

Day 1 Part 1 - Math 2 Factoring CW – Multiplying two binomials

Remember when you multiply a monomial and a binomial; you distribute the monomial to each term in the binomial. There are two ways to multiply the two binomials.

Method 1: Distribute each term in the first binomial to the second binomial then distribute the monomial to the two terms in the binomial. Then combine like terms.

Example: Multiply

$$(x+4)(x+6) = x \cdot (x+6) + 4 \cdot (x+6)$$

$$x^2 + 6x + 4x + 24$$

$$x^2 + 10x + 24$$

$$\text{so, } (x+4)(x+6) = x^2 + 10x + 24$$

You Try: Multiply

$$(x+7)(x+4) = \underline{\hspace{2cm}}(\underline{\hspace{2cm}}) + \underline{\hspace{2cm}}(\underline{\hspace{2cm}})$$

$$(x+7)(x+4) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$(x+7)(x+4) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

Practice: Multiply using method 1

1. $(x+2)(x+7)$

2. $(x+8)(x-3)$

3. $(x-4)(x-2)$

Method 2: When you multiply two binomials you distribute each term in the first binomial to each term in the second binomial. In some way one can think of this as double distributing.

Example: Multiply

$$(x+2)(x+8) = x \cdot x + x \cdot 8 + 2 \cdot x + 2 \cdot 8$$

$$x^2 + 8x + 2x + 16$$

$$x^2 + 10x + 16$$

$$\text{so, } (x+2)(x+8) = x^2 + 10x + 16$$

You Try: Multiply

$$(x+3)(x+5) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$(x+3)(x+5) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

Practice: Multiply using method 2

4. $(x-2)(x+6)$

5. $(x-5)(x+9)$

6. $(2x-7)(x-3)$

Class work Practice: Multiply using the method of your choice

7. $(x-5)(x-6)$

8. $(x-2)(x-6)$

9. $(x-3)(x-6)$

10. $(2x+5)(x+1)$

11. $(5x+2)(x-3)$

12. $(3x-2)(x+6)$

Day 1 Part 2 - Math 2 Factoring CW – Multiplying a binomial and trinomial

Method 1: Distribute the first in the first binomial to the second trinomial then distribute the monomial to the three terms in the trinomial. Then combine like terms.

Example: Multiply $(x + 2)(x^2 + 3x + 4)$

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

$$(x + 2)(x^2 + 3x + 4) = x^3 + 3x^2 + 4x + 2x^2 + 6x + 8$$

$$(x + 2)(x^2 + 3x + 4) = x^3 + 5x^2 + 10x + 8$$

Example 2: Your turn: Multiply $(x + 1)(x^2 + 4x + 6)$

$$(x + 1)(x^2 + 4x + 6) = \underline{\hspace{2cm}}(\underline{\hspace{2cm}}) + \underline{\hspace{2cm}}(\underline{\hspace{2cm}})$$

$$(x + 1)(x^2 + 4x + 6) = \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$$

$$(x + 1)(x^2 + 4x + 6) = \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$$

Method 2: Multiplication square (Punnett Square). Write the binomial on one side and the trinomial on the side. Fill in the squares. Combine like terms on the diagonals.

Multiply: $(x - 3)(x^2 + 5x - 4)$

Your turn: Multiply $(x - 2)(x^2 + 3x + 6)$

	x^2	$5x$	-4
x	x^3	$5x^2$	$-4x$
-3	$-3x^2$	$-15x$	12

$$(x - 3)(x^2 + 5x - 4) = x^3 + 2x^2 - 19x + 12 \quad (x - 2)(x^2 + 3x + 6) = \underline{\hspace{2cm}}$$

Class work Practice: Multiply using the method of your choice

13. $(x - 2)(x^2 + 3x + 4)$

14. $(x - 1)(x^2 - 2x + 1)$

15. $(x + 1)(x^2 + x + 5)$

16. $(2x + 1)(x^2 + 3x - 7)$

17. $(5x - 3)(x^2 + 4x + 2)$

18. $(3x + 2)(x^2 - x - 5)$

Math 2 Factoring CW Day 2 Part 1 – Factoring $x^2 + bx + c$

Remember multiplying is the opposite of factoring. Factoring means, to write as a product. In the case of polynomials sometimes you can factor a trinomial by writing it as the product of two binomials.

When you factor you need to think of the possibilities. What two variables or numbers multiply to give you the term? List the possibilities and choose the pair that works.

Analytical questions: What multiplies to give you _____ but _____ to give you _____?
3rd term + or – middle
 last sign term

Example: Factor

$$x^2 + 7x + 12 = (\quad + \quad)(\quad + \quad)$$

You Try: Factor

$$x^2 + 11x + 24 = (\quad + \quad)(\quad + \quad)$$

Class work Practice:

1. $x^2 + 10x + 16$

2. $x^2 + 10x + 25$

3. $x^2 + 18x + 32$

4. $x^2 + 15x + 26$

5. $x^2 + 25x + 66$

6. $x^2 + 11x + 30$

7. $x^2 + 22x + 40$

8. $x^2 + 17x + 60$

9. $x^2 + 17x + 42$

10. $x^2 + 20x + 36$

11. $x^2 + 13x + 40$

12. $x^2 + 18x + 45$

13. $x^2 + 8x + 16$

14. $x^2 + 23x + 42$

15. $x^2 + 20x + 64$

Math 2 Factoring CW Day 2 Part 2 – Factoring $x^2 - bx + c$

Remember multiplying two numbers whose product is positive, the two numbers could both be positive or the two numbers can both be negative.

When you factor you need to think of the possibilities. What two variables or numbers multiply to give you the term? List the possibilities and choose the pair that works.

Analytical questions: What multiplies to give you $\frac{\quad}{3^{\text{rd}} \text{ term}}$ but $\frac{\quad}{+ \text{ or } - \text{ last sign}}$ to give you $\frac{\quad}{\text{middle term}}$?

Example: Factor

$$x^2 - 7x + 12 = (\quad - \quad)(\quad - \quad)$$

You Try: Factor

$$x^2 - 16x + 15 = (\quad - \quad)(\quad - \quad)$$

Class work Practice:

16. $x^2 - 6x + 8$

17. $x^2 - 17x + 42$

18. $x^2 - 17x + 16$

19. $x^2 - 23x + 42$

20. $x^2 - 5x + 6$

21. $x^2 - 11x + 18$

22. $x^2 - 49x + 48$

23. $x^2 - 12x + 20$

24. $x^2 - 29x + 54$

25. $x^2 - 32x + 60$

26. $x^2 - 11x + 30$

27. $x^2 - 15x + 26$

28. $x^2 - 20x + 64$

29. $x^2 - 12x + 36$

30. $x^2 - 21x + 68$

Math 2 Factoring CW Day 3 Part 1 – Factoring $x^2 \pm bx - c$

Remember multiplying two numbers whose product is negative, the two numbers must have different signs, one positive and one negative.

When you factor you need to think of the possibilities. What two variables or numbers multiply to give you the term? List the possibilities and choose the pair that works.

Analytical questions: What multiplies to give you _____ but _____ to give you _____?
3rd term + or - middle
last sign term

Be careful when choosing the signs of the numbers.

Example: Factor

You Try: Factor

$$x^2 - 5x - 24 = (\underline{\quad} + \underline{\quad})(\underline{\quad} - \underline{\quad})$$

$$x^2 - 3x - 18 = (\underline{\quad} + \underline{\quad})(\underline{\quad} - \underline{\quad})$$

$$x^2 + 4x - 21 = (\underline{\quad} + \underline{\quad})(\underline{\quad} - \underline{\quad})$$

$$x^2 + 4x - 32 = (\underline{\quad} + \underline{\quad})(\underline{\quad} - \underline{\quad})$$

Class work Practice:

1. $x^2 + 12x - 45$

2. $x^2 + 5x - 50$

3. $x^2 + 4x - 60$

4. $x^2 - 2x - 15$

5. $x^2 - 11x - 42$

6. $x^2 - 7x - 18$

7. $x^2 + 13x - 30$

8. $x^2 + 31x - 66$

9. $x^2 - 6x - 40$

10. $x^2 - x - 12$

11. $x^2 + 6x - 27$

12. $x^2 + 15x - 54$

13. $x^2 + 5x - 24$

14. $x^2 - 4x - 12$

15. $x^2 - 20x - 44$

Math 2 Factoring CW Day 3 Part 2 – Factoring $ax^2 \pm bx \pm c$

A leading coefficient is the coefficient of the term with the highest exponent. In this case the leading coefficient is the coefficient of x^2 . Factoring quadratics with a leading coefficient other than 1 takes a few extra steps. Here are two methods to factoring these quadratics, grouping and x-factor.

Grouping:

Example: Factor
 $2x^2 + 7x - 15$

You Try: Factor
 $2x^2 + 5x + 3$

X-Factor

Example: Factor

$2x^2 - 5x - 12$
 $(\quad + \quad)(\quad - \quad)$



You Try: Factor

$6x^2 + 11x - 10$
 $(\quad + \quad)(\quad - \quad)$



Class work Practice:

16. $3x^2 + 4x + 1$

17. $2x^2 - 15x + 7$

18. $4x^2 + 17x + 4$

19. $3x^2 + 5x - 2$

20. $4x^2 + 5x + 1$

21. $3x^2 + 7x - 6$

22. $8x^2 - 18x - 5$

23. $9x^2 - 18x + 5$

24. $6x^2 + 13x + 5$

25. $4x^2 - 12x + 5$

26. $10x^2 + 9x + 2$

27. $3x^2 + 8x + 4$

Math 2 Factoring CW Day 4 Part 1 – Factoring the difference of two squares
and Perfect square trinomials

Multiply the following:

1. $(x - 10)(x + 10)$

2. $(3x - 2)(3x + 2)$

3. $(a - b)(a + b)$

4. How are each of these problems the same? _____

5. What is unique about each product? _____

6. Use algebraic vocabulary to describe the pattern shown in each product _____

Use this pattern to factor each of the following.

7. $x^2 - 9$

8. $x^2 - 4$

9. $x^2 - 81$

Multiply the following: **Remember** $(x + 1)^2$ means $(x + 1)(x + 1)$.

10. $(x + 4)^2$

11. $(x - 3)^2$

12. $(a + b)^2$

13. How are each of these problems the same? _____

14. What is unique about the first and last terms of each product? _____

15. What pattern do you notice in each middle term of the product? _____

Use this pattern to factor each of the following.

16. $x^2 - 10x + 25$

17. $x^2 + 2x + 1$

18. $4x^2 - 12x + 9$

Additional practice: Factor

19. $x^2 - 22x + 121$

20. $x^2 - 169$

21. $9x^2 + 24x + 16$

Math 2 Factoring CW Day 4 Part 2 – Factoring the sum or difference of two cubes

Multiply the following:

22. $(x - 10)(x^2 + 10x + 100)$ 23. $(x + 2)(x^2 - 2x + 4)$ 24. $(a + b)(a^2 - ab + b^2)$

25. How are products of each problem the same? _____

26. Use algebraic vocabulary to describe the pattern shown in each product _____

Factoring a sum or difference of two cubes always follows the same pattern.

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Study these patterns and answer the following questions.

27. Compare the original binomial with the first parentheses in each factor. _____

28. What is the pattern in the second parentheses compared to the first parentheses? _____

29. What patterns do you see with the signs throughout the factors? _____

Use this pattern to factor each of the following.

30. $x^3 + 8$

31. $x^3 - 125$

32. $x^3 - 729$

33. $8x^3 - 125$

34. $64x^3 - 125$

35. $8x^3 + 343$