4.5 Mulitplying & Factoring with GCF

How do you multiply 3 numbers together?

What's allowed? What isn't?

2(3)(4)

$= 2(3)(4)$
$= 6(4)$
$= 24$

$= 2 \cdot 3(4)$
$= 2 \cdot 12$
$= 24$

$= 2(4) \cdot 3$
$= 8 \cdot 3$
$= 24$

(4)(-2)(5)

$= 4(-2) \cdot 5$
$= -8 \cdot 5$
$= -40$

A. Multiplying 3 Factors Together

1. $4(2x-3)(w-3y)$

$= 4(2wx - 3w - 6xy + 9y)$
$= 8wx - 12w - 24xy + 36y$

	$2x$	-3
w	$2wx$	$-3w$
$-3y$	$-6xy$	$9y$

2. $-3x(a-b)(3c+2d)$

$= -3x(3ac - 3bc + 2ad - 2bd)$
$= -9acx + 9bcx - 6adx + 6bdx$

	a	$-b$
$3c$	$3ac$	$-3bc$
$2d$	$2ad$	$-2bd$

3. $-2(x+3)(x-5)$

$= -2(x^2 - 2x - 15)$
$= -2x^2 + 4x + 30$

	x	3
x	x^2	$3x$
-5	$-5x$	-15

4. $5(x-4)(x-6)$

$= 5(x^2 - 10x + 24)$
$= 5x^2 - 50x + 120$

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

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

6. $3(2x-1)(3x+4)$

$= 3(6x^2 + 5x - 4)$
$= 18x^2 + 15x - 12$

7. $-5(3x+1)(2x+5)$

$= -5(6x^2 + 17x + 5)$
$= -30x^2 - 85x - 25$

	$3x$	1
$2x$	$6x^2$	$2x$
5	$15x$	5

8. $4x(3x-4)(2x-3)$

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B. Factoring with a GCF (Greatest Common Factor)

Look for GCF first!!!

1. $3ax - 3ay + 3bx - 3by$

$= 3(ax - ay + bx - by)$

$= 3(a+b)(x-y)$

	x	$-y$
a	ax	$-ay$
b	bx	$-by$

2. $-12x^2y - 8x^2 + 6xy + 4x$

$= 2x(-6xy - 4x + 3y + 2)$

$= 2x(-2x+1)(3y+2)$

	$3y$	2
$-2x$	$-6xy$	$-4x$
1	$3y$	2

3. $5x^2 - 5x - 60$

$= 5(x^2 - x - 12)$

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

	x	3
x	x^2	$3x$
-4	$-4x$	-12

Look for GCF first!!!

4. $-2x^2y + 10xy - 12y$

$= -2y(x^2 - 5x + 6)$

$= -2y(x-2)(x-3)$

5. $24x^2 + 52x + 20$

$= 4(6x^2 + 13x + 5)$

$= 4(3x+5)(2x+1)$

MAC 30
A 13
N 10, 3

	$3x$	5
$2x$	$6x^2$	$10x$
1	$3x$	5

6. $6x^3 + 27x^2 - 15x$

$= 3x(2x^2 + 9x - 5)$

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

MAC -10
A 9
N $-1, 10$

	$2x$	-1
x	$2x^2$	$-x$
5	$10x$	-5

7. $6x^4 + 2x^3 - 4x^2$

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

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

	$3x$	-2
x	$3x^2$	$-2x$
1	$3x$	-2

MAC -6
A 1
N $-2, 3$

8. $3x^3y + 6x^2y + 24xy$

$= 3xy(x^2 + 2x + 8)$ not factorable

$= 3xy(x^2 + 2x + 8)$

Look for GCF first!!!

MAC 8
A 2
N

8
1, 8
2, 4
