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FACTORING

★ First Step — Pull out common factors

2 terms — look for perfect squares or perfect cubes

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

$a^2 + b^2 =$ not factorable

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

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

$x^3 - 8 = (x-2)(x^2+2x+4)$, $8 = 2^3$

$(2x-5)(2x-5)$

FL

$4x^2 + 25$

$50y^4 - 18x^2$

$= 2(25y^4 - 9x^2)$

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

$3p^3 + 192$

$= 3(p^3 + 64)$, $64 = 4^3$

$= 3(p+4)(p^2-4p+16)$

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3 terms – UNFOIL

$x^2+2x-15$

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

4 terms – GROUPING

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

1) Pull out common factors of each group
2) Pull out the common quantity

1) $3x^2(x+5)-2(x+5)$ ← must get same quantity in both groups

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

$12x^3y-4x^2y+21xy-7y$

$y([12x^3-4x^2]+21x-7)$

$y[4x^2(3x-1)+7(3x-1)]$

$y(3x-1)(4x^2+7)$

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Dividing Polynomials

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

Long Division

$2x^3 + 4x^2 + 2x + 3 + \frac{5}{x-2}$

$x-2 \;\big|\; 2x^4 + 0x^3 - 6x^2 - x - 1$

Change signs! $\rightarrow -2x^4 + 4x^3$

$4x^3 - 6x^2$

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

$2x^2 - x$

$-2x^2 + 4x$

$3x - 1$

$-3x + 6$

5

* Dividing Polyn.

$9 \;\big|\; 38\,9$ $\quad 4\,3\,\frac{2}{9}$

-36

29

-27

2

Synthetic Division – only works if dividing by x + # or x –

$2x^4 - 6x^2 - x - 1$ ÷ $(x-2)$

$+2$ | 2 0 −6 −1 −1

	2	4	8	4	6
+		4	8	4	6
	2	4	2	3	5

$2x^3 + 4x^2 + 2x + 3 + \frac{5}{x-2}$

Start by dropping the first number below the line

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Function Operations

$f(x) = x^2 + 3x + 2 \quad g(x) = 3x^2 - x + 7$

$f(-3) =$

$(f+g)(x) =$

$(f+g)(1) =$

$K(x) = 3x + 2 \quad m(x) = x^2 - 2x + 4 \quad p(x) = \frac{1}{x-2}$

$(Km)(x) =$

$\left(\frac{K}{p}\right)(x)$

Composition of Functions – Function in a function

$f(x)=3x+2$ $g(x)=x^2-2x+1$ $h(x)=\frac{3x^2+2}{x^2-1}$ $K(x)=\sqrt{2x+1}$

$f[g(x)]=$

$f[g(2)]$

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$f(x)=3x+2$ $g(x)=x^2-2x+1$ $h(x)=\frac{3x^2+2}{x^2-1}$ $K(x)=\sqrt{2x+1}$

$(f \circ g)(x)$

$(h \circ K)(x)$