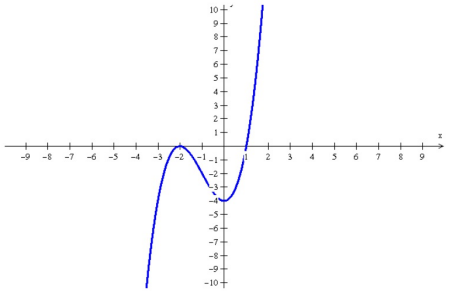
Shapes of Zeros Exploration

1. Graph $y = (x-1)(x+2)^2$ in a Standard Window and sketch it below:

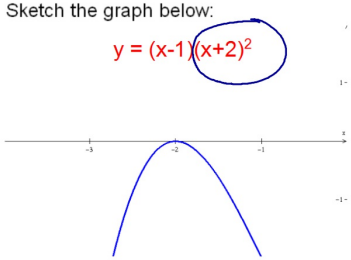


2. Investigate the graph around each zero

Around -2: Use the following window: $x : [-4, 0]$ & $y : [-2, 2]$

Sketch the graph below:

y = (x-1)(x+2)^2



-2 is a double zero.

Double zeros look like Parabolas.

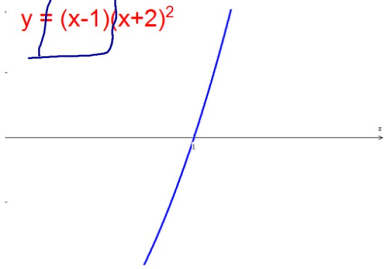
Describe what the graph looks like in this window.

a parabola whose vertex is on the x-axis.

Around 1: Use the following window: $x : [0, 2]$ & $y : [-2, 2]$

Sketch the graph below:

y = (x-1)(x+2)^2



1 is a single zero.

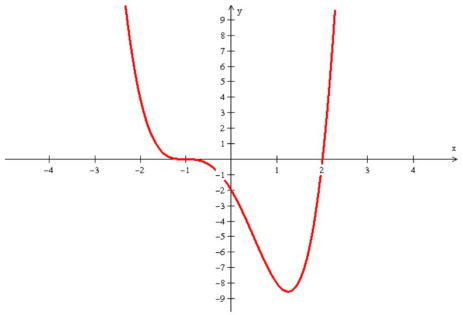
Single Zeros look like a line passing through the x-axis.

Describe what the graph looks like in this window.

A line that passes right through the x-axis

3. Graph $y = (x+1)^3(x-2)$ in the following window and sketch it below:

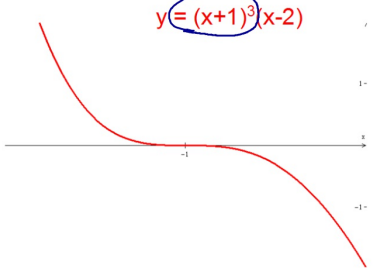
Window: $x : [-5,5]$ & $y : [-10,10]$



Around -1: Use the following window: $x : [-2,0]$ & $y : [-2,2]$

Sketch the graph below:

$y = (x+1)^3(x-2)$



-1 is a triple zero

Triple Zeros look like:
they pass through the x-axis but flatten out as they pass through.
Look like a cubic function

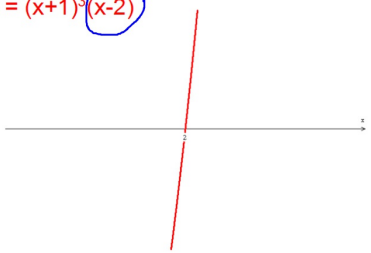
Describe what the graph looks like in this window.

A cubic, the graph flattens out as it passes through the x-axis

Around 2: Use the following window: $x : [1,3]$ & $y : [-2,2]$

Sketch the graph below:

$y = (x+1)^3(x-2)$



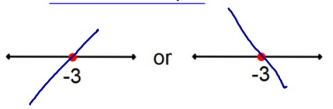
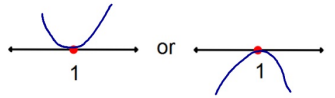
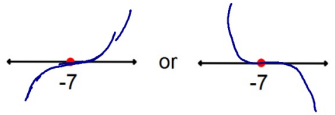
2 is a single zero.

Single Zeros look like a line passing through the x-axis.

Describe what the graph looks like in this window.

a line that passes right through the x-axis

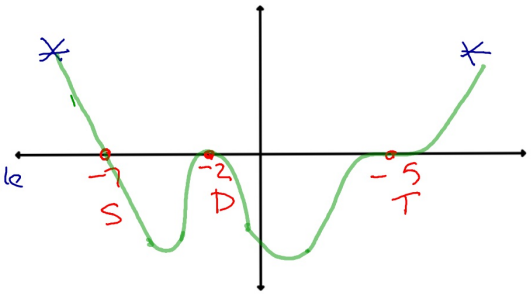
Shapes of Zeros (graphs at x-intercepts)

	Factor	Zero	Possible Shape
Single Zeros:	(x+3)		
Double Zeros:	$(x-1)^2$		
Triple Zeros:	$(x+7)^3$		

Sketch a graph of this function:

$y = (x + 2)^2(x - 5)^3(x + 7)$

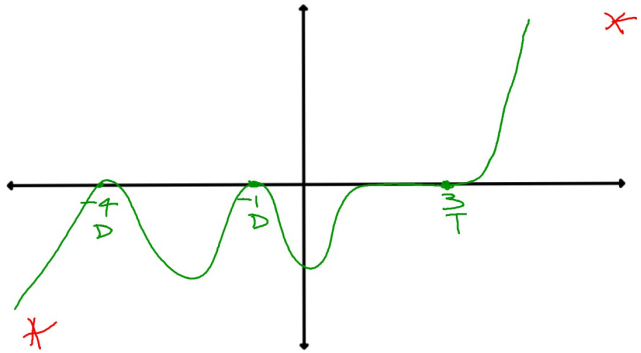
1. Find the Degree and LC
   EVEN POS
2. Determine End Behavior
   (↑ , ↗)
3. Find zeros and what kind
   −2 Double
   5 TRIPLE
   −7 single
4. Place dots on the x-axis for the zeros.
5. Connect Left End to Right End making sure the shape of each zero is correct.



Sketch this function using the shapes of the zeros and the end-behavior

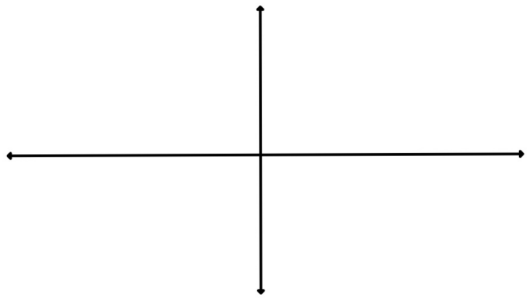
$y = (x+4)^2(x+1)^2(x-3)^3$

DEG = ODD
L.C. = +
(↙ , ↗)



Sketch this function using the shapes of the zeros and the end behavior.

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

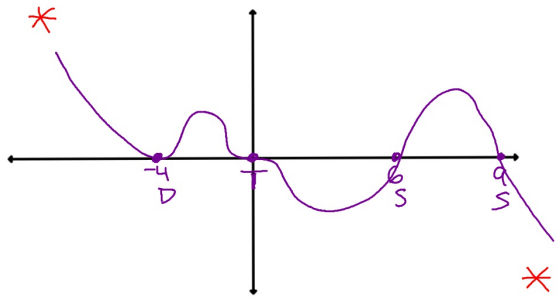


Sketch a graph of this function:

$y = -x^3(x - 6)(x + 4)^2(x - 9)$

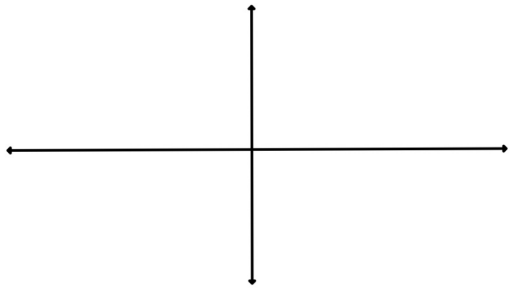
0 6 −4 9
T S D S

ODD
NEG
(↗ ↘)



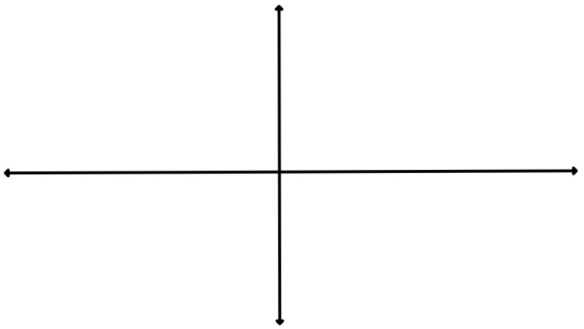
Sketch this function using the shapes of the zeros and the end behavior.

$y = (x - 5)^3(x + 6)^3(x + 2)(x - 1)^2$



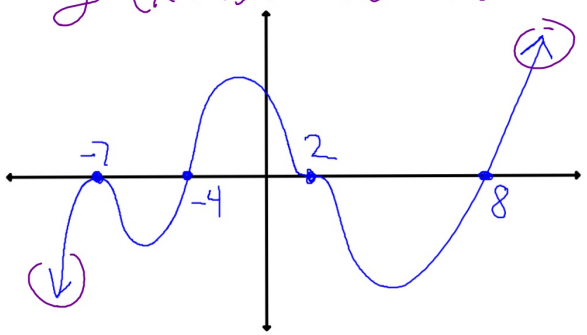
Sketch this function using the shapes of the zeros and the end behavior.

$y = x^2(x + 6)^2(x - 7)^3(x + 3)^2$



Write a possible equation for the function shown in this graph.

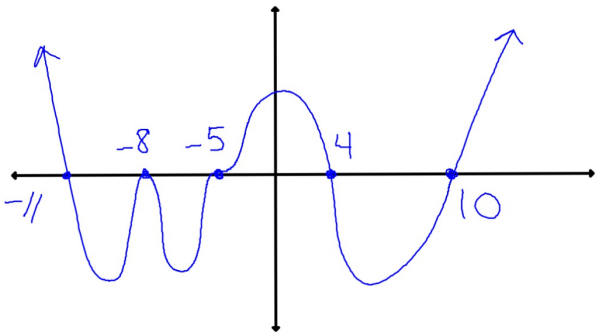
$y = (x+7)^2(x+4)(x-2)^3(x-8)$ ✓



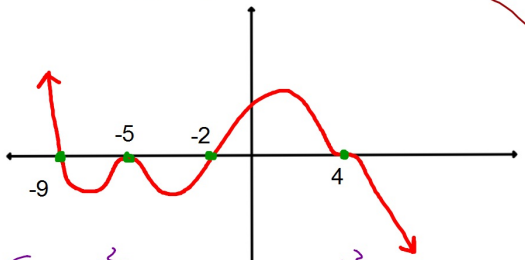
end behavior of the graph shows an POS ODD polynomial.

The equation we wrote is also a POS ODD.

Write a possible equation for the function shown in this graph.



Write the equation of this Polynomial given the polynomial passes through the point (-3, -57624)



$y = a(x+9)(x+5)^2(x+2)(x-4)^3$

$-57624 = a(-3+9)(-3+5)^2(-3+2)(-3-4)^3$
$-57624 = a(6)(2)^2(-1)(-7)^3$
$-57624 = a(8232)$

replace x with -3 and y with -57624 then solve for a.

$a = -7$

$y = -7(x+9)(x+5)^2(x+2)(x-4)^3$