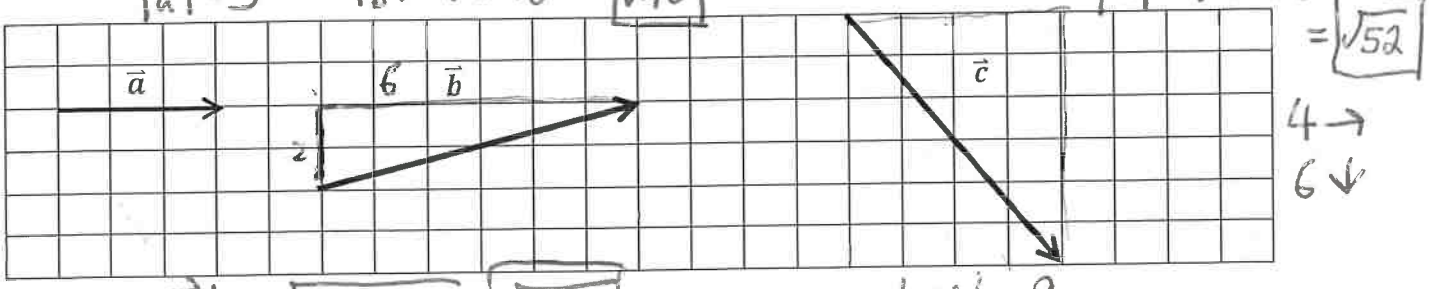
Vector is a quantity that has both direction and magnitude.

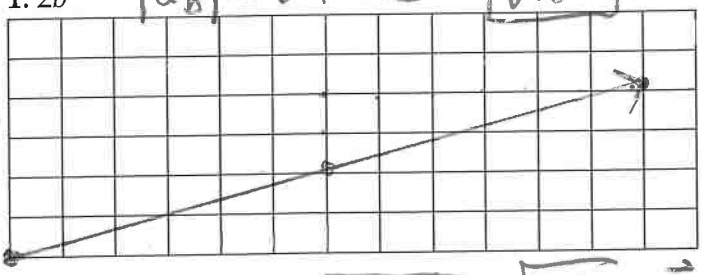
4 (velocity) vs. speed

APC 6.02 Geometric Vectors - Notes

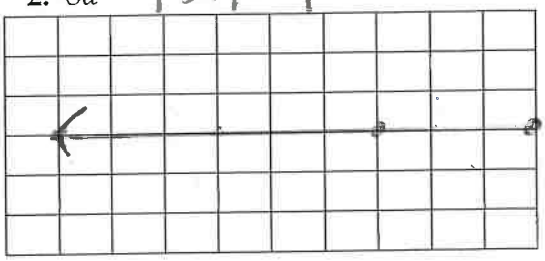
Use the following to draw each vector diagram and resultant vector. Find the magnitude of the resultant. $|\vec{a}| = 3$ $|\vec{b}| = \sqrt{2^2+6^2} = \sqrt{40}$ $|\vec{c}| = \sqrt{4^2+6^2} = \sqrt{52}$



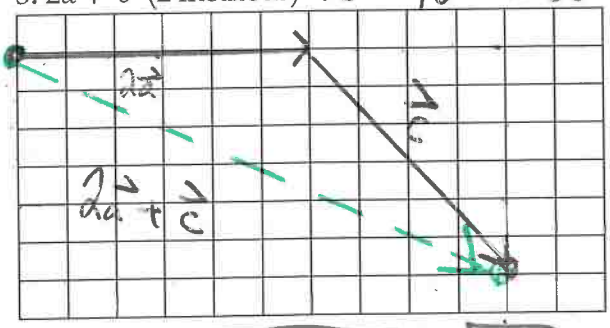
1. $2\vec{b}$ $|2\vec{b}| = \sqrt{4^2+12^2} = \sqrt{160}$

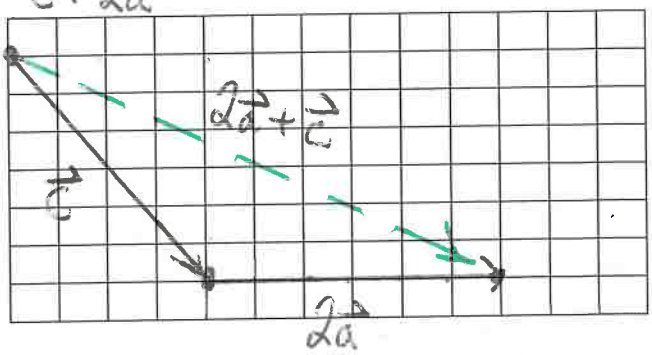


2. $-3\vec{a}$ $|-3\vec{a}| = 9$

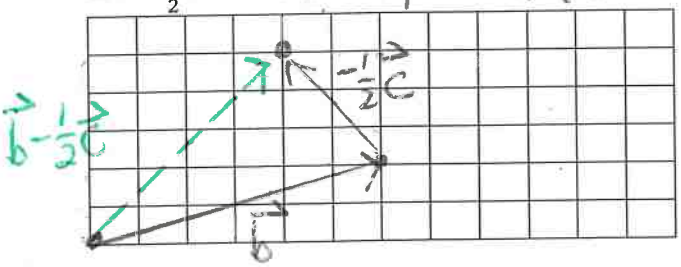


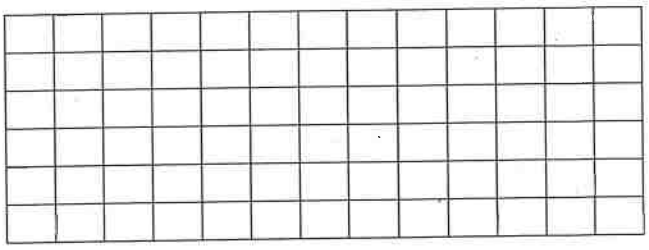
3. $2\vec{a} + \vec{c}$ (2 methods) $\sqrt{6^2+10^2} = \sqrt{136}$ $\vec{c} + 2\vec{a}$





4. $\vec{b} - \frac{1}{2}\vec{c}$ $\sqrt{5^2+4^2} = \sqrt{41}$





State whether each quantity described is a *vector quantity* or a *scalar quantity*.

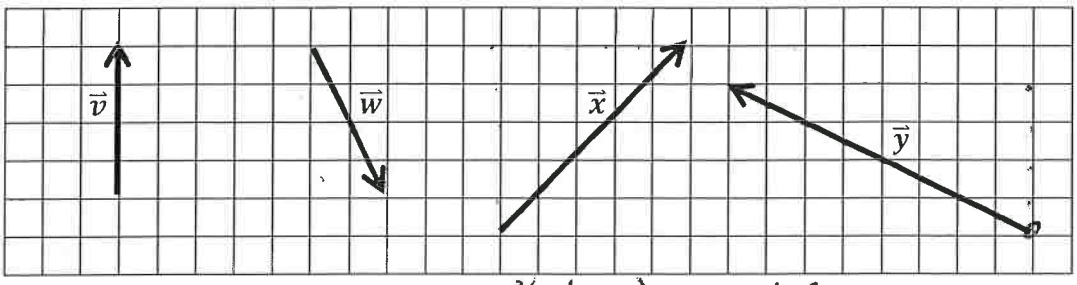
1. A box being pushed with a force of 125 newtons Scalar
2. Wind blowing 20 knots Scalar
3. A deer running 15 m/sec due west vector
4. A 15-pound tire hanging from a rope vector

* vector quantity has both direction and magnitude.

* scalar quantity only has magnitude

6.02 Practice: Vectors Geometrically

5↑ 5→ 4↑ 8←



1) $\left|\frac{1}{2}\vec{x}\right| = \sqrt{2.5^2+2.5^2} = \sqrt{12.5}$

2) $\left|\frac{-3}{4}\vec{y}\right| = \sqrt{3^2+6^2} = \sqrt{45}$

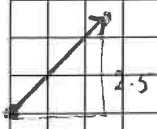
$-\frac{3}{4}(4,8) \rightarrow -3\downarrow 6\rightarrow$

Draw each and label the resultant. Then, find the magnitude of the resultant vector.

$-\vec{w}$ is 4↑ 2←

1. $\frac{1}{2}\vec{x}$

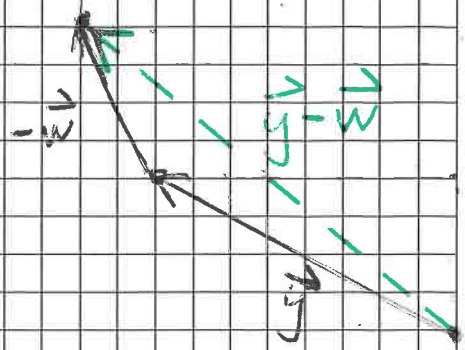
2.5↑ 2.5→



2. $-\frac{3}{4}\vec{y}$

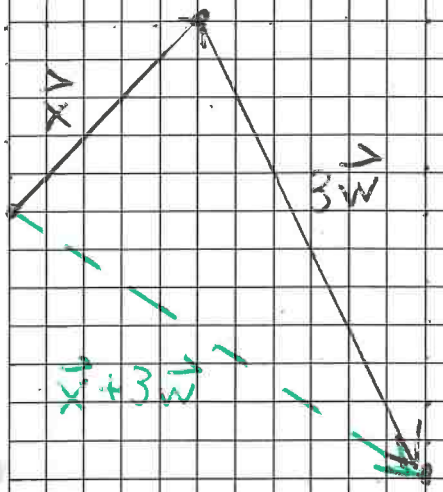
3. $\vec{y}-\vec{w}$

$\sqrt{8^2+10^2} = \sqrt{164}$



4. $\vec{x}+3\vec{w}$

5↑ 5→ 6→ 12↓

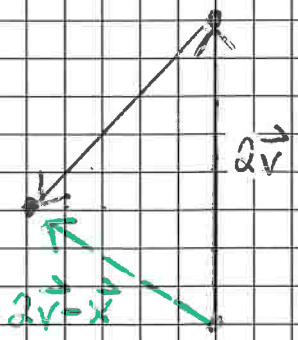


$3\vec{w}$ is 6→ 12↓

$\sqrt{7^2+11^2} = \sqrt{170}$

5. $2\vec{v}-\vec{x}$

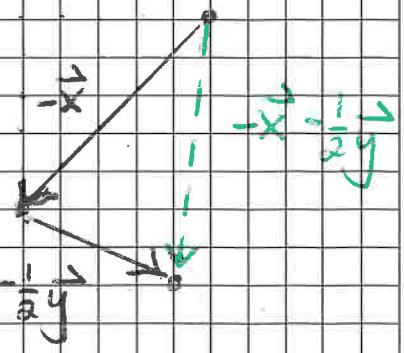
8↑ 5←5↓



$\sqrt{3^2+5^2} = \sqrt{34}$

6. $-\vec{x}-\frac{1}{2}\vec{y}$

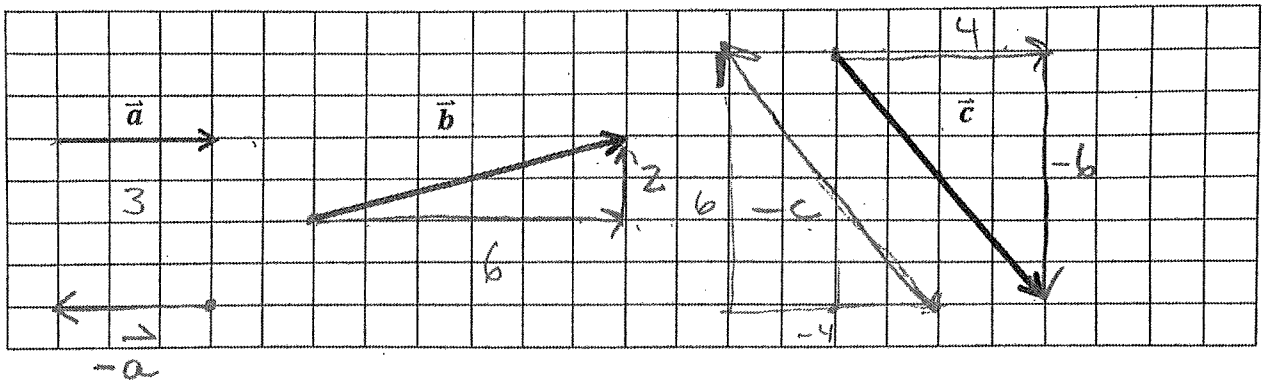
5←5↓ 4→2↓



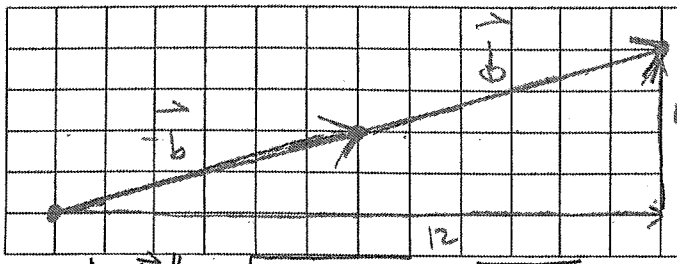
$\sqrt{7^2+1^2} = \sqrt{50}$

APC 5.02 Geometric Vectors - Notes

Use the following vectors to draw each. Find the magnitude.

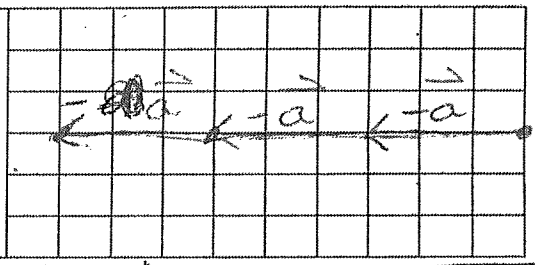


1. $2\vec{b}$



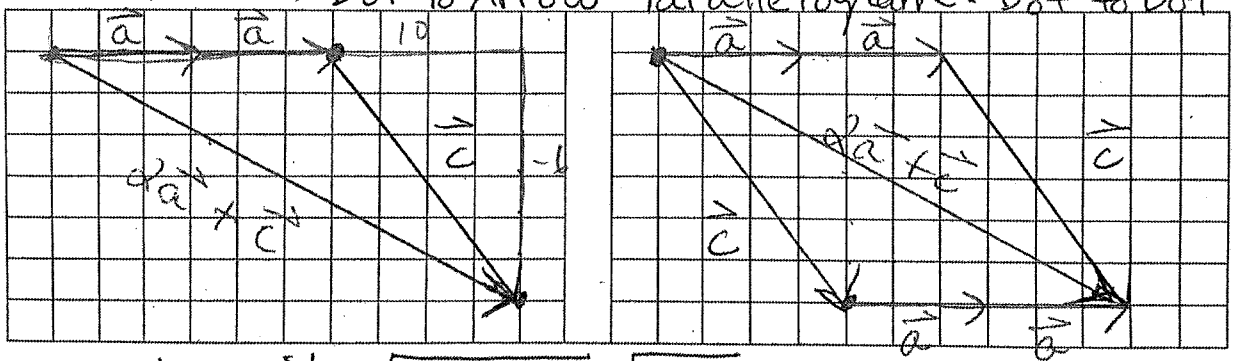
$|2\vec{b}| = \sqrt{12^2+4^2} = \sqrt{160}$

2. $-3\vec{a}$



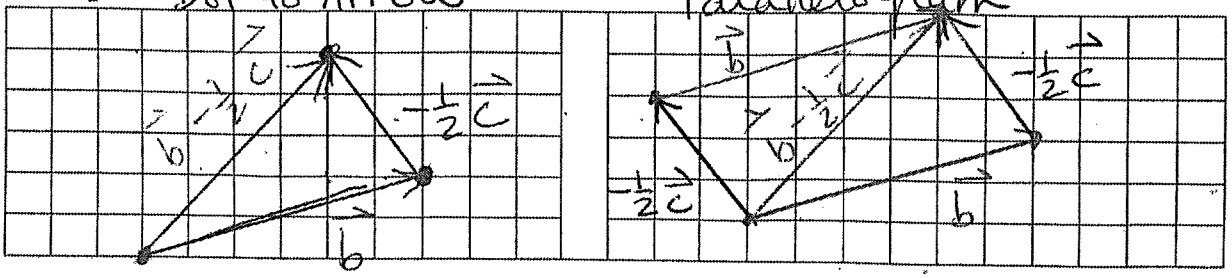
$|-3\vec{a}| = 9$ or $\sqrt{(-9)^2+0^2} = 9$

3. $2\vec{a}+\vec{c}$ (2 methods) Dot to Arrow Parallelogram: Dot to Dot



$|2\vec{a}+\vec{c}| = \sqrt{10^2+(-6)^2} = \sqrt{136}$

4. $\vec{b}-\frac{1}{2}\vec{c}$ Dot to Arrow Parallelogram

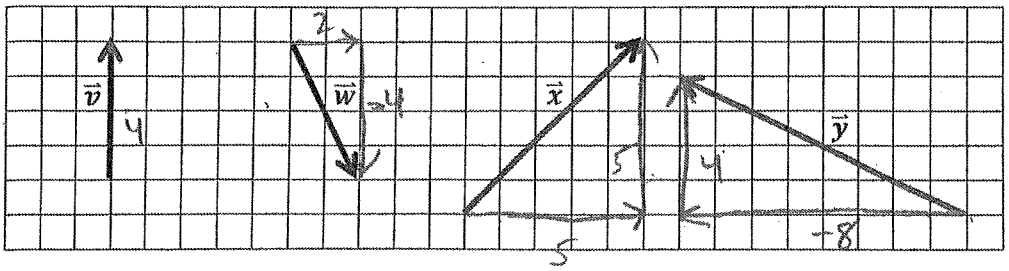


State whether each quantity described is a *vector quantity* or a *scalar* quantity.

1. A box being pushed with a force of 125 newtons Scalar
2. Wind blowing 20 knots Scalar
3. A deer running 15 m/sec due west Vector
4. A 15-pound tire hanging from a rope Vector

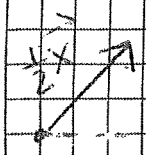
Accelerated Precalculus

5.02 Homework: Vectors Geometrically



Draw each and label the resultant. Then, find the magnitude of the resultant vector.

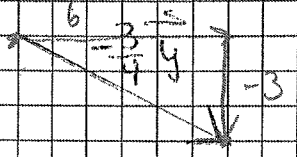
1. $\frac{1}{2}\vec{x}$



$\left\|\frac{1}{2}\vec{x}\right\| = \sqrt{2.5^2 + 2.5^2}$

$= \sqrt{12.5}$ or 3.536

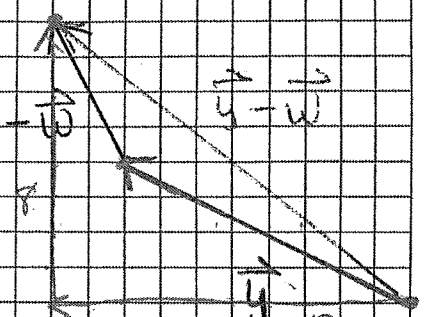
2. $-\frac{3}{4}\vec{y}$



$\left\|-\frac{3}{4}\vec{y}\right\| = \sqrt{6^2 + (-3)^2}$

$= \sqrt{45}$ or 6.708

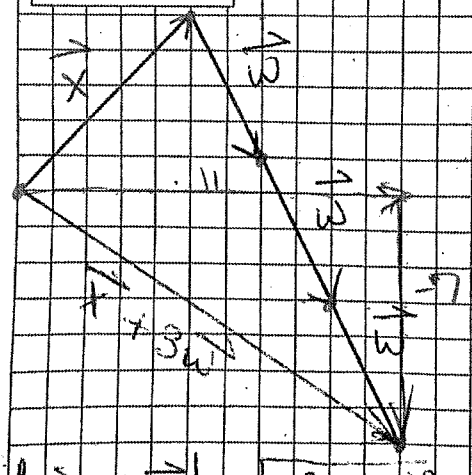
3. $\vec{y} - \vec{w}$



$\left\|\vec{y} - \vec{w}\right\| = \sqrt{(-10)^2 + (8)^2}$

$= \sqrt{164}$ or 12.806

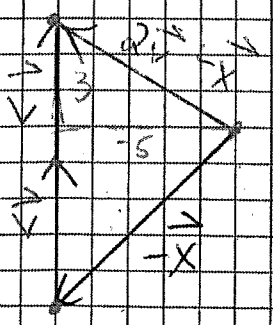
4. $\vec{x} + 3\vec{w}$



$\left\|\vec{x} + 3\vec{w}\right\| = \sqrt{11^2 + (-7)^2}$

$= \sqrt{170}$ or 13.038

5. $2\vec{v} - \vec{x}$

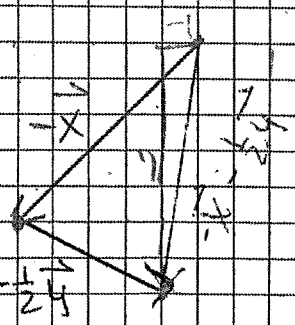


$\left\|2\vec{v} - \vec{x}\right\|$

$\sqrt{(-5)^2 + 3^2}$

$= \sqrt{34}$ or 5.831

6. $-\vec{x} - \frac{1}{2}\vec{y}$



$\left\|-\vec{x} - \frac{1}{2}\vec{y}\right\| = \sqrt{(-1)^2 + 7^2}$

$= \sqrt{50}$ or 7.071