

Review Sheet: Complex Numbers, Solving Quadratics, Rational Exponents

1. The complex number $5i^3 - 2i^2$ is equivalent to:

- (1) $-2 + 5i$ (2) $-2 - 5i$ (3) $2 - 5i$ (4) $2 + 5i$

2. The expression $\sqrt{-192}$ is equivalent to:

- (1) $8\sqrt{3}$ (2) $3\sqrt{8}$ (3) $8i\sqrt{3}$ (4) $3i\sqrt{8}$

Perform the indicated operations and express your answer in simplest $a + bi$ form.

3. $(6 + \sqrt{-49}) + (3 + \sqrt{-64})$

4. $(-1 + 2\sqrt{-12}) - (8 + 5\sqrt{-48})$

5. $(6 - 2i) + (-4 + 5i)$

6. $(2 - \sqrt{-9})(3 + \sqrt{-16})$

7. $\frac{1 + \sqrt{-4}}{2 + \sqrt{-9}}$

8. $4i^2(6 + 8i + 5i^2 - 3i^4)$

9. $(3 - 4i)^2$

10. $\frac{6 + 7i}{2 - i}$

11. Express the product of $(5 + 6i)$ and $(3 - 5i)$ in simplest $a + bi$ form.

12. What is the product of $2 + 5i$ and its conjugate?

13. What is the additive inverse of:

a) $3 - 4i$

b) $-2 + i$

14. What is the multiplicative inverse of:

a) $12 - 3i$

b) $6 + i$

15. Solve for x in simplest $a + bi$ form: $3x^2 - 12x = -21$

16. Solve for x in simplest $a + bi$ form: $x^2 = 6x - 34$

17. The roots of the equation $3x^2 = 5x + 4$ are

- (1) Two real, rational roots
- (2) Two real, irrational roots
- (3) One real root
- (4) Two imaginary roots

18. The roots of the equation $x^2 - 4x + 13 = 0$ are

- (1) Two real, rational roots
- (2) Two real, irrational roots
- (3) One real root
- (4) Two imaginary roots

19. For which value of k will the roots of $2x^2 + kx + 1 = 0$ be real?

- (1) 1
- (2) 2
- (3) 3
- (4) 0

20. The roots of a quadratic equation are $x = 4 + 2i$ and $x = 4 - 2i$.

a) Find the sum of the roots.

b) Find the product of the roots.

c) Write a quadratic equation with roots r_1 and r_2 .

21. Which quadratic equation has roots $3 + i$ and $3 - i$?

(1) $x^2 - 6x + 10 = 0$

(2) $x^2 + 6x - 10 = 0$

(3) $x^2 - 6x + 8 = 0$

(4) $x^2 + 6x - 8 = 0$

Simplify and write answers in simplest rational form.

22. $\frac{4}{\sqrt[3]{9x^2y^8}}$

23. $\frac{5\sqrt{7y^3}}{2\sqrt{3y}}$

24. $x^{\frac{5}{4}} \bullet x^{\frac{1}{4}}$

25. $\sqrt[9]{27x^6}$

$$26. \frac{16a^{\frac{2}{4}}}{6a^{\frac{3}{4}}}$$

$$27. \left(-3y^{\frac{1}{3}}\right)^3$$

$$28. \sqrt[3]{8x^4y^6}$$

$$29. \frac{16a^{\frac{2}{4}}}{6a^{\frac{3}{4}}}$$

$$30. \frac{x^2y^{\frac{5}{3}}}{(x^{\frac{1}{2}}y^{-1})^2}$$