

3.2 Enrichment and Extension

Complex Conjugates and Graphing

The complex conjugate of a complex number $a + bi$ is $a - bi$. For example, the complex conjugate of $-3 - 2i$ is $-3 + 2i$. The sign only differs on the imaginary part of the complex number.

In Exercises 1–6, use the complex conjugate of the denominator to write the quotient in standard form.

1. $\frac{3}{1 + 2i}$

2. $\frac{2 + i}{3 - i}$

3. $\frac{5 + 3i}{-5 - 3i}$

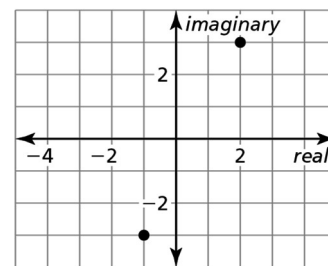
4. $\frac{4 - i}{3i}$

5. $\frac{-2 + 2i}{-3 - 4i}$

6. $\frac{4 + 2i}{\frac{2}{3} + \frac{1}{2}i}$

Complex numbers can be graphed in a coordinate plane called *the complex plane*. The horizontal axis is called the *real axis* and the vertical axis is called the *imaginary axis*.

To graph a complex number such as $2 + 3i$, represent it with coordinates $(2, 3)$ in the complex plane. Similarly, the point $(-1, -3)$ represents $-1 - 3i$.



In Exercises 7–18, graph the number and its complex conjugate in the complex plane.

7. $-2 + 3i$

8. $-4 - 3i$

9. $-5i$

10. $4i$

11. $-1 + 5i$

12. $-6 - i$

13. -3

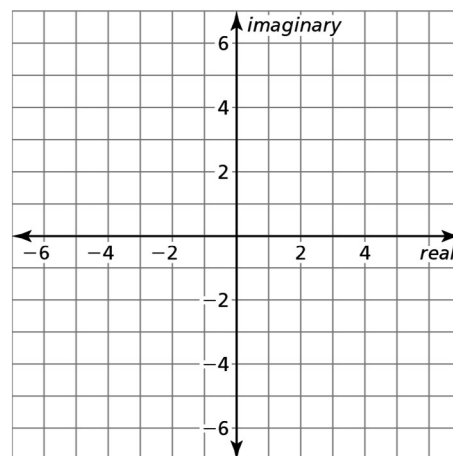
14. $4 + i$

15. $2 - 6i$

16. 4

17. $4 + 3i$

18. $1 + i$



19. Describe the relationship between a complex number and its complex conjugate in the complex plane.

20. If the complex conjugate of $a + bi$ is $-a - bi$, what can you say about the complex number $a + bi$?