4.5 Mulitplying & Factoring with GCF

How do you multiply 3 numbers together?

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

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

What's allowed? What isn't?

A. Multiplying 3 Factors Together

1. $4(2x-3)(w-3y)$
$= (8x-12)(w-3y)$
$= 8wx - 12w - 24xy + 36y$

	$8x$	-12
w	$8wx$	$-12w$
$-3y$	$-24xy$	$36y$

2. $-3x(a-b)(3c+2d)$
$= (-3ax+3bx)(3c+2d)$
$= -9acx - 6adx + 9bcx + 6bdx$

3. $-2(x+3)(x-5)$
$= (-2x-6)(x-5)$
$= -2x^2 + 4x + 30$

	x	-5
$-2x$	$-2x^2$	$10x$
-6	$-6x$	30

4. $5(x-4)(x-6)$
$= (5x-20)(x-6)$
$= 5x^2 - 30x - 20x + 120$
$= 5x^2 - 50x + 120$

5. $-x^2(x+2)(x+1)$
$= (-x^3 - 2x^2)(x+1)$
$= -x^4 - 3x^3 - 2x^2$

	x	1
$-x^3$	$-x^4$	$-x^3$
$-2x^2$	$-2x^3$	$-2x^2$

6. $3(2x-1)(3x+4)$
$= 3(6x^2 + 8x - 3x - 4)$
$= 3(6x^2 + 5x - 4)$
$= 18x^2 + 15x - 12$

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

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

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

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

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

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

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

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

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

M -12
A -1
N $-4, 3$

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

Look for GCF first!!!

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

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

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

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

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

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

M 30
A 13
N $10, 3$

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

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

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

$= 3x[2x^2 - x + 10x - 5]$

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

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

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

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

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

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

$= 3xy($ .... not factorable$)$

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

Look for GCF first!!!

M 8
A 2
N ?

$\frac{8}{1,8}$
$2,4$
?
