

Lesson 18: Factoring Day 1

Objectives:

~ Factor out a Greatest Common Factor
(GCF)

Lesson 18: Factoring Day 1

Today, we are going to learn how to
UNDO *distributing* and FOIL.

This is called **FACTORING**.

Remember the Distributive Property?

$$a(x + y) = ax + ay$$

Well, today, we are going to
"UN-distribute".

It's called FACTORING.

$$\frac{ax}{a} + \frac{ay}{a} = a(x + y)$$

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Factors: Factors are numbers/polynomials that are multiplied together to get the whole.

Example:

$$3(2) = 6 \quad \sim \quad 3 \text{ and } 2 \text{ are factors of } 6 \quad \sim$$

$$(3x + 1)(x - 5) = 3x^2 - 14x - 5$$

\sim $(3x + 1)$ and $(x - 5)$ are factors of the right side polynomial. \sim

Lesson 18: Factoring Day 1

We are going to look for the **Greatest Common Factor (GCF)** of polynomials.

Let's start off with numbers.

~What is the GCF of 6 and 15?



GCF: 3

* NOTE: we can break numbers up into Prime Factorization to help us find the GCF.

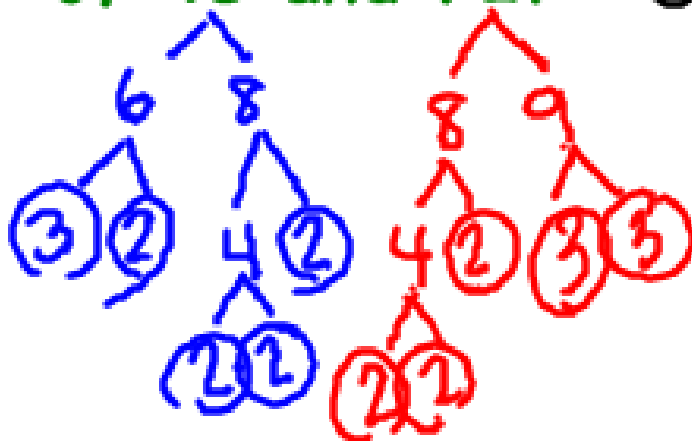
Lesson 18: Factoring Day 1

We are going to look for the **Greatest Common Factor (GCF)** of polynomials.

Let's start off with numbers. (Example 2)

~What is the GCF of 48 and 72? $GCF = 3 \cdot 2 \cdot 2 \cdot 2$

$$48 = 3 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$
$$72 = 3 \cdot 3 \cdot 2 \cdot 2 \cdot 2$$



$$6 \cdot 2 \cdot 2$$
$$12 \cdot 2$$
$$\textcircled{24}$$

* NOTE: we can break numbers up into Prime Factorization to help us find the GCF.

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Find the GCF:

1. $4x, 12$

$4 = 2 \cdot 2$
 $12 = 2 \cdot 2 \cdot 3$

$\begin{array}{c} \wedge \quad \wedge \\ 2 \cdot 2 \quad 4 \cdot 3 \\ \quad \wedge \\ \quad 2 \cdot 2 \end{array}$

GCF = $2 \cdot 2 = \boxed{4}$

2. $6x^3, 12x^2, 15x$

$\begin{array}{c} x \cdot x \cdot x \\ x \cdot x \\ x \end{array}$

GCF = $3x$

$\begin{array}{c} x \cdot x \cdot x \\ x \cdot x \\ x \end{array}$

3. $4x^3y^4, 8x^2y^3, 12xy^2$

GCF = $4xy^2$

Lesson 19: Factoring Day 2

To UNDO distributing, we take our ^{1.} GCF and ^{2.} divide every term by the GCF and write that common factor on the outside of our parentheses. Then ^{3.} simplify what's left (put all the remaining stuff inside the parentheses).

Ex 4: Factor (un-distribute)

$$12x^2 - 6x^2y + 15xy$$

GCF: $3x$

$$= 3x \left(\frac{12x^2}{3x} - \frac{6x^2y}{3x} + \frac{15xy}{3x} \right) = \boxed{3x(4x - 2xy + 5y)}$$

Lesson 19: Factoring Day 2

Ex 5: Factor (un-distribute)

$$5k^3p - 3kp^2 + k^3p^5$$

GCF: KP

$$= KP \left(\frac{5k^3p}{KP} - \frac{3kp^2}{KP} + \frac{k^3p^5}{kP} \right)$$

$$= \boxed{KP (5k^2 - 3p + k^2p^4)}$$

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Ex 6: Factor (un-distribute)

$$6y^3 - 14y^2 + 10y$$

GCF: $2y$

$$= 2y \left(\frac{6y^3}{2y} - \frac{14y^2}{2y} + \frac{10y}{2y} \right)$$

$$= \boxed{2y(3y^2 - 7y + 5)}$$

check $2y(3y^2 - 7y + 5)$
 $= 6y^3 - 14y^2 + 10y$

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Factor out the GCF: (If the coefficient of the highest degree term is negative, we often want to factor out the negative as part of the GCF.)

Ex 7:

$$-8z + 16$$

$$\text{GCF} = -8$$

$$= -8 \left(\frac{-8z}{-8} + \frac{16}{-8} \right)$$

$$= \boxed{-8(z - 2)}$$

Ex 8:

$$-2b^3 + 10b^2 + 8b$$

$$\text{GCF} = -2b$$

$$= -2b \left(\frac{-2b^3}{-2b} + \frac{10b^2}{-2b} + \frac{8b}{-2b} \right)$$

$$= \boxed{-2b(b^2 - 5b - 4)}$$

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*Factor out the GCF: Sometimes the GCF is a Binomial.
Factor the Binomial out.*

Ex 9: $4x(x-3) + 5(x-3)$

GCF = $(x-3)$

$= (x-3) \left(\frac{4x(x-3)}{(x-3)} + \frac{5(x-3)}{(x-3)} \right)$

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

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Objectives:

~ Factor out a Greatest Common Factor
(GCF)

Can you?

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GCF worksheet

Due at the end of Math Lab

GCF =

Assignment 18

Due at the end of next class