

class 4
Chapter 3

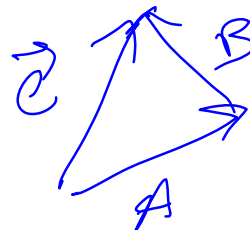
Wednesday, September 10, 2003
9:47 AM

Vectors

Vectors = size & direction
- Arrow above.

Scalar = size only.

$\vec{A} = \vec{B}$, same size & direction
Add geometrically



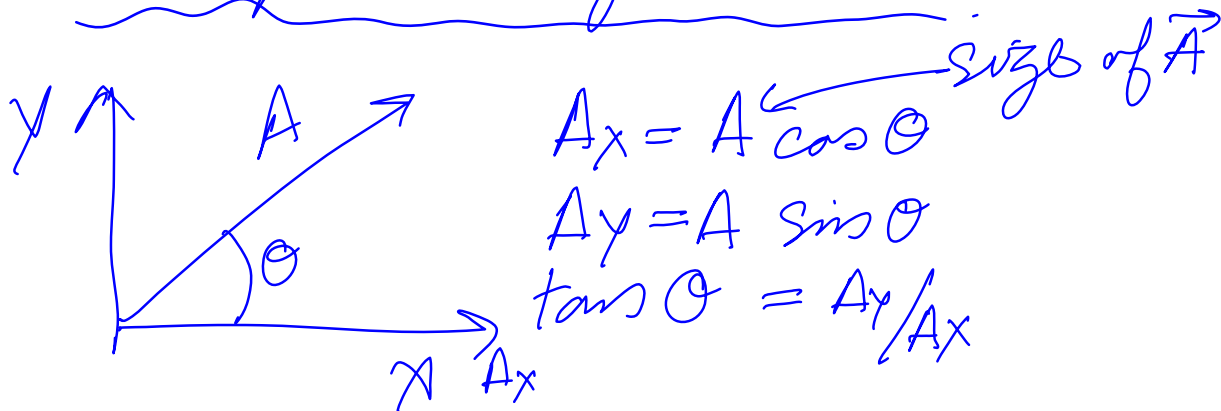
\vec{A} = same size but opposite direction

$$\vec{A} - \vec{B} = \vec{A} + (-\vec{B})$$

$3\vec{A}$ = Same direction but size $\times 3$

$-3\vec{A}$ = opposite direction but size $\times 3$.

"Components of vectors"



$$\begin{aligned}\vec{A} + \vec{B} &= (A_x + B_x)\hat{x} + (A_y + B_y)\hat{y} \\ &= (A \cos \theta_A + B \cos \theta_B)\hat{x} \\ &\quad + (A \sin \theta_A + B \sin \theta_B)\hat{y}\end{aligned}$$

Q(2) cave explorer

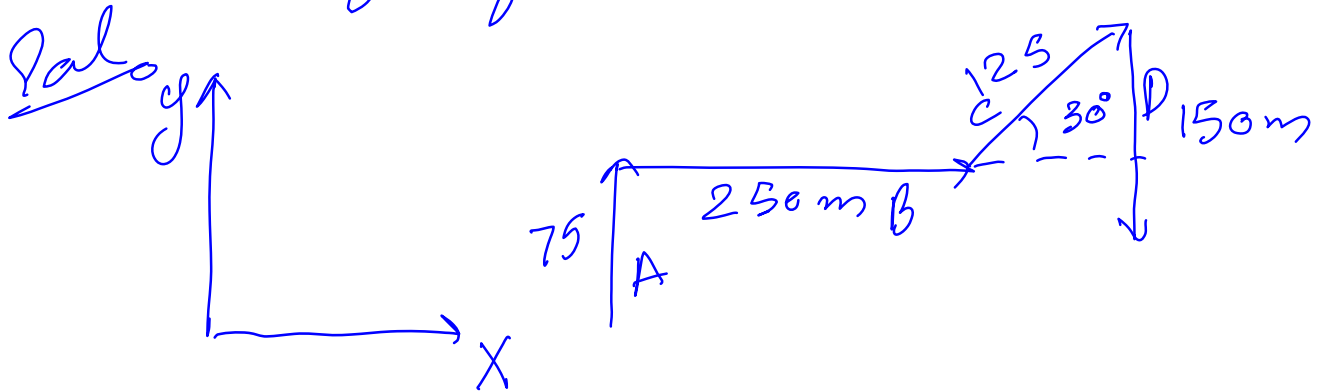
-75.0 m north

-250 m east

-125 m 30° north of east

-150 m south.

How far from entrance?



$$A = 75 \hat{y} \quad B = 250 \hat{x}$$

$$C = 125 \cos 30^\circ \hat{x} + 125 \sin 30^\circ \hat{y}$$

$$D = -150 \hat{y}$$

$$\vec{A} + \vec{B} + \vec{C} + \vec{D} = (75 + 62.5 - 150) \hat{y} + (250 + 108) \hat{x}$$

$$\therefore \vec{E} = 358 \hat{x} - 12.5 \hat{y}$$

$$\text{Distance} = \sqrt{(358)^2 + (-12.5)^2}$$

$$= 358.2 \text{ m}$$

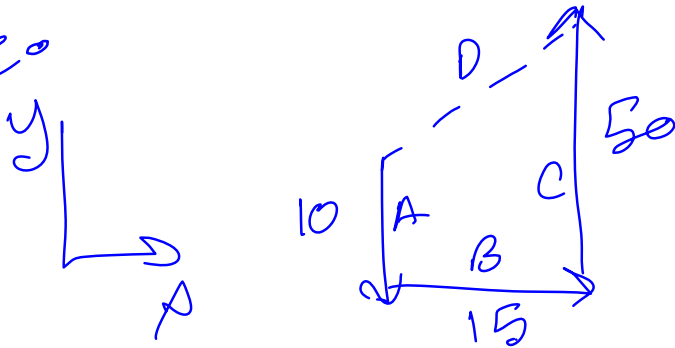
14) Quarter back

-back 10 yd - right 15 yd

-50 yd down field

-what is the magnitude of resulting displacement?

Sol.



$$D_y = -10 + 50 = 40$$

$$D_x = 15$$

$$\vec{D} = 15\hat{x} + 40\hat{y}$$

$$D = \sqrt{(40)^2 + (15)^2} = 43 \text{ yds.}$$