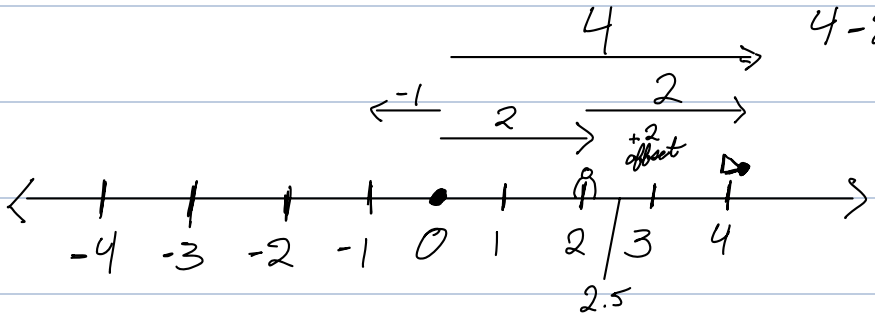
- Real Number Line



$4-2=2$ Distance from player to camera.

$distance(a,b) = |b-a|$

$a=2$ $b=4$ $b-a=2$

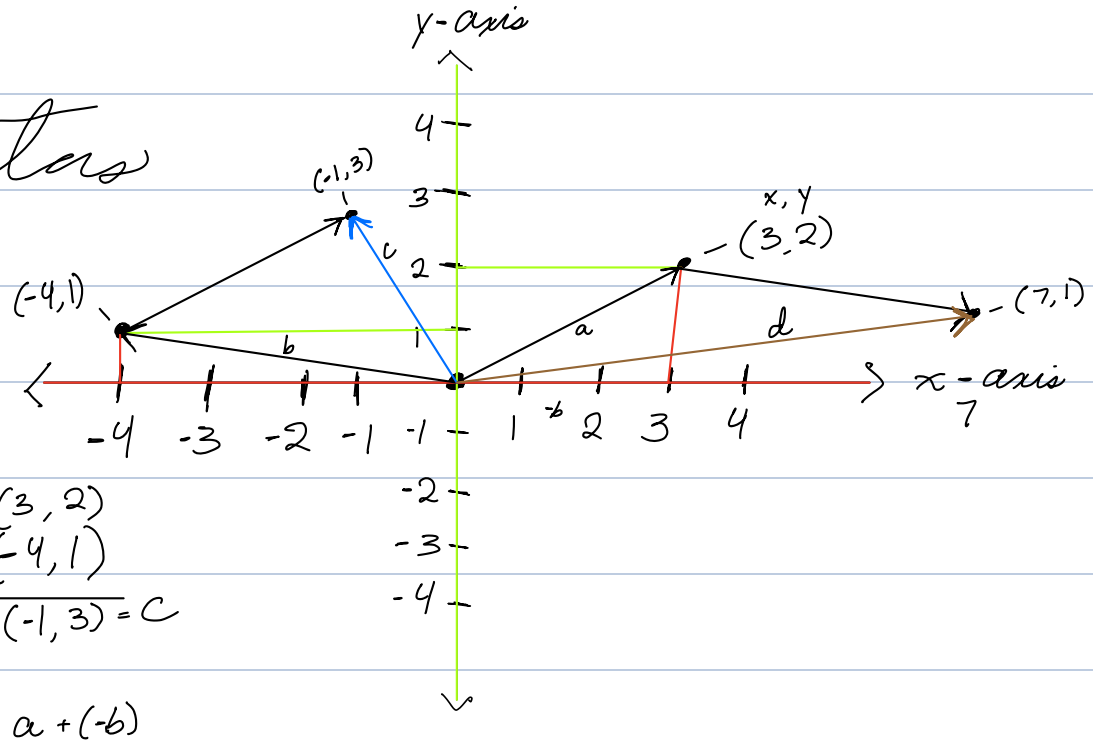
Signed Distance (+/-)

$a=2$ $b=1$ $b-a=-1$

$abs(a) = |a|$ $distance(a,b) = |b-a|$ = Magnitude

$sign(a) = \frac{a}{|a|}$

- Vectors



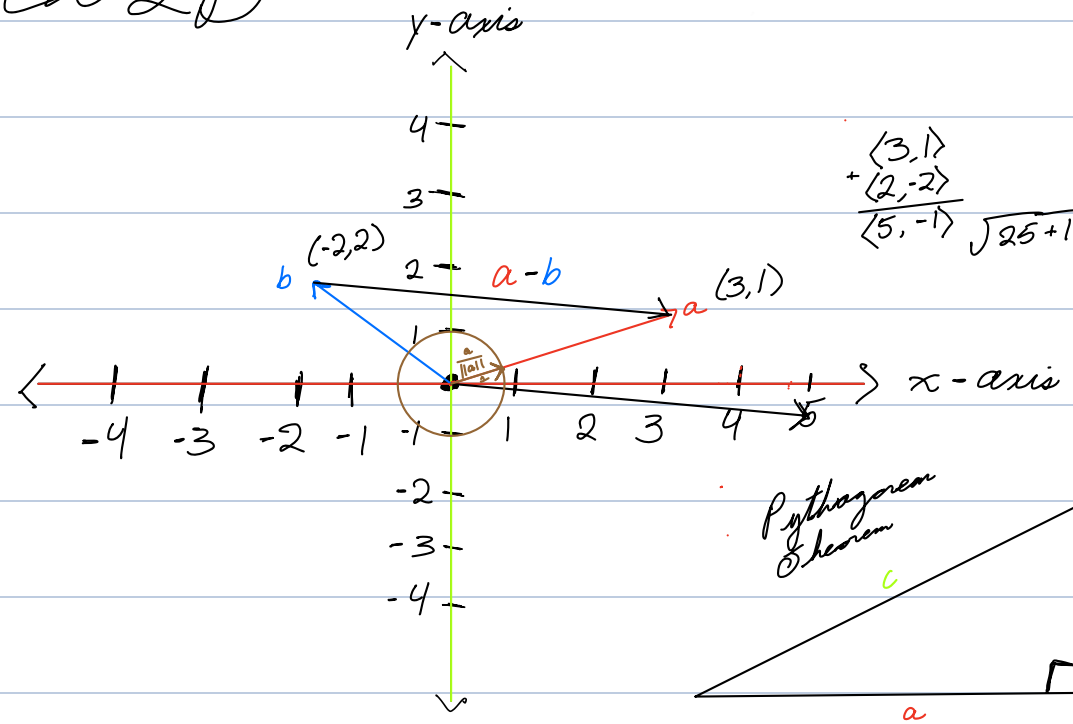
$c = a + b$

$\begin{array}{r} (3,2) \\ +(-4,1) \\ \hline (-1,3) = c \end{array}$

$d = a - b = a + (-b)$

$d = \begin{array}{r} (3,2) \\ +(4,-1) \\ \hline (7,1) = d \end{array}$

- Vectors 2D



$\langle 3,1 \rangle$
$+ \langle 2,-2 \rangle$
$\langle 5,-1 \rangle$ $\sqrt{25+1} = \sqrt{26}$

$c^2 = a^2 + b^2$

$c = \sqrt{a^2+b^2}$ = Length of Vector

$c = \sqrt{x^2+y^2}$

$\text{Length}(a) = \sqrt{a.x^2 + a.y^2}$ = Magnitude

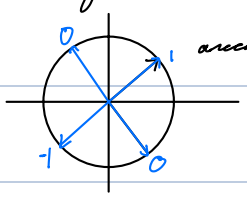
$\text{Dist}(a,b) = \|b-a\|$

$\text{Direction/Normalization}(a) = \frac{a}{\|a\|}$

Dot Product $a \cdot b$

$a \cdot b = a.x * b.x + a.y * b.y$

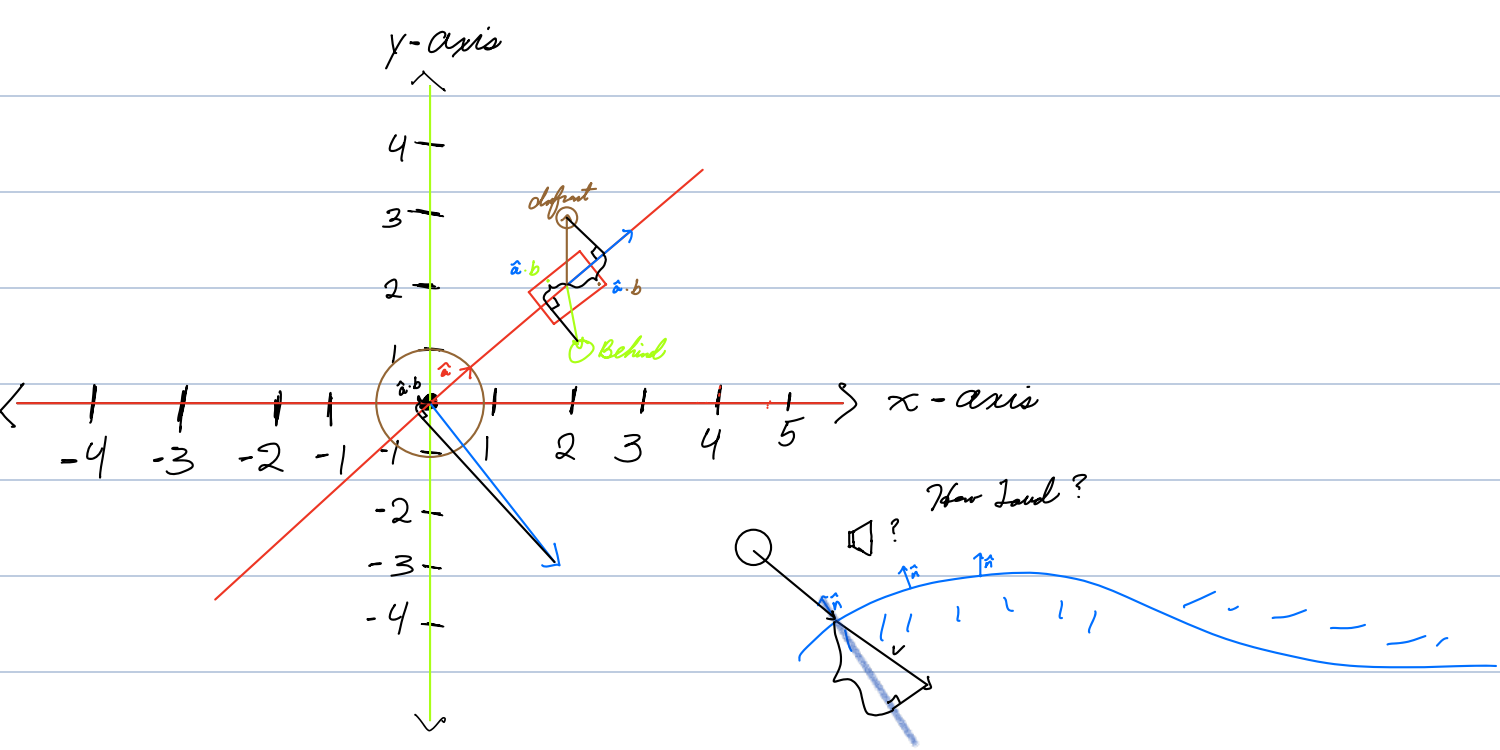
Scalar Projection $\hat{a} \cdot b$



Vector Projection $(\hat{a} \cdot b)\hat{a}$

$a+b$
$a-b$
$a*S = (xs, ys)$

Dot Product $a \cdot b$


y-axis
x-axis
4
3
2
1
-1
-2
-3
-4
-4
-3
-2
-1
1
2
3
4
5
â·b
â·b
â·b
â
Ahead
Behind

How Loud?
?
n̂
n̂
n̂
v