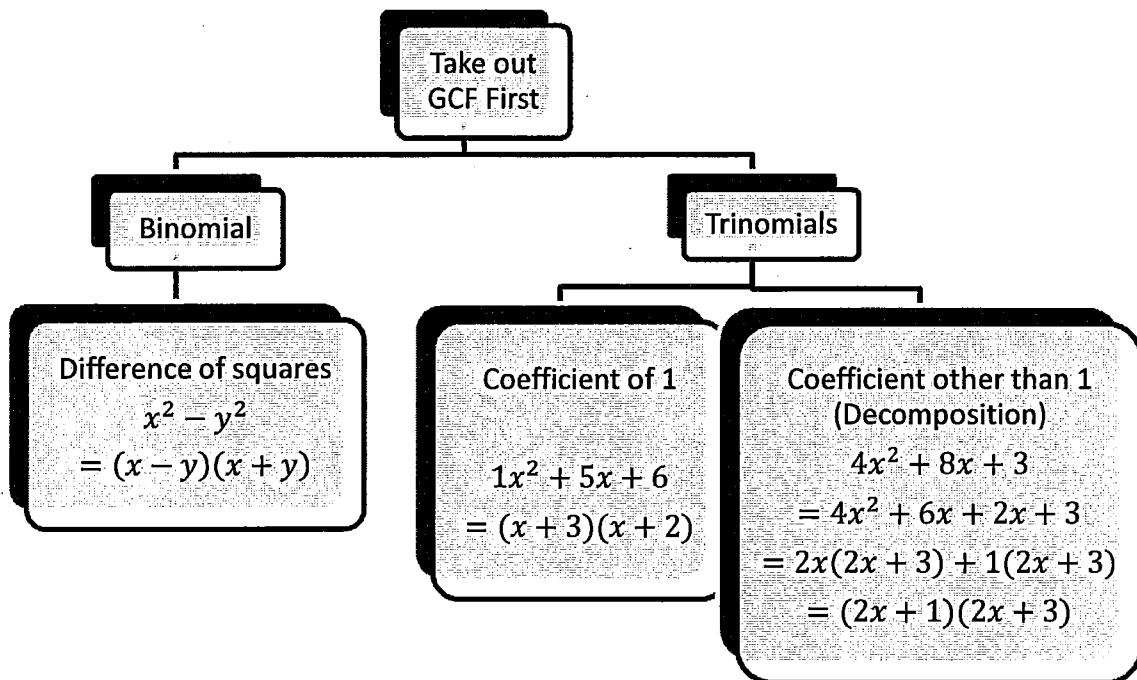


### 3.0 Factoring Polynomial Expressions: Part 1

Review of Factoring:



Basics: Factor the following.

$$\begin{aligned} 1. & 12x^2y^3 - 8x^4y^2 + 4x^5y^2 \\ & = 4x^2y^2(3y - 2x^2 + x^3) \end{aligned}$$

$$\begin{aligned} 2. & x^2 + 5x - 14 \\ & = (x + 7)(x - 2) \end{aligned}$$

$$\begin{aligned} & \frac{1}{1} \times \frac{-2}{-2} = -14 \\ & \underline{1} + \underline{-2} = 5 \end{aligned}$$

$$3. x^4 - 3x^2 - 18$$

$$\begin{aligned} & \frac{-6}{-6} \times \frac{3}{3} = -18 \\ & \underline{-6} + \underline{3} = -3 \\ & = (x^2 - 6)(x^2 + 3) \end{aligned}$$

$$4. \underline{\underline{5}}x^2 + 12x + \underline{\underline{4}}$$

$$\begin{aligned} & = 5x^2 + 10x + 2x + 4 \\ & = 5x(x+2) + 2(x+2) \\ & = (5x+2)(x+2) \end{aligned}$$

$$mn = 5(4) = 20$$

$$\frac{10}{10} \times \frac{2}{2} = 20$$

$$\frac{10}{10} + \frac{2}{2} = 12$$

$$\begin{aligned}
 5. \quad & 6x^3 - 2x^2 - 4x \quad mn = (3)(-2) \\
 & = 2x(3x^2 - x - 2) \quad = -6 \\
 & = 2x(\underline{3x^2} - \underline{3x} + \underline{2x} - 2) \quad \frac{-3}{-3} \times \frac{2}{2} = -1 \\
 & = 2x(3x(x-1) + 2(x-1)) \\
 & = 2x(3x+2)(x-1)
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & 4x^2 + 11xy + 6y^2 \quad (4)(6) = 24 \\
 & = \underline{4x^2} + \underline{8xy} + \underline{3xy} + \underline{6y^2} \quad \frac{8}{8} \times \frac{3}{3} = 24 \\
 & = 4x(x+2y) + 3y(x+2y) + \frac{3}{8} = 11 \\
 & = (4x+3y)(x+2y)
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & 25m^2 + 60mn + 36n^2 \quad (25)(36) = 900 \\
 & = \underline{25m^2} + \underline{30mn} + \underline{36n^2} \quad \frac{30}{30} \times \frac{30}{30} = 900 \\
 & = 5m(5m+6n) + 6n(5m+6n) \quad \frac{30}{30} + \frac{30}{30} = 60 \\
 & = (5m+6n)(5m+6n) \\
 & = (5m+6n)^2
 \end{aligned}$$

$$9a^2 - 16b^2 = (3a)^2 - (4b)^2$$

$$= (3a+4b)(3a-4b)$$

**Beyond Basics:** Factor the following.

$$\begin{aligned}
 9. \quad & 16m^4 - 1^2 \\
 & = (4m^2 + 1)(4m^2 - 1) \\
 & = (4m^2 + 1)(2m - 1)(2m + 1)
 \end{aligned}$$

$$\begin{aligned}
 10. \quad & 4x^4 - 17x^2 + 4 \quad 4(4) = 16 \\
 & = \underline{4x^4} - \underline{16x^2} - \underline{x^2 + 4}, \quad \frac{-16}{-16} \times \frac{-1}{-1} = 16 \\
 & = 4x^2(x^2 - 4) - 1(x^2 - 4) \quad -16 + \frac{-1}{-1} = -17 \\
 & = (4x^2 - 1)(x^2 - 4) \\
 & = (2x - 1)(2x + 1)(x - 2)(x + 2)
 \end{aligned}$$