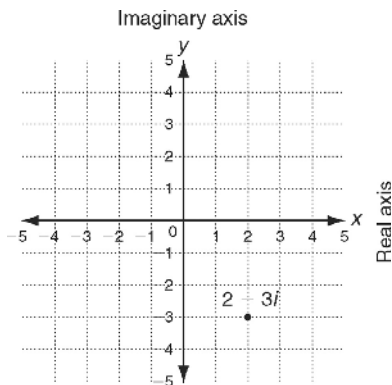


**LESSON**  
**13-2**

# Reteach

## Operations with Complex Numbers

Graphing complex numbers is like graphing real numbers. The real axis corresponds to the x-axis and the imaginary axis corresponds to the y-axis.



To find the **absolute value** of a complex number, use  $|a + bi| = \sqrt{a^2 + b^2}$ .

$$\begin{aligned}
 |7i| &= \sqrt{(0)^2 + (7)^2} \\
 &= \sqrt{49} \\
 &= 7
 \end{aligned}$$

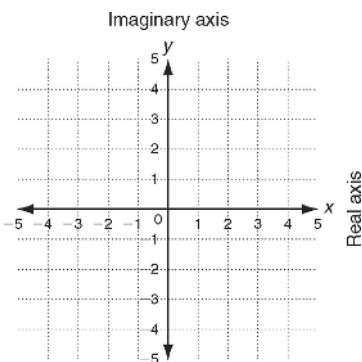
Think:  
 $7i = 0 + 7i$ ;  
so  $a = 0$  and  
 $b = 7$ .

$$\begin{aligned}
 |3 - i| &= \sqrt{(3)^2 + (-1)^2} \\
 &= \sqrt{9 + 1} \\
 &= \sqrt{10}
 \end{aligned}$$

Think:  
 $3 - i = 3 - 1i$ ;  
so  $a = 3$  and  
 $b = -1$ .

**Graph and label each complex number on the complex plane.**

1.  $1 + i$
2.  $4i$
3.  $-2 + 0i$
4.  $2 - i$
5.  $-1 - 3i$



**Find each absolute value.**

6.  $|-8i|$

$$\begin{aligned}
 |0 - 8i| &= \sqrt{(0)^2 + (-8)^2} \\
 &= \sqrt{64} \\
 &= 8
 \end{aligned}$$

7.  $|2 + i|$

$$|2 + 1i|$$

8.  $|3|$

$$|3 + 0i|$$

9.  $|5 - 2i|$

10.  $|9i|$

11.  $|-4 + 3i|$

**LESSON**  
**13-2**

**Reteach**

**Operations with Complex Numbers** (continued)

To add or subtract complex numbers, add the real parts and then add the imaginary parts.

$$(3 - 2i) + (4 + 5i)$$

$$(3 + 4) + (-2i + 5i)$$

$$7 + 3i$$

First, group to add the real parts and the imaginary parts. This is similar to adding like terms.

$$(4 - i) - (-2 + 6i)$$

$$(4 - i) + 2 - 6i$$

$$(4 + 2) + (-i - 6i)$$

$$6 - 7i$$

Remember to distribute when subtracting. Then group to add the real parts and the imaginary parts.

Use the Distributive Property to multiply complex numbers. Remember that  $i^2 = -1$ .

$$3i(2 - i)$$

$$6i - 3i^2$$

$$6i - 3(-1)$$

$$3 + 6i$$

*Distribute.*

*Use  $i^2 = -1$ .*

*Write in the form  $a + bi$ .*

$$(4 + 2i)(5 - i)$$

$$20 - 4i + 10i - 2i^2$$

$$20 + 6i - 2(-1)$$

$$22 + 6i$$

*Multiply.*

*Combine imaginary parts and use  $i^2 = -1$ .*

*Combine real parts.*

**Add, subtract, or multiply. Write the result in the form  $a + bi$ .**

12.  $(6 + i) + (3 - 2i)$

$$(6 + 3) + (i - 2i)$$

13.  $(9 - 3i) - (2 + i)$

$$(9 - 3i) + (-2 - i)$$

14.  $(3 + i)(2 + 2i)$

$$6 + 6i + 2i + 2i^2$$

15.  $(2 - 4i) + (1 - 4i)$

16.  $(1 - 7i) - (1 - 5i)$

17.  $5i(4 + 3i)$

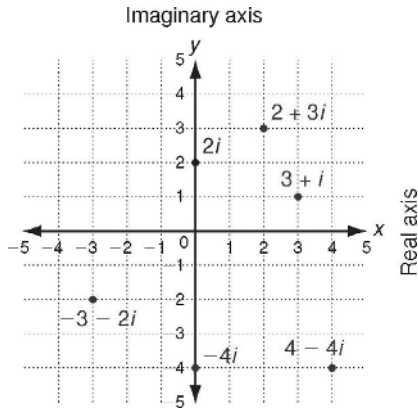
18.  $(6 - 5i) + (-5i - 6)$

19.  $(2 - i)(3i + 2)$

20.  $(2 + 4i)^2$

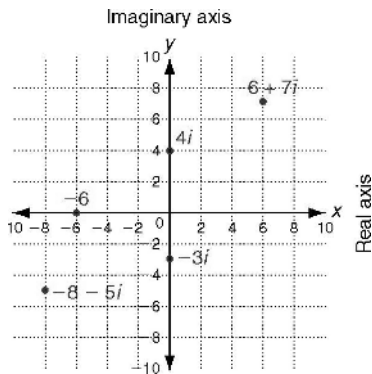
# 13-2 OPERATIONS WITH COMPLEX NUMBERS

## Practice A



- |                                |                                 |
|--------------------------------|---------------------------------|
| 7. $2\sqrt{10}$                | 8. $\sqrt{10}$                  |
| 9. 5                           | 10. $10i$                       |
| 11. $-4i$                      | 12. $2+12i$                     |
| 13. $4+6i$                     | 14. $-3-4i$                     |
| 15. $10-5i$                    | 16. $6i$                        |
| 17. $-20i$                     | 18. $12+16i$                    |
| 19. $-10+6i$                   | 20. $7-11i$                     |
| 21. $-8+9i$                    | 22. $-i$                        |
| 23. $\frac{5}{3}-\frac{2}{3}i$ | 24. $\frac{1}{5}+\frac{13}{5}i$ |

## Practice B

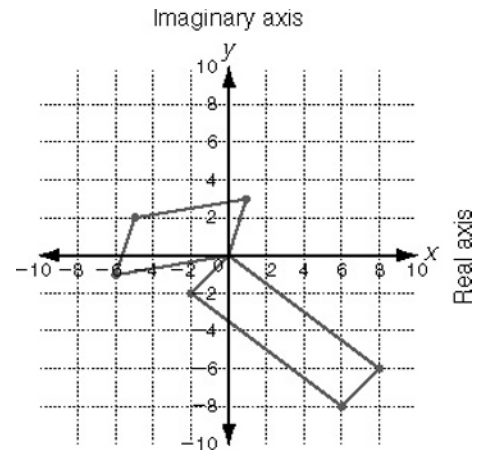


- |                |                                |
|----------------|--------------------------------|
| 6. $2\sqrt{5}$ | 7. $\sqrt{26}$                 |
| 8. 3           | 9. $5-7i$                      |
| 10. $-1-10i$   | 11. $-7+10i$                   |
| 12. $9+6i$     | 13. $3+14i$                    |
| 14. $9+20i$    | 15. $\frac{4}{3}-\frac{2}{3}i$ |

- |                                   |           |
|-----------------------------------|-----------|
| 16. $\frac{14}{17}+\frac{5}{17}i$ | 17. $-2i$ |
| 18. $8+2i$                        |           |

## Practice C

- |                         |                               |
|-------------------------|-------------------------------|
| 1. $6\sqrt{5}$          | 2. $\sqrt{65}$                |
| 3. $\frac{\sqrt{2}}{2}$ | 4. $13+3i$                    |
| 5. $-8-17i$             | 6. $\frac{1}{4}-\frac{1}{2}i$ |
| 7. $-5+2i$              | 8. $6-8i$                     |



- |                                   |               |
|-----------------------------------|---------------|
| 9. $\frac{53}{65}+\frac{31i}{65}$ | 10. $-14-80i$ |
| 11. $\frac{9}{5}+\frac{7i}{5}$    | 12. $2-i$     |
| 13. $-4i$                         | 14. 10        |
| 15. $14+5i$                       |               |

## Reteach

- |               |                |
|---------------|----------------|
| 6. 8          | 7. $\sqrt{5}$  |
| 8. 3          | 9. $\sqrt{29}$ |
| 10. 9         | 11. 5          |
| 12. $9-i$     | 13. $7-4i$     |
| 14. $4+8i$    | 15. $3-8i$     |
| 16. $-2i$     | 17. $-15+20i$  |
| 18. $10i$     | 19. $7+4i$     |
| 20. $-12+16i$ |                |

## Challenge

- Square roots should be simplified first.
- 6; 6