MPM 2D

FACTORING COMPLEX TRINOMIALS

Factoring warm-ups to prepare for Section 4.4.

1. $d^2 + 2d - 8$

2. $-3x^2 - 12x$

3. $x^2 + 2x - 80$

4. $4x^2 - 8x - 12$

5. $10n^3 - 60n^2 + 50n$

6. $8x^2 - 96x + 288$

7. $w^2 - 14w + 49$

8. $-3x^2 - 6x + 24$

9. Try factoring $3x^2 + 2x - 8$. *Show all work and check by expanding and simplifying.*

Are your factors correct? Why or why not?

Compare the trinomial in #9 with trinomials you factored in #1-8 above.

A) What is the same?

B) What is different?

FACTORING A COMPLEX TRINOMIAL $ax^2 + bx + c$

A complex trinomial is identified as having an "a" value that is **NOT** "1" and **cannot** be common factored from the trinomial. If the "a" value is either a "1" or can be factored from the trinomial, then the resulting trinomial is classified as a simple one.

The following technique for factoring a complex trinomial is known as **DECOMPOSITION** and is one of many methods.

To properly factor a complex trinomial, follow these steps:

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

$$\underline{\quad} \times \underline{\quad} = -24 \longrightarrow (a)(c)$$
$$\underline{\quad} + \underline{\quad} = 2 \longrightarrow (b)$$

$$= 3x^2 + 6x - 4x - 8 \longrightarrow$$

Decomposition step = bx term is decomposed into 2 new like terms, derived from the unique pair of factors found in the first step.

$$= \underline{3x^2 + 6x} \ \underline{- 4x - 8} \longrightarrow$$

Group first pair of terms & group second pair of terms; then factor the GCF from each pair.

$$= 3x(x + 2) - 4(x + 2) \longrightarrow$$

Factor the common binomial from the 2 terms.

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

EXAMPLES:

① $2x^2 + 9x + 9$

② $6x^2 + 13x - 8$

③ $10n^2 - 7n + 1$

④ $8y^2 + 10y - 3$

⑤ $9x^3 + 33x^2 + 30x$

⑥ $9a^2 - 14ab - 8b^2$

⑦ $m^2 + 7mp - 30p^2$

⑧ $14x^4y^2 - 15x^2y^2 + 4y^2$

⑨ $9y^2 - 6y + 1$

⑩ $2k^6 - 13k^3 + 18$