Essential Question: What does it mean to factor completely?

Do Now: Review the examples below that have been factored completely.

Example 1

Polynomial Expression: →	$2x^2 - 14x + 24$
Step 1: Factor out the GCF	$2(x^2 - 7x + 12)$
Step 2: Factor using the AM method	$2(x-3)(x-4)$
Complete factorization: $2(x-3)(x-4)$	

Example 2

Polynomial Expression: →	$2x^2 - 32$
Step 1: Factor out the GCF	$2(x^2 - 16)$
Step 2: Factor using DOTS	$2(x-4)(x+4)$
Complete factorization: $2(x-4)(x+4)$	

FACTORING COMPLETELY

Factor out the GCF

Factor AM $x^2 + bx + c$

Factor DOTS $a^2 - b^2$

1) Always factor out the GCF first.

2) After the GCF has been factored out, determine if the remaining polynomial can be factored using DOTS or the AM method.

Factor each polynomial expression completely.

1) $2y^2 + 2y - 4$

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

$2(y+2)(y-1)$

2) $5m^2 - 30m + 40$

$5(m^2 - 6m + 8)$

$5(m-4)(m-2)$

FACTOR OUT GCF FIRST!

3) $2r^2 + 12r + 10$

$2(r^2 + 6r + 5)$

$2(r+5)(r+1)$

4) $4x^2 - 24x - 108$

$4(x^2 - 6x - 27)$

$4(x-9)(x+3)$

5) $6x^2 - 6y^2$

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

$6(x-y)(x+y)$

6) $4a^2 - 36$

$4(a^2 - 9)$

$4(a-3)(a+3)$

7) $5x^2 - 500$

$5(x^2 - 100)$

$5(x-10)(x+10)$

8) $3x^2 + 27x + 54$

$3(x^2 + 9x + 18)$

$3(x+3)(x+6)$

9) $2x^2 - 16x + 14$

$2(x^2 - 8x + 7)$

$2(x-7)(x-1)$

10) $4x^2 + 12x - 16$

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

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

11) $7a^2 - 7a - 42$

$7(a^2 - a - 6)$

$7(a-3)(a+2)$

12) $3x^3 - 6x^2 - 24x$

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

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

Let's try to factor some more challenging expressions.

13) $9y^4 - 144$

$9(y^4 - 16)$

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

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

14) $x^4 - 1$

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

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

15) $x^4 - 14x^2 - 32$

$(x^2 - 16)(x^2 + 2)$

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

16) $x^4 - 10x^2 + 9$

$(x^2 - 9)(x^2 - 1)$

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

When factoring a binomial or trinomial, always factor out the GCF first.

Think about this...

Is the polynomial expression $2x^2 - 5x - 3$ factorable? How can we find out?

can only be $2x \cdot x$

-3 and $+1$
$+3$ and -1

trial and error

$(2x \quad)(x \quad)$

try the different combinations

$(2x-3)(x+1) \rightarrow 2x^2 - x - 3$

$(2x+3)(x-1) \rightarrow 2x^2 + x - 3$

$\boxed{(2x+1)(x-3)} \rightarrow \boxed{2x^2 - 5x - 3}$

$(2x-1)(x+3) \rightarrow 2x^2 + 5x - 3$