Name Key Date

Honors Algebra 2 Imaginary Numbers Practice

Solve each equation.

1. $\frac{1}{2}x^2 = -28$

$x^2 = -56$

$x = \pm 2i\sqrt{14}$

2. $3x^2 + 14 = -19$

$3x^2 = -33$

$x^2 = -11$

$x = \pm i\sqrt{11}$

Find the values of *x* and *y* that make each equation true.

3. $6x - 2i = (-2y)i + 10$

$6x = 10$ $\quad x = 5/3$

$\frac{-2i}{-2i} = \frac{(-2y)i}{-2i}$ $\quad 1 = y$

4. $-40i + 2x = (5y)i - 12$

$\frac{-40i}{5i} = \frac{(5y)i}{5i}$ $\quad -8 = y$

$\frac{2x}{2} = \frac{-12}{2}$ $\quad x = -6$

5. $-8y + 14i = (7x)i - 2$

$\frac{14i}{7i} = \frac{(7x)i}{7i}$ $\quad 2 = x$

$\frac{-8y}{-8} = \frac{-2}{-8}$ $\quad y = 1/4$

Find each complex conjugate.

9. $\sqrt{3i} - 25$

$-25 + \sqrt{3}i$

$-25 - \sqrt{3}i$

10. $-5i + \frac{12}{5}$

$\frac{12}{5} - 5i$

$\frac{12}{5} + 5i$

11. $-2 - 1.5i$

$-2 + 1.5i$

Find each absolute value.

12. $|-12 + 6i|$

$|a + bi| = \sqrt{a^2 + b^2}$

$\sqrt{(-12)^2 + (6)^2} = \sqrt{144 + 36} = \sqrt{180}$

$6\sqrt{5}$

13. $|-7 - 4i|$

$\sqrt{(-7)^2 + (-4)^2} = \sqrt{49 + 16} = \sqrt{65}$

14. $\left|\frac{1}{2} + \frac{1}{2}i\right|$

$\sqrt{(1/2)^2 + (1/2)^2} = \sqrt{1/4 + 1/4} = \sqrt{1/2} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

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

15. $(8 - i) - (-5 - 4i)$

$8 - i + 5 + 4i$

$13 + 3i$

16. $(2 - 11i) - (10 + 6i)$

$2 - 11i - 10 - 6i$

$-8 - 17i$

17. $\left(\frac{1}{2} + \frac{3}{4}i\right) + \left(-\frac{1}{4} - \frac{5}{4}i\right)$

$1/2 + 3/4i - 1/4 - 5/4i$

$1/4 - 2/4i$

$1/4 - 1/2i$

Multiply or divide. Write the result in the form $a + bi$.

18. $\frac{-3+7i}{1+8i} \cdot \frac{(1-8i)}{(1-8i)}$

$\frac{-3+24i+7i-56i^2}{1-8i+8i-64i^2} =$

$\frac{-3+31i-56(-1)}{1-64(-1)} = \boxed{\frac{53+31i}{65}}$

19. $(-4-9i)(8+2i)$

$-32-8i-72i-18i^2$

$-32-80i-18(-1)$

$\boxed{14-80i}$

20. $\frac{5+i}{2-i} \cdot$

$\frac{10+5i}{4+2i-2}$

$\frac{10+7i+6}{4-(-1)} = \boxed{\frac{2+7i}{5}}$

Simplify.

21. $i^{24} - i^{13} + i^{12}$

$24/4 =$ Remainder $0 = 1$

$13/4 =$ Remainder $1 = i$

$12/4 =$ Remainder $0 = 1$

$1 + i + 1 = \boxed{2+i}$

22. $-4i^{13}$

$13/4 =$ Remainder $1 = i$

$-4(i) = \boxed{-4i}$

23. $6 - 4i^{18}$

$18/4 =$ Remainder $2 = -1$

$6-4(-1) = 6+4 = \boxed{10}$

24. In a circuit, the voltage, V, is given by the formula $V = IZ$, where I is the current and Z is the impedance. Both the current and impedance are represented by complex numbers. Find the voltage if the current is 3 + 2i and the impedance is 4 - i.

$V = IZ$

$I = 3+2i$

$Z = 4-i$

$V = (3+2i)(4-i)$

$V = 12-3i+8i-2i^2$

$V = 12+5i-2(-1)$

$\boxed{V = 14+5i}$

Challenge Problems

Evaluate and simplify.

25. $\sqrt{-8} \cdot \sqrt{-128}$

$\pm 2i\sqrt{2} \cdot \pm 8i\sqrt{2}$

$\pm 16i \cdot \sqrt{4} =$

$\boxed{\pm 32i}$

26. $\sqrt{-3} \cdot \sqrt{-2} \cdot \sqrt{-6} \cdot \sqrt{-4}$

$\pm i\sqrt{3} \cdot \pm i\sqrt{2} \cdot \pm i\sqrt{6} \cdot \pm 2i$

$\pm 2i^4\sqrt{36}$

$\pm 2(1)(6) = \boxed{\pm 12}$

27. $\left(\sqrt{-5}\right)^2$

$(\pm i\sqrt{5})^2$

$i^2(5) = \boxed{-5}$

28. $\sqrt{-2} \cdot \sqrt{-90} \cdot \sqrt{-5}$

$\pm i\sqrt{2} \cdot \pm 3i\sqrt{10} \cdot \pm i\sqrt{5}$

$\pm 3i^3\sqrt{100} = \pm 3(-i)(10)$

$\boxed{\pm 30i}$

29. $\sqrt{-3} \cdot \sqrt{12}$

$\sqrt{-36} = \boxed{\pm 6i}$

30. $\left(\sqrt{-2}\right)^5$

$(\sqrt{-2})^2 \cdot (\sqrt{-2})^2 \cdot \sqrt{-2}$

$(-2)(-2)\sqrt{-2}$

$\boxed{4\sqrt{-2}}$