**Multiplying**

 **Polynomials**

 **(1 or more variable)**

(2x + 3)(4x2y – 3xy + 7y) use distributive property

= (2x)(4x2y) + (2x)(-3xy) + (2x)(7y) + (3)(4x2y) + (3)(-3xy) + (3)(7y)

= 8x3y – 6x2y + 14xy + 12x2y – 9xy + 21y combine like terms

= 8x3y + 6x2y + 5xy + 21y order exponents

**Factoring Trinomials (with & without “a”)**

**Without “a”: x2 – 6x + 8**

1. Find factors of **c** such that:

**1)** sum of factors = **b** **2)** product of factors = **c**

(-2) + (-4) = -6 **and**  (-2)(-4) = 8

2. When **c** is negative, 1 factor is +, other is -

 When **c** is positive, either both + or both -

So: x2 – 6x + 8 = **(x – 2)(x – 4)**

**With “a”: 8x2 – 18x – 5**

1. Remove any common factors first

2. Arrange factor combinations of **a** and **c**

1x -1 = -8x 2x -5 = -20x

8x +5 = +5x 4x +1 = +2x

 -3x **X** -18x ![C:\Documents and Settings\abc\Local Settings\Temporary Internet Files\Content.IE5\OPU7OXAR\MM900185588[1].gif]()

So: 8x2 – 18x – 5 = **(2x – 5)(4x + 1)**

3. If the coefficient of “**b**” is:

1)>**a** & >**c**, use larger factors of **a** & **c** first

2)<**a** & <**c**, use smaller factors of **a** & **c** first

**Zero Principle:** add pairs of opposite tiles to make rectangle

**3x2 + 5x – 2 = (3x – 1)(x + 2)**

**Perfect Square Trinomial** **Difference of Squares**

 a2 + 2ab + b2 = (a + b)(a + b) = (a + b)2 a2 − b2 = (a + b)(a – b)

**Area Model**

 10 5 2x -4

10 100 50 x

 3

2 20 10

 (15)(12) = (10 + 5)(10 + 2) (2x – 4)(x + 3)

 = 10(10 + 2) + 5(10 + 2) = 2x(x + 3) – 4(x + 3)

= 10(10) + 10(2) + 5(10) + 5(2) = 2x(x) + 2x(3) – 4(x) – 4(3)

= 100 + 20 + 50 + 10 = 2x2 + 6x – 4x – 12

= 180 = 2x2 + 2x – 12

**GCF**

**Factors Method**

12: 1, 2, 3, **4**, 6, 12

16: 1, 2, **4**, 8, 16

**Prime Factorization**

12: 22 x 3

16: 24

**GCF = 22 = 4**

**Common Factors of a Polynomial**

**-12x3y – 20xy2**

1. Factor each term

**12x3y = 2∙2∙3∙x∙x∙x∙y 20xy2 = 2∙2∙5∙x∙y∙y**

2. Find the GCF 2∙2∙x∙y = 4xy

3. Divide each term by GCF

**4xy(-3x2 - 5y) = -4xy(3x2 + 5y)**

**Alge-Tiles: arrange tiles into EQUAL groups**

**2x2 + 4x**

**= 2x(x +2) 2x**

 **x + 2**

**Decomposition**

**6x2 – 21x + 9**

1. Remove common factors

**3(2x2 – 7x + 3)**

2. Multiply **a** **× c**

**2 x 3 = 6**

3. Find factors of **a** & **c** so the sum = **b**; these are the middle terms when we FOIL or use distributive property

**a × c (=6) a + c (=-7)**

1, 6 1 + 6 = 7

 **-1,-6 -1 + -6 = -7**

2,3 2 + 3 = 5

 -2, -3 -2 + -3 = -5

**So: 2x2 – 1x – 6x + 3**

4. Remove common factor from 1st & 2nd pair of terms

**x(2x – 1) – 3(2x – 1)**

5. Write as binomial factors

**6x2 – 21x + 9 = 3(2x – 1)(x – 3)**

**Expanding Polynomials (x2 + bx + c)**

**FOIL – First, Outer, Inner, Last**

 (x + 4)(x – 2)

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

= x2 – 2x + 4x – 8

= x2 + 2x – 8

**Distributive Property**

(x + 4)(x – 2)

= x(x – 2) + 4(x – 2)

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

= x2 – 2x + 4x – 8

= x2 + 2x – 8

**Algebra Tiles**

 x +4

x

 = x2 + 2x – 8

-2

**Word Problems**

**LCM** – smallest square

**GCF** – largest square

**Perfect Square or Cube?**

**Easy:** 25 =5 2 **YES!** Check: $\sqrt[2]{25}$ = 5

**Medium:** 4225 =5 2 x 13 2 both 2, so **YES!**

$\sqrt[2]{4225}$ = 65 = 5 x 13

**Hard:** 64,000 =2 3 x 4 3 x 5 3 all 3, so **YES!**

Check: $\sqrt[3]{64,000}$ = 40 = 2 x 4 x 5

**NO:** 72 = 2 3 x 3 2 both not 2 or 3, so **NO!**

**LCM**

**Multiples Method**

12: 12, 24, 36, **48**

16: 16, 32, **48**

**Prime Factorization**

12: 22 x 3

16: 24

**LCM = 24 x 3 = 48**

**Prime Factorization**

**Factor Tree** **Prime # Division**

 36 2 36

 2 18

 4 9 3 9

 3

2 2 3 3

**36 = 22 x 32**

**index**

 $\sqrt[3]{1428}$  **radical**

**radicand**

**Determining Prime Factors**

15 13

3 5 1 13

 No!