

Shapes of Zeros Exploration

You will be graphing polynomials using the graphing calculator and sketching what you see in the window and answering questions about what the graph looks like at a given spot.

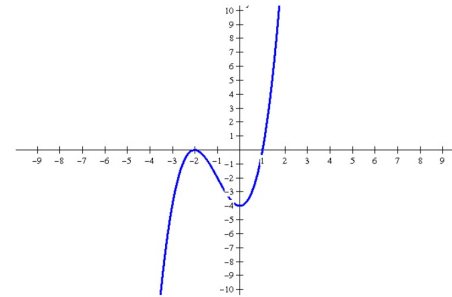
What does it mean when the directions state the following:

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

this means to change
 x_{\min} to 1 and change
 x_{\max} to 3

this means to change
 y_{\min} to -2 and change
 y_{\max} to 2

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



2. Investigate the graph around each zero

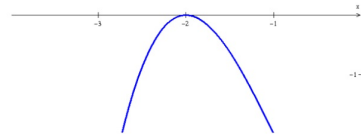
Around -2: Use the following window: $x: [-4, 0]$ & $y: [-2, 2]$

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.

the zero
of -2
has a
multiplicity
of 2

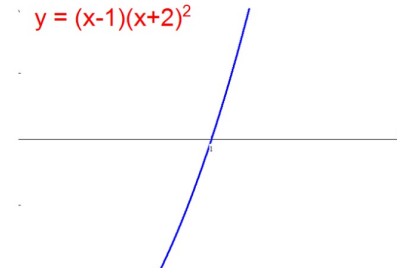
Around 1: Use the following window: $x: [0, 2]$ & $y: [-2, 2]$

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.

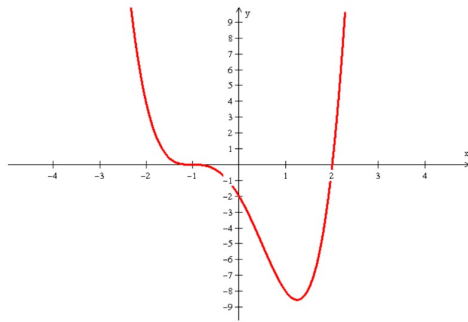


Describe what the graph looks like in this window.

A line that passes right through the x-axis

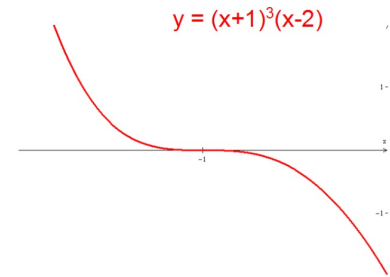
3. Graph $y = (x+1)^3(x-2)$ in the following window and sketch it below:

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



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

Sketch the graph below:



-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

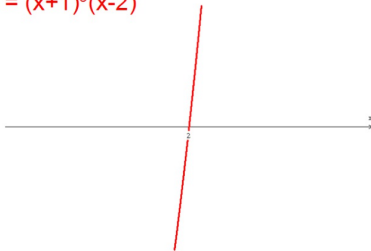
Describe what the graph looks like in this window.

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:

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



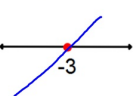
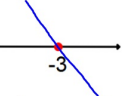
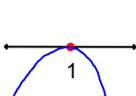
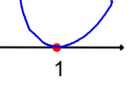

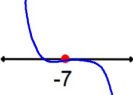
2 is a single zero.

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:	$(x+3)$	-3	 or 
Double Zeros:	$(x-1)^2$	1	 or 
Triple Zeros:	$(x+7)^3$	-7	 or 

Sketch a graph of this function:

1. Find the Degree and LC
EVEN POS

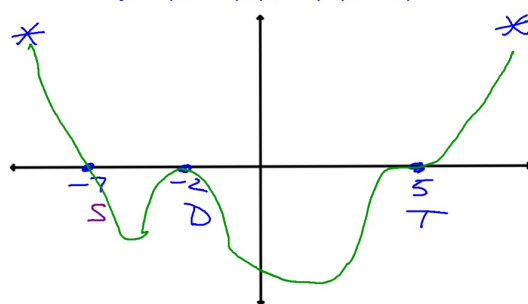
2. Determine End Behavior
(↑, ↑)

3. Find zeros and what kind
-2 → DOUBLE
-7 → TRIPLE
5 → SINGLE

4. Place dots on the x-axis
for the zeros.

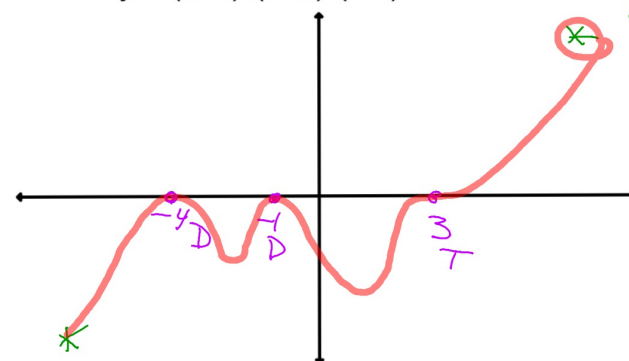
5. Connect Left End to Right
End making sure the
shape of each zero is
correct.

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



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

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



Start in Quadrant III
finish in Quadrant I

- 4 is a double zero
- 1 is a double zero
3 is a triple zero