Read 3.5 - 3.6

H.w 2 Due today

H.w 3 available

Old Exams / practice Questions
coming soon

office hours noon - 1:00 today

D2L
NO H.w
NO clickers (yet)
only Grp 1

* Math

* understand H.w

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. $\vec{v}$, $\vec{a}$

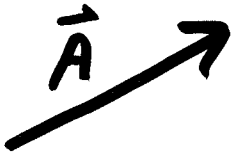
magnitude of a vector is a scalar

Interactive Question

Which of the following is a vector quantity?

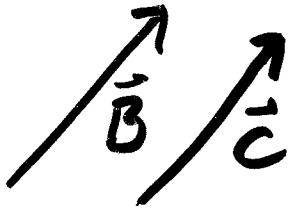
A) The age of the earth.
B) The mass of a football.
C) The earth's pull on your body.
D) The temperature of an iron bar.
E) The number of people attending an OU football game.

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

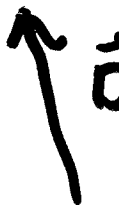


vector $\vec{A}$

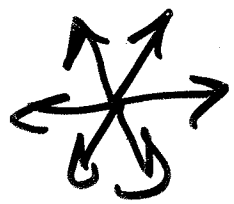
Do not have a specific location

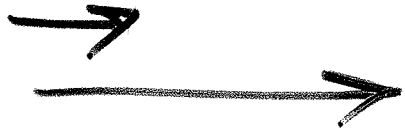


$\vec{B}$ and $\vec{C}$ are the same



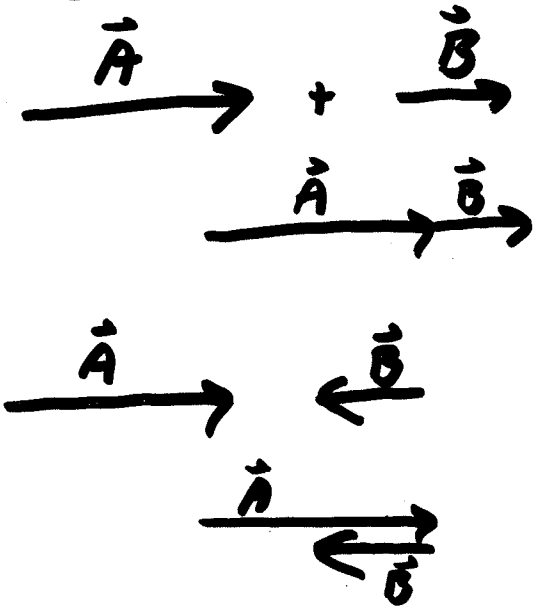
not same





ADDING Vectors

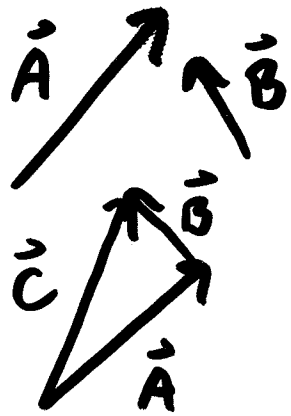
You have already added 1-D Vectors

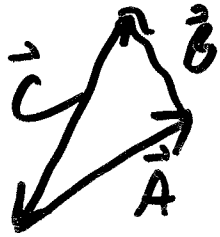


To add put tail of one vector to head of the other

2-D

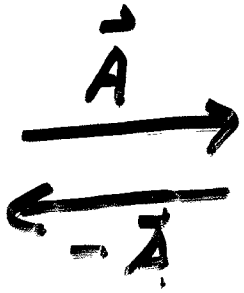
$$\vec{C} = \vec{A} + \vec{B}$$





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

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

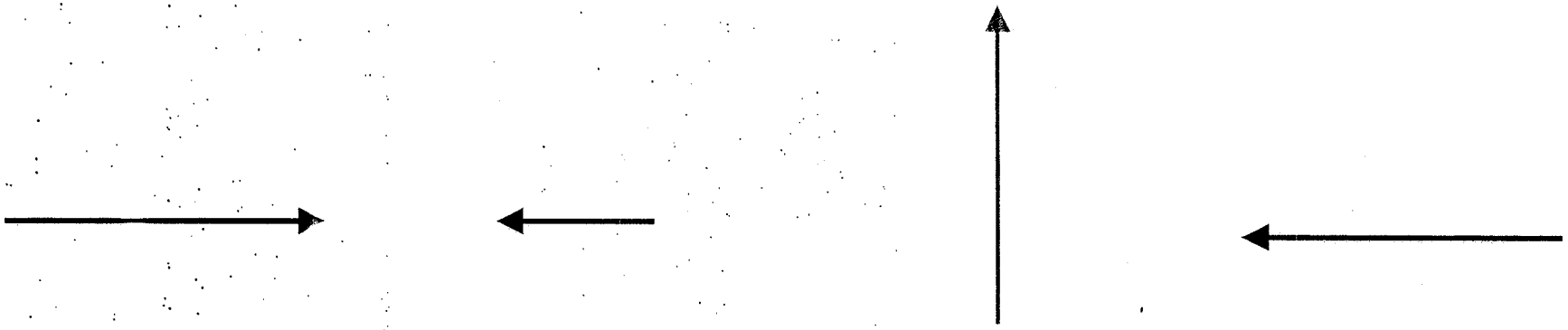


Interactive Question

The vectors **A** is shown.

A

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

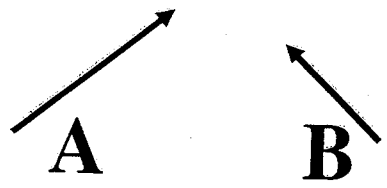


(A) (B) (C) (D)

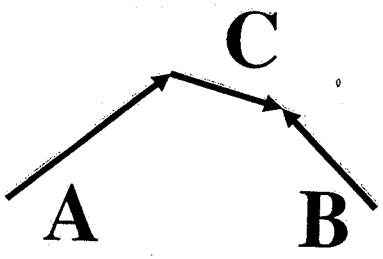
(E) More than one of the above is equal to $-2\mathbf{A}$

Interactive Question

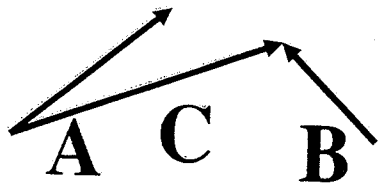
Vectors **A** and **B** are shown below.



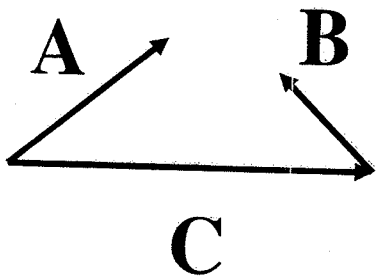
Which diagram below correctly shows the vector **C**, where **C = A + B**



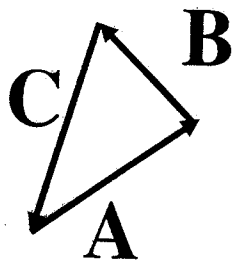
(A)



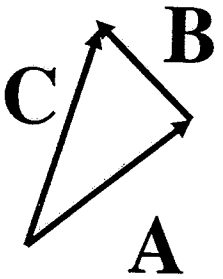
(B)



(C)



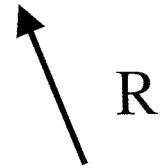
(D)



(E)

Interactive Question:

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



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

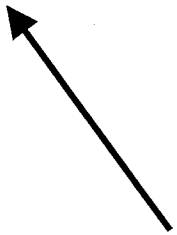
A)

B)

C)

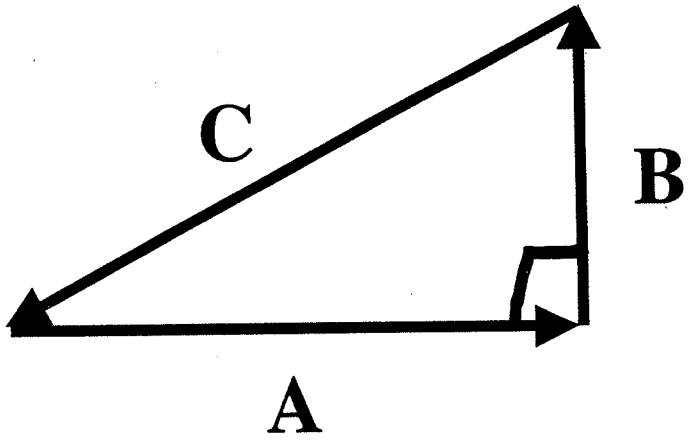
D)

E)



Interactive Question

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



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

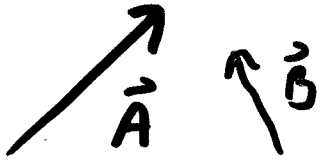
B) $\vec{\mathbf{C}} + \vec{\mathbf{A}} = -\vec{\mathbf{B}}$

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

D) $C < A + B$

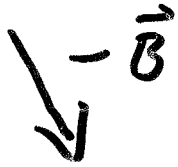
E) $A^2 + B^2 = C^2$

subtraction of vectors



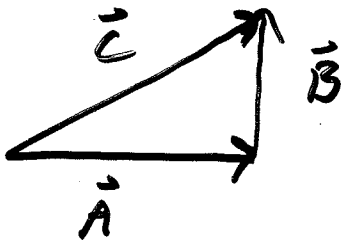
$$\vec{C} = \vec{A} - \vec{B}$$

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



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

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



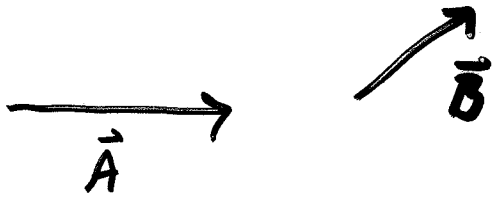
$\vec{C} = \vec{A} + \vec{B}$

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

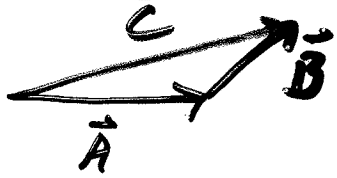
$C^2 = A^2 + B^2$ $\quad |C| = \sqrt{A^2 + B^2}$

$|C|$ ← magnitude

Consider 2 vectors



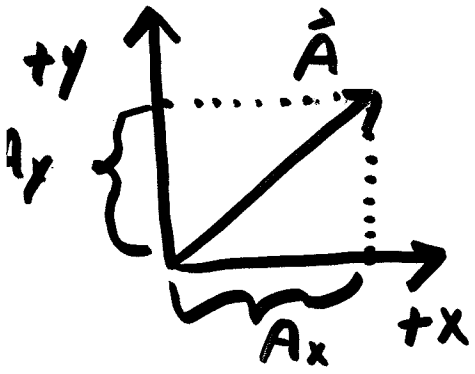
$\vec{C} = \vec{A} + \vec{B}$



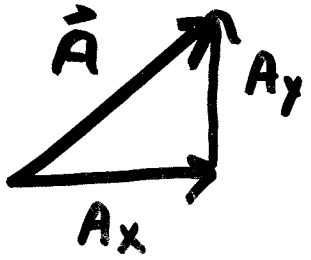
is $|C| = \sqrt{A^2 + B^2}$?

NO, $\vec{A} + \vec{B}$ not at right angles to each other

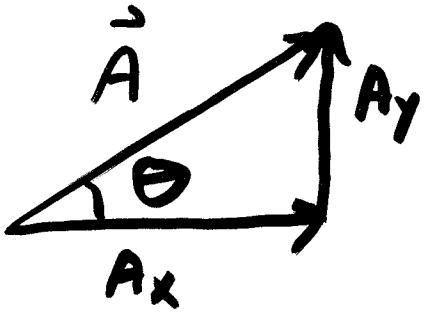
Components



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



$$\vec{A} = A_x + A_y$$



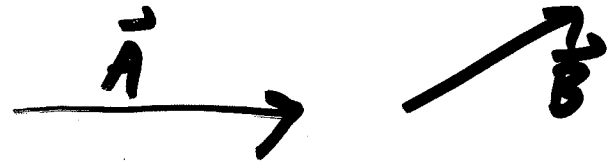
$$A_x = A\cos\theta$$
$$A_y = A\sin\theta$$

SOH
CAH
TOA

TRIG!!!!

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

$$A_y = A\sin\theta$$



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

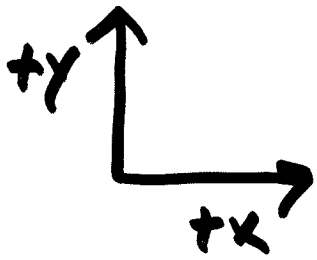
$\vec{A} = A_x + A_y$

$\vec{B} = B_x + B_y$

$\vec{D} = D_x + D_y$

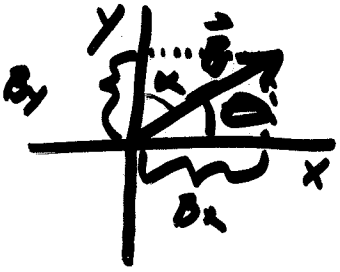
$\vec{D}_x = \vec{A}_x + \vec{B}_x$

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



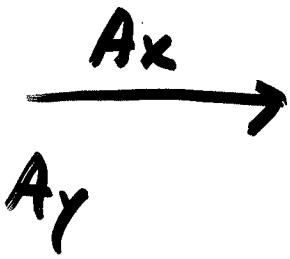
$A_x = |A|$

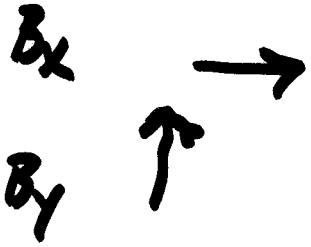
$A_y = 0$

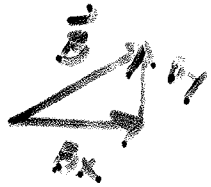


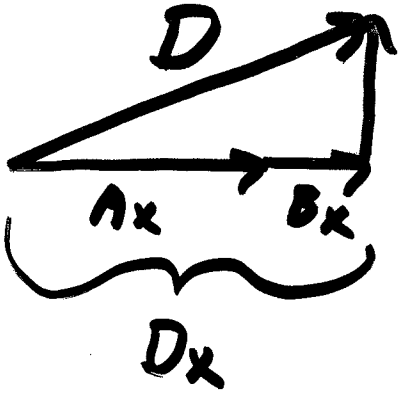
$B_x = B\cos\theta$

$B_y = B\sin\theta$









$A_y = 0 \Big\} D_y$

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