

Essential Question: What does it mean to factor completely?

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

Example 1

Polynomial Expression:	$\longrightarrow 2x^2 - 14x + 24$
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: $2(x - 3)(x - 4)$

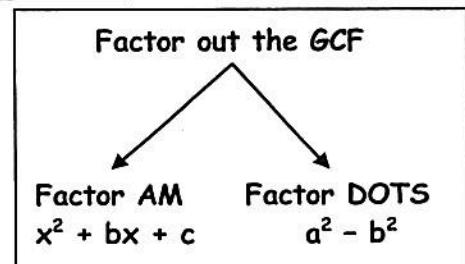
Example 2

Polynomial Expression:	$\longrightarrow 2x^2 - 32$
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

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

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

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

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

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

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

$$7) 5x^2 - 500$$

$$5(x^2 - 100)$$

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

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

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

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

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

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

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

$$6) 4a^2 - 36$$

$$4(a^2 - 9)$$

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

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

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

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

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

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

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

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

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

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



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 -3 and +1 trial and error
 $2x + x$ +3 and -1
 $(2x \quad) (x \quad)$

try the different combinations

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

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

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

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

