

## Lesson 2: Simplifying Algebraic Expressions I Pt 2

### ③ Special formulas

$$x^2 - y^2 = (x+y)(x-y)$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x-y)^2 = x^2 - 2xy + y^2$$

$$x^3 - y^3 = (x-y)(x^2 + xy + y^2)$$

$$x^3 + y^3 = (x+y)(x^2 - xy + y^2)$$

Usually irreducible

- When factoring/simplifying expressions w/ fractional or negative power, when taking out GCF, factor out term raised to the smallest power.

Factor

Ex 1:  $(x+6)^{-2}(x+4) + (x+6)^{-3}(2x+11)$   
 $= (x+6)^{-2}[(x+4) + (x+6)^{-1}(2x+11)]$

Note quite. You really want -3 b/c  $-3 < -2$ .

So let's restart

$$\begin{aligned} & (x+6)^{-2}(x+4) + (x+6)^{-3}(2x+11) \\ &= (x+6)^{-2}(x+6)^{-1}(x+6)^1(x+4) + (x+6)^{-3}(2x+11) \\ &= (x+6)^{-3}(x+6)(x+4) + (x+6)^{-3}(2x+11) \\ &= (x+6)^{-3}[(x+6)(x+4) + (2x+11)] \\ &= (x+6)^{-3}[x^2 + 6x + 4x + 24 + 2x + 11] \\ &= (x+6)^{-3}[x^2 + 12x + 35] \end{aligned}$$

Ex 2: Factor  $(2x^3 + 6x^2 - 8x - 24)^{-1}$

By grouping  $= (2x^2(x+3) - 8(x+3))^{-1}$   
 $= ((2x^2 - 8)(x+3))^{-1}$   
 $= (2(x^2 - 4)(x+3))^{-1}$

$$= (2(x^2 - 4)(x + 3))^{-1}$$

By difference of squares

$$= (2(x - 2)(x + 2)(x + 3))^{-1}$$

$$= 2^{-1}(x - 2)^{-1}(x + 2)^{-1}(x + 3)^{-1}$$