Read 3.5 - 3.6

Clicker updated with latest roster

TA's

H.W sol #2 available

Exam will cover material upto and including Friday's lecture

Equation sheet and practice problems on web soon (tomorrow)

Interactive Question

The graph shows position as a function of time for two trains running on parallel tracks. Which is true:

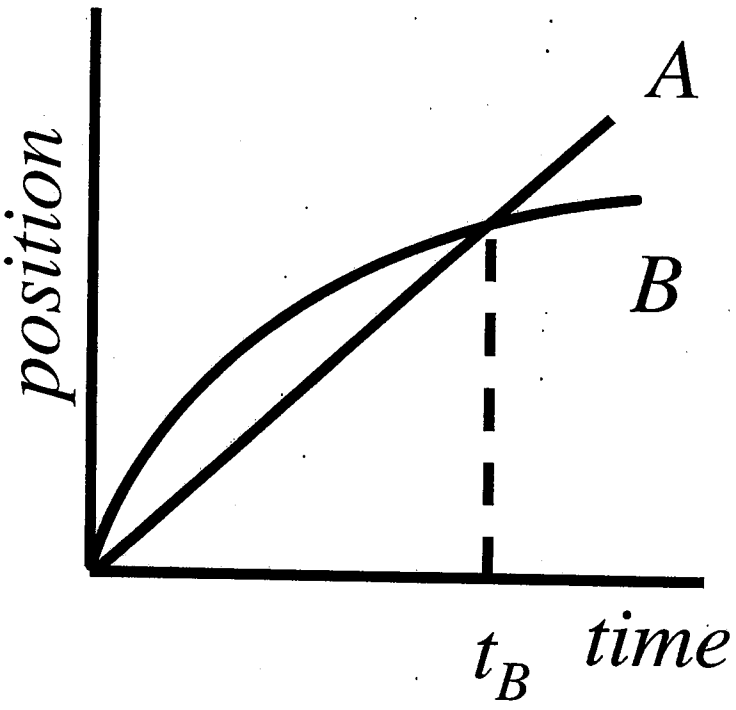
A) At time t_B both trains have the same velocity.

B) Both trains speed up all the time.

C) Both trains have the same velocity at some time before t_B.

D) Somewhere on the graph, both trains have the same acceleration.

E) More than one of the above is true.



Chapter 3

Already seen speed which is described by a single number or magnitude

and velocity which must be described by a magnitude and direction

scalar : magnitude only ex speed, horses, cars, ⋮

Vector: magnitude and direction ex velocity, acceleration, ⋮

written as letter with arrow over it. $\vec{v}$, $\vec{a}$

magnitude of a vector is a scalar

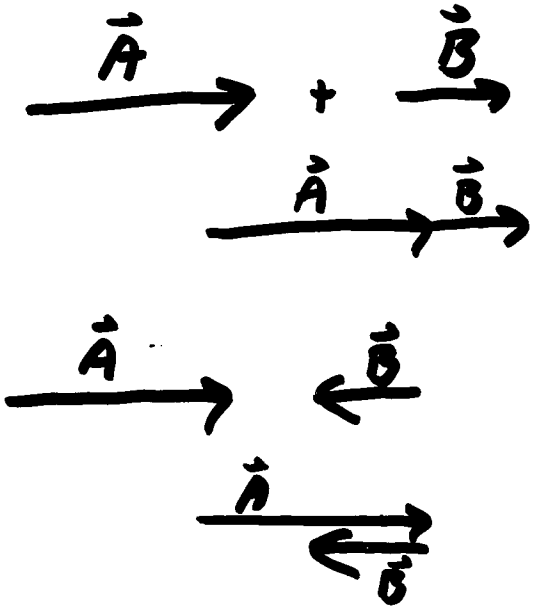
Interactive Question

Which of the following is a vector quantity?

A) The age of the earth.
B) The mass of a football.
C) The earth's pull on your body.
D) The temperature of an iron bar.
E) The number of people attending an OU football game.

ADDING Vectors

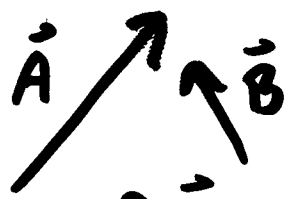
You have already added 1-D Vectors

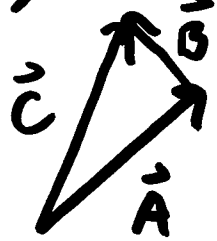


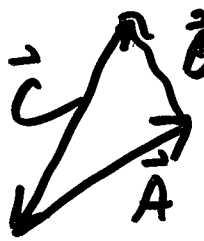
To add put tail of one vector to head of the other

2-D

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







$\vec{A} + \vec{B} + \vec{C} = 0$

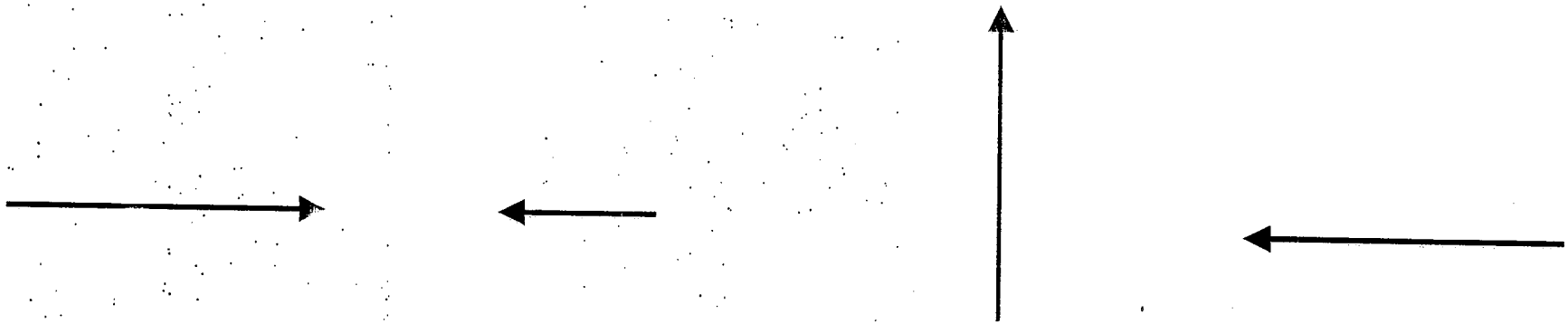
$\vec{A} + \vec{B} = -\vec{C}$

Interactive Question

The vectors **A** is shown.

A

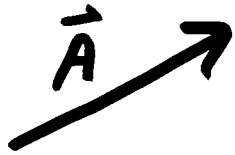
Which vector(s) below is equal to $-2\mathbf{A}$?



(A) (B) (C) (D)

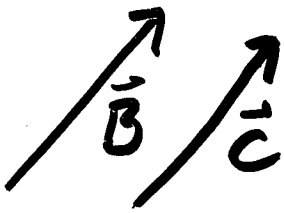
(E) More than one of the above is equal to $-2\mathbf{A}$

Vectors are drawn as an arrow where the length of the arrow is proportional to the magnitude and the direction of the arrow gives the direction of the vector



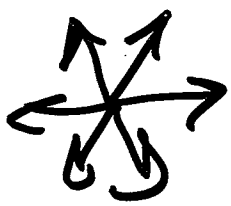
vector $\vec{A}$

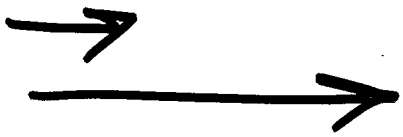
Do not have a specific location



$\vec{B}$ and $\vec{C}$ are the same

not same





Interactive Question:

Consider 2 vectors $\vec{R}$ and $\vec{S}$

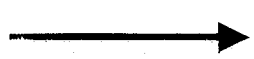
What is $\vec{R} + \vec{S}$?

R

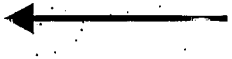
S

A)

B)

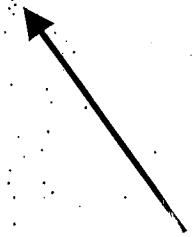


C)



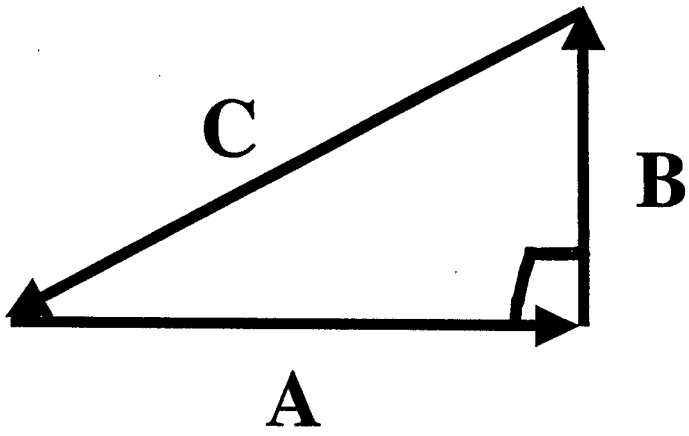
D)

E)



Interactive Question

Which expression is not true concerning the vectors show in the sketch at the right?



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

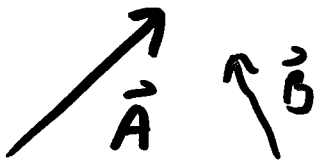
B) $\vec{\mathbf{C}} + \vec{\mathbf{A}} = -\vec{\mathbf{B}}$

C) $\vec{\mathbf{A}} + \vec{\mathbf{B}} + \vec{\mathbf{C}} = 0$

D) $C < A + B$

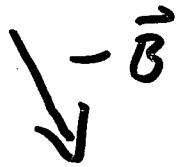
E) $A^2 + B^2 = C^2$

subtraction of vectors



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

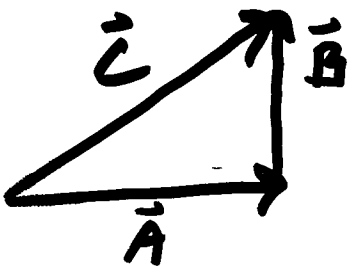
add negative of vector $\vec{B}$ to $\vec{A}$



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

If $\vec{A}$ and $\vec{B}$ at right angles to each other

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

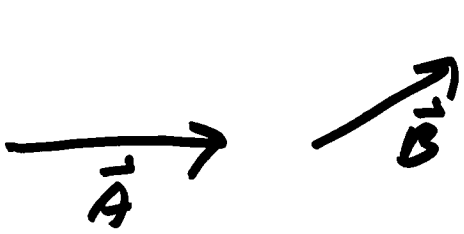


what is length (magnitude) of $\vec{C}$

$$C^2 = A^2 + B^2$$

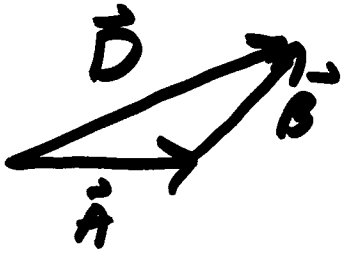
$$|C| = \sqrt{A^2 + B^2}$$

$|C|$ ↑ magnitude



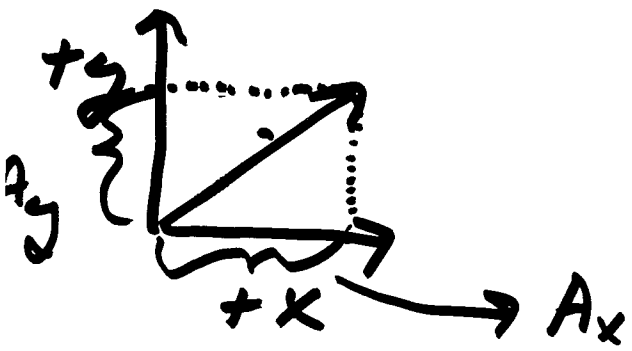
$\vec{C}$ ↑

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

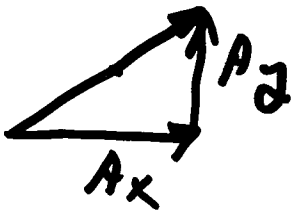


$$|D| = \sqrt{A^2 + B^2}$$

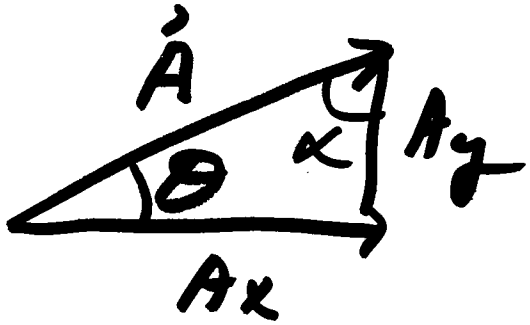
components



How much of $\vec{A}$ is pointing in X-Direction?



$\vec{A} = A_x + A_y$



$A_x = A\cos\theta$

$A_y = A\sin\theta$

$A_x = A\sin\alpha$

$A_y = A\cos\alpha$

Know Trig

soh
cah
toa

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

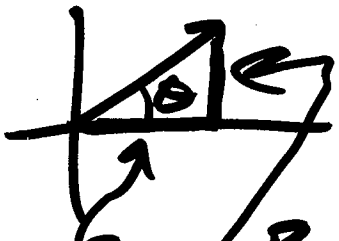
$\vec{A} = A_x + A_y$

$\vec{B} = B_x + B_y$

$\vec{D} = D_x + D_y$

$\vec{D}_x = \vec{A}_x + \vec{B}_x$

$\vec{D}_y = \vec{A}_y + \vec{B}_y$

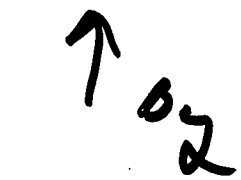


$A_x = |A|$

$A_y = 0$

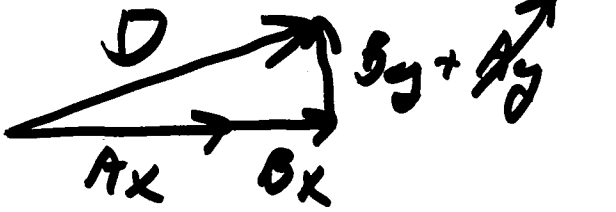
$B_x = B\cos\theta$

$B_y = B\sin\theta$



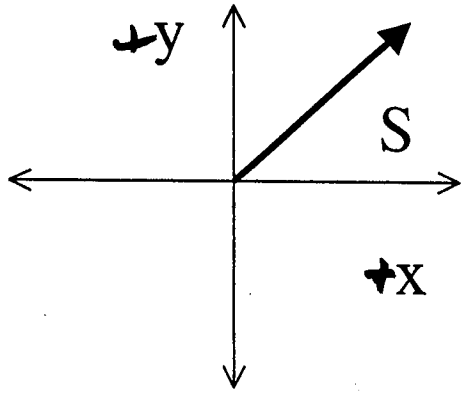
$|D| = \sqrt{A^2 + B^2}$

$|D| = \sqrt{D_x^2 + D_y^2}$



Interactive Question

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

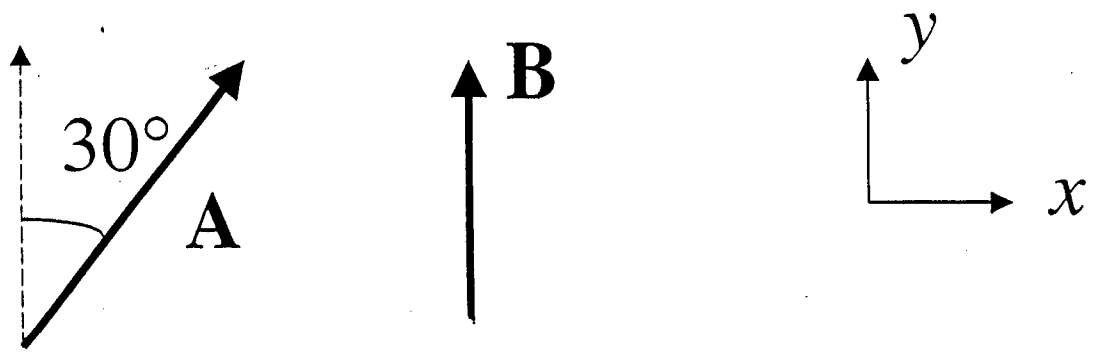


What are the possible components of $\vec{S}$?

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) $S_x = 6$ $S_y = 4$

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

2-D Vectors

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

2) Determine components of each vector

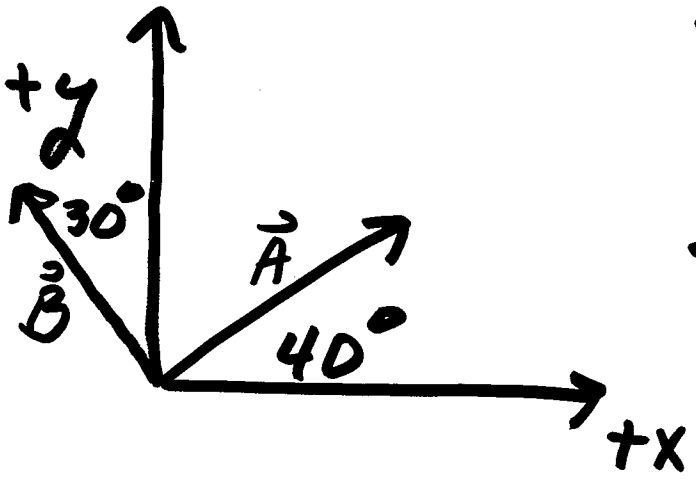
- use Trig to find length of components
- sign given by direction of arrow

3) DO calculations separately using x & y components

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

ex) length of $A = 5.00\ m$

length of $B = 7.00\ m$



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