Finish Reading chp 3

H.w 2 solutions available

old exams, study questions etc available

grp 2 solutions available

office hours

10:30 - 11:30 W

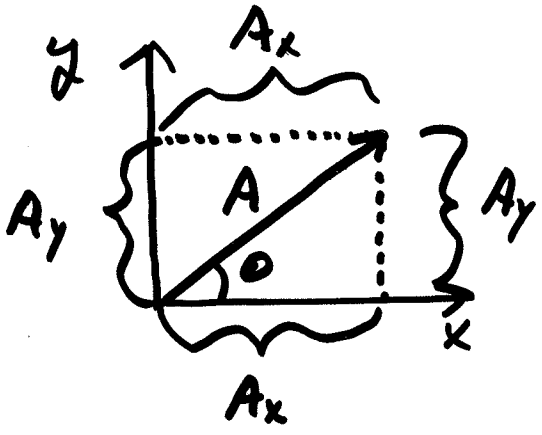
Review

Vectors magnitude and Direction

$\vec{A}$ ↗

2D vectors: Separate into components using Trig.

work with x-components and y-components separately



$$\sin\theta = \frac{A_y}{A}$$

$$\cos\theta = \frac{A_x}{A}$$

$$A_y = A\sin\theta$$

$$A_x = A\cos\theta$$

2-D Vectors

1) DRAW & Label the direction on x-y axis

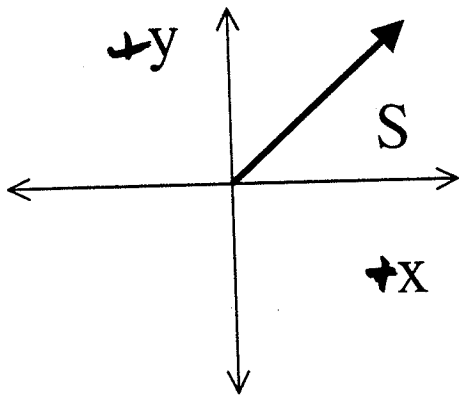
2) Determine components of each vector
   - use Trig to find length of components
   - sign given by direction of arrow

3) DO calculations separately using x & y components

4) combine results from x & y to get final vector

Interactive Question

Vector $\vec{S}$ has a magnitude of 5 m.

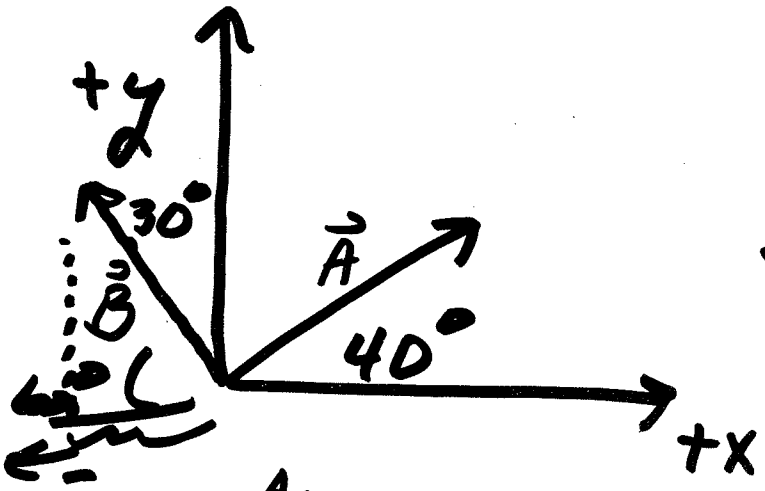


What are the possible components of $\vec{S}$?

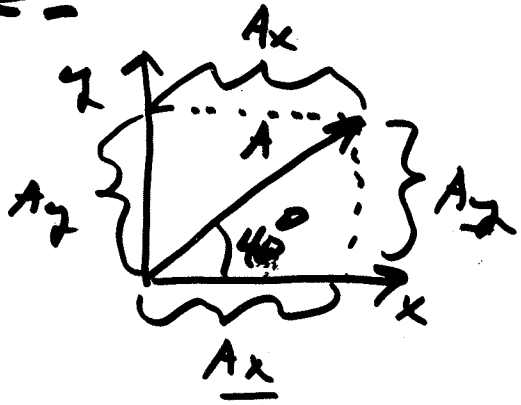
A) $S_x = 3$ $S_y = 4$
B) $S_x = -3$ $S_y = 4$
C) $S_x = -3$ $S_y = -4$
D) $S_x = 3$ $S_y = -4$
E) $S_x = 6$ $S_y = 4$

ex) length of $A = 5.00\ m$

length of $B = 7.00\ m$



- Find components of $\vec{A} + \vec{B}$
- Find $\vec{C} = \vec{A} + \vec{B}$

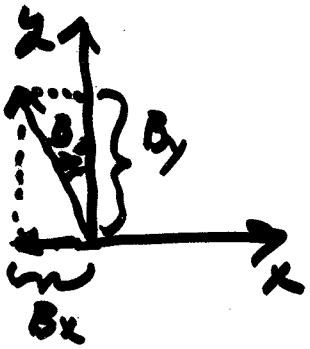


$A_x = A\cos 40^\circ = 5\cdot\cos 40^\circ$

$= \underline{3.83\ m}$

$A_y = A\sin 40^\circ$

$= 5\sin 40^\circ = \underline{3.21\ m}$



$B_x = B\sin 30^\circ =$

$7\sin 30^\circ = \underline{-3.50\ m}$

$B_y = B\cos 30^\circ$

$= 7\cos 30^\circ = \underline{6.06\ m}$

$\vec{C} = \vec{A} + \vec{B}$

$C_x = 3.83 - 3.50 = 0.33\ m$

$C_y = 3.21 + 6.06 = 9.27\ m$

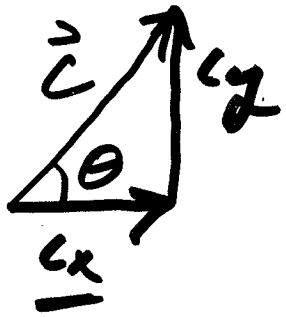
$\vec{A} = A_x + A_y$

$\vec{B} = B_x + B_y$

$\vec{C} = C_x + C_y$

$C_x = A_x + B_x$

$C_y = A_y + B_y$



$|C| = \sqrt{(.33)^2 + (9.27)^2}$

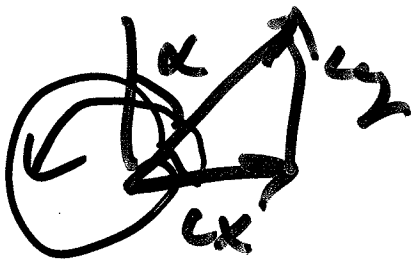
$= 9.28\ m$

$\tan\theta = \frac{9.27\ m}{.33\ m}$

$\sin\theta = \frac{9.27\ m}{9.28\ m}$ $\Rightarrow \theta = 88^\circ$

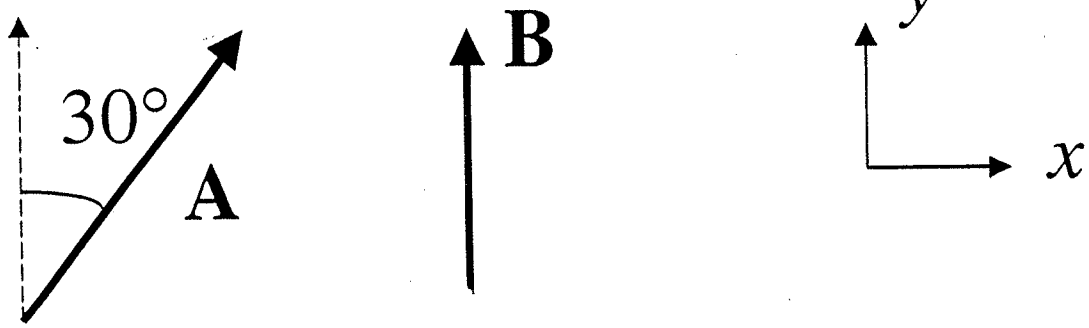
$\cos\theta = \frac{.33\ m}{9.28\ m}$

with respect to x-axis



Interactive Question

Two vectors, **A** and **B** are shown below. Which expressions gives the correct value for the *x* component of **A** and **B?**

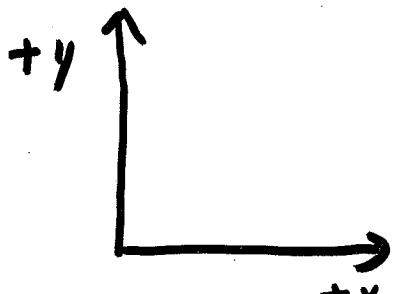


	x component of **A**	*x* component of **B**
A)	$A \cos 30°$	$B \cos 0°$
B)	$A \cos 30°$	B
C)	$A \cos 30°$	0
D)	$A \sin 30°$	$B \cos 0°$
E)	$A \sin 30°$	0

PROJECTILE MOTION

IN EARTH'S GRAVITATIONAL FIELD, acceleration = const

so we can use 4-Kinematic equations



$a = g = -9.8\ m/s^2$ **y-dir**

$$v_y = v_{oy} - gt$$

$$y = y_o + v_{oy}t - \frac{1}{2}gt^2$$

$$y = y_o + \frac{1}{2}(v_o + v_y)t$$

$$v_y^2 = v_{oy}^2 - 2g(y - y_o)$$

How about in X-DIRECTION?

DO we have acceleration in X-DIRECTION?

NO

IN X-DIRECTION $\vec{a} = 0$

(objects falling near earth's surface)

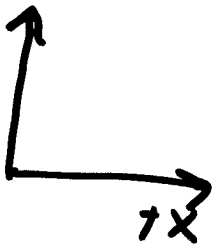
4-kinematic Eq's become

$V_x = V_{ox}$ $\qquad \vec{a} = 0$

$X = X_0 + V_{ox} t$

X-DIR

- No acceleration in X-dir
- $a = -g$ in y-dir



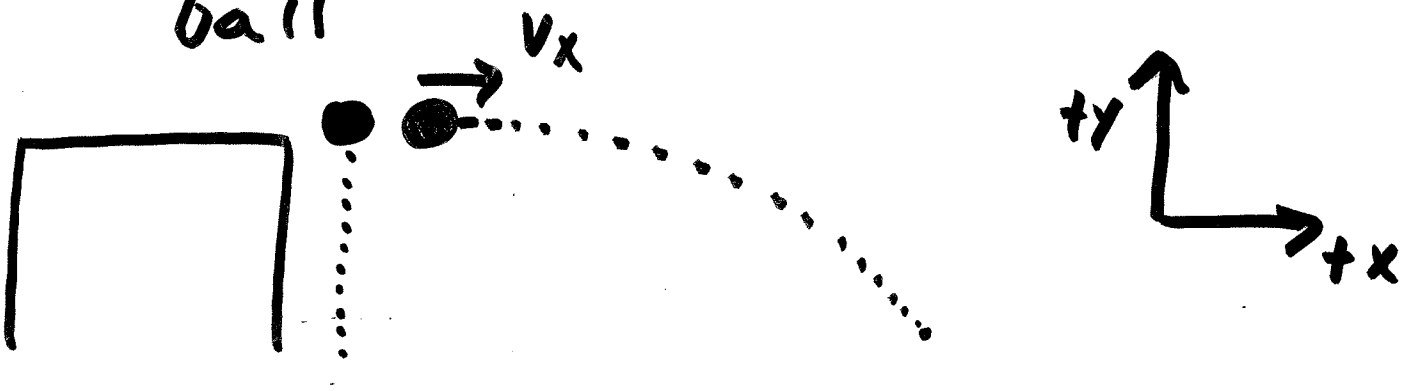
Key to solving problems

X & Y ARE

INDEPENDENT

what is happening in X-dir has NO effect on what is happening in Y-dir

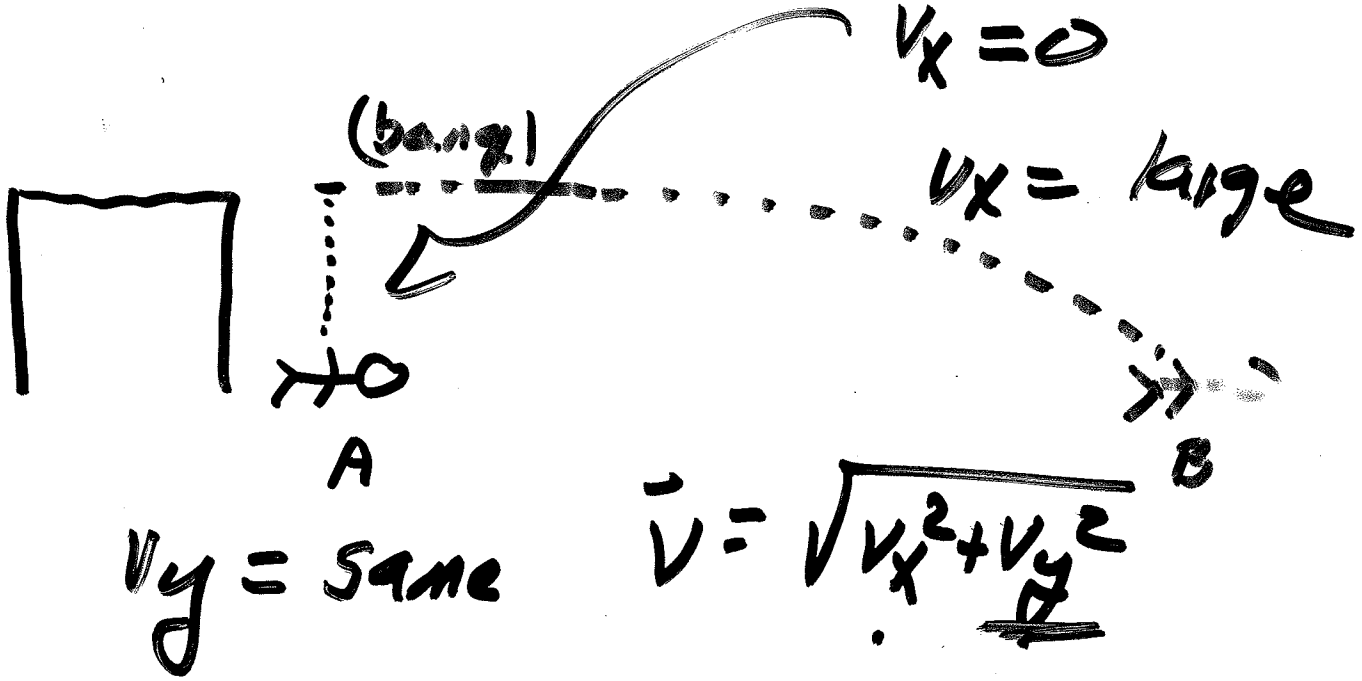
throw a ball and drop a ball



time in air? Same

velocity? NO

shoot a gun and drop a bullet



v_y = same

$\vec{v} = \sqrt{v_x^2 + v_y^2}$