

Review of Factoring

Objectives : 1) Factor out GCF.

2) Factor by grouping

3) Factor trinomials.

4) Factor binomials.

Obj. 1: Factor out GCF

$$2x^2 - 12x = 2x(x - 6)$$

$$6x^3 + 14x^5 = 2x^3(3 + 7x^2)$$

Obj. 2 Factor by grouping

$$\begin{aligned}x^3 + x^2 + x + 1 &= x^2(x+1) + 1(x+1) \\ &= (x+1)(x^2+1)\end{aligned}$$

$$\begin{aligned}4x^2 + 2x - 6x - 3 &= 2x(2x+1) - 3(2x+1) \\ &= (2x+1)(2x-3)\end{aligned}$$

Obj. 3 Factor trinomials

$$1) x^2 + 8x + 7 = (x + 7)(x + 1)$$

$$2) x^2 - 6x + 8 = (x - 4)(x - 2)$$

same

$$3) x^2 - 2x - 24 = (x + 4)(x - 6)$$

~~same~~ different

$$4) y^2 + 3y - 18 = (y - 3)(y + 6)$$

$$\begin{array}{r} 24 \\ \hline 1, 24 \\ 2, 12 \\ 3, 8 \\ 4, 6 \end{array}$$

Use grouping

$$\begin{aligned} 5) 4x^2 + 6x + 7 &= 4x^2 + 2x + 4x + 7 \\ 4 \cdot 7 &= 28 \\ &\frac{1}{28} \\ &\begin{array}{r} 214 \\ 41 \end{array} \\ &= 2x(2x+1) + 7(2x+1) \\ &= (2x+1)(2x+7) \end{aligned}$$

$$\begin{aligned} 6) 6x^2 - 17x - 10 &= 6x^2 + 3x - 20x - 10 \\ 6 \cdot 10 &= 60 \\ &\frac{1}{60} \\ &\begin{array}{r} 2130 \\ 3120 \\ 4115 \\ 6110 \end{array} \\ &= 3x(2x+1) - 10(2x+1) \\ &= (2x+1)(3x-10) \end{aligned}$$

Obj. 4 Factor binomials GCF

Diff. of squares: $X^2 - Y^2 = (X+Y)(X-Y)$
1, 4, 9, 16, 25, 36, 49, ...
Sum of squares: $X^2 + Y^2$ is prime.

Diff. of cubes: $X^3 - Y^3 = (X-Y)(X^2 + XY + Y^2)$
1, 8, 27, 64, 125, 216, ... **SOAP**
Sum of cubes: $X^3 + Y^3 = (X+Y)(X^2 - XY + Y^2)$

Examples:

$$1) 6x^3 - 54x = 6x(x^2 - 9) = 6x(x+3)(x-3)$$

$$2) \underline{25y^2} + \underline{49} \quad \text{Prime}$$

$$3) \underbrace{x^3}_{(x)^3} - \underbrace{64}_{4^3} = (x-y)(x^2 + xy + y^2) \\ (x-4)(x^2 + 4x + 16)$$

$$4) 8x^3 + 125 = (2x+5)(4x^2 - 10x + 25) \\ (2x)^3 \quad (5)^3$$

$$5) \quad x^4 - 16 = (x^2 - 4)(x^2 + 4) \\ (x^2)^2 - (4)^2 = (x+2)(x-2)(x^2+4)$$