College Algebra

2.2 Vertical and Horizontal Shifts of Graphs

There are various ways to transform a function.

Alterations "outside" of the function are akin to vertical transformations and act in the manner we would expect.

$f(x) = x^2$

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

$f(x) = 2x^2$

Alteration "inside" of the function are horizontal movements and act in the manner opposite to what we would expect.

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

$f(x) = (2x)^2$

Investigation 1

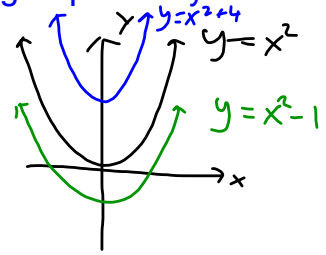
On your calculator graph

$y_1 = x^2$

$y_2 = x^2 + 4$ moves up 4

$y_3 = x^2 - 1$ down 1

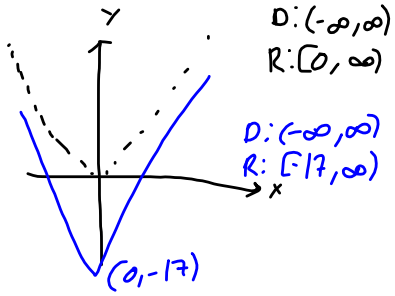
Sketch what you see in your notes and discuss with your group what you see.



TRY

Write the function that moves f(x)=|x| down 17, graph it, show the new critical point and give the new domain and range.

$g(x) = |x| - 17$



D: $(-\infty, \infty)$
R: $[0, \infty)$

D: $(-\infty, \infty)$
R: $[-17, \infty)$

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Investigation 2

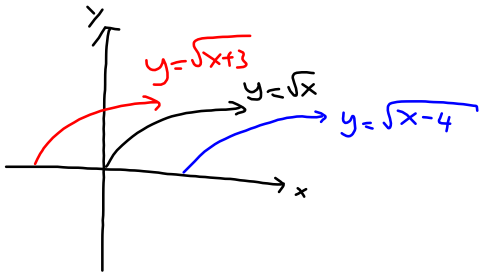
On your calculator graph

$y_1 = \sqrt{x}$

$y_2 = \sqrt{(x - 4)}$

$y_3 = \sqrt{(x + 3)}$

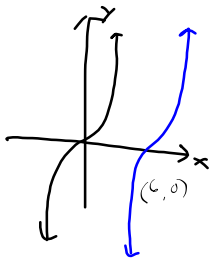
Sketch what you see in your notes and discuss with your group what you see.



TRY

Write the function that moves $f(x)=x^3$ right 6, graph it, show the new critical point and give the new domain and range.

$g(x) = (x-6)^3$



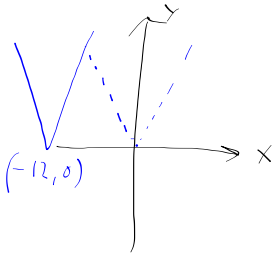
D: $(-\infty,\infty)$

R: $(-\infty,\infty)$

TRY

Write the function that moves g(x)=|x| left 12 units, graph it, show the new critical point and give the new domain and range.

$f(x) = |x+12|$



D: $(-\infty,\infty)$

R: $[0,\infty)$

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Ex.1

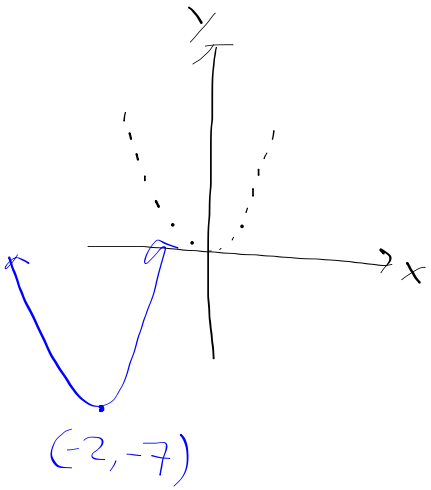
Explain how the graph of $f(x) = (x+2)^2 - 7$ is obtained from the graph of $f(x)=x^2$. Sketch the new graph using the transformations, note any key points, and the domain and range.

Left 2

down 7

D: $(-\infty, \infty)$

R: $[-7, \infty)$

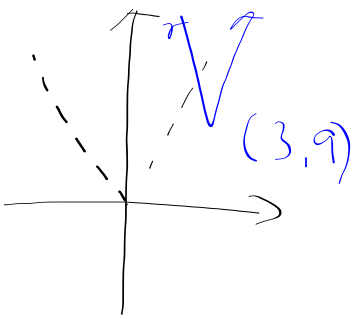


TRY

Explain how the graph of $f(x) = |x-3|+9$ is obtained from the graph of $f(x)=|x|$. Sketch the new graph by hand. Give any critical points and domain and range.

Right 3

Up 9



D: $(-\infty, \infty)$

R: $[9, \infty)$

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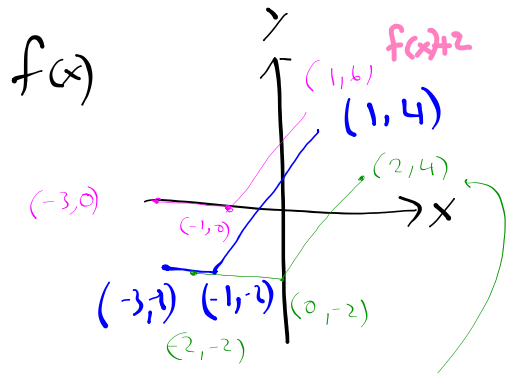
Ex.2

Given the graph of f(x) below, sketch a graph of f(x)+2.



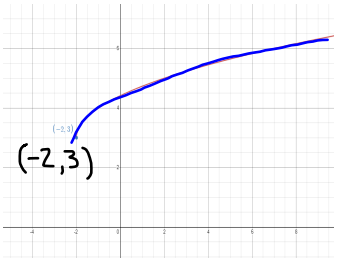
TRY

Sketch a graph of f(x-1)

Right 1

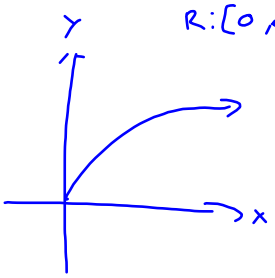
Ex.3

Give the equation of the function graphed below.

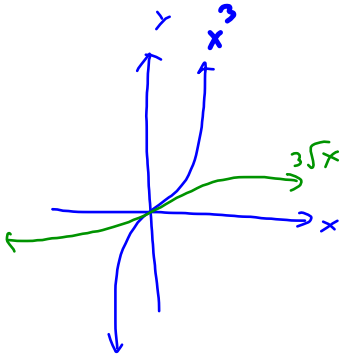


D: $[0,\infty)$

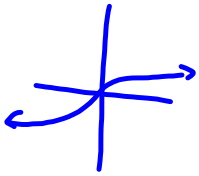
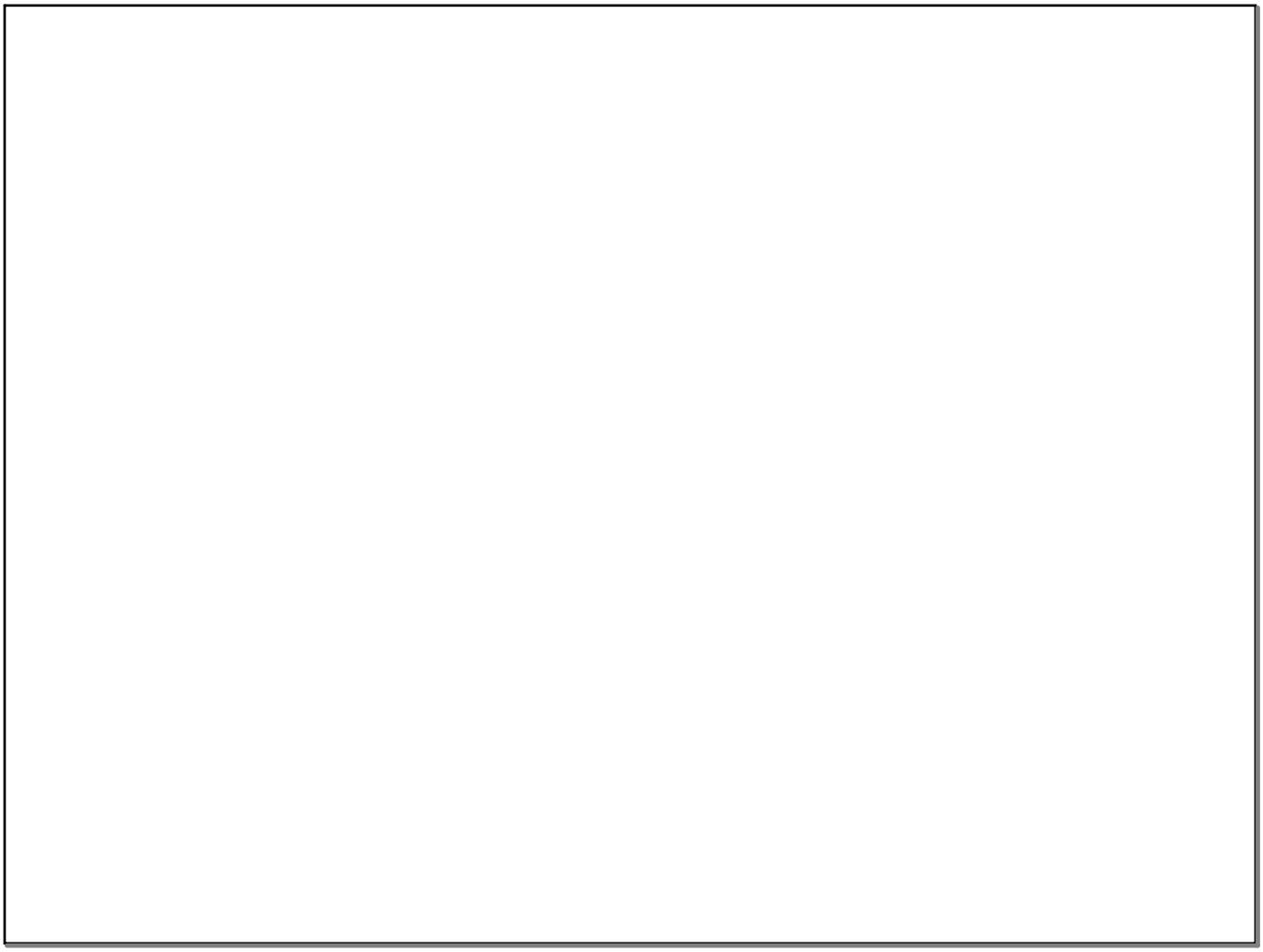
R: $[0,\infty)$



$f(x) = \sqrt{x+2} + 3$



$\sqrt[3]{x}$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