

- Operations with Complex Numbers
 - Powers of i
 - Simplifying Fractions with Complex Denominators
 - Solving Quadratic Equations with Complex Roots by using the Quadratic Formula
 - Graphing Complex Numbers
 - Sum and Product of the Roots of a Quadratic Equation
 - Nature of the Roots of a Quadratic Equation
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Practice:

In 1 – 8, express in simplest $a + bi$ form.

1. $(1 - \sqrt{-9})(2 - \sqrt{-1})$

5. $(2i^4)^5$

2. $5i^{12} - 2i^{17} + 4i^{10}$

6. $\frac{1}{2i}$

3. $2\sqrt{-32} - 2\sqrt{-2}$

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

4. $(4 - 3i)^2$

8. $(\sqrt{-9})(2\sqrt{-4})$

9. Solve for x in simplest $a + bi$ form: $x^2 = 2x - 10$

10. If one root of $2x^2 - 8x + c = 0$ is -1 , find the other root and find c .

11. If the roots of a quadratic equation are $3 \pm i$, write the equation.

12. For which values of x will $\frac{x}{\sqrt{x+4}}$ be real?

(1) $x \geq 4$

(2) $x > -3$

(3) $x > -4$

(4) $x > 4$

13. If the roots of $kx^2 + 2x + 1 = 0$ are imaginary, then k could be

(1) 1

(2) 2

(3) -1

(4) 0

14. Write a quadratic equation with integral coefficients if its roots are -2 and $\frac{3}{2}$.

15. a) State the additive inverse of $-3 + 2i$

b) State the conjugate of $-3 + 2i$.

c) State the multiplicative inverse of $-3 + 2i$ in $a + bi$ form.

16. If one root of a quadratic equation is $9 - 2i$, write the equation.

17. Find the sum and product of the roots of $9x^2 = 7x + 2$.

18. For what value(s) of n will the roots of $nx^2 - 7x + 2 = 0$ be equal?
19. For each equation, state the number (1, 2, 3, or 4) which correctly describes the graph:
- (1) It is tangent to the x -axis.
 - (2) It intersects the x -axis at two points.
 - (3) It lies entirely above the x -axis.
 - (4) It lies entirely below the x -axis.

a) $y = -x^2 + x - 1$

b) $y = 3x^2 - 4x - 3$

c) $y = 9x^2 - 6x + 1$

20. If the discriminant of a quadratic equation with rational coefficients is 100, then the roots are
- (1) real, irrational, and equal
 - (2) real, rational, and equal
 - (3) real, irrational, and unequal
 - (4) real, rational, and unequal

21. Add $4 - i$ and $-2 + 3i$ graphically.



22. a) State the multiplicative identity for the set of complex numbers.
b) State the additive identity for the set of complex numbers.