

4.2 Vector Addition

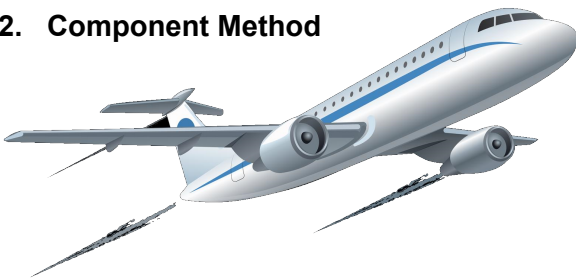
4.2 I can add and subtract vectors graphically.

4.3 I can add and subtract vectors using the component method.



2 Methods of Adding Vectors

- Graphical Method
 - « Head-to-Tail Addition
- Component Method

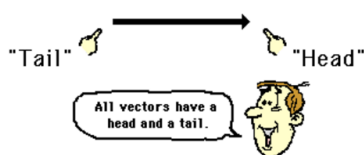


Simple Vector Addition

$$\begin{aligned}
 \vec{5} + \vec{5} &= \vec{10} \\
 \vec{5} + \vec{-5} &= \vec{0} \\
 \vec{5} + \vec{10} &= \vec{15} \\
 \vec{5} + \vec{-10} &= \vec{-5} \\
 \vec{5} + \vec{-15} &= \vec{-10} \\
 \vec{10} + \vec{-5} &= \vec{5}
 \end{aligned}$$

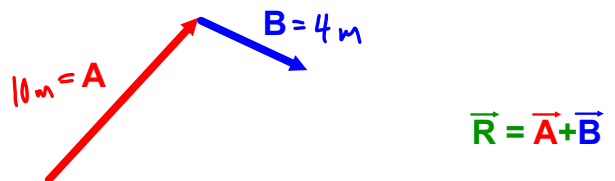
Graphical Method: Head-to-Tail Addition

Adding vectors graphically: Place the tail of the second at the head of the first. The sum points from the tail of the first to the head of the last.



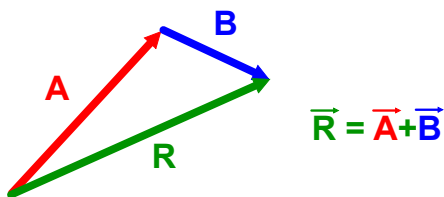
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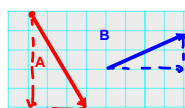


Component Method

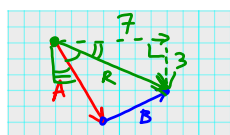
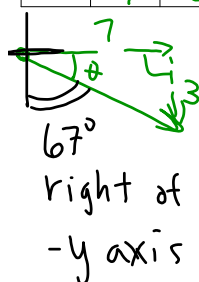
Adding Vectors Using Components:

1. Find the components of each vector to be added.
2. Add the x- and y-components separately.
3. Find the resultant vector.

Example 2: Vector Addition

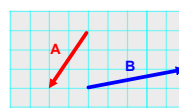


Vector	Horizontal Component	Vertical Component
A	3	-5
B	4	2
R	7	-3

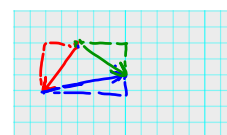


Magnitude of R (Pythagorean theorem):
 $R = \sqrt{7^2 + 3^2} = 7.6u$

Direction of R (SOH CAH TOA):
 $\theta = \tan^{-1}\left(\frac{3}{7}\right)$
 $\theta = 23^\circ$
 below +x axis



Vector	Horizontal Component	Vertical Component
A	-2	-3
B	5	1
R	3	-2



Magnitude of R (Pythagorean theorem):
 $R = \sqrt{3^2 + 2^2} = 3.6u$

Direction of R (SOH CAH TOA):
 $\theta = \tan^{-1}\left(\frac{2}{3}\right)$
 $\theta = 34^\circ$
 below the +x axis

NAME _____ PERIOD _____

VECTOR ADDITION

Directions: For each problem, vectors A and B are shown. Sketch the head-to-tail addition of $A+B$ on the empty grid and label each vector. Draw and label the resultant (R). Record the magnitude and direction of each component and add the components to determine the components of the resultant. Use Pythagorean theorem and SOH CAH TOA to determine the magnitude and direction of R.

1)

Vector	Horizontal Component	Vertical Component
A		
B		
R		

Magnitude of R (Pythagorean theorem):
 Direction of R (SOH CAH TOA):

2)

Vector	Horizontal Component	Vertical Component
A		
B		
R		

Magnitude of R (Pythagorean theorem):
 Direction of R (SOH CAH TOA):

HOMWORK
Worksheet

4.2 Vector Addition

October 09, 2018

3)



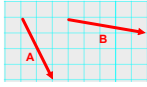
Vector	Horizontal Component	Vertical Component
A		
B		
R		



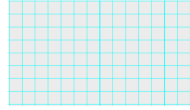
Magnitude of R (Pythagorean theorem):

Direction of R (SOH CAH TOA):

4)



Vector	Horizontal Component	Vertical Component
A		
B		
R		



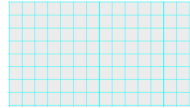
Magnitude of R (Pythagorean theorem):

Direction of R (SOH CAH TOA):

5)



Vector	Horizontal Component	Vertical Component
A		
B		
R		



Magnitude of R (Pythagorean theorem):

Direction of R (SOH CAH TOA):