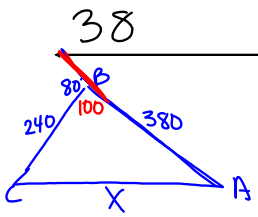
Write your hw questions on the whiteboard!



$x^2 = 240^2 + 380^2 - 2(240)(380)\cos 100°$

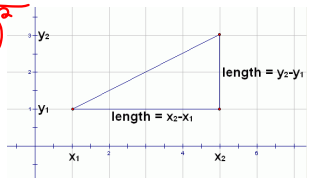
483.4 m

Nov 20-10:17 AM

WARM UP 6.3 Vectors

In your notes, write down the distance formula for points (x_1,y_1) and (x_2,y_2). If you need to refresh your memory, check out page A27 in the back of our textbook.

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$



Nov 24-9:32 PM

6.3: Vectors in the Plane

We'll study this section for the next three days, review on Monday, and then take a quiz (Sections 6.1-6.3) on Tuesday!

So...what's a vector??

Nov 24-9:42 PM

Definition. A **vector** is a quantity that involves both magnitude and direction.

Scalars	Vectors

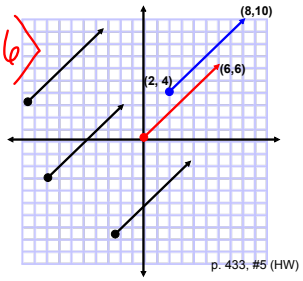
Nov 24-10:00 PM

We use directed line segments to represent vectors.

Component form: $\langle 8-2, 10-4 \rangle = \langle 6, 6 \rangle$

Magnitude: $d = \sqrt{6^2+6^2} = \sqrt{72}$ $\|v\| = \sqrt{72}$

Two vectors are equal if and only if their **components** are the same.

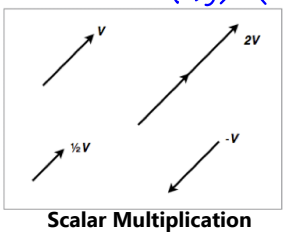


p. 433, #5 (HW)

Nov 24-10:02 PM

2 basic vector operations

- Multiply a vector by a scalar: $a\langle x,y \rangle = \langle ax, ay \rangle$
- Add a vector to another vector: $\langle x,y \rangle + \langle w,z \rangle = \langle x+w, y+z \rangle$



Scalar Multiplication

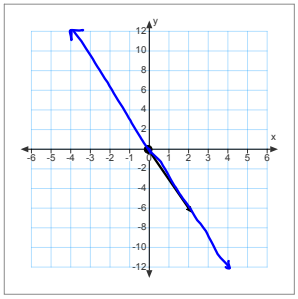
Nov 24-10:23 PM

Example

Given $v = \langle 2, -6 \rangle$ find $2\vec{v}$ and $-2\vec{v}$

$2\vec{v} = \langle 4, -12 \rangle$

$-2\vec{v} = \langle -4, 12 \rangle$



Nov 24-10:28 PM

I need volunteers...

1. **Tail of a vector.** (0,0)
2. **Tip of the vector.** (4,2)
3. **Double the vector.** $\langle 8,4 \rangle$
4. **Half the vector.** $\langle 2,1 \rangle$
5. **Make an opposite vector.** $\langle -4,-2 \rangle$

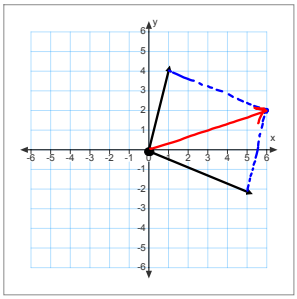
<4,2>

Oct 22-4:28 PM

Vector Addition (Tip to Tail Method)

Example
Add $\vec{u} = \langle 1, 4 \rangle$ *and* $\vec{v} = \langle 5, -2 \rangle$

$\langle 6, 2 \rangle$



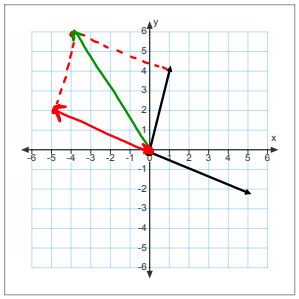
Nov 24-10:31 PM

Vector Addition (Tip to Tail Method)

Example
Add $\vec{u} = \langle 1, 4 \rangle$ *and* $-\vec{v} = \langle 5, -2 \rangle$

$\vec{u} - \vec{v}$ $\langle -4, 6 \rangle$

Note: Think of vector subtraction as "adding a negative."



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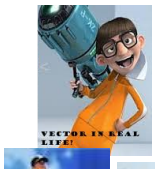
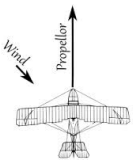




An example of a vector in real life would be an outfielder in a baseball game moving a certain direction for a specific distance to reach a high fly ball before it touches the ground. The outfielder can't just run directly for where he sees the ball first or he is going to miss it by a long shot. The player must anticipate what direction and how far the ball will be from him when it drops and move to that location to have the best chance of catching the ball.

Oct 22-3:54 PM

Summary

If you see pointy parenthesis $\langle \quad \rangle$ that means: vector

To multiply a number k by a vector **v**: $\langle kx, ky \rangle$

To add two vectors **u** and **v**, to get the "resultant":

$\vec{u} + \vec{v} = \langle x_1, y_1 \rangle \langle x_2, y_2 \rangle = \langle x_1 + x_2, y_1 + y_2 \rangle$

Nov 24-10:36 PM

HOMEWORK

...all of 6.3 will be due on Monday; the underlined portion is what we went over today...

6.3 (p. 433): 1-33 (odd), 35-59 (odd), 61-81 (odd, omit 77)

Nov 24-10:42 PM

Write your hw questions on the whiteboard!

Nov 20-5:16 PM

https://www.youtube.com/watch?v=bOIe0DiMbI8

Oct 29-9:07 AM

What do you think of when you hear the term "unit"?

Nov 24-10:48 PM

Definition. A unit vector, **u**, is a vector with length 1.

Q: How do we denote the length of a vector **v**?
A:

Q: Let's say ||**v**||=5. What would we need to do to create a vector in the same direction as **v** but with length (or magnitude) equal to 1?
A:

Nov 24-10:49 PM

To find a unit vector **u** in the direction of **v**:

Example
Find a unit vector in the direction of $\vec{v} = \langle 3, -4 \rangle$; then verify it has a length of 1.

p. 434, #35 (HW)

Nov 24-10:54 PM

2 Forms of a Vector

1) Component Form: $\langle v_1, v_2 \rangle$

2) Linear Combination: $v_1\vec{i} + v_2\vec{j}$

EX. Given $\vec{v} = \langle 4, 7 \rangle$ prove **4i** + **7j** is the linear combo.

Nov 24-10:59 PM

Find a vector **v** with the given magnitude and the same direction as **u**.

||**v**||=10 **u**=3**i**+4**j**

p. 434, #47 (HW)

Nov 26-2:56 PM

HOMEWORK

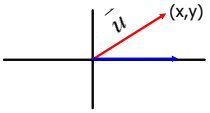
...all of 6.3 will be due on Monday; the underlined portion is what we went over today...

6.3 (p. 433): 1-33 (odd), 35-59 (odd), 61-81 (odd, omit 77)

Nov 24-10:42 PM

Direction Angle of a Vector

Let unit vector **u** have a terminal point (x,y) on the unit circle:



θ is the angle measured from the positive x-axis (initial side) to the vector (terminal side).

$x=$

$y=$

u=

Nov 24-11:16 PM

Suppose that **u** is a unit vector with direction angle θ.

If **v**=a**i**+b**j** is any vector that makes an angle θ with the positive x-axis, then it has the same direction as **u** and you can write:

Nov 24-11:20 PM

Example

Find the magnitude and direction angle, θ, for **v** = -12**i** + 15**j**.

p. 434, #63 (HW)

Nov 24-11:23 PM

Example

Find the magnitude and direction angle given

$$\vec{v} = 8(\cos 135^o \vec{i} + \sin 135^o \vec{j})$$

Nov 24-11:24 PM

Example

Find the component form of the sum of **u** and **v** with direction angles $\theta_u = 30^o$ and $\theta_v = 90^o$ given $\|\vec{u}\| = 2$ *and* $\|\vec{v}\| = 2$

Note: **u** is NOT a unit vector in this problem. The magnitude $\neq 1$.

p. 434, #73 (HW)

Nov 24-11:28 PM

Let's talk through #81 together...

Nov 24-11:33 PM

HOMEWORK

...all of 6.3 will be due Monday; the underlined portion is what we went over today...

6.3 (p. 433): 1-33 (odd), 35-59 (odd), 61-81 (odd, omit 77)

Nov 24-10:42 PM