

## Polynomials Test #2 Review: Quadratics and Complex Numbers

Find the product of the complex number and its conjugate:

1.  $2 + i$

2.  $-4 - 7i$

3.  $5i$

Determine the value of  $c$  that allows you to complete the square by creating a perfect square trinomial. Rewrite the trinomial in binomial form.

4.  $x^2 + 14x + \frac{49}{2}$   
 $(x+7)^2$

5.  $x^2 - 26x + \frac{169}{2}$   
 $(x-13)^2$

6.  $x^2 + 11x + \frac{121}{4}$   
 $(x + \frac{11}{2})^2$

Use the Zero Product Property to find all the solutions to the already factored equations.

7.  $x(x+8) = 0$   $0, -8$   
 $x=0$      $x+8=0$   
 $x=-8$

8.  $2x(3x+4)(2x-5) = 0$   $0, -\frac{4}{3}, \frac{5}{2}$   
 $2x=0$      $3x+4=0$      $2x-5=0$   
 $x=0$      $3x=-4$      $2x=5$   
 $x=-\frac{4}{3}$      $x=\frac{5}{2}$

Simplify the radical expressions completely. Rationalize the denominators.

9.  $\sqrt{224}$   $\frac{\sqrt{16 \cdot 14}}{\sqrt{16} \cdot \sqrt{14}}$   $4\sqrt{14}$

10.  $9\sqrt{5} \cdot 8\sqrt{10}$   $\frac{360\sqrt{2}}{72\sqrt{50}}$   $72\sqrt{25 \cdot 2}$   $72 \cdot 5\sqrt{2}$

11.  $\frac{60\sqrt{10}}{\sqrt{10}\sqrt{10}}$   $\frac{60\sqrt{10}}{10}$   $6\sqrt{10}$

12.  $\frac{\sqrt{14}}{3} \cdot \frac{\sqrt{2}}{3}$   $\frac{2\sqrt{7}}{3}$   
 $\frac{\sqrt{28}}{3}$      $\frac{\sqrt{4 \cdot 7}}{3}$

Simplify the complex number expression. Rationalize the denominators. Write answers in standard form.

13.  $\sqrt{-96}$   $4i\sqrt{6}$

14.  $(13+2i) - 4(2-i)$   $5+6i$

15.  $(6-2i)(1+5i)$   $16+28i$

16.  $2i(5-8i)$   $16+10i$

17.  $\sqrt{-40} + \sqrt{16}$   $4 + 2i\sqrt{10}$

18.  $\frac{12 \pm \sqrt{48}}{8}$   $\frac{3 \pm \sqrt{3}}{2}$

19.  $\frac{20 \pm \sqrt{125}}{65}$   $\frac{4 \pm \sqrt{5}}{13}$

20.  $\sqrt{-99}$   $3i\sqrt{11}$

SOLVE BY FACTORING

21.  $x^2 + 7x + 10 = 0$        $x = -2, x = -5$

$\begin{array}{r} 2 \times 10 \\ \times 5 \\ \hline 17 \end{array}$   
 $(x+2)(x+5) = 0$   
 $x+2=0 \quad x+5=0$   
 $x = -2, x = -5$

23.  $3x^2 - 10x + 8 = 0$        $x = 2, x = \frac{4}{3}$

$\begin{array}{r} 24 \\ \times -4 \\ \hline -10 \end{array}$   
 $(x-2)(3x-4) = 0$   
 $x-2=0 \quad 3x-4=0$   
 $x = 2 \quad 3x = 4$   
 $x = \frac{4}{3}$

SOLVE BY TAKING SQUARE ROOTS

25.  $x^2 = -338$        $x = \pm 13i\sqrt{2}$

$x = \pm \sqrt{-338}$   
 $x = \pm 13i\sqrt{2}$

27.  $5(x+1)^2 - 13 = 27$        $x = -1 \pm 2\sqrt{2}$

$5(x+1)^2 = 40$   
 $(x+1)^2 = 8$   
 $x+1 = \pm\sqrt{8}$   
 $x = -1 \pm 2\sqrt{2}$

Solve by Completing the Square

29.  $x^2 + 18x - 5 = 0$        $x = -9 \pm \sqrt{86}$

$x^2 + 18x = 5$   
 $x^2 + 18x + 81 = 5 + 81$   
 $(x+9)^2 = 86$   
 $x+9 = \pm\sqrt{86}$

SOLVE USING THE QUADRATIC FORMULA

31.  $8x^2 + 4x + 3 = 0$        $x = \frac{-1 \pm i\sqrt{5}}{4}$

22.  $3x^2 - 12 = 0$        $x = 2, x = -2$

$3(x^2 - 4) = 0$   
 $3(x-2)(x+2) = 0$

24.  $4x^2 + 12x - 40 = 0$        $x = -5, x = 2$

$4(x^2 + 3x - 10) = 0$   
 $\begin{array}{r} -10 \\ \times -2 \\ \hline 3 \end{array}$   
 $(x+5)(x-2) = 0$   
 $x = -5, x = 2$

26.  $2x^2 - 18 = 0$        $3, -3$

$2x^2 = 18$   
 $x^2 = 9$   
 $x = \pm 3$

28.  $3(x+4)^2 = 108$        $x = 2, x = -10$

$(x+4)^2 = 36$   
 $x+4 = \pm 6$   
 $x+4 = 6 \quad x+4 = -6$

30.  $x^2 + 4x + 54 = 0$        $x = -2 \pm 5i\sqrt{2}$

$x^2 + 4x = -54$   
 $x^2 + 4x + 4 = -54 + 4$   
 $(x+2)^2 = -50$   
 $x+2 = \pm\sqrt{-50}$   
 $x = -2 \pm 5i\sqrt{2}$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

32.  $2x^2 - 5x - 4 = 0$        $x = \frac{5 \pm \sqrt{57}}{4}$

33.  $3x^2 + 10x + 4 = 0$        $x = \frac{-5 \pm \sqrt{13}}{3}$

34.  $18x^2 - 20x + 9 = 0$        $x = \frac{10 \pm \sqrt{62}}{18}$

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

$$4 - 2i + 2i - i^2$$

$$4 - (-1)$$

$$5$$

$$2. (-4-7i)(-4+7i)$$

$$16 - 28i + 28i - 49i^2$$

$$16 - 49(-1)$$

$$16 + 49$$

$$65$$

$$3. (5i)(-5i)$$

$$-25i^2$$

$$-25(-1)$$

$$25$$

$$13. \frac{\sqrt{-96}}{\sqrt{-16} \cdot 6}$$

$$4i\sqrt{6}$$

$$14. (13+2i) - 4(2-i)$$

$$13 + 2i - 8 + 4i$$

$$5 + 6i$$

$$15. (6-2i)(1+5i)$$

$$6 + 30i - 2i - 10i^2$$

$$6 + 28i - 10(-1)$$

$$6 + 28i + 10$$

$$16 + 28i$$

$$16. 2i(5-8i)$$

$$10i - 16i^2$$

$$10i - 16(-1)$$

$$10i + 16$$

$$16 + 10i$$

$$17. \frac{\sqrt{-40} \sqrt{16}}{\sqrt{-4} \cdot 10 + 4}$$

$$2i\sqrt{10} + 4$$

$$4 + 2i\sqrt{10}$$

$$18. \frac{12 \pm \sqrt{48}}{8}$$

$$\frac{12 \pm \sqrt{16} \cdot 3}{8}$$

$$\frac{12 \pm 4\sqrt{3}}{8}$$

$$8$$

$$\frac{3 \pm \sqrt{3}}{2}$$

$$19. \frac{20 \pm \sqrt{125}}{65}$$

$$\frac{20 \pm \sqrt{25} \cdot 5}{65}$$

$$\frac{20 \pm 5\sqrt{5}}{65}$$

$$65$$

$$\frac{4 \pm \sqrt{5}}{13}$$

$$20. \frac{\sqrt{-99}}{\sqrt{-9} \cdot 11}$$

$$3i\sqrt{11}$$

$$31. \quad 8x^2 + 4x + 3 = 0$$

$$a = 8, \quad b = 4, \quad c = 3$$

$$x = \frac{-4 \pm \sqrt{16 - 4(8)(3)}}{2(8)}$$

$$x = \frac{-4 \pm \sqrt{16 - 96}}{16}$$

$$x = \frac{-4 \pm \sqrt{-80}}{16}$$

$$x = \frac{-4 \pm \sqrt{-16 \cdot 5}}{16}$$

$$x = \frac{-4 \pm 4i\sqrt{5}}{16}$$

$$x = \frac{-1 \pm i\sqrt{5}}{4}$$

$$32. \quad 2x^2 - 5x - 4 = 0$$

$$a = 2, \quad b = -5, \quad c = -4$$

$$x = \frac{5 \pm \sqrt{25 - 4(2)(-4)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{25 + 32}}{4}$$

$$x = \frac{5 \pm \sqrt{57}}{4}$$

$$34. \quad 18x^2 - 20x + 9 = 0$$

$$x = \frac{20 \pm \sqrt{400 - 4(18)(9)}}{2(18)}$$

$$x = \frac{20 \pm \sqrt{400 - 648}}{36}$$

$$x = \frac{20 \pm \sqrt{-248}}{36}$$

$$33. \quad 3x^2 + 10x + 4 = 0$$

$$a = 3, \quad b = 10, \quad c = 4$$

$$x = \frac{-10 \pm \sqrt{100 - 4(3)(4)}}{2(3)}$$

$$x = \frac{-10 \pm \sqrt{100 - 48}}{6}$$

$$x = \frac{-10 \pm \sqrt{52}}{6}$$

$$x = \frac{-10 \pm \sqrt{4 \cdot 13}}{6}$$

$$x = \frac{-10 \pm 2\sqrt{13}}{6}$$

$$x = \frac{20 \pm \sqrt{4 \cdot 62}}{36}$$

$$x = \frac{20 \pm 2\sqrt{62}}{36}$$

$$x = \frac{10 \pm \sqrt{62}}{18}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$