

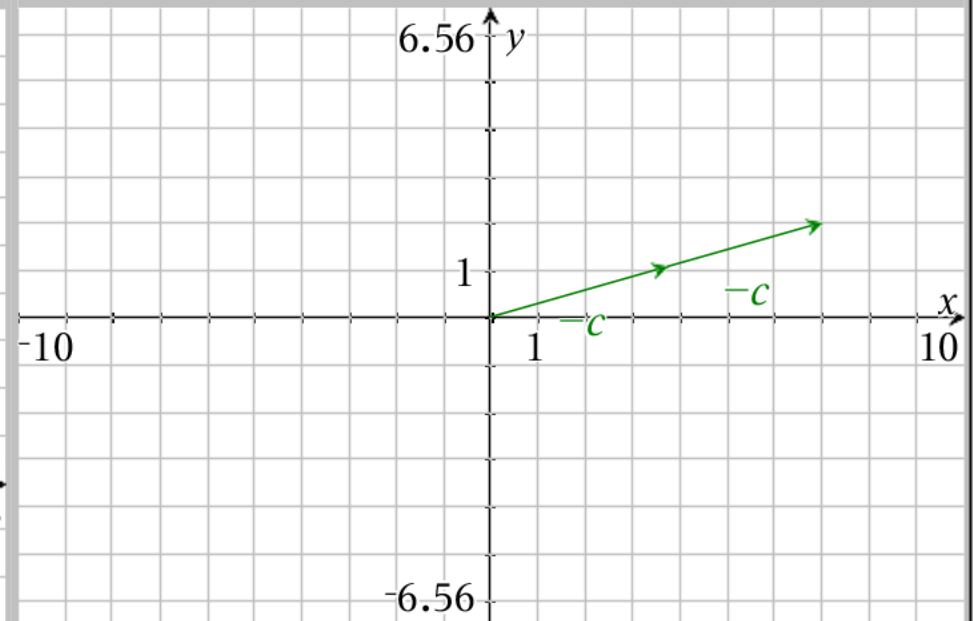
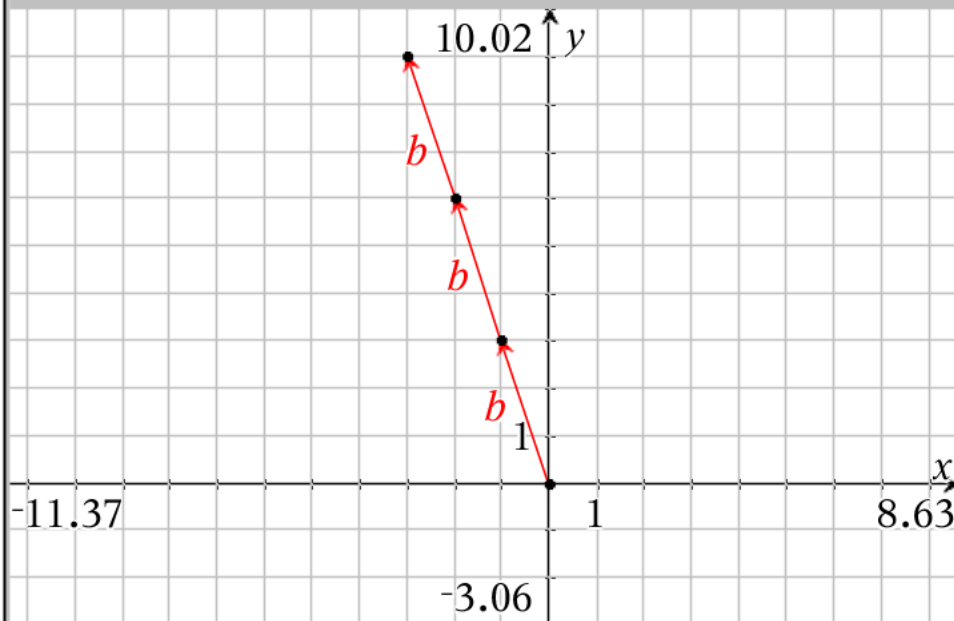
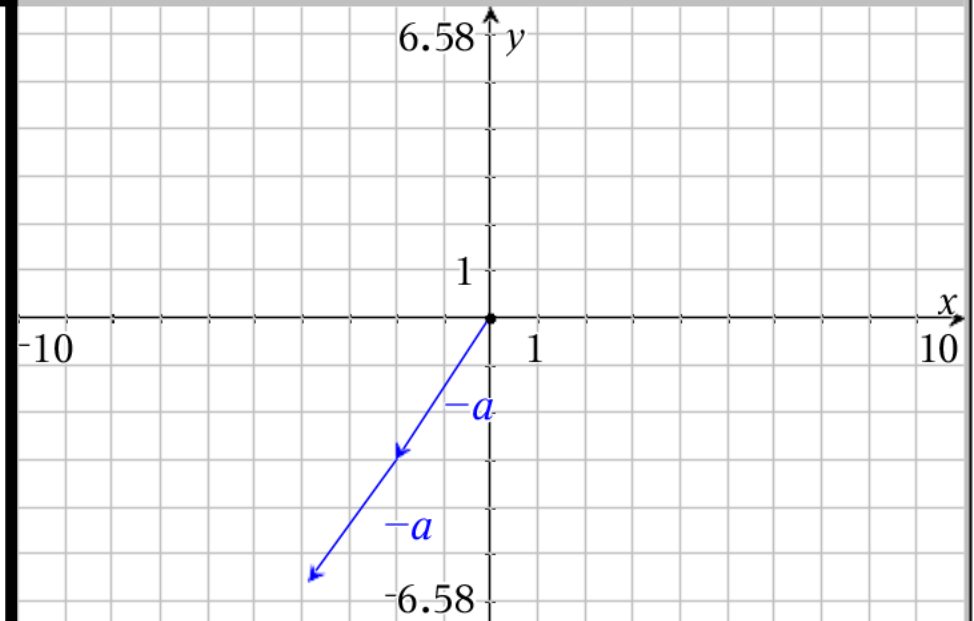
This vector  
 polygon is also  
 the vector  
 equation  
 vector PQ  
 =  $3a - 2b + 3c$

$$a = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad b = \langle -1, 3 \rangle \quad c = -4i - 1j$$

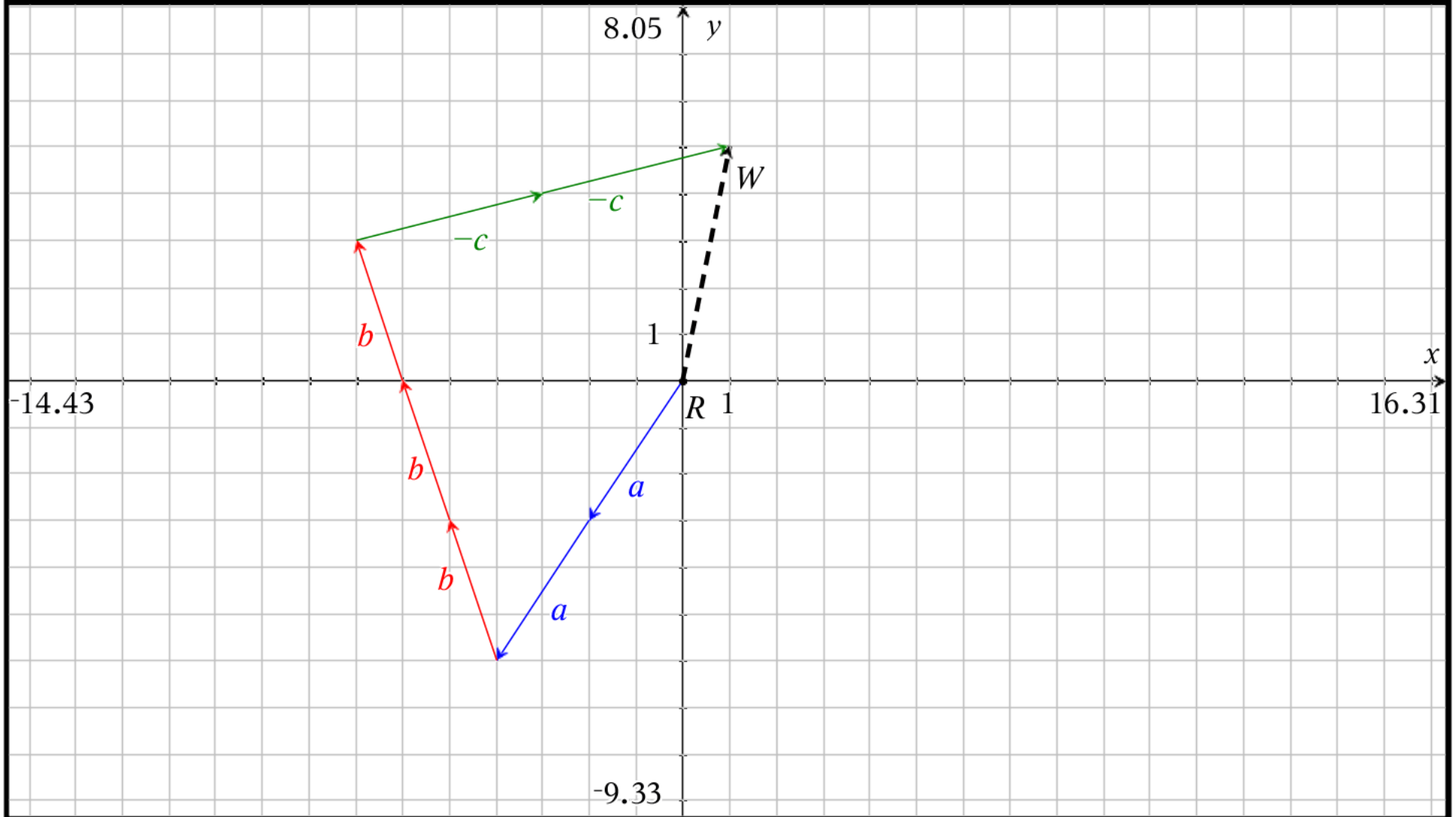
We want to draw the vector polygon

$$-2a + 3b - 2c$$

This is the result of adding the opposite of  $a$  twice, then adding  $b$  three times to that result and finally adding the opposite of  $c$  twice to that result



When we put this all together we get the following



We can check our graph algebraically too

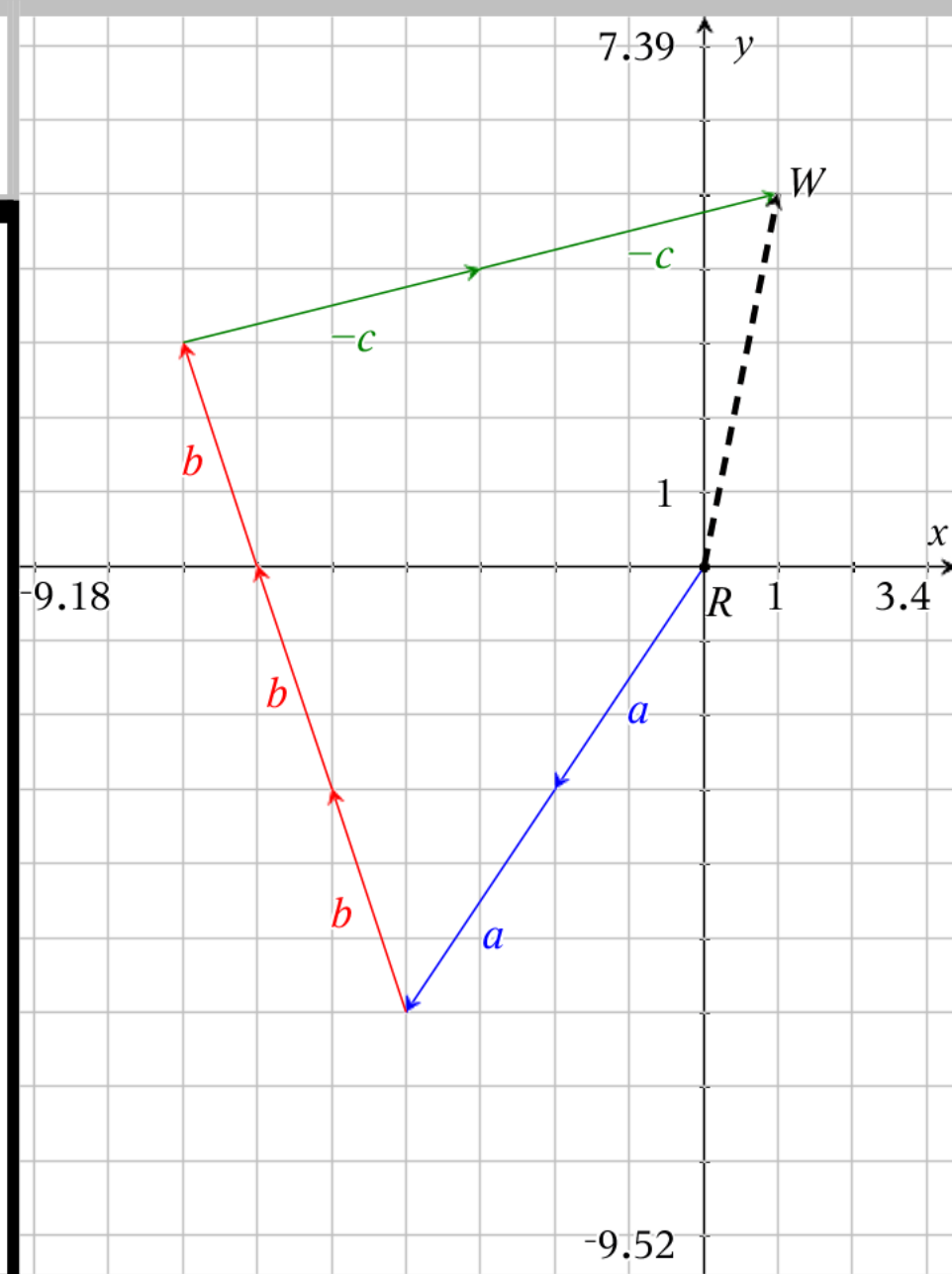
$$a = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad b = \langle -1, 3 \rangle \quad c = -4i - 1j$$

check to see that  $-2a + 3b - 2c = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$

$$-2 \begin{bmatrix} 2 \\ 3 \end{bmatrix} + 3 \begin{bmatrix} -1 \\ 3 \end{bmatrix} - 2 \begin{bmatrix} -4 \\ -1 \end{bmatrix}$$

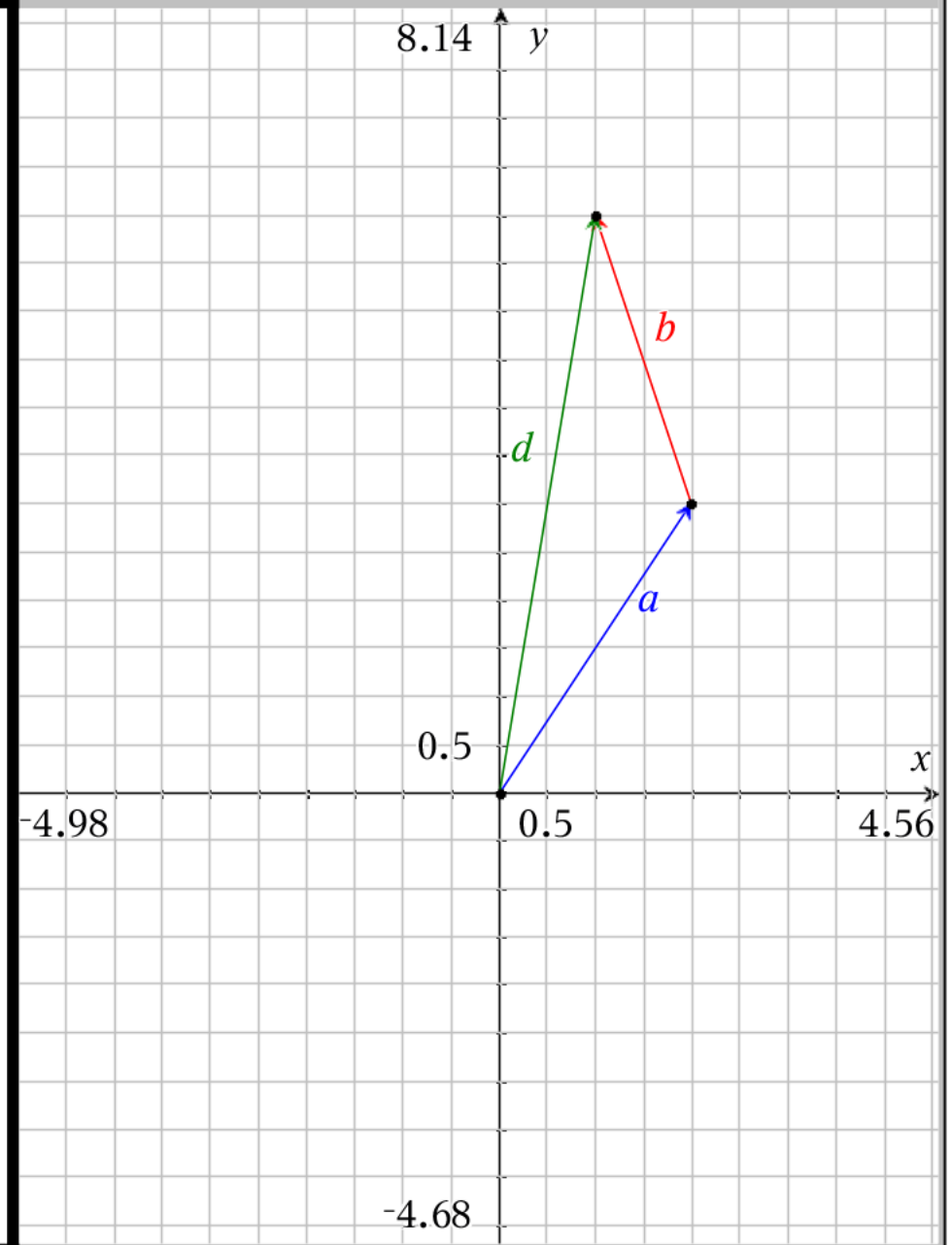
$$\begin{bmatrix} -4 \\ -6 \end{bmatrix} + \begin{bmatrix} -3 \\ 9 \end{bmatrix} + \begin{bmatrix} 8 \\ 2 \end{bmatrix} = \begin{bmatrix} -2 + -3 + 8 \\ -6 + 9 + 2 \end{bmatrix} \\ = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$$

We can say that RW has direction  $\begin{bmatrix} 1 \\ 5 \end{bmatrix}$



$$a = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad b = \langle -1, 3 \rangle$$

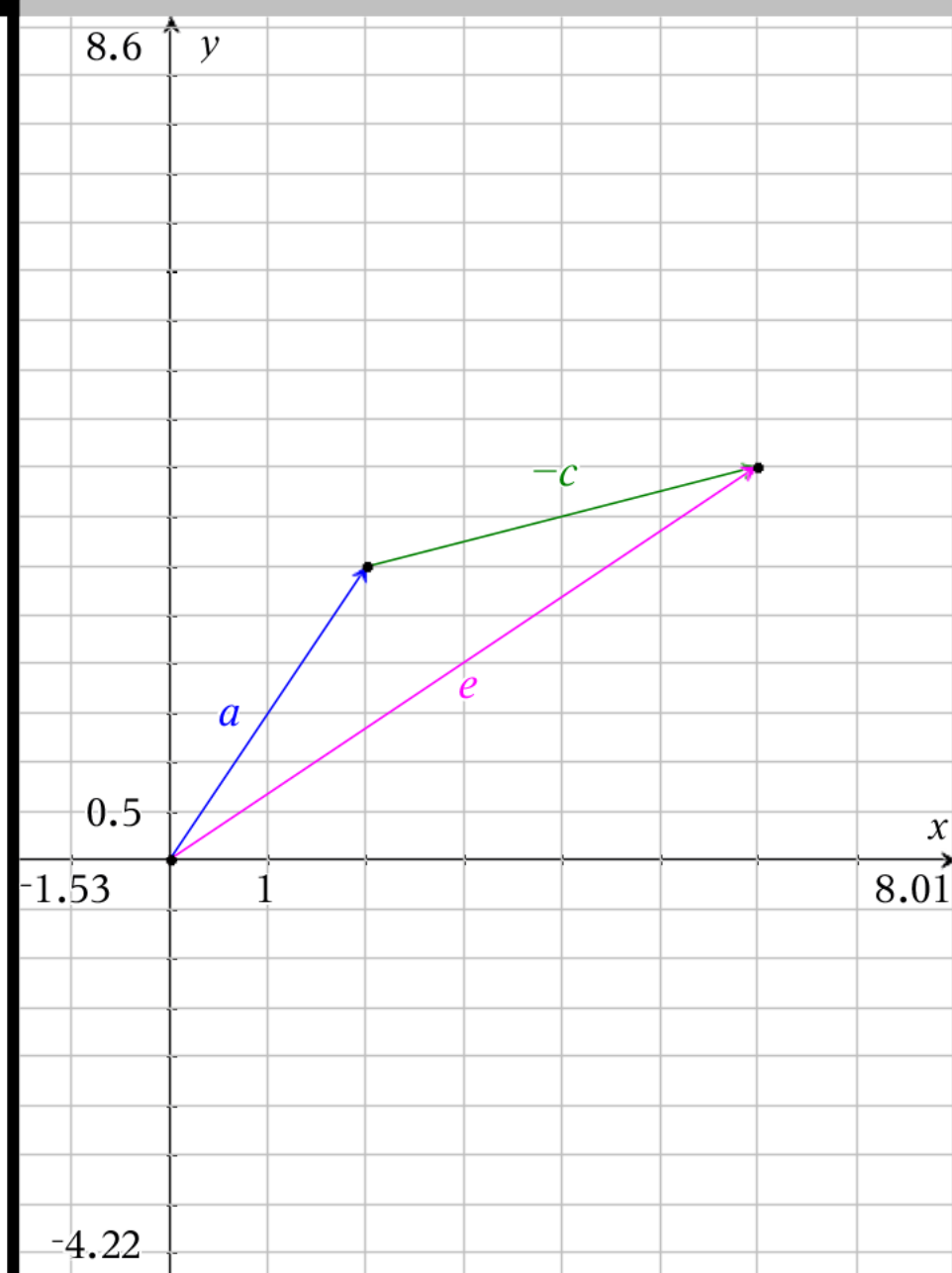
Draw  $d = a + b$



$$a = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad c = -4i - 1j$$

Draw  $e = a - c$

Think of this as  $a + -c$  and it is easier



$b = \langle -1, 3 \rangle$     $c = -4i - 1j$

Draw  $f = -b - c$

Think of this as  $-b + -c$  and it is easier

