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$$\frac{1615201568.(4x+3y)^{6} a^{54}x b^{53}y}{(4x)^{6}(3y)^{6}+6(4x)^{3}(3y)^{6}+5(4x)^{4}(3y)^{6}+20(4x)^{3}(3y)^{3}+15(4x)^{2}(3y)^{4}+6(4x)^{4}(3y)^{5}+1(3x)^{6}(3y)^{6}}$$

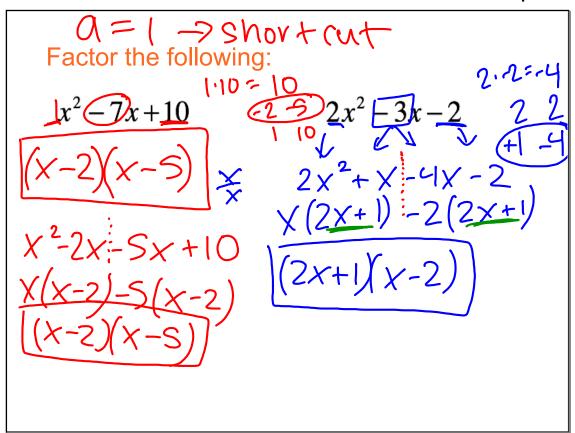
$$\frac{1615201568.(4x+3y)^{6} a^{54}x b^{53}y}{(4x)^{3}(3y)^{6}+15(4x)^{2}(3y)^{4}+6(4x)^{4}(3y)^{5}+15(4x)^{2}(3y)^{4}+6(4x)^{4}(3y)^{5}+15(4x)^{2}(3y)^{4}+6(4x)^{4}(3y)^{5}+15(4x)^{2}(3y)^{6}+16(4x)^{4}(3y)^{6}+16(4x)^{$$

$$(3x)^{5} = 3x \cdot 3x \cdot 3x \cdot 3x \cdot 3x$$

2-3 Factoring Polynomials (Book 6.4 pg. 353-)

Objectives:

- I can factor a polynomial by GCF, special factoring, and factor by grouping
- I can find multiple representations of factored polynomials



Greatest Common Factors pg. 355-356

$$\bigcirc$$
 6x³ + 15x² + 6x

$$6x^3 + 15x^2 + 6x$$
 Write out the polynomial.

$$x(6x^2 + 15x + 6)$$
 Factor out a common monomial, an x .

$$3x(2x^2 + 5x + 2)$$
 Factor out a common monomial, a 3.

$$3x(2x+1)(x+2)$$
 Factor into simplest terms.

Note: The second and third steps can be combined into one step by factoring out the greatest common monomial.

(B)
$$2x^3 - 20x$$

$$\frac{1}{2} \frac{2}{x} = \frac{2}{x}$$
 Write out the polynomial.

$$(x^2 - 10)$$
 Factor out the greatest common monomial.

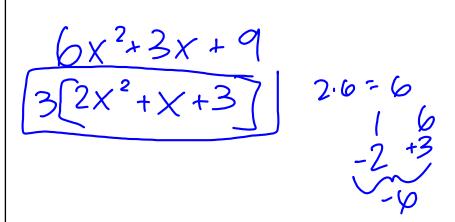
$$\chi^{2} + 0 \times -10$$
 $1(-10)^{2} -10$

$$3 \times (2 \times^{2} + 5 \times + 2)$$

$$3 \times [2 \times^{2} + 2 \times + 4 \times + 2]$$

$$3 \times [\times (2 \times + 1) + 2 \times + 1]$$

$$3 \times (2 \times + 1) (\times + 2)$$



Special Factoring Patterns pg. 355

Remember the factoring patterns you already know:

Difference of two squares: $a^2 - b^2 = (a - b)(a + b)$

Perfect square trinomials: $a^2 + 2ab + b^2 = (a+b)^2$

$$a^2 - 2ab + b^2 = (a - b)^2$$

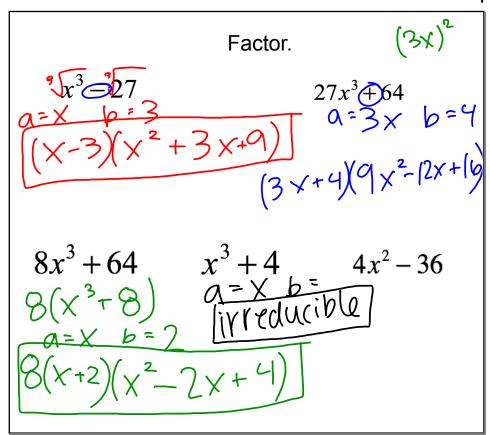
There are two other factoring patterns that will prove useful:

Sum of two cubes: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

Difference of two cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$Q_{-}$$





Factoring by Grouping pg. 357

$$(A)$$
 $x^3 + x^2 + x + 1$

Write out the polynomial. $x^3 - x^2 + x - 1$

Group by common factor. $(x^3 - x^2) + (x - 1)$

Factor. $x^2(x-1) + 1(x-1)$

Regroup. $(x^2+1)(x-1)$

B
$$x^4 + x^3 + x + 1$$

Write out the polynomial. $x^4 + x^3 + x +$

Group by common factor. $(\underline{\hspace{1cm}} + \underline{\hspace{1cm}}) + (x+1)$

Factor. (x+1) + (x+1)

Regroup. $(_{--}+_{--})(x+1)$

Apply sum of two cubes to the first term. $(\underline{\hspace{1cm}} - \underline{\hspace{1cm}} + 1)(x+1)(x+1)$

Substitute this into the expression and simplify. $(\underline{\hspace{1cm}})^2(\underline{\hspace{1cm}}^2-\underline{\hspace{1cm}}+1)$

Factor by Grouping.

$$x^3 + 3x^2 + 3x + 2$$

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