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# Polynomials 2

## Factoring

### First Step

Pull out a common factor!

$2x^2+20x-48=0$

$2(x^2+10x-24)=0$

### 2 terms – look for perfect squares or cubes

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

$(3x-5)(3x+5)$

$9x^2-25$

$a^2+b^2=$ unfactorable

$50y^2-18$

$2(25y^2+9)$

$a^3-b^3=(a-b)(a^2+ab+b^2)$

$2(5y+3)(5y+3)$

$=a^3+a^2b+ab^2-a^2b-ab^2-b^3$

$a^3+b^3=(a+b)(a^2-ab+b^2)$

$x^3+64=(x+4)(x^2-4x+16)$

$4^3$

$5x^3-625$

$=5(x^3-125)$

$5^3$

$=5(x-5)(x^2+5x+25)$

3 terms – UNFOIL

$x^2 - 5x - 14 = 0$

$(x-7)(x+2)$

4 terms – Grouping

$(3x^3 + 15x^2 - 2x - 10)$

1) $3x^2(x+5) - 2(x+5)$

2) $(x+5)(3x^2-2)$

$(30x^3 - 24x^2 + 25x - 20)$

$6x^2(5x-4) + 5(5x-4)$

$(5x-4)(6x^2+5)$

# Division

$$\frac{x^5 - 2x^2 - 27}{x - 2}$$

## Long

$$x^4 + 2x^3 + 4x^2 + 6x + 12 - \frac{3}{x-2}$$

$$x-2 \;\overline{)\; x^5 + 0x^4 + 0x^3 - 2x^2 + 0x - 27}$$

$$-(x^5 + 2x^4)$$

$$2x^4 + 0x^3$$

Change all signs!

$$-2x^4 + 4x^3$$

$$4x^3 - 2x^2$$

$$-4x^3 + 8x^2$$

$$6x^2 + 0x$$

$$-6x^2 + 12x$$

$$12x - 27$$

$$-12x + 24$$

$$-3$$

$$3 \;\overline{)\; 1459}$$

$$-12$$

$$25$$

$$24$$

$$19$$

$$-18$$

$$1$$

$$486\tfrac{1}{3}$$

# Synthetic Division

$\frac{x^5 - 2x^2 - 27}{x-2}$

$x-2$

$+2$ | 1 0 0 −2 0 −27

\+ 2 4 8 12 24

1 2 4 6 12 −3

$1x^4 + 2x^3 + 4x^2 + 6x + 12 - \frac{3}{x-2}$

only works if dividing $x+\#$ or $x-\#$