Introduction to Complex Numbers Name _____

1. Write each complex number in **standard a + bi** form.

a) $\sqrt{-16}$ =

b) $-3 + \sqrt{-81}$ =

c) $8 - \sqrt{-25}$ =

d) $\sqrt{-9} + 1$ =

e) $-\sqrt{-1} + 2$ =

f) $4 - \sqrt{-3}$ =

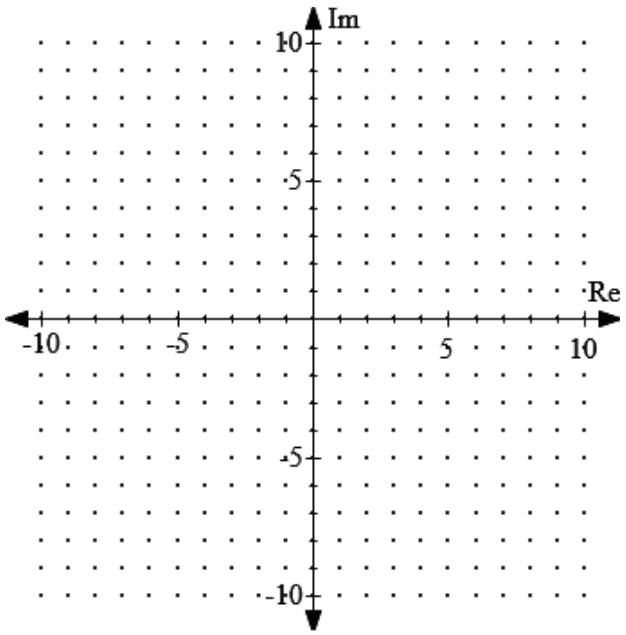
g) $\frac{2 - \sqrt{-12}}{2}$ =

h) $\frac{12 + \sqrt{-36}}{3}$ =

i) $\frac{-15 - \sqrt{-45}}{5}$ =

2. Let $\mathbf{z} = -4 + 7i$ and $\mathbf{w} = 9 - 3i$.

a) Graph and label $\mathbf{w}$ and $\overline{\mathbf{w}}$ as vectors.
b) Graph and label $\mathbf{z}$ and $\overline{\mathbf{z}}$ as vectors.



c) z - w =

d) w + **z** =

e) $2\mathbf{z} + 4\mathbf{w}$ =

f) $|\mathbf{w}|$ =

g) $|\mathbf{z}|$ =

h) w * $\overline{\mathbf{w}}$ =

i) z * $\overline{\mathbf{z}}$ =

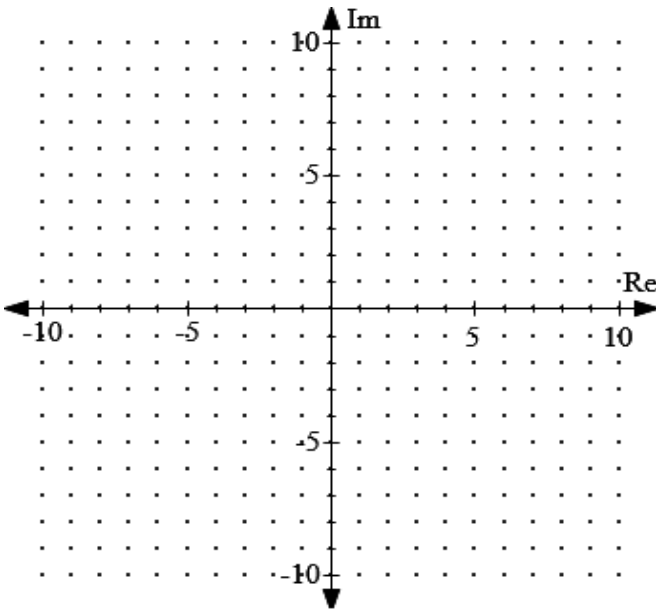
j) $\frac{\mathbf{z}}{\mathbf{w}}$ =

k) $\frac{\mathbf{w}}{\mathbf{z}}$ =

l) z * **w** =

3. Let $\mathbf{z} = -6i$ and $\mathbf{w} = -8 - 6i$.

a) Graph and label **w** and $\overline{\mathbf{w}}$ as vectors.
b) Graph and label **z** and $\overline{\mathbf{z}}$ as vectors.



c) **z** - **w** =

d) **w** + **z** =

e) -**z** - 2**w** =

f) $|\mathbf{w}|$ =

g) $|\mathbf{z}|$ =

h) **w** * $\overline{\mathbf{w}}$ =

i) **z** * $\overline{\mathbf{z}}$ =

j) $\frac{\mathbf{w}}{\mathbf{z}}$ =

k) **z** * **w** =

4. Let $\mathbf{z} = 5 - 2i$ and $\mathbf{w} = -3 + i$.

a) Graph and label $\mathbf{w}$ and $\overline{\mathbf{w}}$ as vectors.

b) Graph and label $\mathbf{z}$ and $\overline{\mathbf{z}}$ as vectors.

c) $\mathbf{z} - \mathbf{w} =$ d) $\mathbf{w} + \mathbf{z} =$

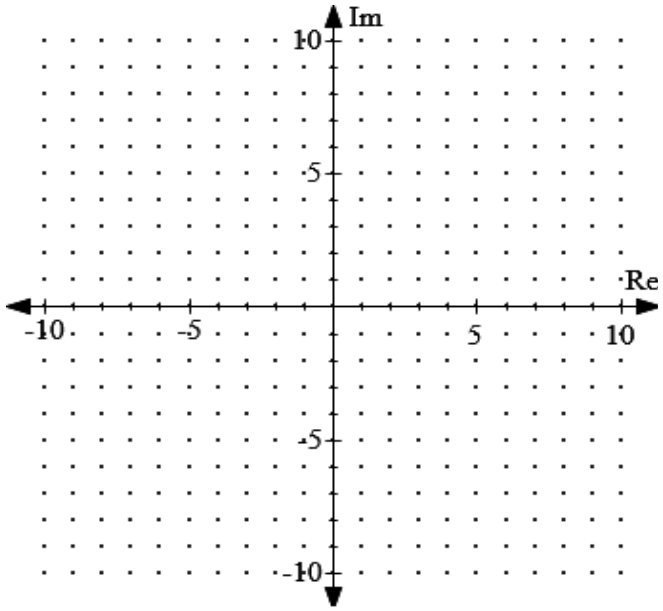
e) $3\mathbf{z} - 5\mathbf{w} =$

f) $|\mathbf{w}| =$ g) $|\mathbf{z}| =$

h) $\mathbf{w} * \overline{\mathbf{w}} =$ i) $\mathbf{z} * \overline{\mathbf{z}} =$

j) $\frac{\mathbf{z}}{\mathbf{w}} =$

k) $\mathbf{w} * \mathbf{z} =$



5. Show that $1 + 2i$ and $1 - 2i$ are solutions (roots) of the equation $x^2 - 2x + 5 = 0$.

6. Show that $3 + i$ and $3 - i$ are solutions (roots) of the equation $x^2 - 6x + 10 = 0$.

7. Use the quadratic formula to solve (find the roots) $2x^2 - 4x + 6 = 0$. Write the roots in $a + bi$ format.

8. Use the quadratic formula to solve $3x^2 + 9x + 10 = 0$. Write the roots in $a + bi$ format.