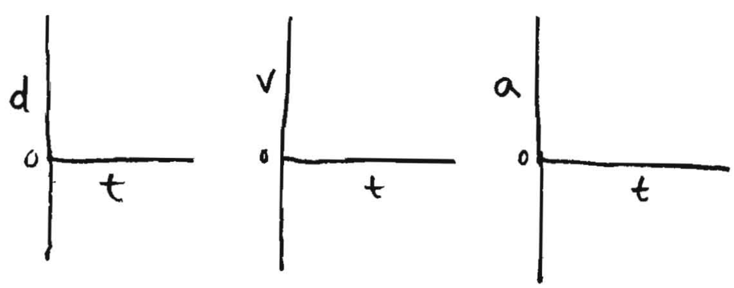
A ball is launched off a cliff. when is the Y-component of velocity the largest?

---

a ball rolls off of the edge of a table at a rate of 8 m/s. How tall is the table if it lands 2.5 m away on the floor?

* what is the Final velocity hitting the floor?

A ball rolls off a table. create the Following graphs



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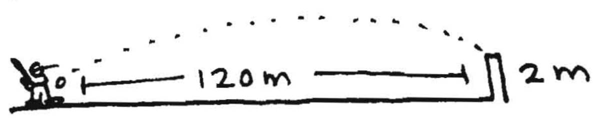
a ball is launched with velocity V at an angle θ from a height h. In terms of V, θ, and h:

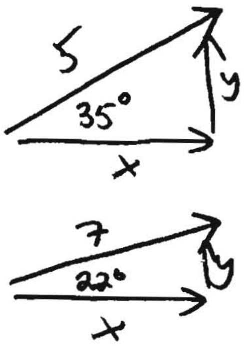
* what is the velocity at the ball's highest point?

* How much time does the ball spend in the air?

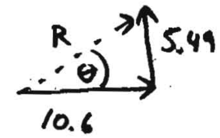
a baseball player hits a ball at a 45° angle to make a home run. If the field is 120m and the back fence is 2m above bat height, what speed must the ball come off the bat



1)



	X	y
$\vec{N}$:	5cos 35	5sin 35
$\vec{K}$:	7cos22	7sin 22
$\vec{R}$:	10.6	5.49



$R = \sqrt{10.6^2 + 5.49^2}$

$= 11.9\,m$

$\theta = \tan^{-1}\left(\frac{5.49}{10.6}\right) = 27.38°$

2)

MAX → SAME DIRECTION

$|5+4| = |9|$

MIN → OPPOSITE DIRECTION

$|5-4| = |1|$

ALL VALUES BETWEEN 1 & 9 CAN BE OBTAINED

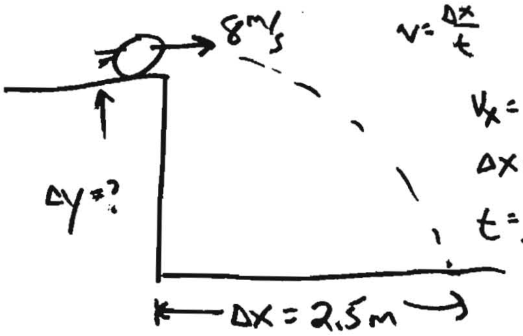
3)

- SAME THROUGHOUT
- V_x DOES NOT CHANGE

4) IN THIS CASE AT THE END OF ITS FLIGHT.

* IF BALL WAS LAUNCHED FROM & LANDED ON THE GROUND, THEN $V_{i_y} = -V_{f_y}$

5)



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

X	y
$V_x = 8\,\frac{m}{s}$	$V_{i_0} = 0$
$\Delta x = 2.5m$	$a = -9.8\,\frac{m}{s^2}$
t = ____	Δy = ?
	t = ____

SOLVE FOR t IN X-DIRECTION

$t = \frac{\Delta x}{V} = \frac{2.5\,m}{8\,\frac{m}{s}} = .313s$

$\Delta y = \cancel{V_i t}^{0} + \frac{1}{2} a t^2$

$\Delta y = \frac{1}{2}\left(-9.8\,\frac{m}{s^2}\right)(.313)^2$

$\Delta y = .48\,m$

~~$V_f = V_i + at$~~

VELOCITY WHEN IT HITS GROUND

$V_{f_y} = \cancel{V_i}^{0} + at$

$= -9.8(.313)$

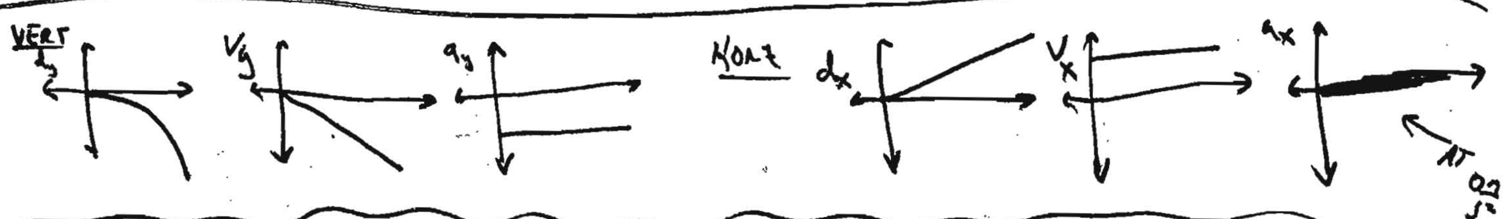
$= 3.07$

$V = \sqrt{8^2 + 3.07^2}$

$= 8.57\,\frac{m}{s}$

$\theta = \tan^{-1}\left(\frac{3.07}{8}\right) = 21$ BELOW HORZ

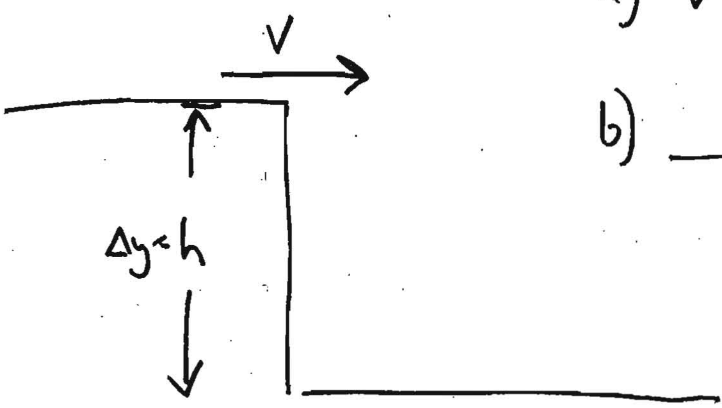
6)



7)

ON BACK

(7)



a) V

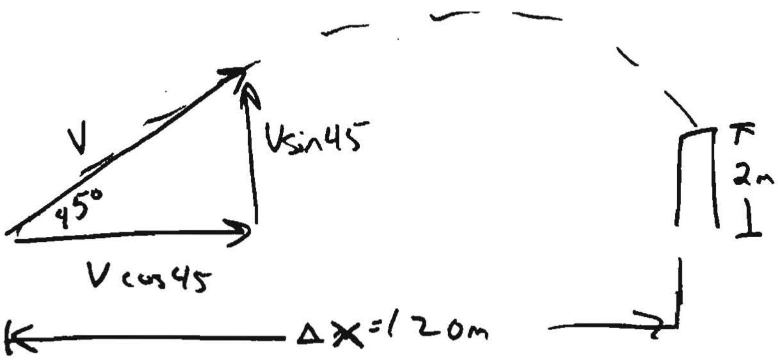
b)

y
$V_i = 0$
$a = -9.8 = g$
$\Delta y = h$
$t = ?$

$$\Delta y = \cancel{V_i t}^{\,0} + \frac{1}{2} a t^2$$

$$t = \sqrt{\frac{2\Delta y}{a}}$$

$$\boxed{t = \sqrt{\frac{2(h)}{g}}}$$



From Horz.

$$t = \frac{120}{V\cos 45}$$

↓ substitute ↓

$$\Delta y = V_i t + \frac{1}{2} a t^2$$

x	y
$V_x = V\cos 45$	$V_{iy} = V\sin 45$
$\Delta x = 120$	$a = -9.8$
$t =$ ____	$\Delta y = 2$

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

$$t = \frac{120}{V\cos 45}$$

$t =$ ____

$$2 = (\cancel{V}\sin 45)\left(\frac{120}{\cancel{V}\cos 45}\right) + \frac{1}{2}(-9.8)\left(\frac{120}{V\cos 45}\right)^2$$

$$2 = 120 + \frac{(-4.9)(14400)}{V^2(\cos 45)^2}$$

$$-118 = \frac{141120}{V^2}$$

$$\sqrt{V^2} = \sqrt{\frac{-141120}{-118}}$$

$$\boxed{V = 34.6 \tfrac{m}{s}}$$