FMP10 Name: _____

Date: _____

# 4.5 Decomposition Factoring

**Recall:**

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

$= 2x^2 + 4x - 3x - 6$

$= 2x^2 + x - 6$ ?

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

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

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

× −12

\+ 1

−3, 4

**Decomposition Factoring**

Factor $3x^2 + 8x + 4$

$3x^2 + 6x + 2x + 4$

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

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

× 12

\+ 8

6, 2

Step 1: Check for a GCF

Step 2: Find two integers with

- A product of $3 \times 4 = 12$
- A sum of $8$

Step 3: Split (decompose) the middle term into two parts using the integers from step 1

Step 4: Factor by grouping

Check? $(x+2)(3x+2)$

$3x^2 + 2x + 6x + 4 = 3x^2 + 8x + 4$ ✓

**Ex.** Factor each trinomial, if possible:

a) $2x^2 + 7x - 4$

$2x^2 + 8x - 1x - 4$

$2x(x+4) - 1(x+4)$

$(x+4)(2x-1)$

× −8

\+ 7

8, −1

~~−2 × 4~~

~~2 × −4~~

~~−8 × 1~~

8 × −1

b) $3x^2 + 2x + 4$

cannot be factored

OR

Prime

× 12

\+ 2

~~4 · 3~~

~~6 · 2~~

~~1 · 12~~

c) $24x^2 - 30x - 9$ GCF!

$= 3(8x^2 - 10x - 3)$

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

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

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

$(6x-9)(4x+1)$

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

× −24

\+ −10

~~−6, 4~~

−12, +2

d) $6x^2 - 5xy + y^2$

$= 6x^2 - 3xy - 2xy + y^2$

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

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

× 6

\+ −5

−3, −2

e) $-3a^3b - 51a^2b - 30ab$

$= -3ab(a^2 + 17a + 10)$

(×) 10
(+) 17

f) $2y^2 + 7xy + 3x^2$

$2y^2 + 6xy + xy + 3x^2$

(×) 6
(+) 7
6, 1

$2y(y + 3x) + x(y + 3x)$

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

**Ex.** Identify all values of q that allows each trinomial to be factored:

a) $2x^2 + \boxed{q}x + 5$

(×) 10
(+) q

5 · 2
10 · 1
−5 · −2
−10 · −1

$q = 7, 11, -7, -11$

b) $3x^2 + qxy - 4y^2$

(×) −12
(+) q

−6 · 2
−2 · 6
−3 · 4
−4 · 3
−12 · 1
−1 · 12

$q = \pm 4, \pm 1, \pm 11$

Practice: pg. 234/ 6 – 8, 9ad, 11ac, 13, 15, 17, 18