Notes & Examples.

We can add, subtract, multiply & divide polynomials.
Just use an area model & combine like terms.
Recall: Degree = highest power, Leading Coefficient = # with highest power term.

Standard Form = Terms all added in descending order.

For each example, $f(x) = x^5 + 15x^4 + 70x^3 + 90x^2 - 71x - 105$
$g(x) = x^2 - 1$

1) $f(x) + g(x) = (x^5 + 15x^4 + 70x^3 + 90x^2 - 71x - 105) + (x^2 - 1)$
$= x^5 + 15x^4 + 70x^3 + 91x^2 - 71x - 106$

Degree $= 5$, L.C. $= 1$

2) $f(x) - g(x) = (x^5 + 15x^4 + 70x^3 + 90x^2 - 71x - 105) - (x^2 - 1)$
$= x^5 + 15x^4 + 70x^3 + 89x^2 - 71x - 104$

Degree $= 5$, L.C. $= 1$

3) $g(x) - f(x) = (x^2 - 1) - (x^5 + 15x^4 + 70x^3 + 90x^2 - 71x - 105)$
$= -89x^2 + 104 - x^5 - 15x^4 - 70x^3 + 71x$
$= -x^5 - 15x^4 - 70x^3 - 89x^2 + 71x + 104$

Not standard form, because powers are not descending.

Degree $= 5$, L.C. $= 1$

4) $f(x) \cdot g(x) = x^7 + 15x^6 + 69x^5 + 75x^4 - 141x^3 - 195x^2 + 71x + 105$

	x^5	$+15x^4$	$+70x^3$	$+90x^2$	$-71x$	-105
x^2	x^7	$15x^6$	$70x^5$	$90x^4$	$-71x^3$	$-105x^2$
$0x$	$0x^6$	$0x^5$	$0x^4$	$0x^3$	$0x^2$	$0x$
-1	$-x^5$	$-15x^4$	$-70x^3$	$-90x^2$	$71x$	105

Add a zero row to make diagonals like terms

5) $f(x) \div g(x) = \dfrac{f(x)}{g(x)} = x^3 + 15x^2 + 71x + 105$

	x^3	$15x^2$	$71x$	$+105$
x^2	x^5	$15x^4$	$71x^3$	$105x^2$
$0x$	$0x^4$	$0x^3$	$0x^2$	$0x$
-1	$-x^3$	$-15x^2$	$-71x$	-105