

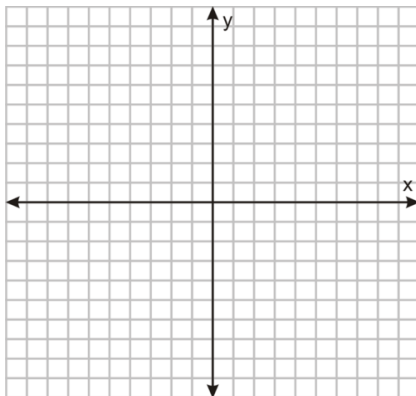
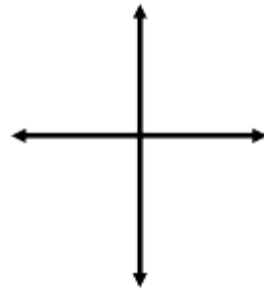
Tim and Tom are twins in a tug-o-war. It is hard to tell, but one of them is winning. Who do you think it is, and why?



Magnitude: **The length of the vector.**

Direction: **The direction of a vector is the direction along which it acts.**

For example, we say 10 N force in the Northeast.



Magnitude:  $|z|$  = magnitude (absolute value)

Find:  $|-3 + 5i|$

Find a complex number in the 4<sup>th</sup> quadrant with a magnitude of 5.

$$|z| = \sqrt{a^2 + b^2}$$

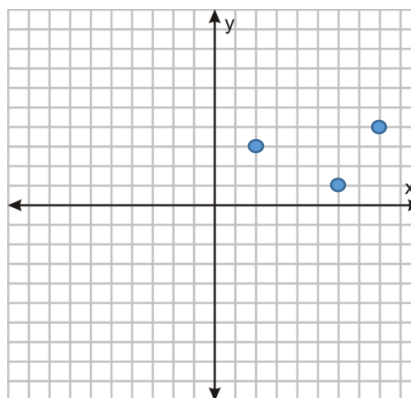
Find:

$$|-4 + 2i| =$$

The graph shows,  
 $z = 2 + 3i$   
 $w = 6 + i$   
 $z + w = 8 + 4i$   
 on the complex plane.

Label the points:

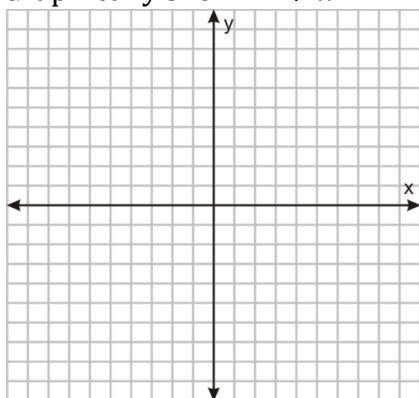
Using vectors, what conclusions can you draw?



Given:  $z = -3 + 4i$

$$w = 2 - 5i$$

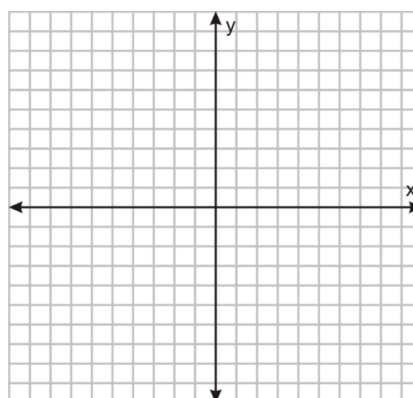
Graphically show:  $z + w$



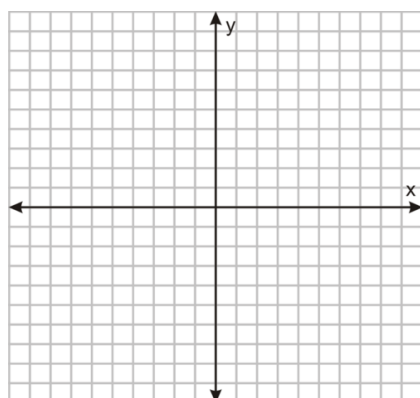
Given:  $z = 5 + i$

$$w = -2 - 6i$$

Graphically show:  $z - w$



What happens graphically when you multiply a complex number by a scalar?



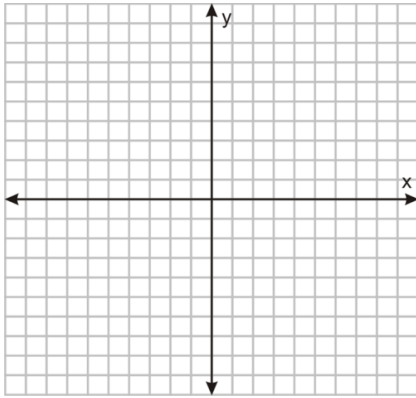
$$z = -3 + i$$

$$2z =$$

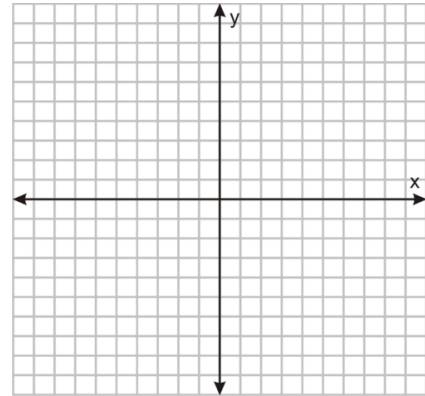
$$-3z =$$

For each  $z$ , graph  $z$  and  $iz$  as vectors on the same complex plane.

$$z = 3 + 5i$$



$$z = -3 - 4i$$



Which of these four complex numbers has the longest vector? Explain your reasoning.

a)  $-5 - 6i$

b)  $6 + i$

c)  $4 + 5i$

d)  $8$

