Try to factor these expressions:

6. $x^2 + 3x - 54$

29. $3x^3 - 75x$

8. $3x^2 - 13x + 12$

1. $x^2 + 19x + 90$

3. $X^2 - 16Y^2$

5.4

What is "factoring"?

Factoring is writing a polynomial as the _____

of 2 or more simpler _____.

Factoring reverses multiplying.

Objective 1	Factor out the greatest common factor (GCF)

The GCF is the largest term that is a factor of all the terms

EX: Factor $8x+12$

GCF:

Factor: $12yz+24xz$

GCF:

Factor: $15x^2 - 6x$

GCF:

Factor: $21x^5 + 35x^4 - 14x^3$

Factor and solve:

$20x^2 + 15x = 0$

Objective 2 Factor by grouping

For polynomials with 4 or more

EX: Factor $2xy + 3y + 2x + 3$

1) Group the terms

2) Factor within groups

3) Find a common factor

Factor and solve: $18x^2 + 3x + 24x - 4$

Objective 3 Factor trinomials with a coefficient of 1

in the form $x^2 + bx + c$

don't forget about a GCF first

1) find pairs of numbers whose product is c
2) find pairs of those numbers whose sum is b

EX: $x^2 - 2x - 15$

1) pairs whose product is -15 and 2) whose sum is -2

-15(1)	-15 + 1
15(-1)	15 + (-1)
3(-5)	3 + (-5)
5(-3)	5 + (-3)

Therefore factors are ( )( )

Examples

$y^2 + 2y - 35 = 0$

check by multiplying

$b^2 - 7b + 10 = 0$

Objective 4 Factor trinomials with a coefficient

in the form $ax^2 + bx + c$

don't forget about a GCF first

1) find pairs of numbers whose product is *a*, and 2) pairs of numbers whose product is *c*. 3) Their combination will sum to *b*.

EX: $3x^2 + 7x + 2$

pairs whose product is 3

3(1)

$(3x \quad)(x \quad)$

pairs whose product is 2

2(1)

$(3x + 2)(x + 1)$

This doesn't FOIL out so switch the 2 and 1

$(3x + 1)(x + 2)$

Examples

Factor: $8y^2 - 13y + 5 = 0$

check by multiplying

Factor: $30x^5 - 55x^4 - 50x^3 = 0$

Objective 5	Factor the difference of 2 squares

in the form

$a^2 - b^2$

$(a - b)(a + b)$

1) Write the terms as perfect squares

2) Follow the pattern

EX: $x^2 - 9$

$x^2 - 3^2$

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

EX: $4x^2 - 25$

Factor and solve:

$x^2 - 36 = 0$

$5a^2 - 20a = 0$

Objective 6 Factor sum and difference of cubes

in the form

$x^3 + c^3$ or $x^3 - c^3$

1) Write the terms as perfect cubes
2) Memorize the pattern

Difference of 2 cubes $x^3 - c^3 = (x - c)(x^2 + cx + c^2)$

EX: $x^3 - 8$

$27m^3 - 64$

Sum of 2 cubes $x^3 + c^3 = (x + c)(x^2 - cx + c^2)$

EX: $x^3 + 8$

$8p^3 + 125$