

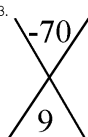


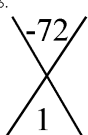

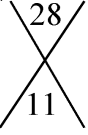
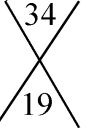


Warm Up

Review

Simple Trinomial Factoring

- Product Sum
- Factor when $a = 1$

| Name: | Period: | Session: |
|---|--|---|
| Sum & Product Puzzle: Set 4 | | |
| In each diagram below, write the two numbers on the sides of the "X" that are <i>multiplied</i> together to get the <u>top</u> number of the "X," but <i>added</i> together to get the <u>bottom</u> number of the "X." | | |
| 1.  | 2.  | 3.  |
| 4.  | 5.  | 6.  |
| 7.  | 8.  | 9.  |

$\underline{\quad} \times \underline{\quad} = c$
 $\underline{\quad} + \underline{\quad} = b$

Remember the rule?

Kuta Software - Infinite Algebra 1 Name _____
 Factoring Trinomials (a = 1) Date _____ Period _____
Factor each completely.

| | |
|---------------------|----------------------|
| 1) $b^2 + 8b + 7$ | 2) $n^2 - 11n + 10$ |
| 3) $m^2 + m - 90$ | 4) $n^2 + 4n - 12$ |
| 5) $n^2 - 10n + 9$ | 6) $b^2 + 16b + 64$ |
| 7) $m^2 + 2m - 24$ | 8) $x^2 - 4x + 24$ |
| 9) $k^2 - 13k + 40$ | 10) $a^2 + 11a + 18$ |
| 11) $n^2 - n - 56$ | 12) $n^2 - 5n + 6$ |

Kuta Software - Infinite Algebra 1 Name _____
 Factoring Trinomials (a = 1) Date _____ Period _____
Factor each completely.

| | |
|---|--|
| 1) $b^2 + 8b + 7$ $(b + 7)(b + 1)$ | 2) $n^2 - 11n + 10$ $(n - 10)(n - 1)$ |
| 3) $m^2 + m - 90$ $(m - 9)(m + 10)$ | 4) $n^2 + 4n - 12$ $(n - 2)(n + 6)$ |
| 5) $n^2 - 10n + 9$ $(n - 1)(n - 9)$ | 6) $b^2 + 16b + 64$ $(b + 8)^2$ |
| 7) $m^2 + 2m - 24$ $(m + 6)(m - 4)$ | 8) $x^2 - 4x + 24$ Not factorable |
| 9) $k^2 - 13k + 40$ $(k - 5)(k - 8)$ | 10) $a^2 + 11a + 18$ $(a + 2)(a + 9)$ |
| 11) $n^2 - n - 56$ $(n + 7)(n - 8)$ | 12) $n^2 - 5n + 6$ $(n - 2)(n - 3)$ |

Turn on the video

Review - Factoring

- perfect squares
- difference of squares
- grouping
- Complex Trinomials -Decomposition

Video Starts here

Perfect Squares $a^2 - 2ab + b^2 = (a-b)(a-b)$
 $a^2 + 2ab + b^2 = (a+b)(a+b)$

Worked Example $9x^2 + 12x + 4$ *pause the video and try this one*

$9x^2 + 12x + 4$
 3^2 $2ab$ $2(3)(2)$ $= 12$ 2^2
 $= (3x + 2)(3x + 2)$
 $= (3x + 2)^2$

$4x^2 - 4x + 1$
 $(2x)^2$ $2(2x)(1)$ 1^2
 $= (2x - 1)^2$

Difference of Squares $a^2 - b^2 = (a+b)(a-b)$

Worked Example

$4x^6 - 16y^4 \rightarrow (2x^3 + 4y^2)(2x^3 - 4y^2)$
 $x^6 = (x^3)(x^3)$

pause the video and try these

$16x^4 - 81$ $16 - x^2$

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

Grouping

Worked Example

$$\begin{aligned}
 & x^3 + 3x^2 + 2x + 6 \\
 &= \underline{x^2}(\underline{x+3}) + \underline{2}(\underline{x+3}) \\
 &= (x+3)(x^2+2)
 \end{aligned}$$

pause the video and try these

$$ac + bc - ad - bd$$

$$y^3 + 4y^2 - 4y - 16$$

Grouping

Worked Example

$$x^3 + 3x^2 + 2x + 6$$

pause the video and try these

$$ac + bc - ad - bd$$

$$= c(a+b) - d(a+b)$$

$$= (a+b)(c-d)$$

$$y^3 + 4y^2 - 4y - 16$$

$$= y^2(y+4) - 4(y+4)$$

$$= (y+4)(\underline{y^2-4})$$

$$= (y+4)(y+2)(y-2)$$

Complex Trinomials

Decomposition and Grouping

Worked Example

$$\begin{array}{l}
 10x^2 - x - 3 \\
 \begin{array}{c}
 \begin{array}{cc}
 -30 & \\
 -6 & 5 \\
 -1 &
 \end{array} \\
 \end{array}
 \end{array}
 = \underbrace{10x^2 + 5x}_{5x(2x+1)} - \underbrace{6x - 3}_{-3(2x+1)} \\
 = 5x(2x+1) - 3(2x+1) \\
 = (2x+1)(5x-3)$$

Pause the video and try these

$$7x^2 - 31x - 20$$

$$2x^2 + 17x + 21$$

Complex Trinomials

Decomposition and Grouping

Worked Example

$$10x^2 - x - 3$$

Pause the video and try these

$$7x^2 - 31x - 20$$

$$2x^2 + 17x + 21$$

$$\begin{array}{l}
 \begin{array}{cc}
 -140 & \\
 4 & -35 \\
 -31 &
 \end{array} \\
 \\
 = 7x^2 - 35x + 4x - 20 \\
 = 7x(x-5) + 4(x-5) \\
 = (x-5)(7x+4)
 \end{array}$$

$$\begin{array}{l}
 \begin{array}{cc}
 42 & \\
 3 & 14 \\
 17 &
 \end{array} \\
 \\
 = 2x^2 + 3x + 14x + 21 \\
 = x(2x+3) + 7(2x+3) \\
 = (2x+3)(x+7)
 \end{array}$$

Combining Strategies

Worked Example

$$\begin{aligned}
 & 4(2-a)^2 - 25 && \textcircled{1}x^2 - 4x + 4 - 9y^2 \\
 & \begin{array}{c} \uparrow \qquad \qquad \uparrow \\ \text{---} \end{array} && \\
 & [2(2-a)]^2 - 5^2 && (x-2)(x-2) - 9y^2 \\
 & = (2(2-a) + 5)(2(2-a) - 5) && = (x-2)^2 - (3y)^2 \\
 & = (4-2a+5)(4-2a-5) && = (x-2+3y)(x-2-3y) \\
 & = (-2a+9)(-2a-1) &&
 \end{aligned}$$

Try On Your Own

Factor by Grouping

1) $x^3 + 3x^2 + 2x + 6$

2) $x^3 + x^2 + x + 1$

3) $2n - 6m + 5n^2 - 15mn$

4) $5n^2 + 2n - 6m - 15mn$

Try On Your Own - Answers

Factor by Grouping

1) $x^3 + 3x^2 + 2x + 6$

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

2) $x^3 + x^2 + x + 1$

$(x+1)(x^2+1)$

3) $2n - 6m + 5n^2 - 15mn$

$(n-3m)(2+5n)$

4) $5n^2 + 2n - 6m - 15mn$

$(5n+2)(n-3m)$

Try On Your Own - Full Solutions

Factor by Grouping

1) $x^3 + 3x^2 + 2x + 6$

$$\begin{aligned} & \underbrace{x^3 + 3x^2}_{x^2(x+3)} + \underbrace{2x + 6}_{2(x+3)} \\ & (x+3)(x^2+2) \end{aligned}$$

2) $x^3 + x^2 + x + 1$

$$\begin{aligned} & \underbrace{x^3 + x^2}_{x^2(x+1)} + \underbrace{x + 1}_{1(x+1)} \\ & (x+1)(x^2+1) \end{aligned}$$

3) $2n - 6m + 5n^2 - 15mn$

$$\begin{aligned} & \underbrace{2n - 6m}_{2(n-3m)} + \underbrace{5n^2 - 15mn}_{5n(n-3m)} \\ & (n-3m)(2+5n) \end{aligned}$$

4) $5n^2 + 2n - 6m - 15mn$

$$\begin{aligned} & n(\underline{5n+2}) - 3m(\underline{2+5n}) \\ & (5n+2)(n-3m) \end{aligned}$$

Try On Your Own**Factor by Grouping and then
Difference of Squares**

5) $x^3 + x^2 - x - 1$

Difference of Squares

6) $4(2+a)^2 - 81$

Perfect Square and then Difference of Squares

7) $(x^2 - 6x + 9) - 4y^2$

Try On Your Own - Answers**Factor by Grouping and then
Difference of Squares**

5) $x^3 + x^2 - x - 1$

Difference of Squares

6) $4(2+a)^2 - 81$

$$= (x+1)^2(x-1)$$

$$= (2a+13)(2a-5)$$

Perfect Square and then Difference of Squares

7) $(x^2 - 6x + 9) - 4y^2 = (x+2y-3)(x-2y-3)$

Try On Your Own - Solutions

**Factor by Grouping and then
Difference of Squares**

$$5) \quad x^3 + x^2 - x - 1$$

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

$$(\underline{x+1})(x^2 - 1)$$

$$(\underline{x+1})(x+1)(x-1)$$

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

Difference of Squares

$$6) \quad 4(2+a)^2 - 81$$

$$2^2(2+a)^2 - 9^2$$

$$(\underline{2(2+a)})^2 - \underline{9^2}$$

$$(2(2+a) + 9)(2(2+a) - 9)$$

$$(4+2a+9)(4+2a-9)$$

$$(2a+13)(2a-5)$$

Perfect Square and then Difference of Squares

$$7) \quad (x^2 - 6x + 9) - 4y^2$$

$$(x^2 - 6x + 9) - 4y^2$$

$$(x-3)^2 - 4y^2$$

$$(\underline{x-3})^2 - (\underline{2y})^2$$

$$((\underline{x-3}) + \underline{2y})(\underline{x-3}) - \underline{2y})$$

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

Try On Your Own

Factor by Grouping

$$8) \quad y^4 - 13y^2 + 36$$

$$9) \quad x^2 + 5xy + 6y^2$$

$$10) \quad 2x^2 - xy - 3y^2$$

Try On Your Own - Answers

Factor by Grouping

$$\begin{aligned}
 8) \quad & y^4 - 13y^2 + 36 \\
 &= y^4 - 4y^2 - 9y^2 + 36 \\
 &= y^2(y^2 - 4) - 9(y^2 - 4) \\
 &= (y^2 - 4)(y^2 - 9) \\
 &= (y + 2)(y - 2)(y + 3)(y - 3)
 \end{aligned}$$

$$\begin{aligned}
 9) \quad & x^2 + 5xy + 6y^2 \\
 &= x^2 + 2xy + 3xy + 6y^2 \\
 &= x(x + 2y) + 3y(x + 2y) \\
 &= (x + 2y)(x + 3y)
 \end{aligned}$$

$$\begin{aligned}
 10) \quad & 2x^2 - xy - 3y^2 \\
 & 2x^2 + 2xy - 3xy - 3y^2 \\
 &= 2x(x + y) - 3y(x - y) \\
 &= (x + y)(2x - 3y)
 \end{aligned}$$

Extra Practise

1. See Next Page
2. TextBook Pg. 102 # 4-7bdf, 10

Extra Practice**The First Rule ... Greatest Common Factor ... then Factor**

1) $2x^4 + 6x^3 + 4x^2$

2) $5x^3y^2 + 10x^2y^2 - 15xy^2$

Two Variables ...

3) $2x^2 + 5xy + 3y^2$

4) $2x^2 - 7xy - 4y^2$

Factor the Perfect Square ... then Factor the Difference of Squares

5) $x^2 - 4y^2 - 4x + 4$

6) $(x^2 + 12x + 36) - 25x^4$

Factor by Grouping

7) $y^4 + y^2 - 20$

8) $y^8 - 15y^4 - 16$

Factor the Difference of Squares

9) $9(3+m)^2 - 4(m-2)^2$

Extra Practice - Solutions**The First Rule ... Greatest Common Factor ... then Factor**

1) $2x^4 + 6x^3 + 4x^2$

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

$$= 2x^2(x+2)(x+1)$$

2) $5x^3y^2 + 10x^2y^2 - 15xy^2$

$$= 5xy^2(x^2 + 2x - 3)$$

$$= 5xy^2(x+3)(x-1)$$

Two Variables ...

3) $2x^2 + 5xy + 3y^2$

$$= 2x^2 + 3xy + 2xy + 3y^2$$

$$= x(2x+3y) + y(2x+3y)$$

$$= (2x+3y)(x+y)$$

$$\begin{array}{r} 6 \\ 3 \times 2 \\ \hline 5 \end{array}$$

4) $2x^2 - 7xy - 4y^2$

$$= 2x^2 - 8xy + 1xy - 4y^2$$

$$= 2x(x-4y) + y(x-4y)$$

$$= (x-4y)(2x+y)$$

$$\begin{array}{r} -8 \\ -8 \times 1 \\ \hline -7 \end{array}$$

Factor the Perfect Square ... then Factor the Difference of Squares

5) $x^2 - 4y^2 - 4x + 4$

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

6) $(x^2 + 12x + 36) - 25x^4$

$$\begin{aligned}
 &= (x+6)^2 - (5x^2)^2 \\
 &= ((x+6)+5x^2)((x+6)-5x^2) \\
 &= (5x^2+x+6)(-5x^2+x+6)
 \end{aligned}$$

Factor by Grouping

7) $y^4 + y^2 - 20$

$$\begin{aligned}
 &= \underbrace{y^4 + 4y^2}_{-4} - \underbrace{y^2 - 4}_{-1} \quad \begin{matrix} -4 \\ -1 \end{matrix} \\
 &= y^2(y^2+4) - (y^2-4) \quad \begin{matrix} 4 \\ 3 \end{matrix} \\
 &= (y^2+4)(y^2-1) \\
 &= (y^2+4)(y+1)(y-1)
 \end{aligned}$$

8) $y^8 - 15y^4 - 16$

$$\begin{aligned}
 &= \underbrace{y^8 - 8y^4}_{-81} + \underbrace{y^2 - 81}_{-1} \quad \begin{matrix} -81 \\ -1 \end{matrix} \\
 &= y^4(y^4-81) + 1(y^4-81) \\
 &= (y^4-81)(y^4+1) \\
 &= (y^2+9)(y^2-9)(y^4+1) \\
 &= (y^2+9)(y+3)(y-3)(y^4+1)
 \end{aligned}$$

Factor the Difference of Squares

9) $9(3+m)^2 - 4(m-2)^2$

$$\begin{aligned}
 &= 3^2(3+m)^2 - 2^2(m-2)^2 \\
 &= (3(3+m))^2 - (2(m-2))^2 \\
 &= (3(3+m) + 2(m-2))(3(3+m) - 2(m-2)) \\
 &= (9+3m+2m-4)(9+3m-2m+4) \\
 &= (5m+5)(m+13)
 \end{aligned}$$

