

4.4: Factoring when  $a > 1$

“I WILL ...

Factor and Solve Quadratic Functions when  $a = 1$ .”

I. Steps in Factoring and Solving Polynomials, Standard Form:  $Ax^2 + Bx + C = f(x)$

- A. Determine if there is a GCF. If there is, take it out.
- B. Make sure the equation equals to zero.
- C. Determine the Target Product and Target Sum of the equation
  - 1. Multiply the First and Last Term
  - 2. Ensure the terms adds to the middle and multiplies the end
  - 3. Rewrite the problem with the new middle terms
  - 4. Make sure that one of the binomials is the same on both sides
- D. Factor by Grouping by Splitting the Terms
- E. Combine like terms and multiply
- F. Put each equation to zero and solve
- G. If there are any answers that repeat, they are known as multiple roots. (i.e. Double Root, Triple Root, etc...)

II. Model Problems

Ex 1: Factor $f(x) = 2x^2 + 5x + 2$	Ex 2: Factor $3x^2 + 20x - 7$	Ex 3: Factor $2x^2 - 9 - 3x$
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Your Turn: Factor $4x^2 + 4x^2 - 3$	Ex 4: Solve $3x^2 + 10x - 8 = 0$	Ex 5: Solve $5x^2 - 27x = 18$
Your Turn: $4x^2 - 10x + 15 = 10x - 10$	Ex 6: Solve $16x^2 - 1 = 0$	Ex 7: Solve $9x^2 - 64 = 0$
Your Turn: $36x^2 - 9 = 0$	Ex 8: Factor $8x^2 - 14xy + 3y^2$	Your Turn: Factor $6xy^2 + 33xy - 18x$
<p>Ex 9: You have made a rectangular quilt that is 5 feet by 4 feet. You want to use the remaining 10 square feet of fabric to add border of uniform width to the quilt. What should the width of the quilt's border be?</p>		


Assignment: Page 263

3-19 EOO, 23-29 odd, 33-57 EOO

Page 263: 3-19 EOO, 23-29 odd, 33-57 EOO

**FACTORING** Factor the expression. If the expression cannot be factored, say so.

- |                    |                     |                       |
|--------------------|---------------------|-----------------------|
| 3. $2x^2 + 5x + 3$ | 4. $3n^2 + 7n + 4$  | 5. $4r^2 + 5r + 1$    |
| 6. $6p^2 + 5p + 1$ | 7. $11z^2 + 2z - 9$ | 8. $15x^2 - 2x - 8$   |
| 9. $4y^2 - 5y - 4$ | 10. $14m^2 + m - 3$ | 11. $9d^2 - 13d - 10$ |

12.  **TAKS REASONING** Which factorization of  $5x^2 + 14x - 3$  is correct?

- |                       |                       |
|-----------------------|-----------------------|
| (A) $(5x - 3)(x + 1)$ | (B) $(5x + 1)(x - 3)$ |
| (C) $5(x - 1)(x + 3)$ | (D) $(5x - 1)(x + 3)$ |


**FACTORING WITH SPECIAL PATTERNS** Factor the expression.

- |                      |                        |                         |
|----------------------|------------------------|-------------------------|
| 13. $9x^2 - 1$       | 14. $4r^2 - 25$        | 15. $49n^2 - 16$        |
| 16. $16s^2 + 8s + 1$ | 17. $49x^2 + 70x + 25$ | 18. $64w^2 + 144w + 81$ |
| 19. $9p^2 - 12p + 4$ | 20. $25t^2 - 30t + 9$  | 21. $36x^2 - 84x + 49$  |

**FACTORING MONOMIALS FIRST** Factor the expression.

- |                        |                         |                         |
|------------------------|-------------------------|-------------------------|
| 22. $12x^2 - 4x - 40$  | 23. $18z^2 + 36z + 16$  | 24. $32v^2 - 2$         |
| 25. $6u^2 - 24u$       | 26. $12m^2 - 36m + 27$  | 27. $20x^2 + 124x + 24$ |
| 28. $21x^2 - 77x - 28$ | 29. $-36n^2 + 48n - 15$ | 30. $-8y^2 + 28y - 60$  |

31. **ERROR ANALYSIS** Describe and correct the error in factoring the expression.

$$\begin{aligned} 4x^2 - 36 &= 4(x^2 - 36) \\ &= 4(x + 6)(x - 6) \end{aligned}$$


**SOLVING EQUATIONS** Solve the equation.

- |                          |                           |                            |
|--------------------------|---------------------------|----------------------------|
| 32. $16x^2 - 1 = 0$      | 33. $11q^2 - 44 = 0$      | 34. $14s^2 - 21s = 0$      |
| 35. $45n^2 + 10n = 0$    | 36. $4x^2 - 20x + 25 = 0$ | 37. $4p^2 + 12p + 9 = 0$   |
| 38. $15x^2 + 7x - 2 = 0$ | 39. $6r^2 - 7r - 5 = 0$   | 40. $36z^2 + 96z + 15 = 0$ |

**FINDING ZEROS** Find the zeros of the function by rewriting the function in intercept form.

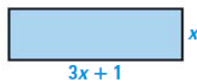
- |                           |                            |                             |
|---------------------------|----------------------------|-----------------------------|
| 41. $y = 4x^2 - 19x - 5$  | 42. $g(x) = 3x^2 - 8x + 5$ | 43. $y = 5x^2 - 27x - 18$   |
| 44. $f(x) = 3x^2 - 3x$    | 45. $y = 11x^2 - 19x - 6$  | 46. $y = 16x^2 - 2x - 5$    |
| 47. $y = 15x^2 - 5x - 20$ | 48. $y = 18x^2 - 6x - 4$   | 49. $g(x) = 12x^2 + 5x - 7$ |

 **GEOMETRY** Find the value of  $x$ .

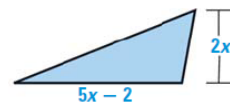
50. Area of square = 36



51. Area of rectangle = 30



52. Area of triangle = 115



**SOLVING EQUATIONS** Solve the equation.

- |                                |                               |                                 |
|--------------------------------|-------------------------------|---------------------------------|
| 53. $2x^2 - 4x - 8 = -x^2 + x$ | 54. $24x^2 + 8x + 2 = 5 - 6x$ | 55. $18x^2 - 22x = 28$          |
| 56. $13x^2 + 21x = -5x^2 + 22$ | 57. $x = 4x^2 - 15x$          | 58. $(x + 8)^2 = 16 - x^2 + 9x$ |