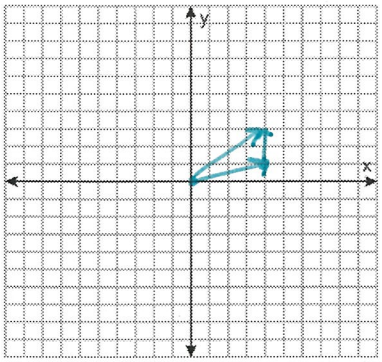
Honors Math II
Unit 2 day 5

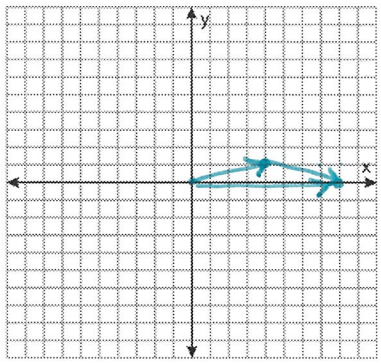
Name Key
Period_____ Date_____

1. Illustrate each addition equation on the complex plane.

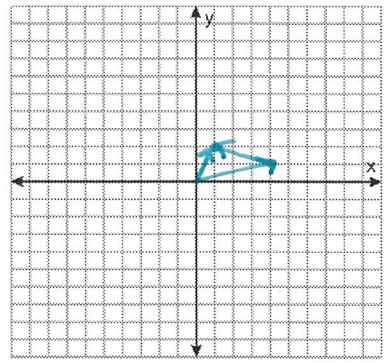
a. $(4+i)+(2i)=4+3i$



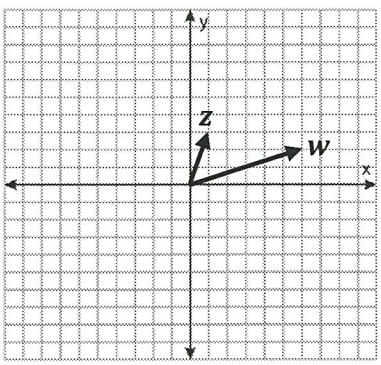
b. $(4+i)+(4-i)=8$



c. $(4+i)+(-3+i)=1+2i$

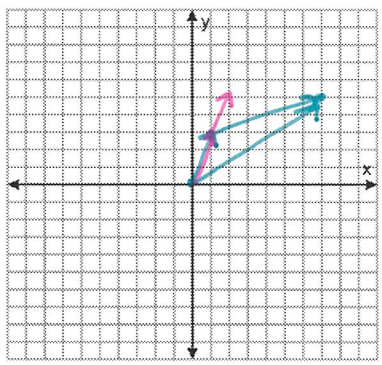


2. The graph below shows two complex numbers z and w. Graph each expression.

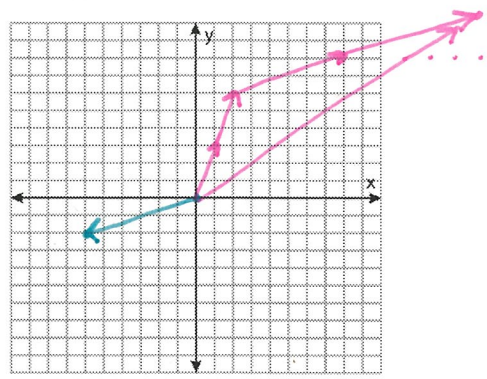


$z = 1+3i$
$w = 6+2i$

a. $z+w$
b. $2z$

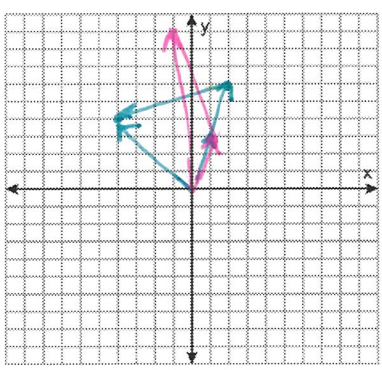


a. $-w$
b. $2z+2w$

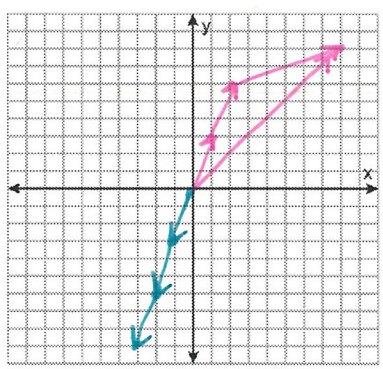


a. $2z-w$
b. $z+wi$

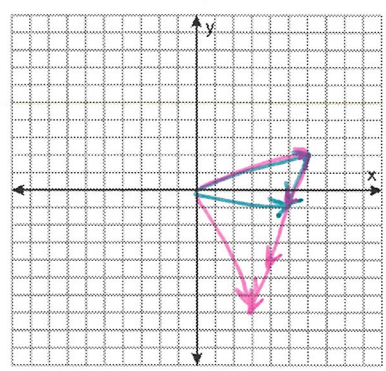
$z+(6+2i)i$
$-2+6i$



a. $-3z$
b. $2z+w$



a. $w-z$
b. $w-3z$



3. If $z=a+bi$ is a complex number, show that z and iz are the same distance from the origin.

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

$iz = ai + bi^2$

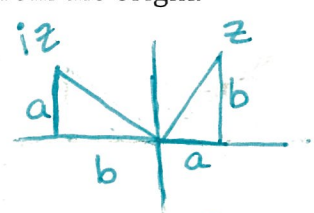
$iz = -b + ai$

$|iz| = \sqrt{(-b)^2+a^2}$

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

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

or



$a^2+b^2 = h^2$
$a^2+b^2 = h^2$ } same

4. For each complex number, find the distance to the origin on the complex plane. Show work

a. $3 - 2i$

$d = \sqrt{13}$

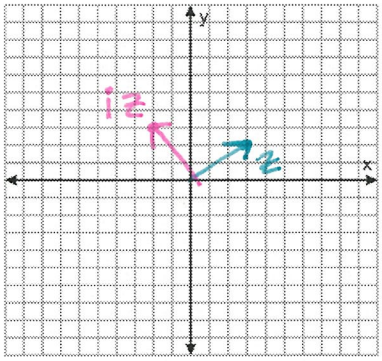
b. $-6 - 5i$

$d = \sqrt{61}$

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

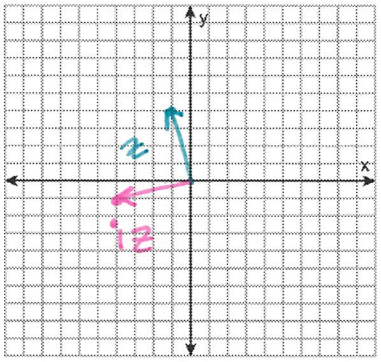
a. $z = 3 + 2i$

$iz = 3i + 2i^2$



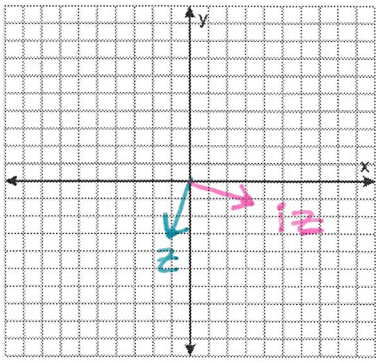
b. $z = -1 + 4i$

$iz = -i + 4i^2$



c. $z = -1 - 3i$

$iz = -i - 3i^2$



6. a. Describe the effect, in the complex plane, of multiplying a complex number by i^2.

$i^2 = -1$ $\quad a + bi \rightarrow -a - bi$ $\quad$ Rotate 180°

b. Describe the effect, in the complex plane, of multiplying a complex number by $-i$.

$-i$ $\quad a + bi \rightarrow -ai - bi^2 = b - ai$ $\quad$ Rotate clockwise 90°

7. For each complex number, find its distance from the origin on the complex plane.

Show work

a. $3 + i$

$\sqrt{10}$

b. $4 - i$

$\sqrt{17}$

c. $(3 + i)(4 - i)$

$\sqrt{170}$

d. $(2 + i)^2$

5

8. Order the following complex number from least to greatest, based on how far each number is from the origin.

$5 + 3i$ $\quad$ $2 - 7i$ $\quad$ 8 $\quad$ $-6 - 4i$

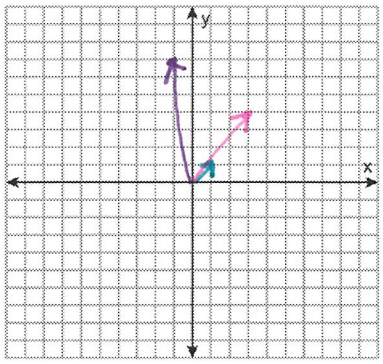
$\sqrt{34}$ $\quad$ $\sqrt{53}$ $\quad$ $\sqrt{64}$ $\quad$ $\sqrt{52}$

$5+3i$, $-6-4i$, $2-7i$, 8

9. Suppose $z = 1 + i$. For each value of w, draw a diagram that shows z, w, and zw.

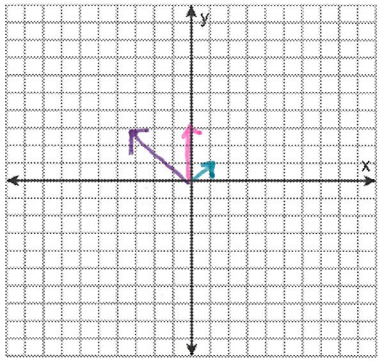
$z = 1+i$ $\quad zw = -1+7i$

a. $w = 3 + 4i$



$z = 1+i$

b. $w = 3i$



$zw = (1+i)(3i)$

$= 3i + 3i^2$

$= -3 + 3i$

10. Find $|w|$.

a. $w = -2 + 2i$

$|w| = 2\sqrt{2}$

b. $w = -5 - 2i$

$|w| = \sqrt{29}$

11. Let $z = 1 + i$ and $w = -2 - 7i$, Find the following:

a. $|z|$ $\quad$ b. $|w|$ $\quad$ c. $|z + w|$ $\quad$ d. The distance from z to w.

$|z| = \sqrt{2}$

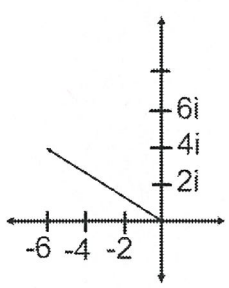
$|w| = \sqrt{53}$

$|-1-6i|$

$|z+w| = \sqrt{37}$

$\sqrt{73}$

12. Standardized Test Prep: Here is a graph of $2iz$ for a complex number z, on the complex plane. Which of the following numbers is z?



a. $-3 + 2i$

b. $2 + 3i$

c. $3 - 2i$

d. $4 + 6i$

show work for credit

Simplify.

13. $(5x^3 - 2x^2 + 10) + (x^2 + x + 1)$ $5x^3 - 3x^2 + x + 9$	14. $-3x(x-5)^2$ $-3x(x-5)(x-5)$ $-3x^3 + 30x^2 - 75x$
15. $(4 - 2i)(6 + 9i)$ $42 + 24i$	16. $\frac{3}{\sqrt{12}}$ $\sqrt{3}/2$
17. $(2x - 1)(x^2 + 5x + 1)$ $2x^3 + 9x^2 - 3x - 1$	18. $\frac{4}{3-2i}$ $\frac{12+8i}{13}$

Factor.

19. $14x^2 - 23x + 3$	20. $25x^2 - 16$
21. $16x^2 + 40x + 25$	22. $10x^2 - x - 3$