Cubic Functions

The cubic function is similar to the cubed root. You will notice similarities in the shape of the curve. Translations are the same as any standard function. The range and domain of any cubic function is all real numbers.

$$f_{(x)} = a(x-h)^3 + k$$

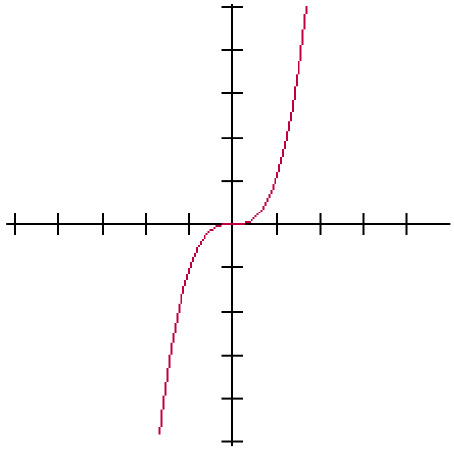
Let us look at this as the standard form of a cubic function. The center of the cubic function is given by (h,k)***. To find the x and y intercepts of the function, follow the standard procedures of substituting zero for one of the values, and solving for the remaining variable.***

All cubic functions in this section will be given to you in this standard form. In the next section of the workbook, we will address polynomial functions that are greater than 2nd degree. These functions will have no standard from with which to work. We will be graphing them by alternative means.

For now we will concentrate on the function $f_{(x)} = x^3$***, and translations of this.***

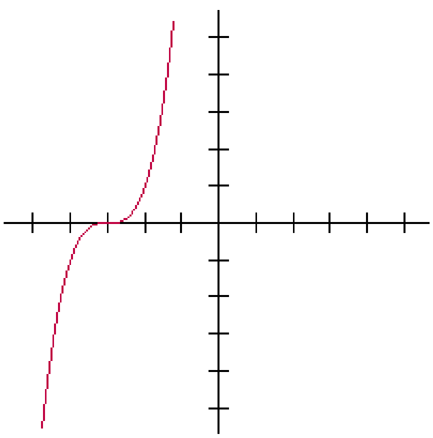
$$f_{(x)} = a(x-h)^3 + k$$

$$f_{(x)} = x^3$$



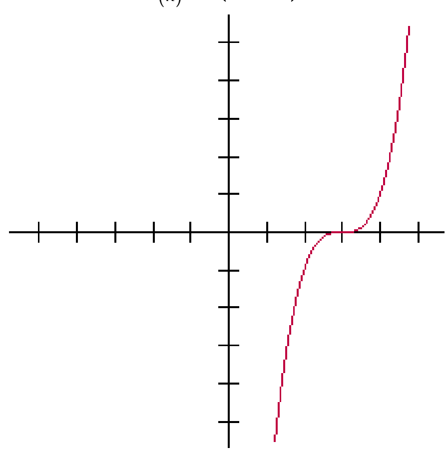
The parent function has the point of origin at (0, 0)

$$f_{(x)} = (x+3)^3$$



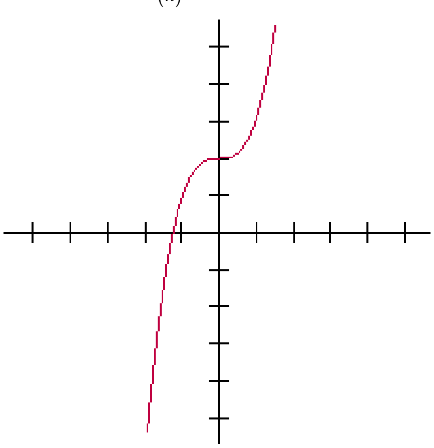
The graph of this function shifts left 3.

$$f_{(x)} = (x-3)^3$$



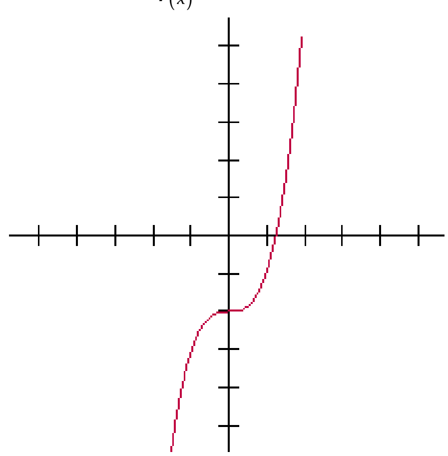
The graph of this function shifts right 3.

$$f_{(x)} = x^3 + 2$$



Graph shifts up 2.

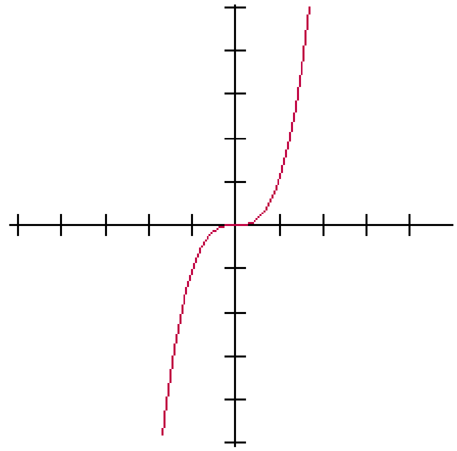
$$f_{(x)} = x^3 - 2$$



Graph shifts down 2.

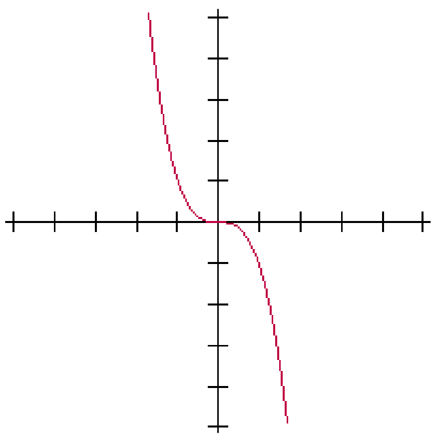
$$f_{(x)} = a(x-h)^3 + k$$

$$f_{(x)} = x^3$$



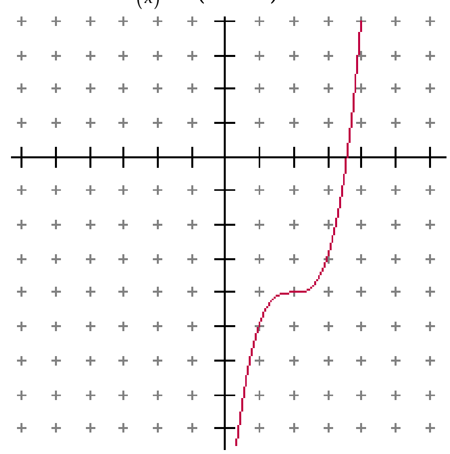
The parent function has the point of origin at (0, 0)

$$f_{(x)} = -x^3$$



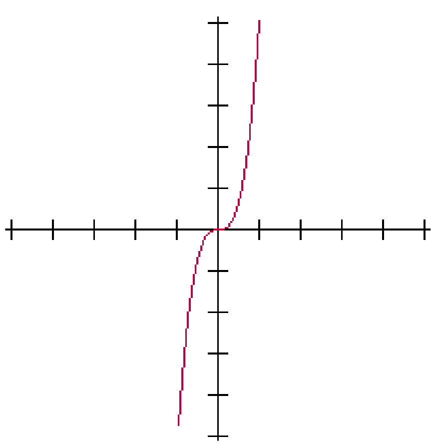
The graph of this function flips upside down.

$$f_{(x)} = (x-2)^3 - 4$$

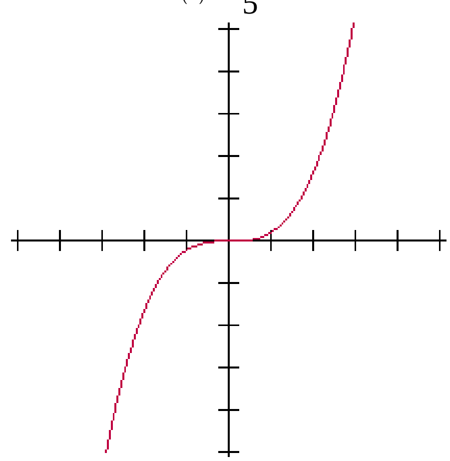


The graph of this function shifts right 2, down 4. vertex at (2,-4).

$$f_{(x)} = 5x^3$$



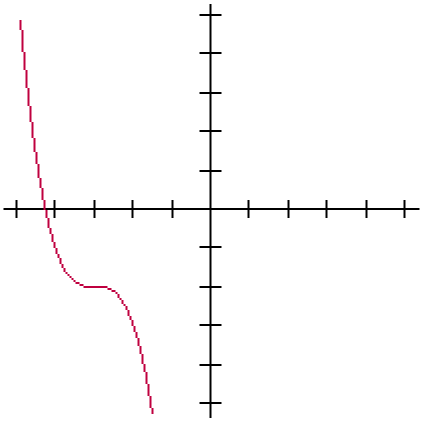
$$f_{(x)} = \frac{1}{5}x^3$$



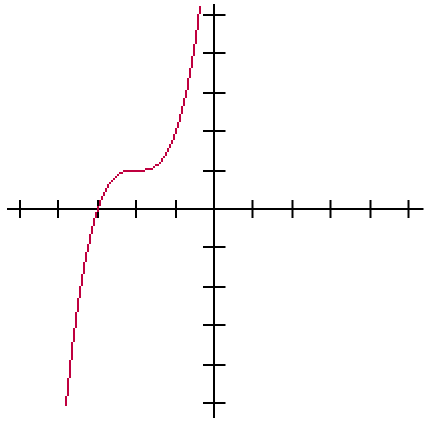
Once again, note difference the value of "a" makes in terms of the scale of the graph.

Match the appropriate graph with its equation below. Explain why each of your solutions is true.

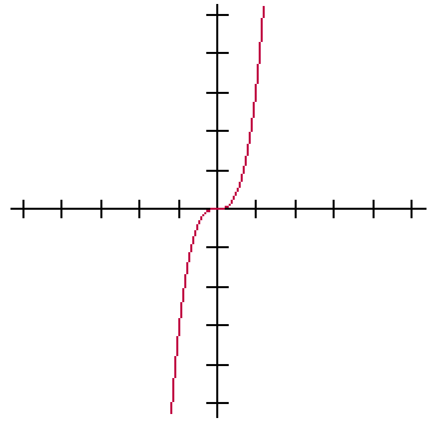
A



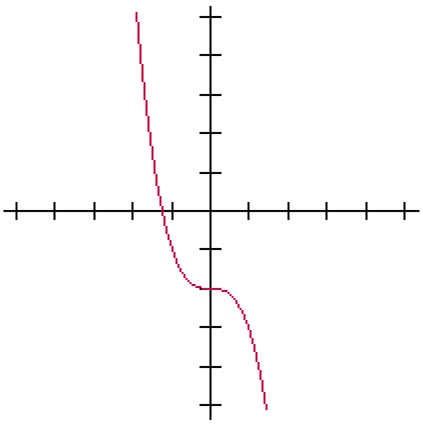
B



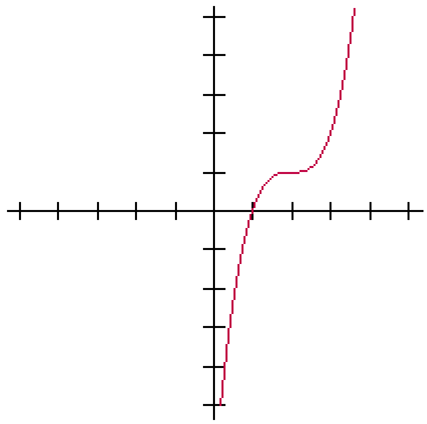
C



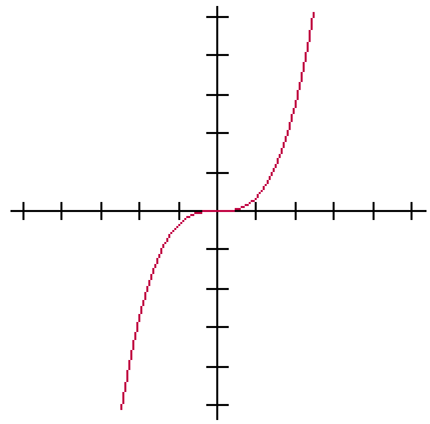
D



E



F



1) $f_{(x)} = -x^3 - 2$

2) $f_{(x)} = (x-2)^3 + 1$

3) $f_{(x)} = (x+2)^3 + 1$

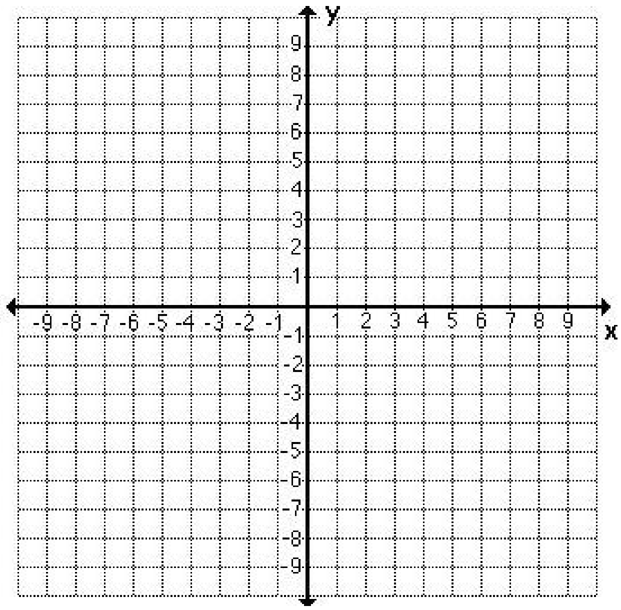
4) $f_{(x)} = \frac{1}{3}x^3$

5) $f_{(x)} = 3x^3$

6) $f_{(x)} = -(x+3)^3 - 2$

Graph each of the following cubic functions. ***Label the vertex, find all intercepts, and the range and domain of each of the following. Don't worry about graphing the intercept if it is too far off the chart.***

A) $f_{(x)} = (x-2)^3 + 3$



Vertex:

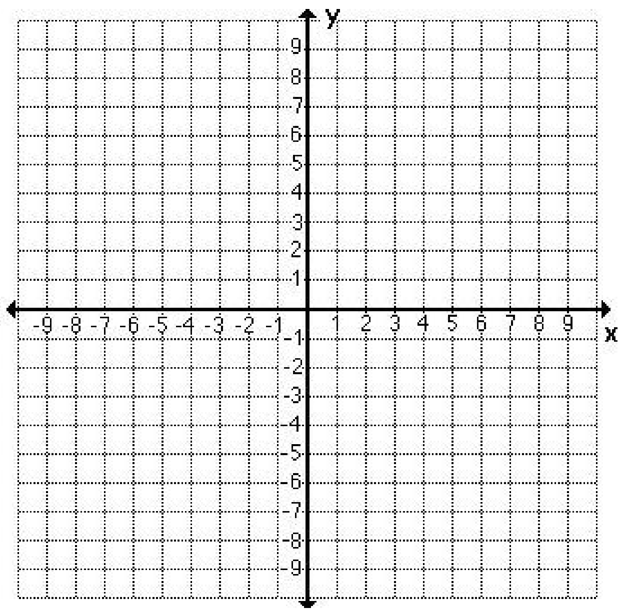
Y-intercept:

X-intercepts:

Range:

Domain:

B) $f_{(x)} = -(x+2)^3 - 1$



Vertex:

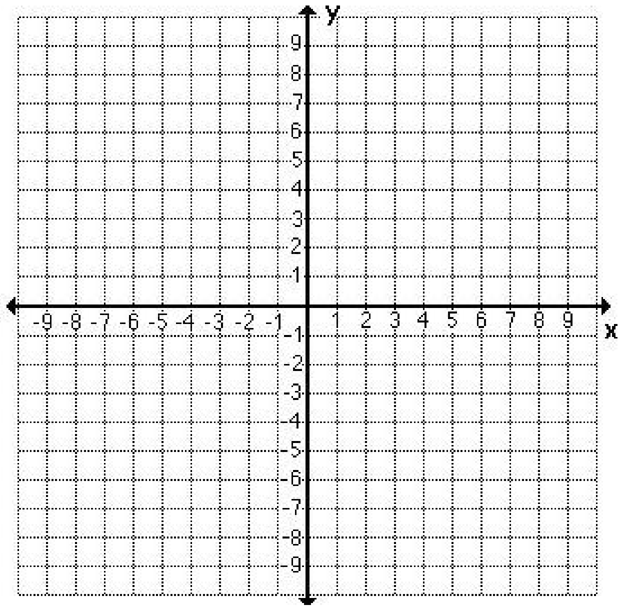
Y-intercept:

X-intercepts:

Range:

Domain:

C) $f_{(x)} = x^3 + 3$



Vertex:

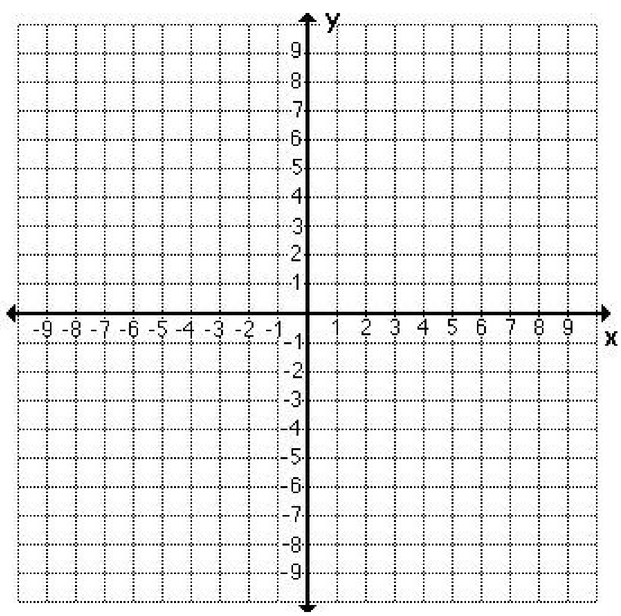
Y-intercept:

X-intercepts:

Range:

Domain:

D) $f_{(x)} = (x+3)^3 - 5$



Vertex:

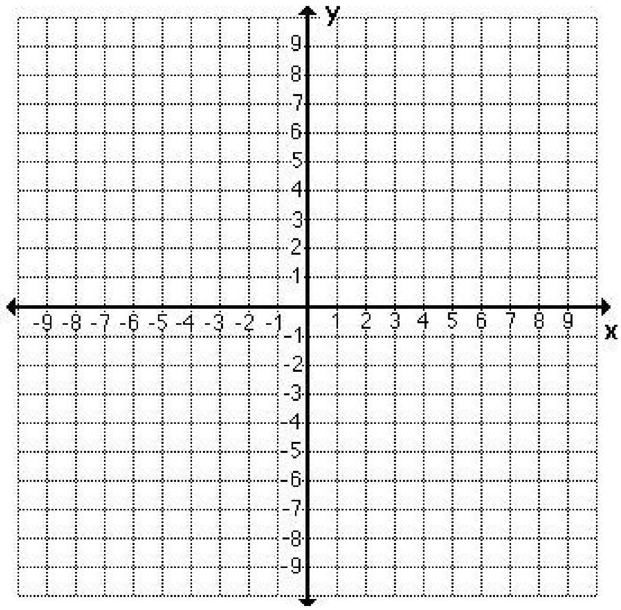
Y-intercept:

X-intercepts:

Range:

Domain:

E) $f_{(x)} = -(x-4)^3 + 2$



Vertex:

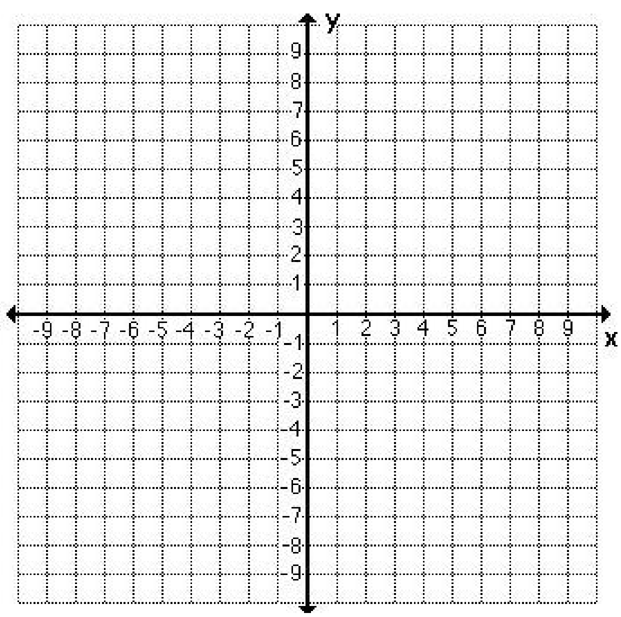
Y-intercept:

X-intercepts:

Range:

Domain:

F) $f_{(x)} = (x-3)^3 - 5$



Vertex:

Y-intercept:

X-intercepts:

Range:

Domain: