

11-9-18

Aim: SWBAT reverse the Distributive Property in order to factor trinomials.

HW: Packet Page 27

Review Due Wednesday

Test Thursday

Do Now: Quiz

HOMEWORK - FACTORING with the GCF

Find the GCF and factor each expression.

1) $9x^2 - 21x$

$$\frac{9x^2}{3x} - \frac{21x}{3x}$$

$$3x(3x - 7)$$

3) $12x^2 + 28x$

$$\frac{12x^2}{4x} + \frac{28x}{4x}$$

$$4x(3x + 7)$$

5) $24x^4 - 18x$

$$\frac{24x^4}{6x} - \frac{18x}{6x}$$

$$6x(4x^3 - 3)$$

7) $4x^4 - 22x^2 + 18x$

$$\frac{4x^4}{2x} - \frac{22x^2}{2x} + \frac{18x}{2x}$$

$$2x(2x^3 - 11x + 9)$$

9) $2c^5d^4 - 3c^4 + 4c^3$

$$\frac{2c^5d^4}{c^3} - \frac{3c^4}{c^3} + \frac{4c^3}{c^3}$$

$$c^3(2c^2d^4 - 3c + 4)$$

2) $15x^2 + 20x$

$$\frac{15x^2}{5x} + \frac{20x}{5x}$$

$$5x(3x + 4)$$

4) $15x^4 - 24x^2$

$$\frac{15x^4}{3x^2} - \frac{24x^2}{3x^2}$$

$$3x^2(5x^2 - 8)$$

6) $12x^3 + 6x^2 - 30$

$$\frac{12x^3}{6} + \frac{6x^2}{6} - \frac{30}{6}$$

$$6(2x^3 + x^2 - 5)$$

8) $21x^5 + 35x^3 + 49x^2$

$$\frac{21x^5}{7x^2} + \frac{35x^3}{7x^2} + \frac{49x^2}{7x^2}$$

$$7x^2(3x^3 + 5x + 7)$$

10) $23y^{10} - 46y^7 + 68y^2 + 10y$

$$\frac{23y^{10}}{y} - \frac{46y^7}{y} + \frac{68y^2}{y} + \frac{10y}{y}$$

$$y(23y^9 - 46y^6 + 68y + 10)$$

27

DO NOW

Use Mental Math to find binomial products. Look for patterns.

1) $(x + 3)(x + 5)$

$$x^2 + 8x + 15$$

2) $(x - 3)(x - 5)$

$$x^2 - 8x + 15$$

3) $(x + 3)(x - 5)$

$$x^2 - 2x - 15$$

4) $(x - 3)(x + 5)$

$$x^2 + 2x - 15$$

The FIRST TERM of the trinomial is the

Quadratic term

The MIDDLE TERM of the trinomial is the

Linear term

The LAST TERM of the trinomial is the

Constant term

AIM: SWBAT reverse the Distributive Property in order to factor trinomials.

In most cases the product of two binomials is a trinomial.

The **PRODUCT** of the **FIRST** terms in the binomials gives you the **FIRST** term of the trinomial

The **SUM** of the **PRODUCTS** of the **OUTER** and **INNER** terms of the binomials gives you the middle term of the trinomial.

The **PRODUCT** of the **LAST** terms of the binomials gives you the **LAST** (constant) term in the trinomial.

Multiplying binomials with the same operations.

(addition)(addition) all terms will be positive

$$\text{Ex. } (x + 4)(x + 9) = \underline{x^2 + 9x + 4x + 36 \rightarrow x^2 \oplus 13x \oplus 36}$$

$$(x + 6)(x + 1) = \underline{x^2 + x + 6x + 6 \rightarrow x^2 \oplus 7x \oplus 6}$$

(subtraction)(subtraction) only middle term will be negative

$$\text{Ex. } (x - 4)(x - 9) = \underline{x^2 - 9x - 4x + 36 \rightarrow x^2 \ominus 13x \oplus 36}$$

$$(x - 6)(x - 1) = \underline{x^2 - x - 6x + 6 \rightarrow x^2 \ominus 7x \oplus 6}$$

Multiplying binomials with different operations.

(addition)(subtraction)

Last (constant) term will always be negative. Middle term will be whatever you have more of.

$$\text{Ex. } (x \oplus 9)(x + 4) = \underline{x^2 + 4x - 9x - 36 \rightarrow x^2 \ominus 5x \ominus 36}$$

$$(x \oplus 6)(x - 1) = \underline{x^2 - x + 6x - 6 \rightarrow x^2 \oplus 5x - 6}$$

Keep these patterns in mind when you are factoring trinomials.

Fill-in the missing information to complete the examples below:

$$1) x^2 \oplus 5x \oplus 6 = (x \underline{+} 2)(x \underline{+} 3)$$

$$2) x^2 \ominus 7x \oplus 10 = (x \underline{-} 2)(x \underline{-} 5)$$

$$3) x^2 \oplus 3x \ominus 54 = (x \underline{-} 6)(x \underline{+} 9)$$

$$4) x^2 \oplus 12x \oplus 20 = (x \underline{+} 2)(x \underline{+} 10)$$

$$5) x^2 \ominus 10x \oplus 24 = (x - 4)(x - \underline{6})$$

$$6) x^2 \ominus 2x \ominus 48 = (x - 8)(x \underline{+} 6)$$

$$7) x^2 \ominus 5x \oplus 50 = (x \underline{+} 5)(x \underline{-} 10)$$

$$8) x^2 \oplus 8x \ominus 9 = (x \underline{+} 9)(x \underline{-} 1)$$

To find the factors of a trinomial we REVERSE the multiplication process. We look for factors of the constant term that have a SUM of the coefficient of the linear term.

Example 1: What is the factored form of $x^2 + 8x + 15$?

Step 1—We need to find factors of 15 that have a sum of 8.

Step 2—Decide upon the signs of the factors. _____

Step 3—Find the factors/Check by Multiplying the Binomials (mental math is ok)

$$x^2 + 8x + 15 = (x + 3)(x + 5)$$

Check:

$$\begin{array}{l}
 x^2 + 5x + 3x + 15 \\
 \hline
 x^2 + 8x + 15
 \end{array}$$

Factors of <u>15</u>	Sum
1 · 15	16
3 · 5	8

Example 2: What is the factored form of $x^2 - 11x + 24$?

$$x^2 - 11x + 24 = (x - 3)(x - 8)$$

Check:

$$\begin{array}{l}
 x^2 - 8x - 3x + 24 \\
 \hline
 x^2 - 11x + 24
 \end{array}$$

Factors of <u>24</u>	Sum
-1 · -24	-25
-2 · -12	-14
-3 · -8	-11
-4 · -6	-10

Example 3: What is the factored form of $x^2 + 2x - 15$?

$$x^2 + 2x - 15 = (x + 5)(x - 3)$$

Check:

Factors of <u>-15</u>	Sum
-1 · 15	14
1 · -15	-14
-3 · 5	2
3 · -5	-2

Factor each expression below.

1) $x^2 + 6x + 5$

Same Signs -- both positive

Factors of 5	Sum
1 and 5	6

$(x + 1)(x + 5)$

3) $x^2 - 7x - 8$

Different Signs -- Bigger Negative

Factors of 8	Sum
1 and -8	-7
2 and -4	-2

$(x - 8)(x + 1)$

5) $x^2 - 7x + 18$

Same Signs -- both negative

Factors of 18	Sum
-1 and -18	-19
-2 and -9	-11
-3 and -6	-9

Cannot be Factored

2) $x^2 - 15x + 56$

Same Signs
both negative

$(x - 7)(x - 8)$

Factors of 56	Sum
-1 and -56	-57
-2 and -28	-30
-3 and -18	-21
-4 and -14	-18
-7 and -8	-15

4) $x^2 + 5x - 36$

Different Signs
Bigger Positive

$(x - 4)(x + 9)$

Factors of 36	Sum
-1 and 36	35
-2 and 18	16
-3 and 12	9
-4 and 9	5
-6 and 6	0

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

Different Signs
Bigger Negative

$(x - 9)(x + 2)$

Factors of 18	Sum
1 and -18	-17
2 and -9	-7
3 and -6	-3

HW: Multiply the binomials in questions 1-11. Match that answer to the correct letter of the alphabet. Enter that letter of the alphabet on the blank corresponding to the problem number.

<u>3</u>	<u>5</u>	<u>9</u>	<u>2</u>	<u>7</u>	<u>11</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>5</u>	<u>10</u>	<u>10</u>	<u>8</u>	<u>9</u>	<u>1</u>	<u>4</u>	<u>2</u>	<u>7</u>
A	B	C	D	E	F	G	H											
$3x^2 + 2x - 1$	$x^2 + 3$	$2x^2 - 12$	$x^2 - 78$	$x^2 + 9x - 36$	$x^2 + 7x - 78$	$3x^2 - 1$	$x^2 - 36$											
I	J	K	L	M	N	O	P											
$x^2 - 12x + 36$	$x^2 + 36$	$20x^2 - 36$	$x^2 + 4x + 3$	$x^2 + 36$	$x^2 - 16$	$x^2 + 10x + 25$	$2x^2 - 25$											
Q	R	S	T	U	V													
$2x^2 + 25$	$2x^2 - 5x - 25$	$2x^2 + 5x - 12$	$20x^2 - 63x + 36$	$x^2 - 9x - 36$	$x^2 + 25$													
W	X	Y	Z															
$x^2 + 16$	$2x^2 - 5x + 12$	$3x^2 + 1$	0															

1) $(x + 3)(x + 1)$

7) $(4x - 3)(5x - 12)$

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

8) $(x - 3)(x + 12)$

3) $(x + 13)(x - 6)$

9) $(2x + 5)(x - 5)$

4) $(3x - 1)(x + 1)$

10) $(x - 4)(x + 4)$

5) $(x - 6)^2$

11) $(x + 5)^2$

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

Divide:

12) $\frac{16b^8c^5}{4b^8c^2}$

13) $\frac{20n^5m^9}{20nm^7}$

14) $\frac{15r^5 + 10r^8 - 5r^2}{5r}$

15) $\frac{27x^5 + 21x^4 - 9x}{3x}$