

Polynomial Functions in Factored Form vs Standard Form

STANDARD FORM (expanded form)	FACTORED FORM
$y = x^6 + 4x^5 - 23x^4 - 38x^3 + 220x^2 - 200x$ <ul style="list-style-type: none"> - y-intercept is zero (0,0) - degree is 6 - positive lead coefficient (end behaviour) 	$y = (x)(x - 2)^3(x + 5)^2$ <ul style="list-style-type: none"> - x intercepts at 0,2,-5 (0,0) (2,0) (-5,0) - "point of inflection" at x=2 - "turning point" or "touch point" at x=-5 - Cross through point at x=0

A **family** of functions is a group of polynomial functions that would have the same **x-intercepts**. For example:

$$f(x) = (x - 2)^2(x + 3)(x - 4)$$

$$f(x) = -3(x - 2)^2(x + 3)(x - 4)$$

$$f(x) = 2(x - 2)^2(x + 3)(x - 4)$$

$$f(x) = -(x - 2)^2(x + 3)(x - 4)$$

Let's Try!

Example 1: Determine the equation of a cubic polynomial function with zeros at -1,4,5 and a y-intercept of -40.

Example 2: Write a possible equation for a polynomial function with zeros at -3 (order 2) and $\frac{1}{2}$.

Example 3: Sketch a possible graph of the polynomial graph $f(x) = -(x - 4)(2x - 5)(x + 1)^2$

Example 4: Sketch a possible graph of the polynomial graph $f(x) = 3x^4 - 3x^3$

Example 5: Determine a possible polynomial function with roots 2, -4 and $\frac{5}{4}$.

Example 6: Determine a general equation for the cubic family of functions with x-intercepts at -3, -4, 5. Then determine the particular equation of the family that passes through the point (3, -252).

Example 7: Determine a general equation for the cubic family of functions with x-intercepts at -3, 0, 2. Then determine the particular equation of the family that passes through the point (-1, 12).

Example 8: Determine a general equation for the cubic family of functions with x-intercepts at -2, -1, 1. Then determine the particular equation of the family that passes through the point (2, -6).

Example 9: Determine a general equation for the quartic family of functions with x-intercepts at -2, -1, 1, 3. Then determine the particular equation of the family that passes through the point (2, -6).