## Learning Targets:

<table>
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<tr>
<th>Factoring Quadratic Expressions</th>
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<tbody>
<tr>
<td>0. I can add, subtract and multiply polynomial expressions</td>
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<tr>
<td>1. I can factor using GCF.</td>
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<tr>
<td>2. I can factor by grouping.</td>
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<td>3. I can factor when a is one.</td>
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<td>4. I can factor when a is not equal to one.</td>
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<tr>
<td>5. I can factor perfect square trinomials.</td>
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<td>6. I can factor using difference of squares.</td>
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<tr>
<th>Solving Quadratic Equations</th>
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<tr>
<td>7. I can solve by factoring.</td>
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<tr>
<td>8. I can solve by taking the square root.</td>
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<tr>
<td>9. I can perform operations with imaginary numbers.</td>
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<tr>
<td>10. I can solve by completing the square.</td>
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<tr>
<td>11. I can solve equations using the quadratic formula (with rationalized denominators).</td>
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<tr>
<td>12. I can use the discriminant to determine the number and type of solutions.</td>
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<tr>
<td>13. I can write quadratic equations given the real solutions.</td>
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Description of Worksheets
Pages 3-24 Teacher Made Worksheets (most have answers)
Pages 25-31 Book Practice Worksheet (with answers)
Pages 32-35 Riddle Worksheets
Pages 36-59 Kudo Worksheets by Learning Target
Pages 60 Unit 1 Review Worksheet

Worksheets Completed
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Quiz/Unit Test Dates(s)
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Quiz Retakes Dates and Rooms


Add, Subtract, Multiply Polynomials
Use and attach another sheet of paper for work.

Write the polynomial in standard form. Then state its degree.

17. \(14 + x + 13x^2\)  
    \[13x^2 + x + 14\]  
    \(2\)

18. \(\frac{2}{3}x - \frac{5}{3}x^2\)  
    \[-\frac{5}{3}x^2 + \frac{2}{3}x\]  
    \(2\)

19. \(-1 + x^2 + 6x^3\)  
    \[6x^3 + x - 1\]  
    \(3\)

20. \(x^3 + 5x - 2x^2 + 2\)  
    \[x^3 - 2x^2 + 5x + 2\]  
    \(3\)

21. \(-3x^2 + 3 - x^3\)  
    \[-x^3 - 3x^2 + 3\]  
    \(3\)

22. \(-4x^3 + 6x^2 - 19x + 18\)

Perform the indicated operation.

23. \((6x^2 + 1) + (5x^2 - 4)\)  
    \[11x^2 - 3\]

24. \((2x^3 + 11x + 2) - (x^3 - 2x + 7)\)

25. \((x^2 - 3x + 3) - (x^2 + x - 1)\)  
    \[-4x + 4\]

26. \((14 - 16x) + (10x - 5)\)

27. \((8x^3 - 1) - (20x^3 + 2x^2 - x - 5)\)  
    \[-12x^3 - 2x^2 - x + 4\]

28. \(6x - (22x + 3 - 36x^2 + x^3)\)

29. \((4x^2 - 15x + 16) + (2x - 20)\)  
    \[4x^2 - 13x - 4\]

30. \((7x^3 - 2 + x^2 + 13x) - (4x^3 + 10)\)

31. \((-3x^2 + 4x - 9) - (2x^3 + x^2 - x)\)  
    \[-5x^3 + x^2 + 5x - 9\]

32. \((6x^2 - 18x + 3) - (14x^2 - 12x + 9)\)

33. \((15 - 10x^3 - 2x^2 + x) - (x^2 + 7x)\)  
    \[-10x^3 - 3x^2 - 6x + 15\]

34. \((50x - 3) - (8x^3 + 9x^2 + 2x + 4)\)

35. \((4x - 33 + 9x^2) + (20x^3 - 19x + 3)\)  
    \[20x^3 + 9x^2 - 15x - 30\]

36. \((12x^3 - 5x^2 - 70x + 1) + (-17x^3 + 56x)\)

37. \(x(x^2 + 9x - 5)\)  
    \[x^3 + 9x^2 - 5x\]

38. \(12x^2(x - 8)\)

39. \(-2x(x + 4)\)  
    \[12x^3 - 96x^2 - 2x^2 + 4x\]
Perform the indicated operation.

40. \(2x(3x^2 - x + 6)\)
\[X^2 - 6x + 8\]

43. \((x+3)(x^2 - x - 2)\)
\[x^3 + 2x^2 - 5x - 6\]

46. \((6x + 2)(2x^2 + x + 1)\)
\[x^2 - 2x + 6\]

Write the polynomial in standard form. Show work!

49. \((x+9)(x-9)\)
\[x^2 - 81\]

53. \((x - 4)^3\)
\[x^3 - 12x^2 + 48x - 64\]

54. \((x + 6)^3\)
\[x^2 + 2x + 1\]

WS #1

17 - 56 even

18. \(-\frac{5}{3}x^2 + \frac{2}{3}x, 2\)

22. \(-4x^3 + 6x^2 - 19x + 18, 3\)

26. \(-6x + 9\)

30. \(3x^3 + x^2 + 13x - 12\)

32. \(-8x^2 - 6x - 634) - 8x^3 - 9x^2 + 48x - 7\)

36. \(-5x^3 - 5x^2 - 14x + 1\)

38. \(12x^3 - 96x^2\)

42. \(x^2 + 7x - 8\)

46. \(12x^3 + 10x^2 + 8x + 2\)

48. \(8x^3 - 18x^2 + 15x - 9\)

50. \(x^2 - 4\)

52. \(x^2 - 6x + 9\)

54. \(x^3 + 18x^2 + 108x + 21656) 9x^2 + 24x + 16\)
Factoring by pulling out the Greatest Common Factor

Factor completely. Write PRIME is the polynomial does not factor:

1) \(5ax - 5a\)  
   \(5a(x-1)\)

2) \(5xz + 2xy - 3yz\)  
   Prime

3) \(24ab^4 + 12ab^3 - 18ab^2\)  
   \(6ab^2(4b^2 + 2b - 3)\)

4) \(3n^2 + 9\)  
   \(3(n^2+3)\)

5) \(x(x+y) - y(x+y)\)  
   \((x-y)(x+y)\)

6) \(25k^3 + 20k^2 + 10k\)  
   \(5k(5k^2 + 4k + 2)\)

7) \(8x^2 + 5x - 7\)  
   \(8x^2 + 14x - 4x - 7\)  
   \(2x(4x + 7) - 1(4x - 7)\)  
   \((2x-1)(4x+7)\)

8) \(7ab^5 - 56ab\)  
   \(7ab(b^4 - 8)\)

9) \(mnx^2 - nx^2 + m^3x\)  
   \(x(mnx - nx + m^3)\)

10) \(x^2(x^2 - 5) + 6(x^2 - 5)\)  
    \((x^2-5)(x^2+6)\)

11) \(6k^3 - 18k^2\)  
    \(6k^2(k-3)\)

12) \(12m^7 - 8m^5 + 20m^3\)  
    \(4m^3(3m^4 - 2m^2 + 5)\)

13) \(6xy - 6xz - 6x\)  
    \(6x(y - z - 6)\)

14) \(3x^4 + 12x^2 - 33\)  
    \(3(x^4 + 4x^2 - 11)\)

15) \(8a^4b^4 - 28a^3b^3 + 4a^2b^2\)  
    \(4a^2b^2(2a^2b^2 - 7ab + 1)\)

16) \(4k^2 + 18k^3 - 6k^4\)  
    \(2k^2(2a^2b^2 - 7ab + 1)\)
Factoring by Grouping

17) \(x^2 + 3x + xk + 3k\)
\[x(x + 3) + k(x + 3)\]
\[(x + 3)(x + k)\]

19) \(uv + 5u + v^2 + 5v\)
\[(u + v)(v + 5)\]

21) \(2ab + 14a + b + 7\)
\[(2a + 1)(b + 7)\]

23) \(2br + 8b - 3r - 12\)
\[(2b - 3)(r + 4)\]

25) \(ac - ad + bc - bd\)
\[(a + b)(c - d)\]

27) \(x^4 + x^3 - 7x - 7\)
\[x^3(x + 1) - 7(x + 1)\]
\[(x^3 - 7)(x + 1)\]

29) \(y^3 + y^2 + 2y + 2\)
\[y^2(y + 1) + 2(y + 1)\]
\[(y^2 + 2)(y + 1)\]

18) \(a^2 - 2a + ad - 2d\)
\[a(a - 2) + d(a - 2)\]
\[(a - 2)(a + d)\]

20) \(m^3 + m^2n + mn^2 + n^3\)
\[m^2(n + m) + n^2(m + n)\]
\[m(n + m)(m^2 + n^2)\]

22) \(5x^2y + x^2 - 10y - 2\)
\[x^2(5y + 1) - 2(5y + 1)\]
\[(5y + 1)(x^2 - 2)\]

24) \(x^2 + 3x - xy - 3y\)
\[x(x + 3) - y(x + 3)\]
\[x(x + 3)(y - y)\]

26) \(3x^2 + 6x - y + 3\)
\[3(x + 2) - 1(y - 3)\]
Prime

28) \(y^3 + 3y^2 + 3y + 9\)
\[y^2(y + 3) + 3(y + 3)\]
\[-(y + 3)(y^2 + 3)\]

30) \(10a + 10b + xa + xb\)
\[10(a + b) + x(a + b)\]
\[(a + b)(10 + x)\]

Answers Scrambled

- prime
- \(2k^2(2 + 9k - 3k^2)\)
- \(7ab(b^4 - 8)\)
- \(6k^2(k - 3)\)
- \((x + y)(x - y)\)
- prime
- \(3(x^4 + 4x^2 - 11)\)
- \(3(n^2 + 3)\)
- \(6x(y - z - 1)\)
- \(x(mnx - nx + m^3)\)
- \(5a(x - 1)\)
- \(4m^3(3m^4 - 2m^2 + 5)\)
- \((x^2 - 5)(x^2 + 6)\)

- \(6ab^2(4b^2 + 2b - 3)\)
- \(4a^2b^2(2a^2b^2 - 7ab + 1)\)
- \(5k(5k^2 + 4k + 2)\)

- \((x + 3)(x - y)\)
- prime
- \((2b - 3)(r + 4)\)
- \((x + 3)(x + k)\)
- \((10 + x)(a + b)\)
- \((2a + 1)(b + 7)\)
- \((v + 5)(u + v)\)
- \((y + 1)(y^2 + 2)\)
- \((x + 1)(x^2 - 7)\)
- \((a + b)(c - d)\)
- \((a + d)(a - 2)\)
- \((m^2 + n^2)(m + n)\)
- \((5y + 1)(x^2 - 2)\)
- \((y + 3)(y^2 + 3)\)
Factoring TRINOMIALS

1) \(X^2 - X - 42\)
   \((X - 7)(X + 6)\)

2) \(X^2 + 4X - 21\)
   \((X + 7)(X - 3)\)

3) \(X^2 - 2X - 63\)
   \((X - 9)(X + 7)\)

4) \(X^2 - 11X + 18\)
   \((X - 9)(X - 2)\)

5) \(2X^2 + 9X - 18\)
   \((2X - 3)(X + 6)\)

6) \(3X^2 + 10X - 8\)
   \(3x^2 + 12x - 2x - 8\)
   \(3x(x + 4) - 1(x + 4)\)

7) \(X^2 - 18X + 72\)
   \((X - 6)(X - 12)\)

8) \(X^2 - 7X + 6\)
   \((X - 1)(3x - 1)\)

9) \(X^2 - 9X + 18\)
   \((X - 3)(X - 6)\)

10) \(6X^2 - X - 15\)
    \(6x^2 - 10x + 9x - 15\)
    \(2x(3x - 5) + 3(3x - 5)\)

11) \(3X^2 + 5X + 2\)
    \((3X + 1)(X + 1)\)

12) \(2X^2 - X - 15\)
    \((3x - 5)(2x + 1)\)

13) \(4X^2 - 17X - 15\)
    \((4X + 3)(X - 5)\)

14) \(8X^2 - 25X + 3\)
    \(8x^2 - 24x - x + 3\)
    \(8x(x - 3) - 1(x - 3)\)

15) \(8X^2 - 6X - 5\)
    \((4X - 5)(2X + 1)\)

16) \(8X^2 + 10X - 3\)
    \(8x^2 + 12x - 2x - 3\)
    \(4x(2x + 3) - 1(2x + 3)\)

17) \(6X^2 + 19X + 3\)
    \((6x + 1)(x + 3)\)

18) \(6X^2 + X - 2\)
    \(6x^2 + 4x - 3x - 2\)
    \(2x(3x + 2) - 1(3x + 2)\)
    \((3x + 2)(2x - 1)\)
19) \(6x^2 - 17x - 3\)
\[(6x + 1)(x - 3)\]

21) \(3x^2 - 15x + 18\)
\[3(x^2 - 5x + 6)\]
\[3(x - 3)(x - 2)\]

22) \(7x^2 + 2x + 1\)
\[prime\]

23) \(x^3 + 11x^2 + 10x\)
\[x(x^2 + 11x + 10)\]
\[x(x + 10)(x + 1)\]

24) \(8x^3 - 18x\)
\[2x(x^2 - 9)\]
\[2x(x + 3)(x - 3)\]

25) \(5x^3 - 40x^2 + 60x\)
\[5x(x^2 - 8x + 12)\]
\[5x(x - 6)(x - 2)\]

26) \(4x^2 + 8x - 60\)
\[4(x^2 + 2x - 15)\]
\[4(x + 5)(x - 3)\]

27) \(x^6 + 8x^4 - 20x^2\)
\[x^2(x^4 + 8x^2 - 20)\]
\[x^2(x^2 + 10)(x^2 - 2)\]

28) \(10x^3y^2 - 25x^2y^2 - 35xy^2\)
\[5xy^2(2x^2 - 5x - 7)\]
\[5xy(y - 7)(x + 1)\]

29) \(3x^3y - 10x^2y + 8xy\)
\[xy(3x^2 - 10x + 8)\]
\[xy(3x + 2)(x - 4)\]

30) \(15x^2y - 10xy - 25y\)
\[5y(3x^2 - 2x - 5)\]
\[5y(3x - 5)(x + 1)\]

**Mixed-up Answers**

- \((x - 6) (x - 1)\)
- \((6x + 1) (x + 3)\)
- \(5x (x - 6) (x - 2)\)
- \(4(x + 5) (x - 3)\)
- \((x - 7) (x + 6)\)
- \(xy (3x - 4) (x - 2)\)
- \(3(x - 3) (x - 2)\)
- \((4x - 1) (2x + 3)\)
- \((3x + 2) (x + 1)\)
- \(x (x + 10) (x + 1)\)
- \((x - 9) (x - 2)\)
- \(5xy^2 (2x - 7) (x + 1)\)
- \((4x + 5) (2x - 3)\)
- \((3x - 2) (x + 4)\)
- \((8x - 1) (x - 3)\)
- \((2x - 5) (x - 3)\)
- \((x - 6) (x - 12)\)
- \((2x + 1) (4x - 5)\)
- \((x - 6) (x + 6)\)
- \(x^2 (x^2 + 10) (x^2 - 2)\)
- \((4x + 3) (x - 5)\)
- \(5y (3x - 5) (x + 1)\)
- \((3x - 5) (2x + 3)\)
- \((3x + 2) (2x - 1)\)
- \(2x (2x + 3) (2x - 3)\)
- \((x - 6) (x - 3)\)
- \((x - 9) (x + 7)\)
- \((x + 7) (x - 3)\)
Factoring the Difference of Squares

1) \(x^2 - 25 = (x - 5)(x + 5)\)

2) \(x^2 - 144 = (x + 12)(x - 12)\)

3) \(9x^2 - y^2 = (3x - y)(3x + y)\)

4) \(9 - x^2 = (3 + x)(3 - x)\)

5) \(2x^2 - 32 \quad 2(\sqrt{\frac{x^2}{16}}) = 2(x + 4)(x - 4)\)

6) \(2x^3 - 18x \quad 2x(x^2 - 9) = 2x(x + 3)(x - 3)\)

7) \(x^2 - 1 \quad (x + 1)(x - 1)\)

8) \(15a^3b^3 - 18a^5b^2 + 24ab^4 \quad 3ab^2(5a^2b - 6a^4 + 8b^2)\)

9) \(16x^2 - 9 \quad (4x + 3)(4x - 3)\)

10) \(x^2 + 4 \quad \text{Prime}\)

11) \(64x^2 - 81 \quad (8x + 9)(8x - 9)\)

12) \(625 - x^4 \quad (25 + x^2)(25 - x^2) = (25 + x^2)(x + 5)(x - 5)\)

13) \(4x^2 - 9 \quad (2x + 3)(2x - 3)\)

14) \(2x(3x + 1) - (3x + 1) \quad (3x + 1)(2x - 1)\)

15) \(5x^2 - 125 \quad 5(x + 5)(x - 5)\)

16) \(49x^2y^2 - 25z^2 \quad (7xy + 5z)(7xy - 5z)\)

17) \(30x^2y - 24xy^2 + 36x^3y \quad 6xy(5x - 4y + 6x^2)\)

18) \(25x^4 - 4 \quad (5x^2 + 2)(5x^2 - 2)\)

19) \(x^4 - 81 \quad (x^2 + 9)(x + 3)(x - 3)\)

20) \(x^2 + 2x + 7x + 14 \quad x(x + 2) + 7(x + 2)\)

21) \(x^2 + 2x + 7x + 14 \quad (x + 2)(x + 7)\)

22) \(x^2 - y^2 \quad (x + y)(x - y)\)

23) \(9x^2 - 1 \quad (3x - 1)(3x + 1)\)

24) \((2z - 3)^2 - (x + 7y)^2 \quad (2z - 3 + x + 7y)(2z - 3 - x - 7y)\)

25) \((x + y)^2 - z^2 \quad (x + y - z)(x + y + z)\)

26) \(6x + xy + 6y + y^2 \quad x(6 + y) + y(6 + y)\)

\( (6 + y)(x + y) \)
27) \((x - y)^2 - (y - 8)^2\)
\[= (x-y + y - 8)(x-y - y + 8)\]
\[= (y-8)(y+8)\]
\[29) x^3 + x^2y - xy^2 - y^3\]
\[= y^2(x+y) - y^2(x+y)\]
\[= (x+y)(x+y)(x+y)\]
\[31) x^2 - (y + 2)^2\]
\[= (x-y-2)(x+y+2)\]
\[32) 16x^2 + 49y^2\]

33) \((x - 6)^2 - 9y^2\)
\[= (x-6-3y)(x-6+3y)\]

35) \(169 - 49x^2\)
\[= (13+y)(13-y)\]

37) \(-x^2 + 25 = 25-x^2\)
\[= (5+x)(5-x) \text{ or } (-1)(x+5)(x-5)\]

39) \(-x^2 + 100\)
\[= -1(x+10)(x-10) \text{ or } (10-x)(10+x)\]

34) \((3x + y)^2 - (2x + 5)^2\)
\[= (3x+y + 2x+5)(3x+y-2x-5)\]
\[= (5y+y+5)(x-y-5)\]

36) \(100 - (x + 9y)^2\)
\[= (10-x-9y)(10+x+9y)\]

38) \(2x^3 - 6x^2 + 3x - 9\)
\[= 2x(x-3)(x-3)\]
\[= (2x+3)(x-3)\]

40) \(x^2 + 1\)

ANSWERS SCRAMBLED

\begin{align*}
(3x+1)(2x-1) & \quad (x-6+3y)(x-6-3y) & \quad (x+5)(x-5) \\
(x^2+9)(x+3)(x-3) & \quad (5+x)(5-x) & \quad 5(x+5)(x-5) \\
(2z-3+x+7y)(2z-3-x-7y) & \quad (x+y+z)(x+y-z) & \quad (x+1)(x-1) \\
\text{prime} & \quad (x+y)(x-y) & \quad \text{prime} \\
6xy(5x-4y+6x^2) & \quad (x-8)(x-2y+8) & \quad (10+x)(10-x) \\
2x(x+3)(x-3) & \quad (2x+3)(2x-3) & \quad (5x+2)(5x^2-2) \\
3ab(5a^2b-6a^4+8b^2) & \quad (10+x+9y)(10-x-9y) & \quad (xyz+6)(xyz-6) \\
(x+y)(x-y) & \quad (3+x)(3-x) & \quad (3x+1)(3x-1) \\
(x-5+y)(x-5-y) & \quad 2(x+4)(x-4) & \quad (x+y)(x+y)(x-y) \\
(8x+9)(8x-9) & \quad (13-7x)(13+7x) & \quad (7xy+5z)(7xy-5z) \\
(x+y+2)(x-y-2) & \quad \text{prime} & \quad (5x+y+5)(x+y-5) \\
(x+12)(x-12) & \quad (x-3)(2x^2+3) & \quad (a+b+c+5)(a+b-c-5) \\
(25+x^2)(5+x)(5-x) & \quad (x+3)(x-y) & \\
(3+x)(3-x) & & \\
\end{align*}
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<tbody>
<tr>
<td>15. $9x^2 - 4$</td>
<td>16. $3x^2 - 48$</td>
<td>21. $200x^2 - 50$</td>
</tr>
<tr>
<td>$(3x + 2)(3x - 2)$</td>
<td>$3(x + 4)(x - 4)$</td>
<td>$50(2x + 1)/(2x - 1)$</td>
</tr>
<tr>
<td>27. $x^3 - 2x^2 + 4x - 8$</td>
<td>28. $30x^3 + 40x^2 + 3x + 4$</td>
<td>29. $x^3 + 2x^2 + 5x + 10$</td>
</tr>
<tr>
<td>$(x^2 + 4)(x - 2)$</td>
<td>$(3x + 4)(10x^2 + 1)$</td>
<td>$(x^2 + 5)(x + 2)$</td>
</tr>
<tr>
<td>30. $x^3 - 2x^2 + 4x - 8$</td>
<td>31. $9x^3 + 18x^2 + 7x + 14$</td>
<td>32. $-2x^3 - 4x^2 - 3x - 6$</td>
</tr>
<tr>
<td>$(x^2 + 4)(x - 2)$</td>
<td>$(9x^2 + 7)(x + 2)$</td>
<td>$-1(2x^2 + 3)(x + 2)$</td>
</tr>
<tr>
<td>33. $2x^3 + 4x^2 + 4x + 8$</td>
<td>34. $18x^3 + 30x^2 + 3x + 5$</td>
<td>35. $2x^3 - 2x^2 + 5x - 5$</td>
</tr>
<tr>
<td>$2(x^2 + 2)(x + 2)$</td>
<td>$(6x^2 + 1)(3x + 5)$</td>
<td>$(2x^2 + 5)(x - 1)$</td>
</tr>
<tr>
<td>36. $2x^3 + 3x^2 - 32x - 48$</td>
<td>37. $5x^3 - 20x^2 + 3x - 12$</td>
<td>38. $18x^3 - 2x^2 + 27x - 3$</td>
</tr>
<tr>
<td>$(x + 4)(x - 4)(2x + 3)$</td>
<td>$(5x^2 + 3)(x - 4)$</td>
<td>$(2x^2 + 27)(9x - 1)$</td>
</tr>
</tbody>
</table>
LT 1-6 Mixed Factoring

39. \(7x^3 + 14x^2 + 7x\)
\[7x(x + 1)(x + 1)\]

40. \(3x^2 - 24x + 48\)
\[3(x - 4)(x - 4)\]

41. \(2x^3 - 4x^2 - 3x + 6\)
\[(2x^2 - 3)(x - 2)\]

42. \(6x^3 - 18x^2 - 2x + 6\)
\[(6x^2 - 2)(x - 3)\]

43. \(3x^4 - 300x^2\)
\[3x^2(x + 10)(x - 10)\]

44. \(28x^3 - 7x\)
\[7x(2x + 1)(2x - 1)\]

45. \(3x^4 + 3x^3 + 6x^2 + 6x\)
\[3x(x^2 + 2)(x + 1)\]

46. \(28x^3 - 7x\)
\[7x(2x + 1)(2x - 1)\]

47. \(3x^4 + 3x^3 + 6x^2 + 6x\)
\[3x(x^2 + 2)(x + 1)\]

48. \(x^4 + 12x^3 + 4x^2 + 48x\)
\[x(x^2 + 4)(x + 12)\]

49. \(10x^3 - 20x^2 - 2x + 4\)
\[2(5x^2 - 1)(x - 2)\]

50. \(18x^3 - 9x^2 - 18x + 9\)
\[9(x + 1)(x - 1)(2x - 1)\]

15 – 50 even
15. \((3x - 2)(3x + 2)\)
16. \(3(x + 4)(x - 4)\)
21. \(50(2x + 1)(2x - 1)\)
28. \((10x^2 + 1)(3x + 4)\)
30. \((x^2 + 4)(x - 2)\)
32. \((-2x^2 - 3)(x + 2)\)
33. \((-1)(2x^2 + 3)(x + 2)\)
34. \((6x^2 + 1)(3x + 5)\)
36. \((x + 4)(x - 4)(2x + 3)\)
38. \((2x^2 + 3)(9x - 1)\)
39. \(7x(x + 1)^2\)
40. \(40(3x - 4)^2\)
42. \(2(3x^2 - 1)(x - 3)\)
45. \(3x^2(x + 10)(x - 10)\)
46. \(7x(x + 1)(2x - 1)\)
48. \(x(x^2 + 4)(x + 12)\)
49. \((5x^2 - 1)(2x - 4)\)
50. \(9(x + 1)(x - 1)(2x - 1)\)
CP Algebra 2

LT 1-6 Review of Factoring (LT0)

Simplify Completely:
1) \((x^4 + 3x^2 - 2x + 1) + (2x^3 - x^2 + x - 6)\)
   \[\begin{align*}
   x^4 + 2x^3 + 2x^2 - x - 5
   \end{align*}\]

2) \((3x - 6)(2x + 5)\)
   \[\begin{align*}
   6x^2 + 3x - 30
   \end{align*}\]

3) \((4x + 3)^3\)
   \[\begin{align*}
   64x^3 + 144x^2 + 108x + 27
   \end{align*}\]

4) \((2x - 3)^2\)
   \[\begin{align*}
   4x^2 - 12x + 9
   \end{align*}\]

Factor Completely. Write PRIME if it can't be factored:
5) \(3a^2b + 6ab\)
   \[\begin{align*}
   3ab(x + 2)
   \end{align*}\]

6) \(x^2 - 16\)
   \[\begin{align*}
   (x - 4)(x + 4)
   \end{align*}\]

7) \(x^2 - x - 12\)
   \[\begin{align*}
   (x - 4)(x + 3)
   \end{align*}\]

8) \(5x^2 + x - 4\)
   \[\begin{align*}
   (5x - 4)(x + 1)
   \end{align*}\]

9) \(a^3 + 3a^2 + 5a + 15\)
   \[\begin{align*}
   (a^2 + 5)(a + 3)
   \end{align*}\]

10) \(16x^2 - 49\)
    \[\begin{align*}
    (4x + 7)(4x - 7)
    \end{align*}\]

11) \(x^3 + 12x^2 + 16x\)
    \[\begin{align*}
    x(x^2 + 12x + 16)
    \end{align*}\]

12) \(4x^3 + 8x^2 - 3x - 6\)
    \[\begin{align*}
    (4x^2 - 3)(x + 2)
    \end{align*}\]
LT 1-6 Review of Factoring (and LT 0)

15) \(xw + xy + xz\)
   \[\mathfrak{v}(w+y+z)\]

16) \(x^4 - x^2 - 30\)
   \[(x^2 - 6)(y^2 + 5)\]

17) \(x^2 - (2y + 3z)^2\)
   \[(x + 2y + 3z)(x - 2y - 3z)\]

18) \(5x^3 - 45x\)
   \[5x(x+3)(x-3)\]

20) \(6x^2 + 8x - 3x - 4\)
   \[(2x-1)(3x+4)\]

21) \(x^8 - 1\)
   \[(x^4 + 1)(x^2 + 1)(x + 1)(x - 1)\]

22) \(2y^4 - y^3 + 16y - 8\)
   \[(y^3 + 8)(2y - 1)\]

23) \(x^4 + 2x^2 - 3\)
   \[(x^2 + 3)(x + 1)(x - 1)\]

24) \(4x^3 - 12x^2 - 40x\)
   \[4x(x-5)(x+2)\]

25) \((a + 2b)^2 - (2a - 3b)^2\)
   \[(3a - b)(-a + 5b)\]

26) \((2m - 5n)^2 - (4m + 3n)^2\)
   \[(2m - 5n - 4m + 3n)(2m - 5n + 4m + 3n)\]
   \[(6m - 2n)(-2m - 8n) = -4(3m - n)(m + 4n)\]

ANSWERS:
1) \(x^4 + 2x^3 + 2x^2 - x - 5\)
2) \(6x^2 + 3x - 30\)
3) \(64x^3 + 144x^2 + 108x + 27\)
4) \(4x^2 - 12x + 9\)
5) \(3ab(a + 2)\)
6) \((x - 4)(x + 4)\)
7) \((x - 4)(x + 3)\)
8) \((5x - 4)(x + 1)\)
9) \((a^2 + 5)(a + 3)\)
10) \((4x + 7)(4x - 7)\)
11) \(x(x^2 + 12x + 16)\)
12) \((4x^2 - 3)(x + 2)\)
13) \(x(w + y + z)\)
14) \((x^2 + 5)(x^2 - 6)\)
15) \((x+2y+3z)(x-2y-3z)\)
16) \(5x(x + 3)(x - 3)\)
17) \(21) (x^4 + 1)(x^2 + 1)(x + 1)(x - 1)\)
18) \((y + 2)(y^2 - 2y + 4)(2y - 1)\)
19) \((x+1)(x-1)(x^2 + 3)\)
20) \(4x(x - 5)(x + 2)\)
21) \((3a - b)(-a + 5b)\)
22) \(4(3m - n)(m + 4n)\)
23) \(-4(3m - n)(m + 4n)\)
Review of Polynomials Factoring

Simplify Completely:
1) \( (6x^3 - 4x^2 + 5) - (2x^3 + 6x^2 - 7) \)
   \( 4x^3 - 10x^2 + 12 \)

2) \(-6x^3 \left( 4x^2 - 3x + 5 \right) \)
   \(-24x^5 + 18x^4 - 30x^3 \)

3) \((2x + 3)(4x^2 - 6x + 1)\)
   \(8x^3 - 16x + 3\)

4) \((x - 2)^3 = (x^2 - 4x + 4)(x - 2)\)
   \(x^3 - 6x^2 + 12x - 8\)

Factor Completely. Write PRIME if it can’t be factored:
5) \(4x^3y^2 - 2x^2y\)
   \(2x^2y(2x - 1)\)

6) \(25 - x^2\)
   \((5 + x)(5 - x)\)

7) \(x^3 - 8\)
   \((x - 2)(x^2 + 2x + 4)\)

8) \(x^2 - 7x + 10\)
   \((x - 5)(x - 2)\)

9) \(8x^2 + 26x + 15\)
   \((4x + 3)(2x + 5)\)

10) \(8x^3 + 1\)
    \((2x + 1)(4x^2 - 2x + 1)\)

11) \(x^4 - x^3y - 4x + 4y\)
    \((x^3 - 4)(x - y)\)

12) \(25x^2 + 16\)
    Prime

13) \(x^3 - 13x^2 - 36x\)
    \(x(x^2 - 13x - 36)\)

14) \(9y^4 - 6y^2 + 12y^2 - 8\)
    \(3y^2(3y^2 - 2) + 4(3y^2 - 2)\)
    \((3y^2 - 2)(3y^2 + 2)\)

15) \(2ax^2 - 2ay - 2az\)
    \(2a(x - y - z)\)

16) \((x + y)^2 - z^2\)
    \((x + y - z)(x + y + z)\)
17) \(3x^3 - 48x\)
\[
3x(x^2-16) \\
3x(x+4)(x-4)
\]

19) \(3xy - 9x + y - 3\)
\[
3x(y-3) + 1(y-3) \\
(y-3)(3x+1)
\]

21) \(x^4 + 3x^3 - 27x - 81\)
\[
x^3(x+3) - 27(x+3) \\
(x^3-27)(x+3) \\
(x-3)(x^2+3x+9)(x+3)
\]

23) \(3x^3 + 9x^2 - 12x\)
\[
3x(x^2+3x-4) \\
3x(x+4)(x-1)
\]

18) \(16x^3 - 2\)
\[
2(8y^3-1) \\
2(2x-1)(4x^2+3x+1)
\]

20) \(x^4 - 81\)
\[
(x^2-9)(x^2+9) \\
(x+3)(x-3)(x^2+9)
\]

22) \(x^4 - 2x^2 - 8\)
\[
(x^2-4)(x^2+2) \\
(x+2)(x-2)(x+2)
\]

24) \((3x+2y)^2 - (5x - 4y)^2\)
\[
(3x+2y+5x-4y)(3x+2y-5x+4y) \\
(8x-2y)(-2x+6y) \\
4(4x-y)(-x+3y)
\]

**ANSWERS**

1) \(4x^3 - 10x^2 + 12\)  

2) \(-24x^5 + 18x^4 - 30x^3\)  

3) \(8x^3 - 16x + 3\)  

4) \(x^3 - 6x^2 + 12x - 8\)  

5) \(2x^2y(2x - 1)\)  

6) \((5 + x)(5 - x)\)  

7) \((x - 2)(x^2 + 2x + 4)\)  

8) \((x - 5)(x - 2)\)  

9) \((4x + 3)(2x + 5)\)  

12) prime  

10) \((2x + 1)(4x^2 - 2x + 1)\)  

11) \((x^3 - 4)(x - y)\)  

15) \(2a(x - y - z)\)  

13) \(x(x^2 - 13x - 36)\)  

14) \((3y^2 + 4)(3y^2 - 2)\)  

18) \((2x - 1)(4x^2 + 2x + 1)\)  

20) \((x^2 + 9)(x + 3)(x - 3)\)  

21) \((x + 3)(x - 3)(x^2 + 3x + 9)\)  

23) \(3x(x + 4)(x - 1)\)  

24) \(4(4x - y)(-x + 3y)\)
Unit 1 LT 3 I can simplify square roots

Name__________________

Simplify each square root

1) \( \sqrt{8} = \frac{\sqrt{4} \cdot \sqrt{2}}{2\sqrt{2}} \)
2) \( \sqrt{45} \)
3) \( \sqrt{50} = \sqrt{25} \sqrt{2} \)

4) \( \sqrt{12} = 2\sqrt{3} \)
5) \( \sqrt{98} = 7\sqrt{2} \)
6) \( \sqrt{48} = \sqrt{16} \sqrt{3} \)

7) \( \sqrt{125} = 5\sqrt{5} \)
8) \( \sqrt{20} = 2\sqrt{5} \)
9) \( \sqrt{72} = \sqrt{4} \sqrt{18} \)

10) \( \sqrt{63} = 3\sqrt{7} \)
11) \( \sqrt{144} = 12 \)
12) \( \sqrt{32} = \sqrt{4} \sqrt{8} \)

13) \( \sqrt{75} = 5\sqrt{3} \)
14) \( \sqrt{200} = 10\sqrt{2} \)
15) \( 5\sqrt{18} = 5\sqrt{9} \cdot \sqrt{2} \)

16) \( 3\sqrt{28} = 3\sqrt{4 \cdot 7} \)
17) \( 2\sqrt{1000} = 2\sqrt{100 \cdot 10} \)
18) \( \sqrt{1,000,000} = 1000 \)

19) \( 3\sqrt{128} = 3\sqrt{64 \cdot 2} \)
20) \( 8\sqrt{27} \)
21) \( 4\sqrt{80} = 4\cdot \sqrt{16 \cdot 5} \)

22) \( -3\sqrt{54} = -3\sqrt{9 \cdot 6} \)
23) \( -7\sqrt{40} = -7\sqrt{4 \cdot 10} \)
24) \( -8\sqrt{121} \)

25) \( 2\sqrt{500} = 2\sqrt{100 \cdot 5} \)
26) \( -4\sqrt{24} = -4\sqrt{4 \cdot 6} \)
27) \( 3\sqrt{175} = 3\sqrt{25 \cdot 7} \)
28) \( 5\sqrt{108} = 5\sqrt{9 \cdot 12} \)

ANSWERS SCRAMBLED

7\sqrt{2} 3\sqrt{7} 5\sqrt{5} 6\sqrt{2} 2\sqrt{2} 10\sqrt{2}
5\sqrt{2} 4\sqrt{2} 4\sqrt{3} 2\sqrt{5} 2\sqrt{3} 12 3\sqrt{5} 5\sqrt{3}
6\sqrt{7} 24\sqrt{3} 24\sqrt{2} 15\sqrt{2} 16\sqrt{5} 1000 20\sqrt{10}
-8\sqrt{6} 30\sqrt{3} -14\sqrt{10} 20\sqrt{5} 15\sqrt{7} -9\sqrt{6} -88
1. Solve the following equations by the square root method. Solve for all solutions, including imaginary numbers.

   a. $8x^2 - 70 = 11x^2 + 5 \quad x = \pm 5i$
   
   b. $9x^2 - 13 = 0 \quad x = \pm \frac{\sqrt{13}}{3}$

2. Solve the following quadratic equations by factoring.

   a. $4x^2 + 16x + 12 = 0 \quad x = 3$  
   
   b. $3x^2 - 10x + 8 = 0 \quad x = -2/3, 4$
   
   c. $x^2 - 64 = 0 \quad x = \pm 8$

5. Rewrite each number in the standard form for complex numbers, $a + bi$. Reduce fractions and simplify radicals.

   a. $\sqrt{-11} = i\sqrt{11}$
   
   b. $(-3 - 10i) + (-6 - 5i) = -9 - 15i$
   
   c. $\frac{\sqrt{-27}}{6} = \frac{i\sqrt{3}}{2}$

   d. $i^3 = -i$
   
   e. $i^{42} = 1$
   
   f. $(1-2i)(-4+3i) = 2 + 11i$

   g. $\frac{(5+2i)}{2-3i} = \frac{4+19i}{13}$
6. Use the Quadratic Formula to solve \( x^2 + x + 1 = 0 \):

\[
\frac{-1}{a} \pm \frac{\sqrt{b}}{2a} i
\]

7. Use "completing the square" to solve the following equation.

\[
2x^2 + 10x - 3 = 0 = -\frac{5}{a} \pm \frac{\sqrt{31}}{2}
\]

8. Solve the following equations for real solutions only.

a. \(-5x^2 = -125\) \( x = \pm 5 \)

b. \(-3y^2 + 11 = 95\) \( y = \pm 2i\sqrt{7} \)

9. Find the discriminant of the following quadratic equations and put it on the first blank. On the second blank, state the number of real solutions for the equation.

a. \(3x^2 - 4x + 5 = 2x + 3\) \( \_12\) \( \_2\) real solutions

b. \(2x^2 + 8x + 8 = 0\) \( \_0\) \( \_1\) real solutions

13. Solve the following equations for real or imaginary solutions using the method indicated. Carefully show all of the work and simplify your answers as much as possible to simplified radical form and/or the standard form for complex numbers.

a. \(x^2 + 20x + 80 = 0\) completing the square \( \_{-10 \pm 2\sqrt{5}}\)
b. $2x^2 + 3x = -5$ completing the square b. $-3/4 \pm \frac{1}{2}i$

c. $2x - 9x^2 = 3x + 2 - 10x^2$ Quadratic Formula c. $2, -1$

d. $5x^2 + 2x + 3 = 0$ Quadratic Formula d. $-1/5 \pm i \sqrt{4/5}$

15. Find the approximate real roots (or real zeros) of the following quadratic equation, rounded to the nearest hundredth. (multiple choice)

$y = 3x^2 + 2x - 6$

a) no real roots b) -1.75, 1.15 c) 1.08, -1.85 d) 1.12, -1.79
Factor if possible. Use completing the square for those that don’t factor.

1) \( X^2 + 10X - 24 = 0 \)

2) \( X^2 + 12X = 28 \)

3) \( X^2 + 18X + 56 = 0 \)

\[ \begin{align*}
\text{Ans.} \quad X &= \underline{\phantom{0}} \quad \text{or} \quad X &= \underline{\phantom{0}} \\
4) \quad X^2 - 6X &= 5 \\
5) \quad X^2 - 9X + 20 &= 0 \\
6) \quad X^2 - 5X &= 50
\end{align*} \]

7) \( X^2 = 8X - 15 \)

8) \( X^2 - X = 1 \)

9) \( 4X^2 + 8X - 12 = 0 \)

Solve by completing the square:

10) \( 2X^2 - 4X - 8 = 0 \)

11) \( 2X^2 - 6X - 10 = 0 \)

12) \( 2X^2 + X - 6 = 0 \)

\[ \begin{align*}
\text{ANSWERS:} \quad 1) \quad 2, -12 & \quad 2) \quad 2, -14 & \quad 3) \quad -4, -14 & \quad 4) \quad 3 \pm \sqrt{14} & \quad 5) \quad 5, 4 & \quad 6) \quad -5, 10 & \quad 7) \quad 5, 3 \\
8) \quad \frac{1 \pm \sqrt{5}}{2} & \quad 9) \quad 1, -3 & \quad 10) \quad 1 \pm \sqrt{5} & \quad 11) \quad \frac{3 \pm \sqrt{29}}{2} & \quad 12) \quad \frac{3}{2}, -2
\end{align*} \]
LT 7,8,10,11 Solving Equations

Solve for x:

1) \(x^2 + 7x + 10 = 0\)
   \(0 = (x + 5) \cdot (x + 2) = 0\)
   \(x = -5, -2\)

2) \(x^2 - 8x + 12 = 0\)
   \((x - 6)(x - 2) = 0\)
   \(x = 6, 2\)

3) \(x^2 - 49 = 0\)
   \((x + 7)(x - 7) = 0\)
   \(x = -7, 7\)

4) \(x^2 + 5x - 6 = 0\)
   \((x + 6)(x - 1) = 0\)
   \(x = -6, 1\)

5) \(x^2 - 7x - 18 = 0\)
   \((x - 9)(x + 2) = 0\)
   \(x = 9, -2\)

6) \(x^2 - 5x = 0\)
   \(x(x - 5) = 0\)
   \(x = 0, 5\)

7) \(2x^2 + 5x - 3 = 0\)
   \((2x - 1)(x + 3) = 0\)
   \(x = \frac{1}{2}, -3\)

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

9) \(2x^2 - 3x - 5 = 0\)
   \((2x - 5)(x + 1) = 0\)
   \(x = \frac{5}{2}, -1\)

10) \(3x^2 + x - 10 = 0\)
    \((3x - 5)(x + 2) = 0\)
    \(x = \frac{5}{3}, -2\)

11) \(4x^2 - 25 = 0\)
    \((2x + 5)(2x - 5) = 0\)
    \(x = \frac{5}{2}, -\frac{5}{2}\)

12) \(2x^2 + 7x = 0\)
    \(x(2x + 7) = 0\)
    \(x = 0, -\frac{7}{2}\)

13) \(5x^2 + 29x + 20 = 0\)
    \((5x + 4)(x + 5) = 0\)
    \(x = -\frac{4}{5}, -5\)

14) \(6x^2 - 19x + 15 = 0\)
    \((3x - 5)(2x - 3) = 0\)
    \(x = \frac{3}{2}, 3\)

Answers Scrambled (+2 that don't match anything!): \[\{\frac{3}{5}, -1\}, \{2, 6\}, \{\frac{3}{2}, \frac{5}{3}\}, \{-2, -5\}, \{0, -\frac{7}{2}\}, \{-6, 1\}, \{-\frac{4}{5}, -5\}, \{0, 5\}, \{\frac{5}{2}, -\frac{5}{2}\}, \{\frac{5}{2}, -1\}, \{\frac{5}{3}, -2\}, \{7, -7\}, \{\frac{3}{2}, \frac{5}{2}\}, \{2, 2\}, \{\frac{1}{2}, -3\}, \{-2, 9\}\]
LT 12. I can use the discriminant to determine the number and type of solutions.

CP Algebra 2 Discriminant

Fill in the chart:

<table>
<thead>
<tr>
<th>Equation</th>
<th>Standard Form</th>
<th>Discriminant</th>
<th>Number and type of Solutions/Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $6x^2 + 3x + 4 = 0$</td>
<td>$6x^2 + 3x + 4 = 0$</td>
<td>$-87$</td>
<td>0 real 2 complex</td>
</tr>
<tr>
<td>2. $x^2 = -6x - 9$</td>
<td>$x^2 + 6x + 9 = 0$</td>
<td>$0$</td>
<td>1 real</td>
</tr>
<tr>
<td>3. $3x^2 - 6 = -5x$</td>
<td>$3x^2 + 5x - 6 = 0$</td>
<td>$97$</td>
<td>2 real</td>
</tr>
<tr>
<td>4. $2x^2 - x = -4$</td>
<td>$2x^2 - x + 4 = 0$</td>
<td>$-31$</td>
<td>0 real 2 complex</td>
</tr>
</tbody>
</table>
LT 7,8,10,11 Solving Equations

I. Solve using the square root method.

(1) \(3x^2 + 12 = 2x^2 + 61\)

\[ x = \pm 7 \]

(2) \(4x^2 + 26 = -38\)

\[ x = \pm 4i \]

II. Solve by completing the square.

(3) \(x^2 - 8x + 15 = 0\)

\[ x = 5 \text{ or } 3 \]

(4) \(3x^2 + 9x = 6\)

\[ x = -\frac{3}{2} + \frac{\sqrt{17}}{2} \]

III. Solve using the quadratic formula.

***Get in standard form first! \(ax^2 + bx + c = 0\)

(5) \(2x^2 - x - 3 = 0\)

\[ x = \frac{3}{2} \text{ or } -1 \]

(6) \(3x^2 + 2x = -3\)

\[ x = -1 \pm \frac{3\sqrt{3}}{3} \]

IV. Use the discriminant to determine the number of real solutions.

\(b^2 - 4ac\)

(2) \(2, (0) 1, (-) 0\)

\[ \text{disc} = -47 \]

\[ \text{no real solution, 2 complex} \]

(8) \(2x^2 + x = 6\)

VII. Simplify.

\(i^0 = 1, i = \sqrt{-1}, i^2 = -1, i^3 = -i\)

10) \(18-5i) + (-3+11i)\)

\[ 15 - 6i \]

11) \((2+5i) - (3-i)\)

\[ -1 + 6i \]

12) \((3+7i)(4-8i)\)

\[ 68 + 4i \]
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$x^2 + 4x + 4$</td>
<td>2.</td>
</tr>
<tr>
<td>4.</td>
<td>$x^2 - 6x$</td>
<td>5.</td>
</tr>
<tr>
<td>7.</td>
<td>$x^2 + 6x + 5$</td>
<td>8.</td>
</tr>
<tr>
<td>10.</td>
<td>$x^2 - 4$</td>
<td>11.</td>
</tr>
<tr>
<td>13.</td>
<td>$x^2 - x - 6$</td>
<td>14.</td>
</tr>
<tr>
<td>16.</td>
<td>$x^2 - 64$</td>
<td>17.</td>
</tr>
<tr>
<td>19.</td>
<td>$x^2 - 36$</td>
<td>20.</td>
</tr>
<tr>
<td>22.</td>
<td>$4x^2 - 1$</td>
<td>23.</td>
</tr>
<tr>
<td>25.</td>
<td>$x^2 - 7x - 8$</td>
<td>26.</td>
</tr>
<tr>
<td>28.</td>
<td>$x^2 + 5x + 4$</td>
<td>29.</td>
</tr>
<tr>
<td>31.</td>
<td>$2x^2 - 5x - 3$</td>
<td>32.</td>
</tr>
<tr>
<td>34.</td>
<td>$5x^2 + 4x - 12$</td>
<td>35.</td>
</tr>
<tr>
<td>37.</td>
<td>$3x^2 - 7x - 6$</td>
<td>38.</td>
</tr>
<tr>
<td>40.</td>
<td>$x^2 + 34x - 72$</td>
<td>41.</td>
</tr>
<tr>
<td>43.</td>
<td>$x^2 + 8x + 12$</td>
<td>44.</td>
</tr>
<tr>
<td>46.</td>
<td>$x^2 - 2x - 168$</td>
<td>47.</td>
</tr>
<tr>
<td>49.</td>
<td>$x^2 - 121$</td>
<td>50.</td>
</tr>
<tr>
<td>52.</td>
<td>$4x^2 + 12x + 9$</td>
<td>53.</td>
</tr>
<tr>
<td>55.</td>
<td>$x^2 + 6x - 40$</td>
<td>56.</td>
</tr>
<tr>
<td>58.</td>
<td>$2x^2 - 98$</td>
<td>59.</td>
</tr>
<tr>
<td>61.</td>
<td>$9x^2 + 30x + 16$</td>
<td>62.</td>
</tr>
<tr>
<td>64.</td>
<td>$x^2 - 169$</td>
<td>65.</td>
</tr>
<tr>
<td>67.</td>
<td>$2x^2 - 10x - 28$</td>
<td>68.</td>
</tr>
<tr>
<td>70.</td>
<td>$x^2 + 2x - 63$</td>
<td>71.</td>
</tr>
<tr>
<td>73.</td>
<td>$4x^2 - 5x - 6$</td>
<td>74.</td>
</tr>
</tbody>
</table>
LT 7. I can solve by factoring. LT 8. I can solve by taking the square root.

Name _______________________

Practice 5-5 Quadratic Equations Solve each equation by factoring, by taking square roots, or by graphing.

When necessary, round your answer to the nearest hundredth.

1. \( x^2 - 18x - 40 = 0 \)
2. \( 16x^2 = 56x \)
3. \( 5x^2 = 15x \)
4. \( x^2 - 6x - 7 = 0 \)
5. \( x^2 - 49 = 0 \)
6. \( x^2 + 2x + 1 = 0 \)
7. \( x^2 - 1 = 0 \)
8. \( x^2 - 3x - 4 = 0 \)
9. \( x^2 + 9x^2 + 20 = 0 \)
10. \( 6x^2 + 9 = -55x \)
11. \((x + 5)^2 = 36 \)
12. \( 2x^2 - 3x = 0 \)
13. \( 2x^2 + x - 10 = 0 \)
14. \(-4x^2 + 3x = -1 \)
15. \( 5x^2 - 6x + 1 = 0 \)
16. \( 3x^2 + 1 = -4x \)
17. \(-2x^2 + 2 = -3x \)
18. \( 6x^2 + 1 = 5x \)
19. \(-2x^2 - x + 1 = 0 \)
20. \( 3x^2 + 5x = 2 \)
21. \( x^2 - 6x = -8 \)
22. \( x^2 + 6 = -7x \)
23. \( 6x^2 + 18x = 0 \)
24. \( 2x^2 + 5 = 11x \)
25. \( 3x^2 - 7x + 2 = 0 \)
26. \( 2x^2 - 3x = -1 \)
27. \( 2x^2 - x = 6 \)
28. \( x^2 - 144 = 0 \)
29. \( 4x^2 + 2 = 6x \)
30. \( 5x^2 + 2 = -7x \)
31. \( 7x^2 + 6x - 1 = 0 \)
32. \( 2x^2 - 6x = -4 \)
33. \( 11x^2 - 12x + 1 = 0 \)
34. \( 7x^2 + 1 = -8x \)
35. \( x^2 + 9 = -10x \)
36. \( 5x - 2)^2 = 18 \)
37. \( x^2 - 8x + 7 = 0 \)
38. \( x^2 - 16 = 0 \)
39. \( x^2 + 6x = -8 \)
40. \( x^2 + 3 = 4x \)
41. \( 2x^2 + 6 = -7x \)
42. \( 6x^2 + 2 = 7x \)
43. \( (x + 7)^2 = \frac{49}{16} \)
44. \( 9x^2 - 8x = 1 \)
45. \( 10x^2 + 7x + 1 = 0 \)
46. \( 4x^2 + 2 = -9x \)
47. \( 3x^2 + 4 = 8x \)
48. \( 4x^2 + 5 + 9x = 0 \)
49. \( 9x^2 + 10x = -1 \)
50. \( 2x^2 + 9x + 4 = 0 \)
51. \( 2x^2 + 6x = -4 \)
52. \( 11x^2 - 1 = -10x \)
53. \( 4x^2 = 1 \)
54. \( 6x^2 = 12x \)
55. \( 25x^2 - 9 = 0 \)
56. \( 2x^2 + 11x = 6 \)
57. \( 8x^2 - 6x + 1 = 0 \)
58. \( x^2 + 11 = -12x \)
59. \( 6x^2 + 2 = 13x \)
60. \( x^2 = 121 \)
61. \( 4x^2 - 11x = 3 \)
62. \( 8x^2 + 6x + 1 = 0 \)
63. \( x^2 + 9x + 8 = 0 \)
64. \( x^2 + 8x = -12 \)
65. \( x^2 + 6x = 40 \)
66. \( 2x^2 = 8 \)
67. \( x^2 = x + 6 \)
68. \( x^2 + 2x - 6 = 0 \)
69. \( x^2 - 12 = 0 \)
70. \( 3x^2 + 4x = 6 \)
71. \( 7x^2 - 105 = 0 \)
72. \( 16x^2 = 81 \)
73. \( x^2 + 5x + 4 = 0 \)
74. \( x^2 + 36 = -13x \)
75. \( x^2 + 6 = 5x \)
LT 8. I can solve by taking the square root. LT 9. I can perform operations with imaginary numbers.

**Practice 5-6 Complex Numbers**

Name __________________________________________

LT 9. I can perform operations with imaginary numbers

Simplify each expression.

26. \( \sqrt{40} \)  
27. \( \sqrt{-88} \)  
28. \( -\sqrt{-36} \)  
29. \((1 + 5i) + (1 - 5i)\)  
30. \((3 + 2i) - (3 + 2i)\)  
31. \(4 - \sqrt{-25}\)  
32. \((2 + 6i) - (7 + 9i)\)  
33. \((1 + 5i)(1 - 5i)\)  
34. \((1 + 5i)(6 - 3i)\)  
35. \((5 - 6i)(6 - 2i)\)  
36. \((3 + 4i)(3 + 4i)\)  
37. \((2 + 3i)(2 - 3i)\)  
38. \((2 + 2i)(2 - 2i)\)  
39. \((-3 - 2i)(1 - 3i)\)  
40. \((3 + 3i) - (4 - 3i)\)  
41. \(\sqrt{-48}\)  
42. \(\sqrt{-300}\)  
43. \(\sqrt{-75}\)  
44. \(\sqrt{-16} + 2\)  
45. \((4 - i)(4 - i)\)  
46. \((4 + 2i)(1 - 7i)\)  
47. \((1 + 3i)(1 - 7i)\)  
48. \((2 + 4i)(-3 - 2i)\)  
49. \((11 - 12i)(11 + 12i)\)  
50. \((2 + 3i) + (-4 + 5i)\)  
51. \((5 + 14i) - (10 - 2i)\)  
52. \((5 + 12i)(5 - 12i)\)  
53. \((3 + 4i)(1 - 2i)\)  
54. \((6 + 2i)(1 - 2i)\)  
55. \((5 - 13i)(5 - 13i)\)  
56. \(\sqrt{-44}\)  
57. \(-\sqrt{-63}\)  
58. \(\sqrt{-8}\)  
59. \((2 + 3i)(4 + 5i)\)  
60. \((5 + 4i) - (-1 - 2i)\)  
61. \((1 + 2i)(-1 - 2i)\)  
62. \((-1 + 4i)(1 - 2i)\)  
63. \((6 + 2i) + (1 - 2i)\)  
64. \((3 + 2i)(3 + 2i)\)  
65. \((-2 + 3i) + (4 + 5i)\)  
66. \((5 + 4i)(1 + 2i)\)  
67. \((-1 - 5i)(-1 + 5i)\)

LT 8. I can solve by taking the square root.

Solve each equation.

68. \(x^2 + 80 = 0\)  
69. \(5x^2 + 500 = 0\)  
70. \(2x^2 + 40 = 0\)  
71. \(3x^2 + 36 = 0\)  
72. \(3x^2 + 75 = 0\)  
73. \(2x^2 + 144 = 0\)  
74. \(4x^2 + 1600 = 0\)  
75. \(4x^2 + 1 = 0\)  
76. \(2x^2 + 10 = 0\)  
77. \(4x^2 + 100 = 0\)  
78. \(x^2 + 9 = 0\)  
79. \(9x^2 + 90 = 0\)
LT10. I can solve by completing the square.  Name ____________________________

Practice 5-7

Complete the square.

1. \( x^2 + 6x + \_ \)  
2. \( x^2 - 7x + \_ \)  
3. \( x^2 + 12x + \_ \)  
4. \( x^2 + 3x + \_ \)

5. \( x^2 - 8x + \_ \)  
6. \( x^2 + 16x + \_ \)  
7. \( x^2 + 21x + \_ \)  
8. \( x^2 - 2x + \_ \)

Solve each quadratic equation by completing the square.

24. \( x^2 + 12x + 4 = 0 \)  
25. \( x^2 - x - 5 = 0 \)  
26. \( 3x^2 = -12x - 3 \)

27. \( x^2 - x - 1 = 0 \)  
28. \( 4x^2 - 8x + 1 = 0 \)  
29. \( 5x^2 = 8x - 6 \)

30. \( 2x^2 - 4x - 3 = 0 \)  
31. \( x^2 + 11x = 0 \)  
32. \( x^2 = 5x + 14 \)

33. \( 2x^2 + x - 1 = 0 \)  
34. \( 2x^2 + 6x - 7 = 0 \)  
35. \( 2x^2 = -8x + 45 \)

36. \( x^2 = -3x - 3 \)  
37. \( 4x^2 = -2x + 1 \)  
38. \( 3x^2 = -6x + 9 \)

39. \( x^2 = 7x + 12 \)  
40. \( x^2 = 3x + 7 \)  
41. \( 3x^2 = 6x - 9 \)

42. \( x^2 = -3x + 2 \)  
43. \( x^2 = -7x - 1 \)  
44. \( 4x^2 = -3x + 2 \)

45. \( 2x^2 = 4x - 5 \)  
46. \( 2x^2 = 5x + 5 \)  
47. \( 2x^2 = 6x + 5 \)

48. \( x^2 = 3x \)  
49. \( x^2 = 8x \)  
50. \( 4x^2 = -2x - 3 \)

51. \( 2x^2 = -2x + 5 \)  
52. \( 2x^2 = -5x - 5 \)  
53. \( 3x^2 = -5x + 1 \)

54. \( 2x^2 = 2x + 4 \)  
55. \( 3x^2 = 7x + 8 \)  
56. \( 2x^2 = -6x + 4 \)

57. \( x^2 = -7x - 9 \)  
58. \( 2x^2 = 5x \)  
59. \( 3x^2 = -42x \)

60. \( 2x^2 = -4x + 5 \)  
61. \( 4x^2 = -x + 5 \)  
62. \( 3x^2 = -3x + 1 \)

63. \( x^2 = 3x + 4 \)  
64. \( 2x^2 = 2x + 8 \)  
65. \( 3x^2 = x + 4 \)

Solve each equation.

66. \( x^2 + 2x + 1 = 9 \)  
67. \( 3x^2 - 18x + 27 = 125 \)  
68. \( x^2 - 4x + 4 = 5 \)

69. \( x^2 + 3x + \frac{9}{4} = \frac{13}{4} \)  
70. \( x^2 + 3x + \frac{9}{4} = -\frac{15}{4} \)  
71. \( x^2 + 3x + \frac{9}{4} = \frac{41}{4} \)
LT 12. I can use the discriminant to determine the number and type of solutions.
LT 11. I can solve equations using the quadratic formula (with rationalized denominators).

Name ___________________ Class _______________ Date ____________

Practice 5-8

The Quadratic Formula

Evaluate the discriminant of each equation. Tell how many solutions each equation has and whether the solutions are real or imaginary.

1. \( y = x^2 + 10x - 25 \)  
2. \( y = x^2 + 10x + 10 \)  
3. \( y = 9x^2 - 24x \)  
4. \( y = 4x^2 - 4x + 1 \)  
5. \( y = 4x^2 - 5x + 1 \)  
6. \( y = 4x^2 - 3x + 1 \)  
7. \( y = x^2 + 3x + 4 \)  
8. \( y = x^2 + 7x - 3 \)  
9. \( y = -2x^2 + 3x - 5 \)  
10. \( y = x^2 - 5x + 4 \)  
11. \( y = x^2 + 12x + 36 \)  
12. \( y = x^2 + 2x + 3 \)  
13. \( y = 2x^2 - 13x - 7 \)  
14. \( y = -5x^2 + 6x - 4 \)  
15. \( y = -4x^2 - 4x - 1 \)

LT 11. I can solve equations using the quadratic formula (with rationalized denominators).

Solve each equation using the Quadratic Formula.

16. \( x^2 + 6x + 9 = 0 \)  
17. \( x^2 - 15x + 56 = 0 \)  
18. \( 3x^2 - 5x + 2 = 0 \)  
19. \( 2x^2 + 3x + 5 = 0 \)  
20. \( 10x^2 - 23x + 12 = 0 \)  
21. \( 4x^2 + x - 5 = 0 \)  
22. \( x^2 + 8x + 15 = 0 \)  
23. \( 3x^2 + 2x + 1 = 0 \)  
24. \( 4x^2 + x + 5 = 0 \)  
25. \( x^2 - 4x - 12 = 0 \)  
26. \( x^2 = 3x + 2 \)  
27. \( 2x^2 - 5x + 2 = 0 \)  
28. \( x^2 + 6x - 4 = 0 \)  
29. \( x^2 = 2x - 5 \)  
30. \( 3x^2 + 7 = -6x \)  
31. \( 2x^2 + 6x + 3 = 0 \)  
32. \( x^2 = -18x - 80 \)  
33. \( x^2 + 9x - 13 = 0 \)  
34. \( x^2 - 8x + 25 = 0 \)  
35. \( 4x^2 + 13x = 12 \)  
36. \( 3x^2 - 5x = -12 \)  
37. \( 3x^2 + 4x + 5 = 0 \)  
38. \( 2x^2 = 3x - 7 \)  
39. \( 5x^2 + 2x + 1 = 0 \)  
40. \( 5x^2 + x + 3 = 0 \)  
41. \( 5x^2 + x = 3 \)  
42. \( 5x^2 - 2x + 7 = 0 \)  
43. \( x^2 - 2x + 3 = 0 \)  
44. \( -2x^2 + 3x = 24 \)  
45. \( 4x^2 = 5x - 6 \)  
46. \( x^2 + 6x + 5 = 0 \)  
47. \( x^2 - 6x = -8 \)  
48. \( x^2 - 6x = -6 \)

Solve: 49. A model of the daily profits \( p \) of a gas station based on the price per gallon \( g \) is

\[
p = -15,000g^2 + 34,500g - 16,800.
\]

Use the discriminant to find whether the station can profit $4000 per day. Explain.

Solve each equation using the Quadratic Formula. Find the exact solutions. Then approximate any radical solutions. Round to the nearest hundredth.

50. \( x^2 - 2x - 3 = 0 \)  
51. \( x^2 + 5x + 4 = 0 \)  
52. \( x^2 - 2x - 8 = 0 \)  
53. \( 7x^2 - 12x + 3 = 0 \)  
54. \( 5x^2 + 5x - 1 = 0 \)  
55. \( 4x^2 + 5x + 1 = 0 \)  
56. \( 6x^2 + 5x - 4 = 0 \)  
57. \( x^2 + x = 6 \)  
58. \( x^2 - 13x = 48 \)  
59. \( 2x^2 + 5x = 0 \)  
60. \( x^2 + 3x - 3 = 0 \)  
61. \( x^2 - 4x + 1 = 0 \)  
62. \( 9x^2 - 6x - 7 = 0 \)  
63. \( x^2 - 35 = 2x \)  
64. \( x^2 + 7x + 10 = 0 \)
Practice WS Answers

Practice 5-4
1. (x + 2)²  2. (x - 5)(x - 2)  3. (x + 8)(x - 1)
4. 6x - 6)  5. (2x - 1)(x - 4)  6. (x + 7)(x - 5)
7. (x + 5)(x + 1)  8. (x + 3)(x - 3)  9. (x - 16)(x + 3)
10. (x + 2)(x - 2)  11. x² + 1  12. (x - 25)(x - 4)
13. (x - 3)(x + 2)  14. (3x - 1)(3x - 1)  15. x²(3x - 2)
16. (x + 8)(x - 8)  17. (x + 5)(x - 5)
18. (x - 9)(x - 9)  19. (x + 6)(x - 6)
20. (x + 10)(x - 10)  21. (x + 1)(x - 1)
22. (2x + 1)(2x - 1)  23. (x + 3)(x - 3)
24. (3x + 2)(3x - 2)  25. (x - 8)(x + 1)
26. (x - 9)(x + 4)  27. (x - 3)(x - 2)
28. (x + 4)(x + 1)  29. (x + 2)(x + 1)
30. (x + 5)(x + 8)  31. (2x + 1)(x - 3)
32. (x + 11)(x - 1)  33. (x + 12)(x - 2)
34. (x + 2)(3x - 6)  35. (x + 1)(2x - 7)
36. (x + 5)(2x + 3)  37. (x - 3)(3x + 2)
38. (x + 3)(3x + 7)  39. (8x + 3)(x - 3)
40. (x - 36)(x - 35)  41. (x + 2)(x + 4)
42. (x + 3)(x - 6)  43. (x + 10)(x - 3)
46. (x - 14)(x + 12)
47. (x - 9)(x + 8)  48. (2x + 5)(2x + 3)
49. (x + 11)(x - 1)  50. (x + 16)(x + 1)
51. (5x - 1)(2x - 3)  52. (2x + 3)(2x + 7)
53. (x + 2)(3x - 2)  54. (x + 2)(3x - 2)
55. (x + 5)(x + 3)  56. (2x + 2)(x - 2)
57. (x + 11)(x - 1)  58. (2x + 7)(x - 7)
59. (x + 14)(x + 7)  60. (x + 6)(x + 14)
61. (3x + 2)(3x + 8)  62. (2x + 5)(4x - 9)
63. (x - 9)(x + 6)  64. (x + 13)(x - 13)
65. (5x + 3)(5x - 2)  66. 7x³ + 7  68. 7x² - 7(2x - 1)(x + 2)
68. (x + 6)(x + 2)  69. (x + 5)(x - 7)
70. (x + 9)(x - 7)  71. (5x + 1)(4x - 3)
72. (2x + 1)(3x + 5)  73. (4x + 3)(x - 2)
74. (4x - 3)(2x + 7)  75. (3x + 7)(x - 8)

Practice 5-5
1. 20, -1 2. 2.5 2 3. 0, 3 4. 7, -1 5. -7, -7 6. 1
7. 1, -1 8. 4, -1 9. -4, -5 10. -9, -1 11. 1, -11
12. 3 12 13. 2.5 14. -1, -4 15. 1.5 16. -1, -1
17. 0.5 18. 1 19. -0.5 20. -2, -1 21. 4, 2
22. -5, -1 23. 0, -3 24. 1.5 25. 2 26. 1, 1
27. -3, 2 28. 12, -12 29. 1, 1 30. -1, -3 31. -1, -1
32. 1, 2 33. 1, 1 34. -1, -1 35. -9, -1
36. 6.24, -2.24 37. 7.1 38. 4, -4 39. 2, 4 40. 4, 1
41. -2, -2 42. 1.2 43. -1.2 44. 1, -1
45. -1, -1 46. -2, -1 47. 2, 2 48. 1, -4
49. -1, -1 50. -4, -1 51. -2, -1 52. 1, -1
53. 2, 1 54. 0, 2 55. 3, 3 56. 2, 6 57. 1, 1
58. -1, -1 59. 2, 1 60. 11, -11 61. 3, -4 62. 2, -1
63. -8, -1 64. -2, -6 65. 4, 10 66. 2, -2 67. 3, -2
68. 16, -6 69. 3, 4 70. 0, 9 70. 0, 9 70. 0, 9 70. 0, 9
71. 3, 4 72 73. 1, 1 74. -4, -4 75. 3, 2

Practice 5-6
1. 2i, -4 + 2i, 12 - 14i 2. 1 + i, 1 + 3i, -7 + 7i
3. -2 - 3i 4. 4 - i 5. 5, -2i 6. 1 + i 7. 7i 8. -5 + 2i
17. 1/2 18. 1/3 19. -3/2 20. 3 21. 2
22. 3² 23. 3² 24. 3 25. 4 26. 2 27. 2 28. 6i 29. 2 30. 0 31. 4 - 5i 32. -5 - 3i 33. 34. 21 + 27i 35. 18 - 46i 36. -7 + 24i 37. 38. 39. 39. 39. 9 + 7i 40. 1, 6i 41. 4i 1/3 42. 10i 3 43. 5² 44. 2 + 4i 45. 15 - 8i 46. 18 - 26i 47. 22 - 4i 48. 2 - 16i 49. 265 50. 2 + 8i 51. 5, -5 + 16i 52. 169 53. 11, 3 54. 0, 5 55. 0, -144 + 130i 56. 2 57. -3 + 7 58. 3 59. 7 + 22i 60. 6 + 6i 61. 3 - 4i 62. 7 + 6i 63. 7 64. -4 + 12i 65. 2 + 8i 66. -3 + 14i 67. 26 68. 4 + 4 69. 10i 70. 2 + 5i 71. 72. ±5i 73. ±6i 74. ±20i 75. ±3 76. ±4i 77. ±5 ± 78. ±3i 79. ±2/5 80.
Practice 5-7

1. 9 2. 49 3. 36 4. 9 5. 16 6. 64 7. 4 8. 1
9. \( y = (x + 2)^2 - 10; (-2, -10) \)
10. \( y = (x - 3)^2 - 3; (3, -3) \)
11. \( y = 4(x + 1)^2 - 8; (-1, -8) \)
12. \( y = 4 \left( x + \frac{1}{2} \right)^2 - \left( \frac{1}{2}, 0 \right) \)
13. \( y = 2(x + 1)^2 - 7; (1, -7) \)
14. \( y = -3 \left( x + \frac{1}{3} \right)^2 + \frac{1}{3}; \left( \frac{1}{3}, \frac{1}{3} \right) \)
15. \( y = -3 \left( x - \frac{1}{2} \right)^2 - \frac{1}{4}; \left( \frac{1}{2}, -\frac{1}{4} \right) \)
16. \( y = (x + 1)^2; (-1, 0) \)
17. \( y = -5(x - 1)^2 + 6; (1, 6) \)
18. \( y = -2(x - 1)^2 + 5; (1, 5) \)
19. \( y = \left( x + \frac{3}{2} \right)^2 - 5; \left( \frac{3}{2}, -5 \right) \)
20. \( y = -2 \left( x - \frac{5}{2} \right)^2 + \frac{3}{2}; \left( \frac{3}{2}, \frac{3}{2} \right) \)
21. \( y = 6(x - 1)^2 - 5; (1, -5) \)
22. \( y = -2(x - 2)^2 - 1; (2, -1) \)
23. \( y = 3 \left( x + \frac{3}{2} \right)^2 - \frac{3}{4}; \left( \frac{3}{2}, -\frac{3}{4} \right) \)

24. \(-6 \pm 4\sqrt{2} \)
25. \(\frac{1}{2} \pm \sqrt{\frac{21}{2}} \)
26. \(-2 \pm \sqrt{3} \)
27. \(\frac{1}{2} \pm \sqrt{\frac{5}{2}} \)
28. \(1 \pm \sqrt{\frac{3}{5}} \)
29. \(\frac{4}{5} \pm \sqrt{\frac{14}{5}} \)
30. \(1 \pm \sqrt{\frac{10}{2}} \)
31. \(-1 \pm 1 \)
32. \(-2 \pm \sqrt{106} \)
33. \(-\frac{3}{2} \pm \sqrt{\frac{13}{2}} \)
34. \(-\frac{3}{2} \pm \sqrt{\frac{23}{4}} \)
35. \(-2 \pm \sqrt{\frac{106}{2}} \)
36. \(-\frac{3}{2} \pm \sqrt{\frac{13}{2}} \)
37. \(-\frac{1}{4} \pm \sqrt{\frac{5}{4}} \)
38. \(-1 \pm 1 \)
39. \(-3 \pm \sqrt{\frac{9}{2}} \)
40. \(3 \pm \sqrt{\frac{17}{2}} \)
41. \(1 \pm i\sqrt{2} \)
42. \(-2 \pm \sqrt{\frac{17}{2}} \)
43. \(-\frac{3}{2} \pm \sqrt{\frac{13}{2}} \)
44. \(-\frac{3}{8} \pm \sqrt{\frac{41}{8}} \)
45. \(1 \pm i\sqrt{\frac{6}{2}} \)
46. \(\frac{5}{4} \pm \sqrt{\frac{65}{4}} \)
47. \(\frac{3}{2} \pm \sqrt{\frac{19}{2}} \)
48. \(0, 0 \)
49. \(0, 0 \)
50. \(-\frac{1}{4} \pm i\sqrt{\frac{11}{4}} \)
51. \(-\frac{1}{2} \pm i\sqrt{\frac{11}{4}} \)
52. \(-\frac{5}{4} \pm i\sqrt{\frac{15}{4}} \)
53. \(-\frac{5}{6} \pm \sqrt{\frac{37}{6}} \)
54. \(2, -1 \)
55. \(\frac{7}{6} \pm \sqrt{\frac{145}{6}} \)
56. \(\frac{3}{2} \pm \sqrt{\frac{17}{2}} \)
57. \(-\frac{5}{2} \pm \sqrt{\frac{13}{2}} \)
58. \(\frac{5}{2} \)
59. \(0, -10 \)
60. \(-1 \pm \sqrt{\frac{14}{2}} \)
61. \(1, -\frac{5}{4} \)
62. \(\frac{1}{2} \pm \sqrt{\frac{21}{2}} \)
63. \(-\frac{1}{2} \pm \sqrt{\frac{17}{2}} \)
64. \(-\frac{1}{4} \pm \sqrt{\frac{13}{2}} \)
65. \(1, -\frac{5}{4} \)
66. \(-4 \pm \sqrt{\frac{21}{2}} \)
67. \(3 \pm \sqrt{\frac{15}{3}} \)
68. \(2 \pm \sqrt{5} \)
69. \(-\frac{3}{2} \pm \sqrt{\frac{13}{2}} \)
70. \(-\frac{3}{2} \pm \sqrt{\frac{15}{2}} \)
71. \(\frac{3}{2} \pm i\sqrt{\frac{41}{2}} \)
72. \(-\frac{7}{2} \pm i\sqrt{\frac{53}{2}} \)
73. \(\frac{3}{2} \pm \sqrt{\frac{29}{2}} \)
74. \(3 \pm \sqrt{7} \)

Practice 5-8

1. 200; 2 real 2. 60; 2 real 3. 576; 2 real 4. 0; 1 real
5. 9; 2 real 6. 7; 2 imaginary 7. 7; 2 imaginary
8. 61; 2 real 9. 31; 2 imaginary 10. 9; 2 real 11. 0; 1 real
12. 8; 2 imaginary 13. 225; 2 real 14. 44; 2 imaginary
15. 0; 1 real 16. 3 17. 7 18. 3 1 19. 3 ± i\sqrt{31}
20. 3 2 21. 5 4 1 22. 3 5 23. 1 ± i\sqrt{2}
24. 1 ± i\sqrt{95} 25. 6 2 26. 3 ± 2\sqrt{17} 27. 2 1 2
28. 3 ± 2\sqrt{13} 29. 1 ± 2i 30. 3 ± 2\sqrt{3}
31. 3 ± 2\sqrt{13} 32. 10 8 33. 9 ± 2\sqrt{133} 34. 4 ± 3i
35. 4 3 36. 5 ± 2\sqrt{19} 37. 2 ± i\sqrt{11}
38. 3 ± i\sqrt{47} 39. 1 ± 2i 40. 1 ± i\sqrt{59}
41. -1 ± i\sqrt{61} 42. 1 ± i\sqrt{34}
43. 1 ± i\sqrt{2}
44. 3 ± i\sqrt{183} 45. 5 ± i\sqrt{71}
46. -5 1 47. 4 2
48. 3 ± i\sqrt{3} 49. No; When p = 4000, the discriminant is negative, so there are no real solutions.
50. 3, -1
51. -1, -4 52. 4, -2 53. 6 ± i\sqrt{15} 7 1.41, 0.30
54. -5 ± 3\sqrt{5}
55. -1 5 56. 1 4 57. -3 2 58. 16, -3 59. 0, -\frac{5}{2}
60. -3 ± \sqrt{21} 0.79, -2 79 61. 2 ± \sqrt{3}; 3.73, 0.27
62. 1 ± 2\sqrt{2} 3 1.28, -0.61 63. 7, -5 64. -5, -2
Unit 1 LT 3 Did you Hear About.. Rationalizing Radicals in denominators

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
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<tbody>
<tr>
<td>The</td>
<td>very</td>
<td>sad</td>
<td>guy</td>
<td>who</td>
<td>tried</td>
<td>to</td>
<td>KISS</td>
<td>his</td>
<td>girl</td>
<td>friend</td>
<td>in</td>
<td>the</td>
<td>fog</td>
<td>and</td>
<td>mist?</td>
</tr>
</tbody>
</table>

**Answers A–H:**

- \( \sqrt{11} \) TO
- \( \frac{\sqrt{5}}{2} \) WAS
- \( \frac{\sqrt{2}}{6} \) HUG
- \( \frac{2\sqrt{10}}{5} \) TRIED
- \( 4\sqrt{5} \) SAD
- \( \frac{5\sqrt{3}}{3} \) THE
- \( \frac{3\sqrt{5}}{10} \) BIG
- \( \frac{\sqrt{6}}{2} \) WHO
- \( \frac{\sqrt{3}}{2} \) KISS
- \( \frac{2\sqrt{7}}{7} \) VERY
- \( 7\sqrt{2} \) GUY
- \( \frac{2\sqrt{6}}{3} \) GIRL

**Rationalize the denominator and simplify each expression below. Find your answer in the adjacent answer column and notice the word next to it. Write this word in the box containing the letter of that exercise. Keep working and you will hear about a mistake.**

**Answers I–P:**

- \( 3\sqrt{2} \) BUT
- \( \frac{\sqrt{2}}{4} \) AND
- \( \frac{\sqrt{21}}{3} \) IN
- \( \frac{4\sqrt{5}}{5} \) GIRL
- \( \frac{6\sqrt{2}}{5} \) LOST
- \( 3\sqrt{3} \) FOG
- \( \frac{3\sqrt{5}}{10} \) FRIEND
- \( \frac{\sqrt{2}}{2} \) THE
- \( 5\sqrt{2} \) HIS
- \( 2\sqrt{2} \) A
- \( \frac{2\sqrt{5}}{5} \) MIST
- \( \frac{9\sqrt{3}}{10} \) TODAY

**OBJECTIVE 3-k:** To simplify quotients containing radicals by rationalizing the denominator.

D–43
What Do You Get When You Cross a Cooking Utensil With a Mathematical Formula?

Solve each equation below. Find the solution set at the bottom of the page and cross out the letter above it. When you finish, the answer to the title question will remain.

1. \((x - 4)^2 = 25\)  \(x = 4 \pm 5\)
   \(x = 9, -1\)

2. \(5(x + 7)^2 = 5\)  \(x + 7 = \pm 1\)
   \((x + 7)^2 = 1\)  \(x = -6, -8\)

3. \(3(x - 2)^2 = 36\)
   \(x - 2 = \pm \sqrt{12}\)
   \(x = 2 \pm 2\sqrt{3}\)

4. \(x^2 - 10x + 25 = 0\)
   \((x - 5)^2 = 9\)
   \(x = 5 \pm 3\)

5. \(x^2 - 6x + 9 = 49\)
   \((x - 3)^2 = 49\)
   \(x = 3 \pm 7\)

6. \(x^2 + 2x + 1 = 64\)
   \((x + 1)^2 = 64\)
   \(x = -3, -7\)

7. \(x^2 - 18x + 81 = 24\)
   \((x - 9)^2 = \pm 2\sqrt{6}\)

8. \(x^2 + 12x + 36 = 75\)
   \((x + 6)^2 = \pm 5\sqrt{3}\)

9. \((x - \frac{3}{2})^2 = 4\)
   \(x = -\frac{3}{2} \pm 1\)

10. \((x - \frac{3}{2})^2 = 4\)
    \(x = -\frac{3}{2} \pm 1\)

11. \((x + 5)^2 = \frac{15}{4}\)
    \(x = -\frac{5}{2} \pm \frac{\sqrt{15}}{2}\)

12. \(2x^2 = 5\)
    \(x = \pm \frac{\sqrt{10}}{2}\)

13. \((x - \frac{1}{2})^2 = \frac{3}{4}\)
    \(x = 1 \pm \frac{\sqrt{3}}{2}\)

14. \((x - \frac{3}{5})^2 = 4\)
    \(x = -\frac{3}{5} \pm \frac{2\sqrt{5}}{5}\)

15. \(3(x + \frac{7}{3})^2 = 1\)
    \(x = -\frac{7}{3} \pm \frac{1}{\sqrt{3}}\)

The solution set for the equation \(x^2 - 6x + 9 = 49\) is \(x = 3 \pm 7\).
Solve each equation below by completing the square. Find the solution set in the answer list and notice the letter next to it. Each time the exercise number appears in the code, write this letter above it. Keep working and you will decode the title of the picture.

1. \(x^2 + 6x = 16\)
2. \(a^2 + 10a = -21\)
3. \(x^2 - 8x = 33\)
4. \(n^2 - 4n = 11\)
5. \(b^2 + 20b = -80\)
6. \(x^2 - 12x = 39\)
7. \(m^2 - 6m - 1 = 0\)
8. \(t^2 - 8t - 20 = 0\)
9. \(x^2 + 12x + 18 = 0\)
10. \(y^2 + 2y - 80 = 0\)
11. \(x^2 - 10x - 7 = 3\)
12. \(k^2 + 16k + 60 = 5\)
13. \(x^2 - 24x + 70 = -30\)
14. \(y^2 + 30y - 75 = 100\)

**CODED TITLE:**

\[
\text{BOUSSCOUTTNT}
\]

\[
\text{AFTERASNOWSTORM}
\]

<table>
<thead>
<tr>
<th>(B)</th>
<th>(C)</th>
<th>(S)</th>
<th>(N)</th>
<th>(U)</th>
</tr>
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<td>{2 ± (\sqrt{15})}</td>
<td>{5, -35}</td>
<td>{-3, -7}</td>
<td>{3 ± (\sqrt{10})}</td>
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<th>(F)</th>
<th>(Y)</th>
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<th>(T)</th>
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<tbody>
<tr>
<td>{2, -8}</td>
<td>{8, -10}</td>
<td>{11, -3}</td>
<td>{10, -2}</td>
<td>{12 ± 2(\sqrt{11})}</td>
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</tbody>
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<th>(O)</th>
<th>(A)</th>
<th>(L)</th>
<th>(M)</th>
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<tr>
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<td>{-5, -11}</td>
<td>{-10 ± 2(\sqrt{5})}</td>
<td>{5 ± 3(\sqrt{10})}</td>
<td>{-6 ± 3(\sqrt{2})}</td>
</tr>
</tbody>
</table>
How Can You Help Control Soil Erosion?

Use the related graph or the discriminant of each equation to determine how many real number solutions it has. Circle the letter of the correct choice and write this letter in the box containing the exercise number.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2 + 2x - 3 = 0$</td>
<td>(D) two solutions</td>
</tr>
<tr>
<td>$x^2 - 4x + 4 = 0$</td>
<td>(C) two solutions</td>
</tr>
<tr>
<td>$x^2 - 2x + 2 = 0$</td>
<td>(H) two solutions</td>
</tr>
<tr>
<td>$x^2 + 5x + 4 = 0$</td>
<td>two solutions</td>
</tr>
<tr>
<td>$x^2 - 3x = 2$</td>
<td>one solution</td>
</tr>
<tr>
<td>$y^2 + 10y + 25 = 0$</td>
<td>no solutions</td>
</tr>
<tr>
<td>$2x^2 = 4x - 3$</td>
<td></td>
</tr>
<tr>
<td>$4x^2 + 9 = 12x$</td>
<td></td>
</tr>
<tr>
<td>$-3n^2 + 5n - 2 = 0$</td>
<td></td>
</tr>
<tr>
<td>$\frac{1}{2}x^2 + 3x + 8 = 0$</td>
<td></td>
</tr>
<tr>
<td>$\frac{1}{3}t^2 + 3 = 2t$</td>
<td></td>
</tr>
</tbody>
</table>

Objective 4-1: To use the related graph or the discriminant of a quadratic equation to determine how many real number solutions it has.
Practice Assignment

LT 1: I can factor by grouping.

1) \(-5x^3 - 10x^2 - 15\)
   \[-5(x^3 + 2x^2 + 3)\]

2) \(-2n^5 - 10n^3 + 2n^2\)
   \[2n^2(-n^3 - 5n + 1)\]

3) \(-15k^7 - 5k^3 - 25k^2\)
   \[-5k^2(3k^5 + k + 5)\]

4) \(4v^4 - 2v^3 + v^2\)
   \[v^2(4v^2 - 2v + 1)\]

5) \(2k - 6k^2 + 10k^4\)
   \[2k(1 - 3k + 5k^3)\]

6) \(2x^4 + 6x + 10\)
   \[2(x^4 + 3x + 5)\]

7) \(-3b^4 + 3b^2 - 3b^5\)
   \[3b^2(-b^2 + 1 - b^3)\]

8) \(5x^8 - 5x^6 - 5x^5\)
   \[5x^5(x^3 - x - 1)\]

9) \(4 - 8\nu - 8\nu^2\)
   \[4(1 - 2\nu - 2\nu^2)\]

10) \(10 + 20n^2 + 15n^4\)
    \[5(2 + 4n^2 + 3n^4)\]

11) \(10x^2 + 4x + 6\)
    \[2(5x^2 + 2x + 3)\]

12) \(25b^5 - 20b^6 + 10b^8\)
    \[5b^5(5 - 4b + 2b^3)\]

13) \(24x^3y^3 - 8y^3 - 80x + 40\)
    \[8(3x^3y^3 - y^3 - 10x + 5)\]

14) \(20x^2y + 20x + 15y + 15\)
    \[5(4x^2y + 4x + 3y + 3)\]

15) \(72xy^2 + 40x^2y - 48x^2 - 80x\)
    \[8x(9y^2 + 5xy - 6x - 10)\]

16) \(-40x^3y - 45x + 25y + 30\)
    \[5(-8x^3y - 9x + 5y + 6)\]
Practice Assignment

LT 2: I can factor by grouping.

1) \(3x^3 - 3x^2 + 4x - 4\)
   \[(3x^2 + 4)(x - 1)\]

2) \(12b^3 + 15b^2 + 20b + 25\)
   \[(3b^2 + 5)(4b + 5)\]

3) \(3p^3 - 5p^2 + 15p - 25\)
   \[(p^2 + 5)(3p - 5)\]

4) \(15a^3 + 5a^2 + 9a + 3\)
   \[(5a^2 + 3)(3a + 1)\]

5) \(6b^3 - 4b^2 + 3b - 2\)
   \[(2b^2 + 1)(3b - 2)\]

6) \(15a^3 - 3a^2 + 25a - 5\)
   \[(3a^2 + 5)(5a - 1)\]

7) \(2a^3 + 8a^2 + a + 4\)
   \[(2a^2 + 1)(a + 4)\]

8) \(2x^3 - 3x^2 + 4x - 6\)
   \[(x^2 + 2)(2x - 3)\]
9) $5r^3 - 2r^2 + 15r - 6$
   $(r^2 + 3)(5r - 2)$

10) $10b^3 - 25b^2 + 2b - 5$
    $(5b^2 + 1)(2b - 5)$

11) $9m^3 + 6m^2 + 6m + 4$
    $(3m^2 + 2)(3m + 2)$

12) $3n^3 + 4n^2 + 3n + 4$
    $(n^2 + 1)(3n + 4)$

13) $x^3 + 5x^2 + 3x + 15$
    $(x^2 + 3)(x + 5)$

14) $5b^3 + 5b^2 + b + 1$
    $(5b^2 + 1)(b + 1)$

15) $56xy + 7x^3 + 64y + 8x^2$
    $(7x + 8)(8y + x^2)$

16) $21xy + 49x^2 - 3y - 7x$
    $(7x - 1)(3y + 7x)$

17) $72mn + 192m + 12n + 32$
    $4(6m + 1)(3n + 8)$

18) $10uv + 25u - 2v^2 - 5v$
    $(5u - v)(2v + 5)$
Practice Assignment

LT 3: I can factor when a is one.

1) \( b^2 - 18b + 80 \)
   \((b - 10)(b - 8)\)

2) \( r^2 + 6r - 16 \)
   \((r + 8)(r - 2)\)

3) \( x^2 - 13x + 40 \)
   \((x - 5)(x - 8)\)

4) \( x^2 + 6x - 7 \)
   \((x + 7)(x - 1)\)

5) \( a^2 + 3a - 54 \)
   \((a - 6)(a + 9)\)

6) \( v^2 + 3v + 2 \)
   \((v + 1)(v + 2)\)

7) \( b^2 + 17b + 70 \)
   \((b + 10)(b + 7)\)

8) \( v^2 + 16v + 60 \)
   \((v + 6)(v + 10)\)
9) $r^2 + 5r + 6$
   $(r + 3)(r + 2)$

10) $b^2 + 14b + 48$
    $(b + 6)(b + 8)$

11) $m^2 - 3m$
    $m(m - 3)$

12) $r^2 + 6r - 27$
    $(r + 9)(r - 3)$

13) $p^2 + 5p + 4$
    $(p + 1)(p + 4)$

14) $a^2 - 12a + 20$
    $(a - 2)(a - 10)$

15) $x^2 + 11x + 10$
    $(x + 10)(x + 1)$

16) $x^2 - 4x + 4$
    $(x - 2)^2$

17) $n^2 - 2n - 80$
    $(n + 8)(n - 10)$

18) $x^2 + 5x - 6$
    $(x - 1)(x + 6)$
Practice Assignment

LT 4: I can factor when a is not equal to one.

1) \(5x^2 - 46x + 48\)
   \((5x - 6)(x - 8)\)

2) \(3x^2 - 14x - 80\)
   \((3x + 10)(x - 8)\)

3) \(7p^2 - 46p + 24\)
   \((7p - 4)(p - 6)\)

4) \(3v^2 - 28v + 32\)
   \((3v - 4)(v - 8)\)

5) \(7x^2 - 58x - 45\)
   \((7x + 5)(x - 9)\)

6) \(7v^2 + 38v + 40\)
   \((7v + 10)(v + 4)\)

7) \(5p^2 + 44p + 32\)
   \((5p + 4)(p + 8)\)

8) \(7m^2 - 53m - 90\)
   \((7m + 10)(m - 9)\)

9) \(3x^2 - 35x + 72\)
   \((3x - 8)(x - 9)\)

10) \(4x^2 + 37x + 9\)
    \((x + 9)(4x + 1)\)
11) \(4m^2 + 28m + 45\)  
\((2m + 9)(2m + 5)\)
12) \(9a^2 - 64a + 60\)  
\((a - 6)(9a - 10)\)

13) \(8r^2 + 57r + 54\)  
\((r + 6)(8r + 9)\)
14) \(9x^2 - 14x - 8\)  
\((x - 2)(9x + 4)\)

15) \(10x^2 - 13x - 30\)  
\((2x - 5)(5x + 6)\)
16) \(9x^2 + 56x + 12\)  
\((x + 6)(9x + 2)\)

17) \(10p^2 + 39p + 14\)  
\((2p + 7)(5p + 2)\)
18) \(9r^2 - 6r - 8\)  
\((3r + 2)(3r - 4)\)

19) \(6x^2 + 17x - 14\)  
\((3x - 2)(2x + 7)\)
20) \(6x^2 - 17x - 10\)  
\((2x + 1)(3x - 10)\)

21) \(9n^2 + 14n - 8\)  
\((n + 2)(9n - 4)\)
22) \(8p^2 + 50p + 63\)  
\((4p + 7)(2p + 9)\)
Practice Assignment

LT 5: I can factor perfect square trinomials.

1) $4x^2 - 16x + 16$
   \[ 4(x - 2)^2 \]

2) $27r^2 + 36r + 12$
   \[ 3(3r + 2)^2 \]

3) $4r^2 - 20r + 25$
   \[ (2r - 5)^2 \]

4) $9b^2 - 12b + 4$
   \[ (3b - 2)^2 \]

5) $k^2 - 4k + 4$
   \[ (k - 2)^2 \]

6) $25p^2 + 10p + 1$
   \[ (5p + 1)^2 \]

7) $45b^2 - 150b + 125$
   \[ 5(3b - 5)^2 \]

8) $25p^2 - 10p + 1$
   \[ (5p - 1)^2 \]
9) $36m^2 + 96m + 64$
   \[4(3m + 4)^2\]

10) $9b^2 + 30b + 25$
   \[(3b + 5)^2\]

11) $m^2 - 2m + 1$
   \[(m - 1)^2\]

12) $25a^2 - 20a + 4$
   \[(5a - 2)^2\]

13) $32b^2 - 16b + 2$
   \[2(4b - 1)^2\]

14) $32x^2 + 80x + 50$
   \[2(4x + 5)^2\]

15) $125n^2 - 100n + 20$
   \[5(5n - 2)^2\]

16) $b^2 + 2b + 1$
   \[(b + 1)^2\]

17) $25x^2 - 30x + 9$
   \[(5x - 3)^2\]

18) $25v^2 - 40v + 16$
   \[(5v - 4)^2\]
Practice Assignment

LT 6: I can factor using difference of two squares.

1) \(4b^2 - 1\)
   \[(2b + 1)(2b - 1)\]

2) \(9p^2 - 16\)
   \[(3p + 4)(3p - 4)\]

3) \(27n^2 - 75\)
   \[3(3n + 5)(3n - 5)\]

4) \(27v^2 - 12\)
   \[3(3v + 2)(3v - 2)\]

5) \(125m^2 - 20\)
   \[5(5m + 2)(5m - 2)\]

6) \(25x^2 - 9\)
   \[(5x + 3)(5x - 3)\]

7) \(100v^2 - 4\)
   \[4(5v + 1)(5v - 1)\]

8) \(4b^2 - 25\)
   \[(2b + 5)(2b - 5)\]
9) \(8a^2 - 18\)
   \[2(2a + 3)(2a - 3)\]

10) \(p^2 - 1\)
    \[(p + 1)(p - 1)\]

11) \(50x^2 - 2\)
    \[2(5x + 1)(5x - 1)\]

12) \(16x^2 - 36\)
    \[4(2x + 3)(2x - 3)\]

13) \(16x^2 - 9\)
    \[(4x + 3)(4x - 3)\]

14) \(16n^2 - 25\)
    \[(4n + 5)(4n - 5)\]

15) \(9r^2 - 25\)
    \[(3r + 5)(3r - 5)\]

16) \(2r^2 - 18\)
    \[2(r + 3)(r - 3)\]

17) \(p^2 - 4\)
    \[(p + 2)(p - 2)\]

18) \(25n^2 - 4\)
    \[(5n + 2)(5n - 2)\]
Practice Assignment

LT 7: I can solve by factoring.

1) \(a^2 - 2a + 1 = 0\)
   \(\{1\}\)

2) \(n^2 - 7n + 12 = 0\)
   \(\{4, 3\}\)

3) \(m^2 - 3m + 2 = 0\)
   \(\{2, 1\}\)

4) \(b^2 + 8b + 15 = 0\)
   \(\{-5, -3\}\)

5) \(7m^2 - 451 = -3\)
   \(\{8, -8\}\)

6) \(b^2 - b - 7 = 5\)
   \(\{-3, 4\}\)

7) \(n^2 + 8n + 20 = 4\)
   \(\{-4\}\)

8) \(4b^2 + 20b + 13 = -3\)
   \(\{-4, -1\}\)
9) \(b^2 - 3b - 45 = -5\)  
\([-5, 8]\)

10) \(3p^2 + 6p - 5 = 4\)  
\([1, -3]\)

11) \(a^2 + 5a - 13 = -7\)  
\([-6, 1]\)

12) \(7v^2 + 7v - 217 = -7\)  
\([-6, 5]\)

13) \(x^2 + 14 = 9x\)  
\([2, 7]\)

14) \(x^2 - 2x = 0\)  
\([2, 0]\)

15) \(4n^2 = -12n + 112\)  
\([4, -7]\)

16) \(n^2 + 28 = 11n\)  
\([7, 4]\)

17) \(x^2 + 21 = -10x\)  
\([-7, -3]\)

18) \(-48m = -90 - 6m^2\)  
\([5, 3]\)
Practice Assignment

LT 8: I can solve by taking square roots.

1) $x^2 + 9 = 91$
   \[ \{\sqrt{82}, -\sqrt{82}\} \]

2) $p^2 + 7 = 76$
   \[ \{\sqrt{69}, -\sqrt{69}\} \]

3) $-8x^2 = -512$
   \[ \{8, -8\} \]

4) $x^2 + 4 = 94$
   \[ \{3\sqrt{10}, -3\sqrt{10}\} \]

5) $x^2 + 6 = 47$
   \[ \{\sqrt{41}, -\sqrt{41}\} \]

6) $-10k^2 = -220$
   \[ \{\sqrt{22}, -\sqrt{22}\} \]

7) $4k^2 = 76$
   \[ \{\sqrt{19}, -\sqrt{19}\} \]

8) $-7x^2 = -693$
   \[ \{3\sqrt{11}, -3\sqrt{11}\} \]
9) \(7x^2 - 3 = 564\)  
\[9, -9\]

10) \(-1 - 2x^2 = -99\)  
\[7, -7\]

11) \(7x^2 - 9 = 509\)  
\[\sqrt{74}, -\sqrt{74}\]

12) \(7x^2 - 6 = 512\)  
\[\sqrt{74}, -\sqrt{74}\]

13) \(2r^2 + 1 = 17\)  
\[2\sqrt{2}, -2\sqrt{2}\]

14) \(-5 - 8p^2 = -29\)  
\[\sqrt{3}, -\sqrt{3}\]

15) \(36p^2 - 10 = 15\)  
\[\frac{5}{6}, -\frac{5}{6}\]

16) \(2k^2 + 2 = 122\)  
\[2\sqrt{15}, -2\sqrt{15}\]

17) \(1 + 16n^2 = 2\)  
\[\frac{1}{4}, -\frac{1}{4}\]

18) \(16x^2 - 5 = 76\)  
\[\frac{9}{4}, -\frac{9}{4}\]
Practice Assignment

LT 9: I can perform operations with imaginary numbers.

1) \((8i) - (6 - 2i)\)
   \(-6 + 10i\)

2) \((i) - (4i)\)
   \(-3i\)

3) \((-6i) - (i)\)
   \(-7i\)

4) \((-2i) - (6i)\)
   \(-8i\)

5) \((-2i) + (5i)\)
   \(3i\)

6) \((-5 - 6i) + (7i)\)
   \(-5 + i\)

7) \((-7i)(3i)\)
   \(21\)

8) \((3i)(-8 - 8i)\)
   \(24 - 24i\)

9) \((-4i)(-4 + 2i)\)
   \(8 + 16i\)

10) \(3(-5i)\)
    \(-15i\)
11) \((-8i)(-5i)\)
   \(-40\)

12) \((4i)(-4i)(2i)\)
   \(32i\)

13) \((-i)(-8 - 2i)\)
   \(-2 + 8i\)

14) \((-3i)(5 + 4i)\)
   \(12 - 15i\)

Solve each equation by taking square roots. Simplify your answers.

15) \(p^2 + 2 = -1\)
    \(\{i\sqrt{3}, -i\sqrt{3}\}\)

16) \(2p^2 = -18\)
    \(\{3i, -3i\}\)

17) \(5v^2 = -35\)
    \(\{i\sqrt{7}, -i\sqrt{7}\}\)

18) \(n^2 + 6 = -12\)
    \(\{3i\sqrt{2}, -3i\sqrt{2}\}\)

19) \(4p^2 = -320\)
    \(\{4i\sqrt{5}, -4i\sqrt{5}\}\)

20) \(-3r^2 = 96\)
    \(\{4i\sqrt{2}, -4i\sqrt{2}\}\)

21) \(m^2 + 1 = -9\)
    \(\{i\sqrt{10}, -i\sqrt{10}\}\)

22) \(n^2 + 6 = -7\)
    \(\{i\sqrt{13}, -i\sqrt{13}\}\)
Practice Assignment

LT 10: I can solve by completing the square.

1) \(m^2 + 4m - 77 = 0\)
   \[7, -11\]

2) \(4b^2 - 16b - 24 = 0\)
   \[2 + \sqrt{10}, 2 - \sqrt{10}\]

3) \(b^2 + 6b + 93 = 0\)
   \[-3 + 2i\sqrt{21}, -3 - 2i\sqrt{21}\]

4) \(n^2 - 18n + 56 = 0\)
   \[14, 4\]

5) \(k^2 - 8k + 61 = 0\)
   \[4 + 3i\sqrt{5}, 4 - 3i\sqrt{5}\]

6) \(n^2 + 6n + 5 = 0\)
   \[-1, -5\]

7) \(a^2 - 2a - 35 = -10\)
   \[1 + \sqrt{26}, 1 - \sqrt{26}\]

8) \(k^2 - 4k - 38 = -6\)
   \[8, -4\]
9) \(x^2 + 2x - 12 = 2\)
\[
[-1 + \sqrt{15}, \, -1 - \sqrt{15}]
\]

10) \(x^2 - 16x - 48 = -4\)
\[
[8 + 6\sqrt{3}, \, 8 - 6\sqrt{3}]
\]

11) \(p^2 + 18p + 12 = -3\)
\[
[-9 + \sqrt{66}, \, -9 - \sqrt{66}]
\]

12) \(x^2 - 8x + 20 = 5\)
\[
[5, \, 3]
\]

13) \(x^2 - 10x - 73 = 2\)
\[
[15, \, -5]
\]

14) \(p^2 + 12p + 41 = 9\)
\[
[-4, \, -8]
\]

15) \(5n^2 + 10n + 34 = 4\)
\[
[-1 + i\sqrt{5}, \, -1 - i\sqrt{5}]
\]

16) \(6y^2 - 12y + 85 = 9\)
\[
\left\{ \frac{3 + i\sqrt{105}}{3}, \, \frac{3 - i\sqrt{105}}{3} \right\}
\]

17) \(7x^2 + 14x - 53 = 3\)
\[
[2, \, -4]
\]

18) \(2b^2 - 8b + 94 = 7\)
\[
\left\{ \frac{4 + i\sqrt{158}}{2}, \, \frac{4 - i\sqrt{158}}{2} \right\}
\]
Practice Assignment

LT 11: I can solve using the quadratic formula.

1) \[ 2x^2 - 2x - 12 = 0 \]
   \[ \{3, -2\} \]

2) \[ -3x^2 - 3x - 1 = 0 \]
   \[ \left\{ \frac{-3 - i\sqrt{3}}{6}, \frac{-3 + i\sqrt{3}}{6} \right\} \]

3) \[ -5x^2 + 2x - 4 = 0 \]
   \[ \left\{ \frac{1 - i\sqrt{19}}{5}, \frac{1 + i\sqrt{19}}{5} \right\} \]

4) \[ 5n^2 + 2n + 2 = 0 \]
   \[ \left\{ \frac{-1 + 3i}{5}, \frac{-1 - 3i}{5} \right\} \]

5) \[ -4x^2 - 4x + 2 = 0 \]
   \[ \left\{ \frac{-1 - \sqrt{3}}{2}, \frac{-1 + \sqrt{3}}{2} \right\} \]

6) \[ 5x^2 + 4x - 8 = 0 \]
   \[ \left\{ \frac{-2 + 2\sqrt{11}}{5}, \frac{-2 - 2\sqrt{11}}{5} \right\} \]

7) \[ -n^2 + 3n - 4 = 0 \]
   \[ \left\{ \frac{3 - i\sqrt{7}}{2}, \frac{3 + i\sqrt{7}}{2} \right\} \]

8) \[ -p^2 - 3p + 9 = 0 \]
   \[ \left\{ \frac{-3 - 3\sqrt{5}}{2}, \frac{-3 + 3\sqrt{5}}{2} \right\} \]
9) \(-2n^2 + n + 3 = 0\)
\[
\left\{ \begin{array}{c}
-1, \frac{3}{2}
\end{array} \right. 
\]

10) \(-a^2 + 10 = 4a\)
\[
\left\{ \begin{array}{c}
-2 - \sqrt{14}, -2 + \sqrt{14}
\end{array} \right. 
\]

11) \(3n^2 - 1 = 3n\)
\[
\left\{ \frac{3 + \sqrt{21}}{6}, \frac{3 - \sqrt{21}}{6} \right. 
\]

12) \(-3x^2 + x = 2\)
\[
\left\{ \frac{1 - i\sqrt{23}}{6}, \frac{1 + i\sqrt{23}}{6} \right. 
\]

13) \(-2x^2 + 3 = -4x\)
\[
\left\{ \frac{2 - \sqrt{10}}{2}, \frac{2 + \sqrt{10}}{2} \right. 
\]

14) \(-x^2 = -5x - 10\)
\[
\left\{ \frac{5 - \sqrt{65}}{2}, \frac{5 + \sqrt{65}}{2} \right. 
\]

15) \(5n^2 - 2n - 7 = 3n^2\)
\[
\left\{ \frac{1 + \sqrt{15}}{2}, \frac{1 - \sqrt{15}}{2} \right. 
\]

16) \(2b^2 + 5b - 6 = b\)
\[
\left\{ 1, -3 \right. 
\]

17) \(5n^2 - 3n - 10 = 2n + n^2 - 3\)
\[
\left\{ \frac{5 + \sqrt{137}}{8}, \frac{5 - \sqrt{137}}{8} \right. 
\]

18) \(4x^2 + 4x - 6 = -2 + 3x^2\)
\[
\left\{ -2 + 2\sqrt{2}, -2 - 2\sqrt{2} \right. 
\]
Practice Assignment

LT 12: I can use the discriminant to determine the number and type of solutions.

1) \(3k^2 + 8k - 5 = -10\)
   4; two real solutions

2) \(-6n^2 + 5n + 4 = 5\)
   1; two real solutions

3) \(7r^2 - 3r - 5 = -9\)
   \(-103; two imaginary solutions\)

4) \(6r^2 + 10r = 4\)
   \(196; two real solutions\)

5) \(-x^2 - 2x - 8 = -7\)
   0; one real solution

6) \(8r^2 - 8r + 10 = 8\)
   0; one real solution

7) \(-6m^2 + 3m + 3 = 9\)
   \(-135; two imaginary solutions\)

8) \(-3m^2 - m - 6 = -10\)
   \(49; two real solutions\)

9) \(5n^2 + n - 4 = -6\)
   \(-39; two imaginary solutions\)

10) \(-6n^2 + 9n - 14 = -5n\)
    \(-140; two imaginary solutions\)

11) \(7x^2 + 3x - 2 = 9x^2\)
    \(-7; two imaginary solutions\)

12) \(16v^2 + 10 = 6 + 12v^2 - 8v\)
    0; one real solution

13) \(4k^2 - 14 = -14 + 10k\)
    100; two real solutions

14) \(4x^2 - 7 = -12 - 4x\)
    \(-64; two imaginary solutions\)

15) \(3n^2 - 2n - 8 = -3\)
    64; two real solutions

16) \(-6v^2 - 16v - 5 = -13v\)
    \(-111; two imaginary solutions\)
Practice Assignment

LT 13: I can write quadratic equations given the real solutions. Write each equation in factored form AND standard form.

1) $-3$ and $2$

\[
(x+3)(x-2)=0 \\
x^2 + x - 6 = 0 \\
\]

2) $8$ and $1$

\[
(x-8)(x-1)=0 \\
x^2 - 9x + 8 = 0 \\
\]

3) $0$ and $2$

\[
(x)(x-2)=0 \\
x^2 - 2x = 0 \\
\]

4) $-1$ and $-5$

\[
(x+1)(x+5)=0 \\
x^2 + 6x + 5 = 0 \\
\]

5) $-2$ and $7$

\[
(x+2)(x-7)=0 \\
x^2 - 5x - 14 = 0 \\
\]

6) $3$ and $9$

\[
(x-3)(x-9)=0 \\
x^2 - 12x + 27 = 0 \\
\]

7) $2$ and $-10$

\[
(x-2)(x+10)=0 \\
x^2 + 8x - 20 = 0 \\
\]

8) $-5$ and $-6$

\[
(x+5)(x+6)=0 \\
x^2 + 11x + 30 = 0 \\
\]
CP Algebra 2

Previous Unit Learning Targets

DO YOU REMEMBER Unit 1?

1) Write an equation of the line through the points (2,-3) and (-1,0).

\[ m = \frac{-1}{1} \quad \text{or} \quad y - (-3) = -1(x + 1) \quad y = -x - 3 \]

2) Solve: \[ |2x - 5| = 3 \]

\[ 2x - 5 = 3 \quad \text{or} \quad -2x + 5 = 3 \]

\[ 2x = 8 \quad \text{or} \quad -2x = -2 \]

\[ x = 4 \quad \text{or} \quad x = 1 \]

3) Solve: \[ 7x - 3(x - 2) = 2(5 - x) \]

\[ x = \frac{2}{3} \]

4) Solve the system:
\[ x - 2y = 16 \]
\[ -2x - y = -2 \]

\[ (4, -6) \]

5) Solve the system:
\[ y = 2x + 7 \]
\[ 4x - y = -3 \]

\[ (2, 11) \]

6) Find the x and y intercepts of the line \[ 3y - x = 4 \]

\[ (0, \frac{4}{3}) \quad (-4, 0) \]

7) Evaluate: \[ -3x^2 + 4x \] when \[ x = -2 \]

\[ -20 \]

8) Solve for \[ x \]: \[ 2(3 - (2x + 4)) - 5(x - 7) = 3x + 1 \]

\[ x = 4 \]

ANSWERS

1) \[ y = -x - 1 \]

5) \(2, 11\)

2) \[ x = 4, 1 \]

6) \((0, \frac{4}{3}) \quad (-4, 0)\)

3) \[ x = \frac{2}{3} \]

7) \[-20\]

4) \((4, -6)\)

8) \[ x = 4 \]