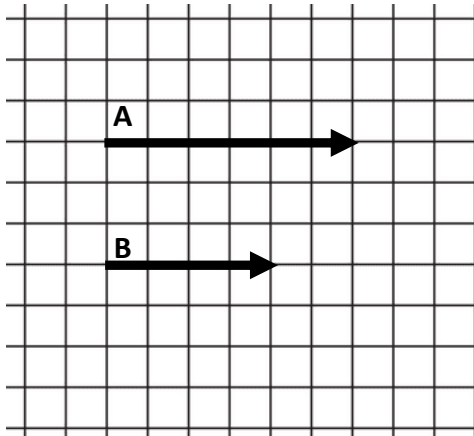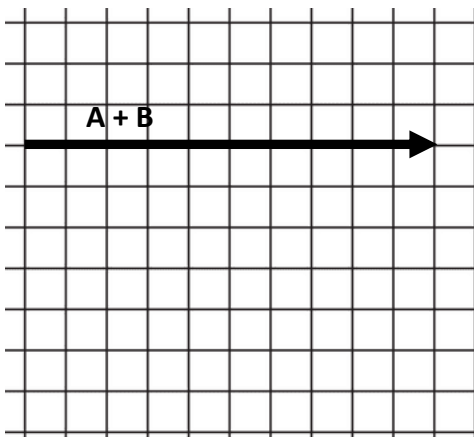# Vector Addition and Subtraction

Name: _____

In physics, vectors can be used to represent velocity, displacement, or acceleration. Vectors have a certain length and can be added or subtracted like any other number.

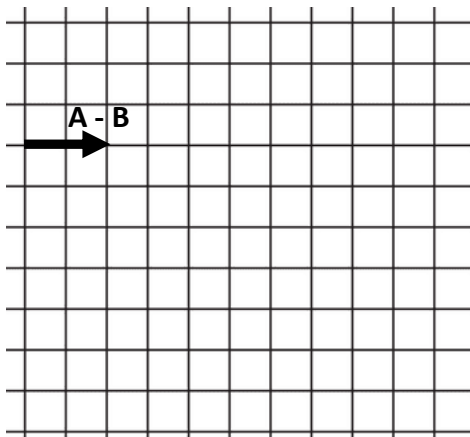Example: Consider the following vectors shown below.

Looking at these vectors we can see that A has a length of 6, while B has a length of 4.
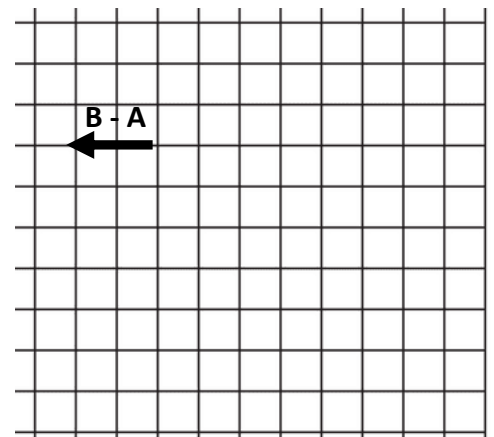
If we're going to add these vectors together (A + B) the vector should have a length of 10, and look like this…

If we're going to subtract these vectors (A - B) the vector should have a length of 2, and look like this…

If we're going to subtract these vectors (B - A) the vector should have a length of -2, and look like this…

Vector Addition and Subtraction

Now, vectors can have a length horizontally (side-to-side, corresponding with the 'x-axis') AND a length vertically (up-and-down, corresponding with the 'y-axis'). When we look at vectors like this, we need to take both into account. Look at the vectors shown below.
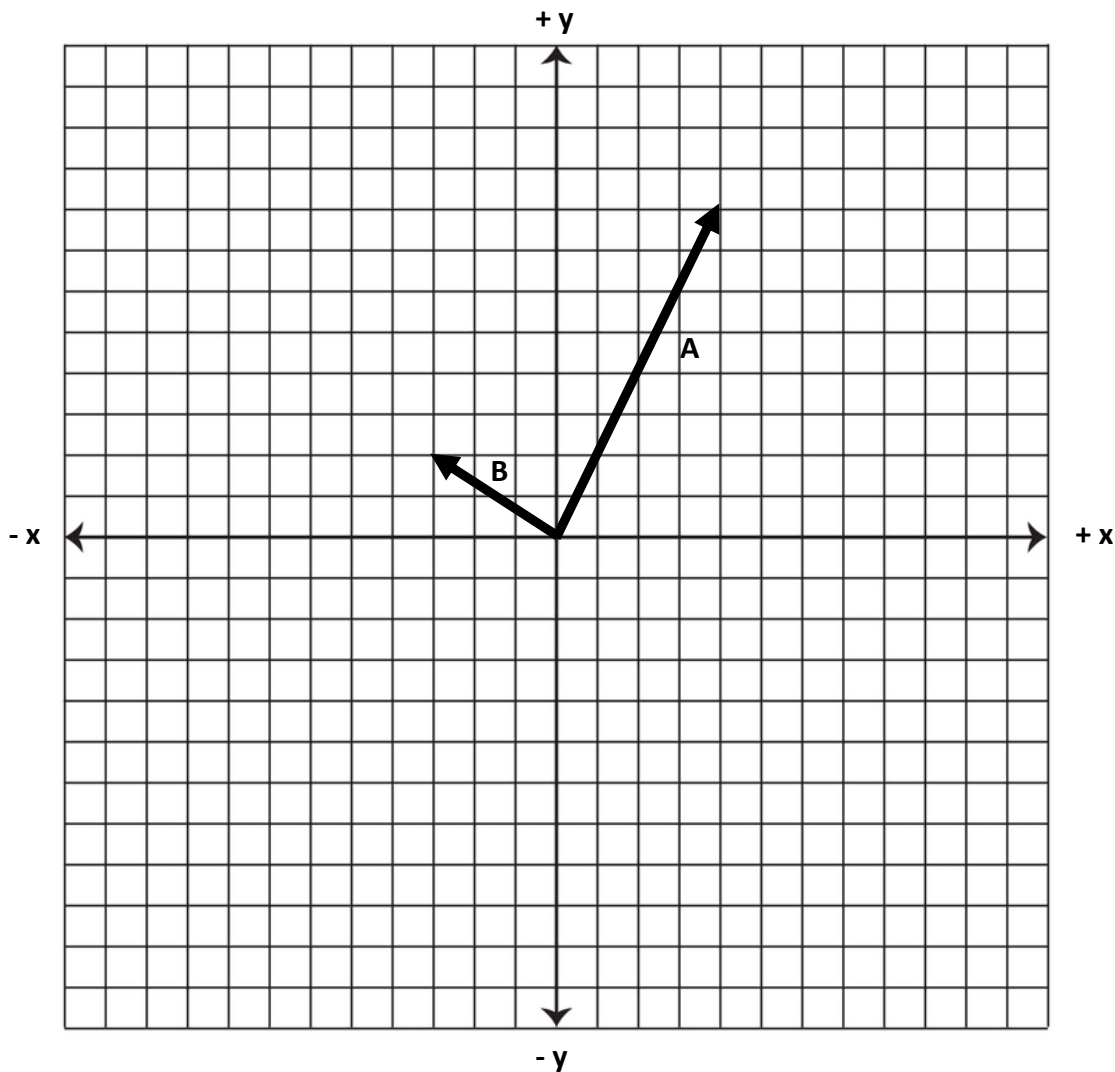
When looking at the vectors for "A" and "B", we need to take horizontal, and vertical into account, and determine if it's positive or negative <u>based on its orientation</u>!

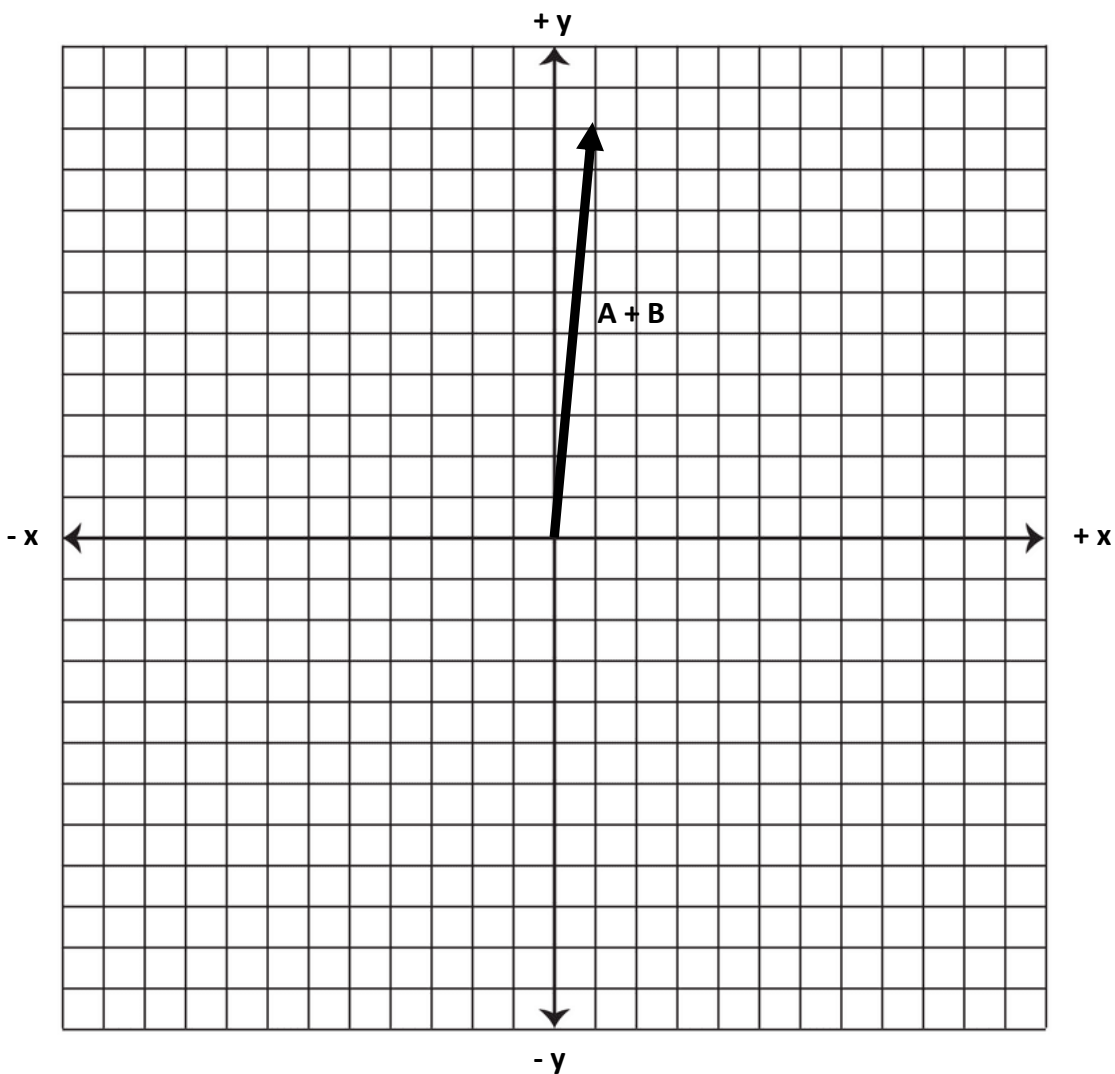We see that A has a HORIZONTAL LENGTH of +4, and a VERTICAL LENGTH of +8.

We see that B has a HORIZONTAL LENGTH of - 3, and a VERTICAL LENGTH of +2.

Vector Addition and Subtraction

If we add the vectors together (A + B), we must add the horizontal and vertical lengths of each together.

- Horizontal length for A = +4

- Horizontal length for B = -3

- Horizontal length for A + B = (+4) + (-3) = (4 - 3) = **+1**

- Vertical length for A = +8

- Vertical length for B = +2

- Vertical length for A + B = (+8) + (+2) = (8 + 2) = **+10**

The vector, A + B, needs to have a horizontal length of +1, and a vertical length of +10, and should therefore look like this…
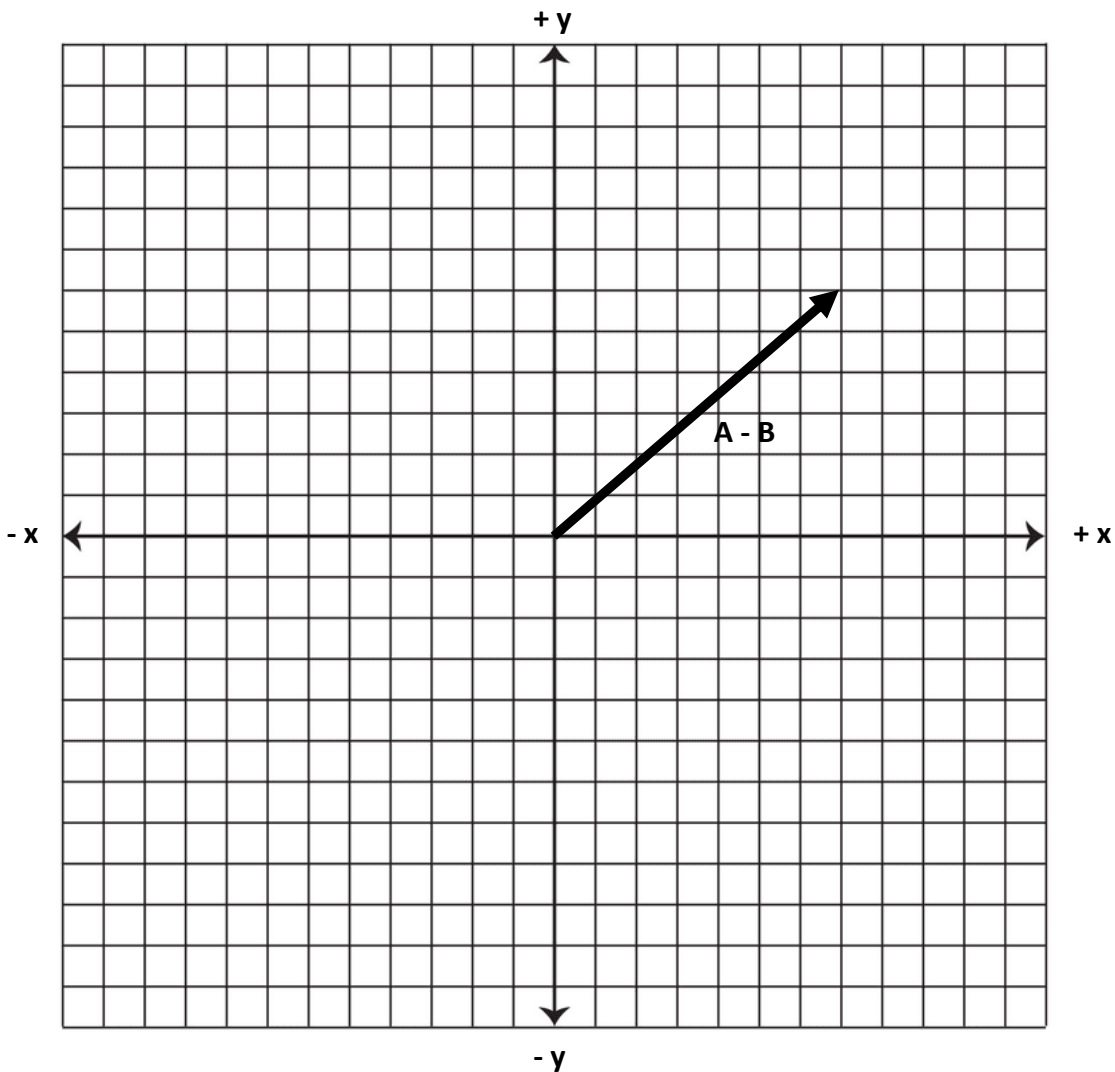
+ y

- x

+ x

A + B

- y

Vector Addition and Subtraction

If we subtract the vectors (A - B), we must subtract the horizontal and vertical lengths of each.

- Horizontal length for A = +4

- Horizontal length for B = -3

- Horizontal length for A - B = (+4) - (-3) = (4 + 3) = **+7**

- Vertical length for A = +8

- Vertical length for B = +2

- Vertical length for A - B = (+8) - (+2) = (8 - 2) = **+6**

The vector, A - B, needs to have a horizontal length of +7, and a vertical length of +6, and should therefore look like this…

+ y

A - B

- x   + x

- y

Vector Addition and Subtraction

If we subtract the vectors (B - A), we must subtract the horizontal and vertical lengths of each.

- Horizontal length for A = +4

- Horizontal length for B = -3

- Horizontal length for B - A = (-3) - (+4) = (-3 - 4) = **- 7**

- Vertical length for A = +8

- Vertical length for B = +2

- Vertical length for B - A = (+2) - (+8) = (2 - 8) = **- 6**
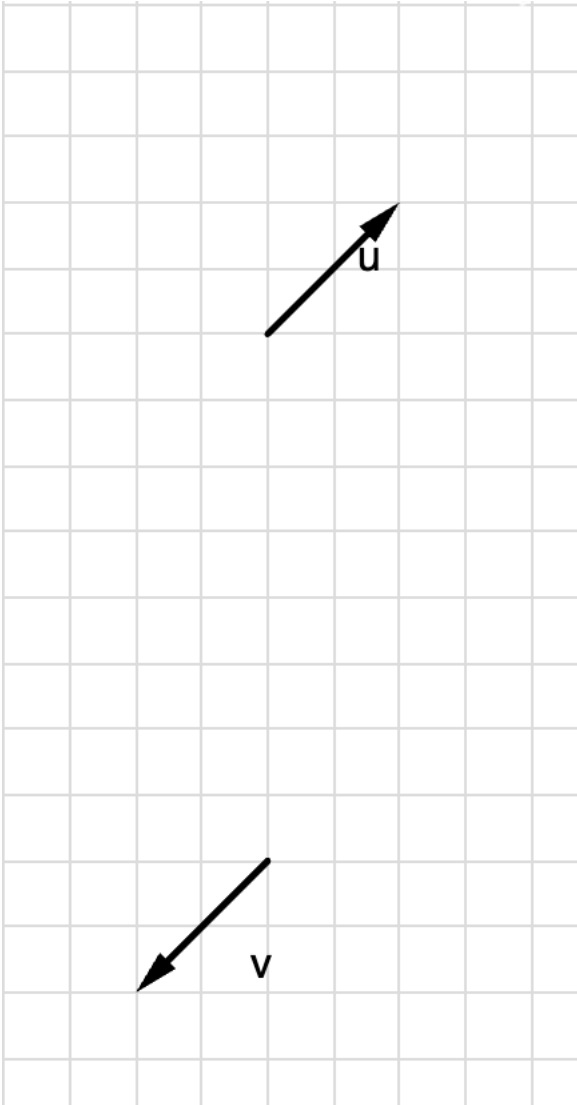

The vector, B - A, needs to have a horizontal length of -7, and a vertical length of -6, and should therefore look like this…

+ y

- x   **+ x**

B - A

- y
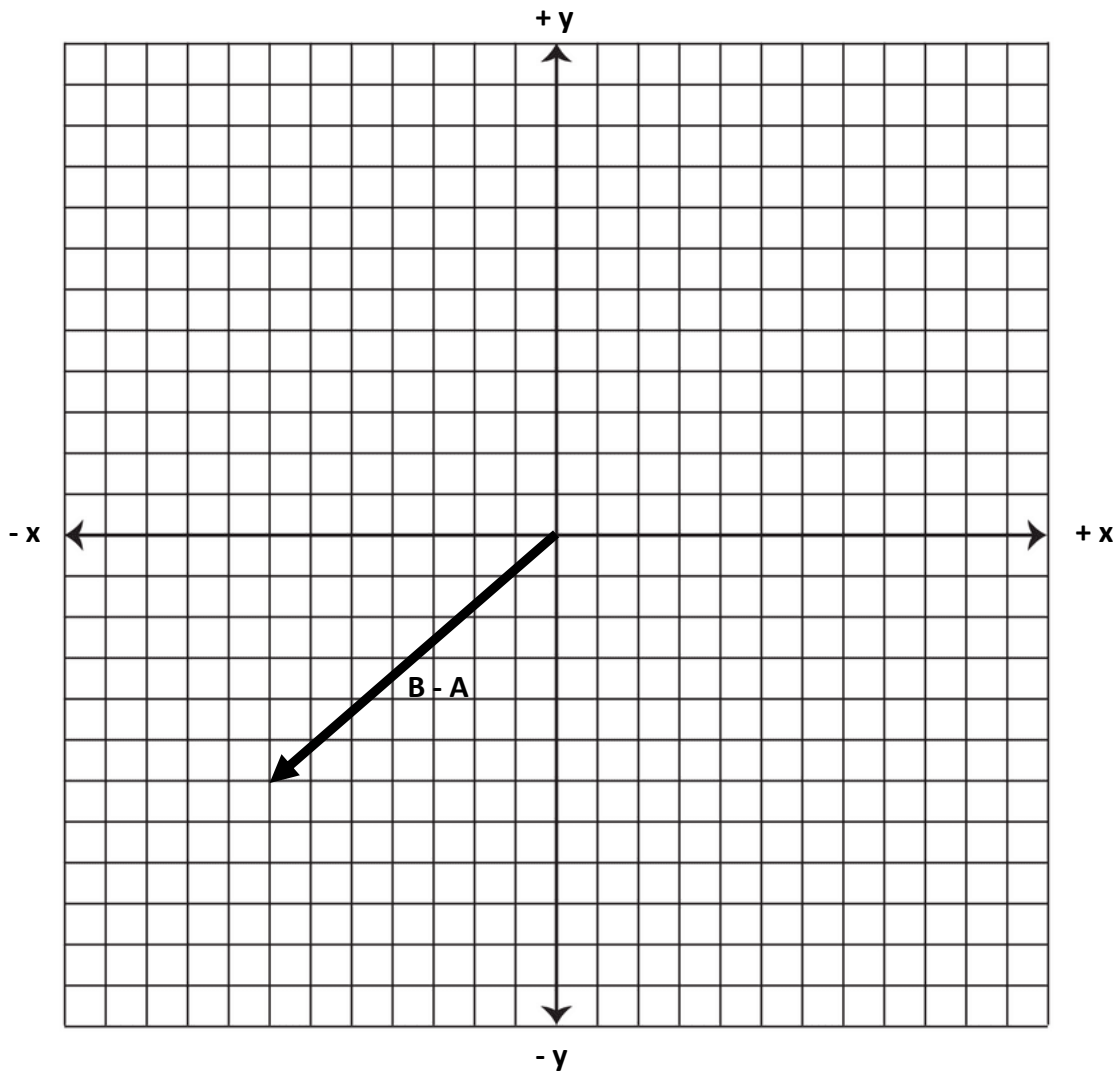
Vector Addition and Subtraction

Go into the 'Activities' tab on "Cox Physics" and open the link title "oPhysics Vectors"

These are the first vectors that you'll get.

We see that "u" has a horizontal length of +2 and a vertical length of +2.

We see that "v" has a horizontal length of -2 and a vertical length of -2.

Vector Addition and Subtraction

When you're asked "Draw: u - v" we can figure this out by doing the following.

- Horizontal length for u = +2

- Horizontal length for v = - 2

- Horizontal length for u - v = (+2) - (-2) = (2 + 2) = **+ 4**

- Vertical length for u = +2

- Vertical length for v = - 2

- Vertical length for u - v = (+2) - (- 2) = (2 + 2) = **+ 4**

The vector, u - v, needs to have a horizontal length of +4, and a vertical length of +4, and should therefore look like this…
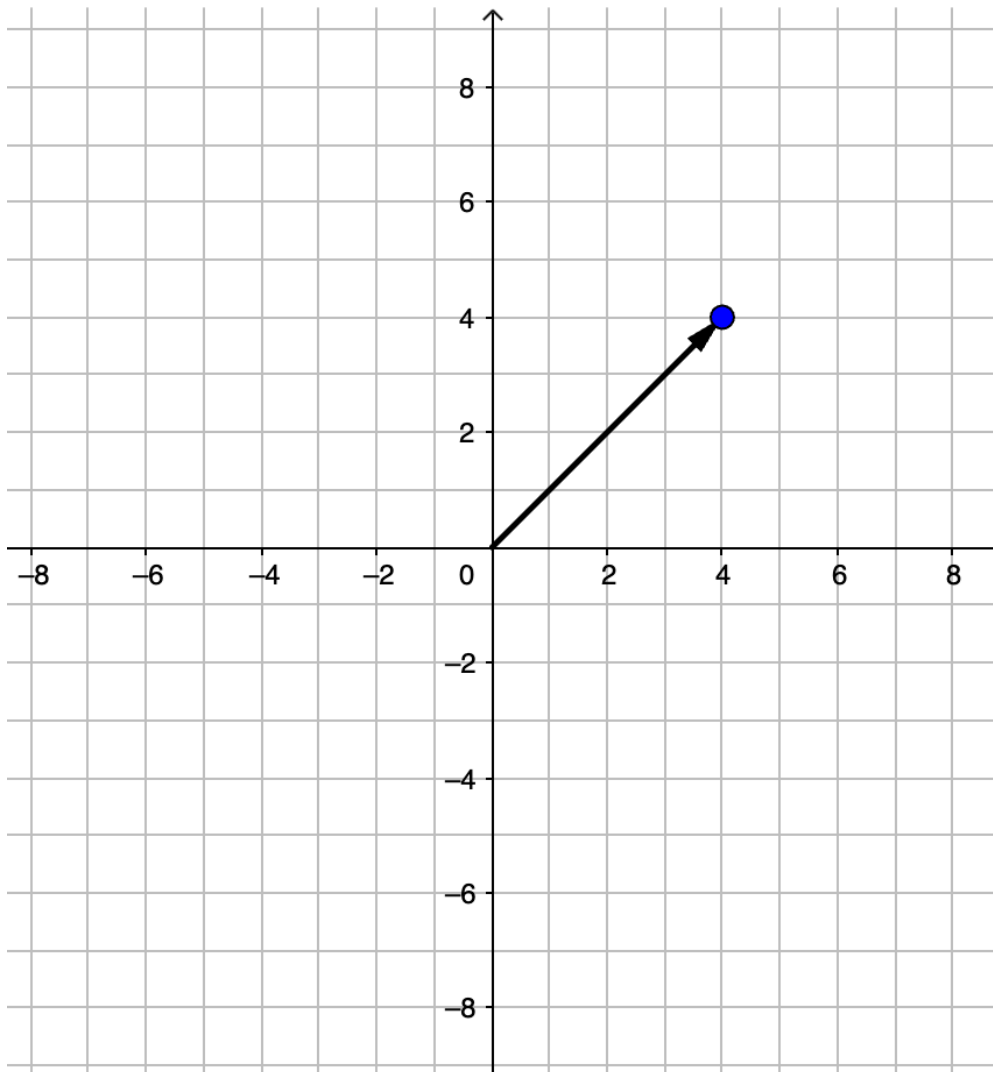
Click on "New Problem" at the top of the page.

New Problem

Check Answer

Show Answer

Draw: u - v
(by moving the blue dot)

Correct

Number Correct
0
Number Incorrect
0

Reset Stats

You'll get a new vector for "u" and "v" and possibly a new formula (not necessarily 'u - v'. You could get anything from ('u - v'), ('v - u'), ('v + u'), or ('u + v')).

What you'll be completing:

What you're going to do is complete and take 5 screenshots of you getting the correct vector for the problem that you're given. ***The opening problem doesn't count!***

Open a new google document and upload your screenshots!

You don't need to label your screenshots, just make sure that you have 5 of them.

An example of what you should be screenshotting is shown below!
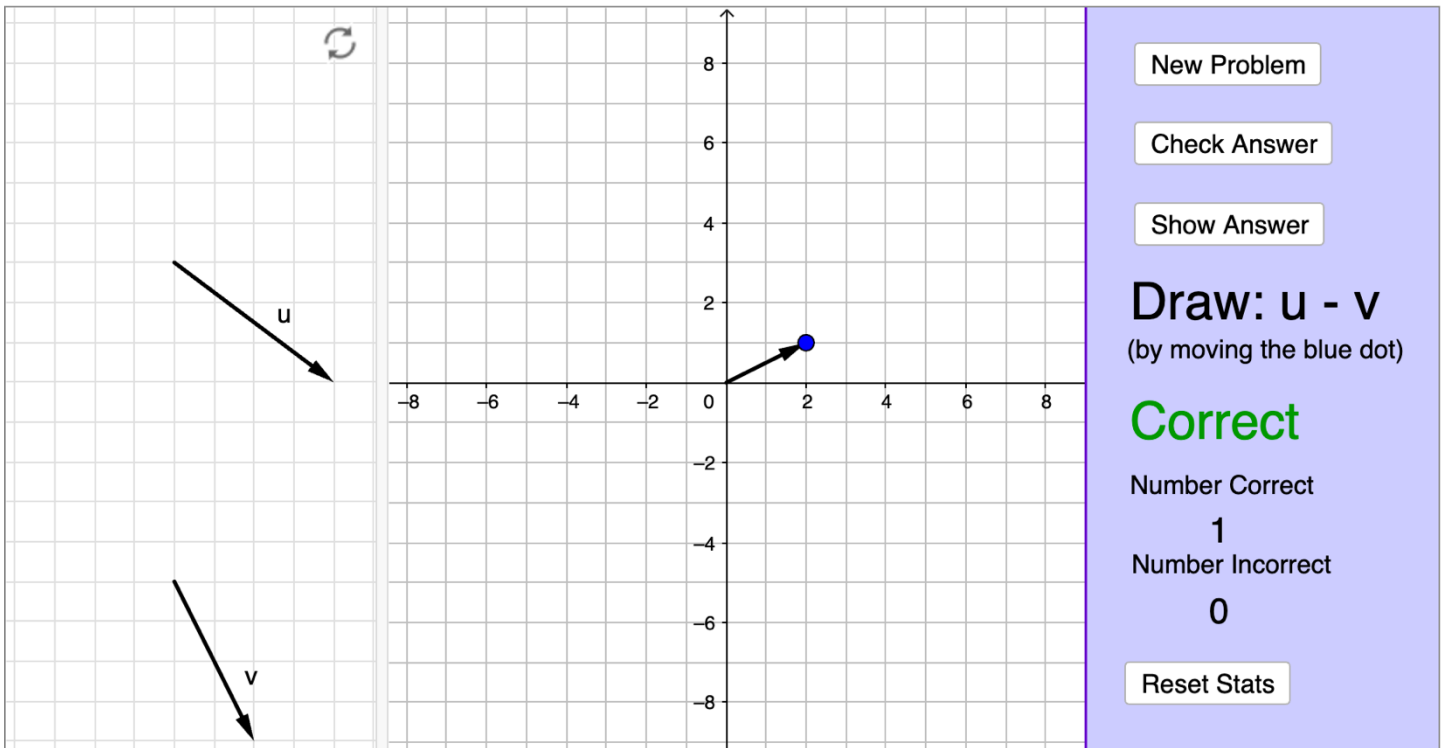
5 screenshots in a google document like the one shown above will be perfect!

P.S, it'll keep track of how many you got correct and incorrect (shown in "Number Correct" and "Number Incorrect"). Don't worry about it you get a couple incorrect. You don't need to Reset Stats if you get a couple wrong. Everyone makes mistakes!