

11-8-18

Aim: SWBAT factor an expression by finding the Greatest Common Factor (GCF) and begin to factor trinomials by reversing the Distributive Property.

HW: Packet Page 30

Quiz tomorrow (Multiplying Binomials)

Do Now: Packet Page 28 # 1 - 8

Packet Page 31 # 1 - 4

Simplify.

1. $\frac{2a+2b}{2} \quad a+b$

2. $\frac{6x+6y}{3} \quad 2x+2y$

3. $\frac{4c+4c^2}{4c} \quad 1+c \rightarrow c+1$

4. $\frac{9r+18r^2}{9r} \quad 1+2r \rightarrow 2r+1$

5. $\frac{8m^2n-6mn^2}{2mn} \quad 4m-3n$

6. $\frac{15x^3y^2-10x^4y^3}{5xy} \quad 3x^2y-2x^3y^2$

7. $\frac{12a^3b^4+8a^2b^5}{4a^2b^2} \quad 3ab^2+2b^3$

8. $\frac{28a^3b^2+35a^4b^5}{7a^3b^2} \quad 4+5ab^3$

9. $\frac{18c^4d^5e-27c^5d^3}{-9c^3d^2} \quad -2cd^3e+3c^2d$

10. $\frac{20x^7y^3-30x^3y^2z}{10x^2y} \quad 2x^5y^2-3xyz$

11. $\frac{24a^3b^7-36a^{10}b^5c^2}{6a^3b^3} \quad 4b^4-6a^7b^2c^2$

12. $\frac{16p^6q^5r^4-28p^7q^2}{4p^2q^2} \quad 4p^4q^3r^4-7p^5$

13. $\frac{35m^6n^2+50m^8n^4}{-5m^6n^2} \quad -7-10m^2n^2$

14. $\frac{39a^9b^4+52a^7b^9}{-13a^5b^3} \quad -3a^4b-4a^2b^6$

15. $\frac{3a+7a^3+12a^5}{a} \quad 3+7a^2+12a^4$

16. $\frac{9x^7+5x^4+8x}{x} \quad 9x^6+5x^3+8$

17. $\frac{15x^3y^2-9x^2y+3xy}{3xy} \quad 5x^2y-3x+1$

18. $\frac{21a^5b^3-14a^3b^2+7ab}{7ab} \quad 3a^4b^2-2a^2b+1$

19. $\frac{5xy+15x^3y^4-25x^5y^7}{-5xy} \quad -1-3x^2y^3+5x^4y^6$

20. $\frac{3mn+18m^4n^2+27m^9n^5}{-3mn} \quad -1-6m^3n-9m^8n^4$

21. $\frac{4m^5n-16m^3n^4+20m^7n^5}{4mn} \quad m^4-4m^2n^3+5m^6n^4$

22. $\frac{7c^7d^6-21c^3d^3+28c^2d^5}{7c^2d^2} \quad c^5d^4-3cd+4d^3$

23. $\frac{18x^9y^4+27x^5y^6+45x^2y^8}{9x^2y^4} \quad 2x^7+3x^3y^2+5y^4$

24. $\frac{33a^{10}b^2+55a^6b^6+99a^2b^{10}}{11a^2b^2} \quad 3a^8+5a^4b^4+9b^8$

AIM: SWBAT factor an expression by finding a greatest common factor (GCF).

DO NOW:

Find the Greatest Common Factor (GCF) of each pair.

15: 1, 3, 5, 15

1) 18 and 24

GCF: 6

2) 12 and 16

GCF: 4

3) 144 and 48

GCF: 48

4) 15 and 35

GCF: 5

5) x and x^3

GCF: x

6) x^3 and x^8

GCF: x^3

7) $2x$ and $6x^5$

GCF: $2x$

8) $24x^2$ and $36x$

GCF: $12x$

Factoring an expression by finding the GCF is reversing the Distributive Property.

To factor out a GCF:

- 1) Find the GCF of ALL terms in the expression.
- 2) Divide each term of the expression by the GCF.
- 3) Rewrite the expression as the product of the GCF and the remaining factors.

Example 1: Factor $4x^2 + 14x^4$

GCF: $2x^2$

Divide each term by the GCF:

$$\frac{4x^2}{2x^2} + \frac{14x^4}{2x^2}$$

Rewrite as the product of the GCF and the remaining factors:

$$\frac{2x^2}{\text{GCF}} (2 + 7x^2)$$

remaining factors

Example 2: Factor $6x^4 - 60x^2$

GCF: $6x^2$

$$6x^2(x^2 - 10)$$

Example 3: Factor: $9x^6 + 81x^3 - 27x$

GCF: $9x$

$$9x(x^5 + 9x^2 - 3)$$

Example 4: Factor $10x^3 - 5x^2$

$$\frac{10x^3}{5x^2} - \frac{5x^2}{5x^2}$$

$$5x^2(2x - 1)$$

Find a GCF and factor each expression.

1) $8x^2 + 10x$

2) $12y - 16$

3) $-15d^5 + 45d^3$

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

5) $6n^2 - 30n + 42$

6) $18p^3 - 63p^2 - 9p$

7) $100x^9 + 50x^6 - 75x^5$

8) $36rs^2 - 108r^2s^3$

9) $36k - 30$

$$25x^5(4x^4 + 2x - 3)$$

$$36rs^2(1 - 3rs)$$

10) $18x^2 - 50y^2$

11) $a^7b - a^{10}$

12) $18x^5 - 48x^4 + 56x^3 - 86x$

$$2(9x^2 - 25y^2)$$

$$2x(9x^4 - 24x^3 + 28x^2 - 43)$$

Find a GCF and factor each expression.

1) $8x^2 + 10x$

$$\frac{8x^2}{2x} + \frac{10x}{2x}$$

$$2x(4x + 5)$$

2) $12y - 16$

$$\frac{12y}{4} - \frac{16}{4}$$

$$4(3y - 4)$$

3) $-15d^5 + 45d^3$

$$\frac{-15d^5}{15d^3} + \frac{45d^3}{15d^3}$$

$$15d^3(-d^2 + 3)$$

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

$$\frac{c^3}{c} + \frac{c^2}{c} - \frac{c}{c}$$

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

5) $6n^2 - 30n + 42$

$$\frac{6n^2}{6} - \frac{30n}{6} + \frac{42}{6}$$

$$6(n^2 - 5n + 7)$$

6) $18p^3 - 63p^2 - 9p$

$$\frac{18p^3}{9p} - \frac{63p^2}{9p} - \frac{9p}{9p}$$

$$9p(2p^2 - 7p - 1)$$

7) $100x^9 + 50x^6 - 75x^5$

$$\frac{100x^9}{25x^5} + \frac{50x^6}{25x^5} - \frac{75x^5}{25x^5}$$

$$25x^5(4x^4 + 2x - 3)$$

8) $36rs^2 - 108r^2s^3$

$$\frac{36rs^2}{36rs^2} - \frac{108r^2s^3}{36rs^2}$$

$$36rs^2(1 - 3rs)$$

9) $36k - 30$

$$\frac{36k}{6} - \frac{30}{6}$$

$$6(6k - 5)$$

10) $18x^2 - 50y^2$

$$\frac{18x^2}{2} - \frac{50y^2}{2}$$

$$2(9x^2 - 25y^2)$$

11) $a^7b - a^{10}$

$$\frac{a^7b}{a^7} - \frac{a^{10}}{a^7}$$

$$a^7(b - a^3)$$

12) $18x^5 - 48x^4 + 56x^3 - 86x$

$$\frac{18x^5}{2x} - \frac{48x^4}{2x} + \frac{56x^3}{2x} - \frac{86x}{2x}$$

$$2x(9x^4 - 24x^3 + 28x^2 - 43)$$

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

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

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

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

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

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

Multiplying binomials with different operations.

(addition)(subtraction)

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

$$\text{Ex. } (x - 9)(x + 4) = \underline{\hspace{10em}}$$

$$(x + 6)(x - 1) = \underline{\hspace{10em}}$$

Keep these patterns in mind when you are factoring trinomials.

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

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

$$2) x^2 - 7x + 10 = (x \underline{\hspace{1em}} 2)(x \underline{\hspace{1em}} 5)$$

$$3) x^2 + 3x - 54 = (x \underline{\hspace{1em}} 6)(x \underline{\hspace{1em}} 9)$$

$$4) x^2 + 12x + 20 = (x + \underline{\hspace{1em}})(x + \underline{\hspace{1em}})$$

$$5) x^2 - 10x + 24 = (x - 4)(x - \underline{\hspace{1em}})$$

$$6) x^2 - 2x - 48 = (x - 8)(x + \underline{\hspace{1em}})$$

$$7) x^2 - 5x - 50 = (x \underline{\hspace{1em}} 5)(x \underline{\hspace{1em}} 10)$$

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

HOMEWORK - FACTORING with the GCF

Find the GCF and factor each expression.

1) $9x^2 - 21x$

2) $15x^2 + 20x$

3) $12x^2 + 28x$

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

5) $24x^4 - 18x$

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

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

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

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

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