Unit 7 Day 4

Notes

Factoring: GCF

Review:

Multiply the following polynomials: $(x-3)(x+10)$

Box

	x	+10
x	x^2	10x
-3	-3x	-30

$x^2+7x-30$

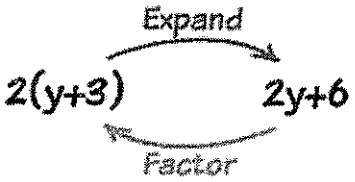
Distribute

$(x-3)(x+10)$

$x^2+10x-3x-30$

$x^2+7x-30$

Factoring: Factoring means to find out which two expressions you multiplied together to get to one single expression. Factoring is like "splitting" an expression into a product of similar expressions. Factoring is the opposite of expanding/distributing.

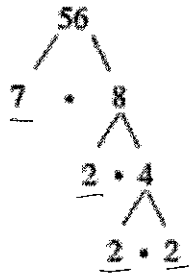


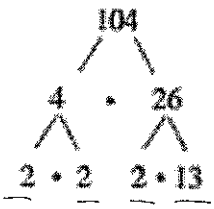
$(x+3)(x+1) = x^2+4x+3$

Factor Factor

Factors that are shared by two or more numbers are called common factors. The greatest of the common factors is called the **Greatest Common Factor (GCF)**. To find the greatest common factor, you can make a factor tree and complete the prime factorization of both numbers. The GCF is the product of the common prime factors.

Example: Find the GCF of 56 and 104.





$56 = 2 \cdot 2 \cdot 2 \cdot 7$

$104 = 2 \cdot 2 \cdot 2 \cdot 13$

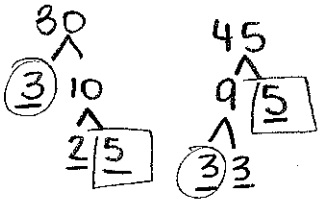
So, the GCF of 56 and 104 is $2 \cdot 2 \cdot 2 = 8$.

Factor Trees

Listing Factors

Practice: Find the GCF of the following numbers.

a) 30 and 45



*multiply common factors

$GCF = 3 \cdot 5 \rightarrow 15$

b) 12 and 54

12: 1 12, 2 6, 3 4

54: 1 54, 2 27, 3 18, 6 9

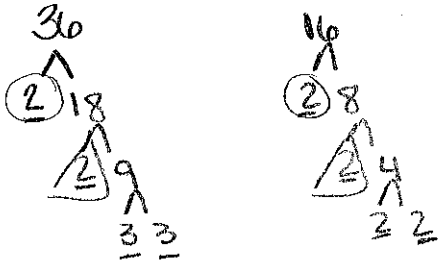
*only look for biggest factor

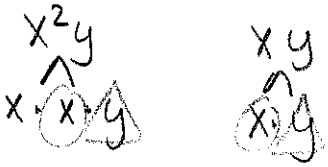
GCF: 6

Finding the GCF of Two Expressions

To find the GCF of two expressions, you will complete the prime factorization of the two numbers and expand the variables. Circle what is common to both.

Example: Find the GCF of $36x^2y$ and $16xy$





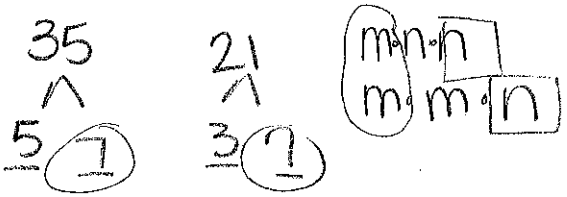
GCF: $x \cdot y \rightarrow xy$

GCF: $2 \cdot 2 \rightarrow 4$

$4xy$

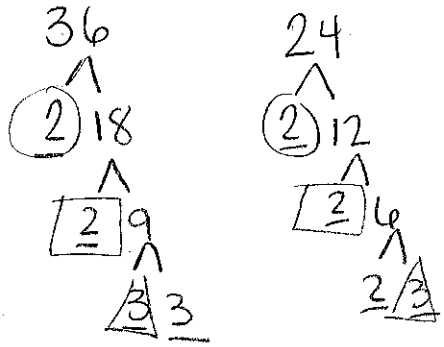
Practice: Find the GCF of the following expressions.

a) $35mn^2$ and $21m^2n$



GCF: $7mn$

b) $36xy^3$ and $24y^2$



$2 \cdot 2 \cdot 3 \rightarrow 12$

$y \cdot y \rightarrow y^2$

GCF $\rightarrow 12y^2$

Comparing Factoring and Distributing

When you learned to multiply polynomials, you multiplied two expressions to create one expression that represented the distributed version of the original two polynomials. When you *factor* an expression, you go in reverse and think about how to take a polynomial represented as the sum of the terms and write an equivalent expression. When we factor expressions, we rewrite the expressions as a product of both of its factors. The factored form of an expression should be equivalent to the expression you started with.

Distributed Version	Factored Version	
$5x^2 + 15x$	$5x(x+3)$	GCF: $5x$
$2x^2 - 8x$	$2x(x-4)$	GCF: $2x$
$2x^2 - 4x$	$2x(x-2)$	GCF: $2x$
$15x^2 - 5x + 30$	$5(3x^2 - x + 6)$	GCF: 5

① Find GCF
② Factor / divide out

Factoring Expressions

Factor the following expressions.

a) $\frac{28x}{7} - \frac{63}{7}$ GCF: 7

$7(4x-9)$

b) $\frac{18x^2}{6x} - \frac{6x}{6x}$ GCF: $6x$

$6x(3x-1)$

c) $\frac{4x^2}{4x} + \frac{4x}{4x}$ GCF: $4x$

$4x(x+1)$

d) $\frac{2m^2}{2m} - \frac{8m}{2m}$ GCF: $2m$

$2m(m-4)$

*GCF is neg bc 1st # is neg.

e) $-9a^2 - a$ GCF: $-a$

$-a(9a+1)$

f) $\frac{35y^2}{5} - \frac{5}{5}$ GCF: 5

$5(7y^2-1)$