Name _____

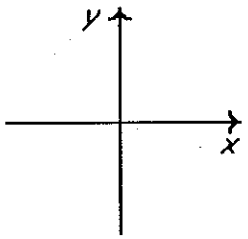
Concepts Worksheet 2

Chapter 1 For use after Article 1.4.

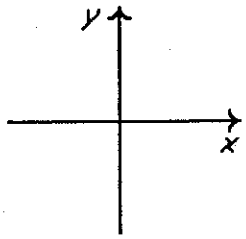
Graphical Transformations

Graph each indicated function on the coordinate axes provided. Clearly indicate units on each axis.

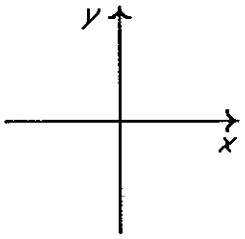
1.a. Graph $f(x) = 2x + 1$



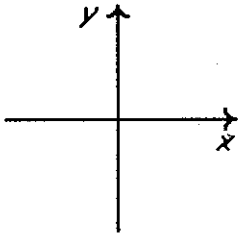
b. Using $f(x)$ above, graph $g(x) = f(-x)$



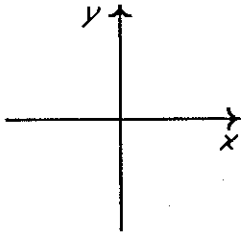
2.a. Graph $f(x) = \sqrt{x}$



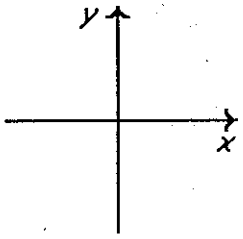
b. Using $f(x)$ above, graph $g(x) = -f(x)$



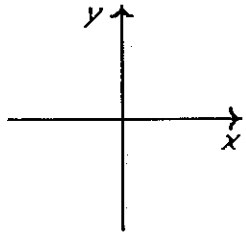
3.a. Graph $f(x) = 2^x$



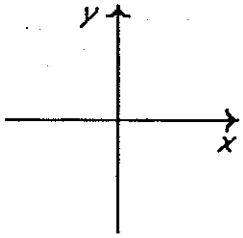
b. Using $f(x)$ above, graph $g(x) = f(x) + 1$



4.a. Graph $f(x) = x^2$



b. Using $f(x)$ above, graph $g(x) = f(x - 2)$



5. Generalize what is happening geometrically when using $f(x)$ to obtain the graph of:

a. $f(-x)$ _____

b. $-f(x)$ _____

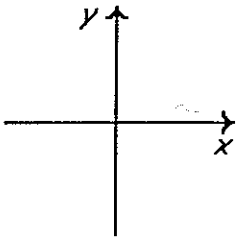
c. $f(x) + c$ _____ for $c > 0$

_____ for $c < 0$

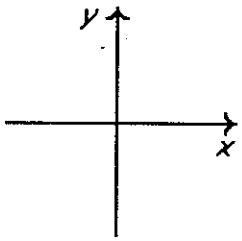
d. $f(x - c)$ _____ for $c > 0$

_____ for $c < 0$

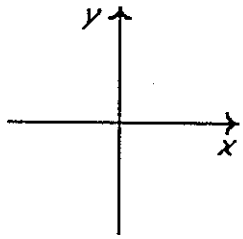
6.a. Graph $f(x) = \sin x$



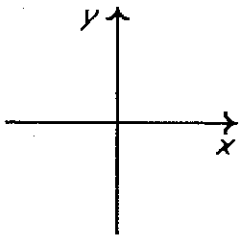
b. Using $f(x)$ in a, graph $g(x) = 2f(x)$



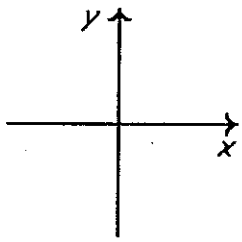
c. Using $f(x)$ in a, graph $h(x) = f(2x)$



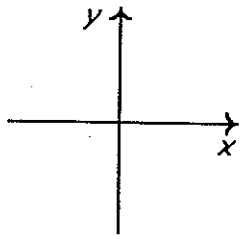
7.a. Graph $f(x) = |x|$



b. Using $f(x)$ in a, graph $g(x) = \frac{1}{3}f(x)$



c. Using $f(x)$ in a, graph $h(x) = f\left(\frac{x}{3}\right)$



8. Generalize what geometric transformation takes place when using $f(x)$ to obtain the graph of:

a. $cf(x)$ _____ for $c > 1$

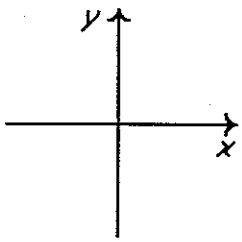
and _____ for $0 < c < 1$

b. $f(cx)$ _____ for $c > 1$

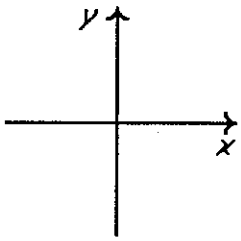
and _____ for $0 < c < 1$

9. Using a basic function (one of the 16 from Worksheet 1) and transformational geometry, quickly sketch the following. Indicate units on the coordinate axes.

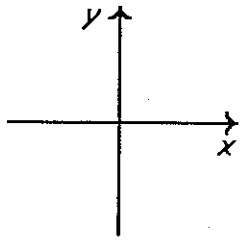
a. $f(x) = 2^{-x}$



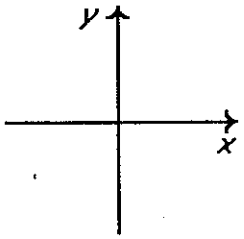
b. $f(x) = -\sec x$



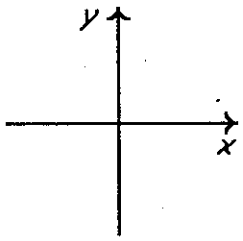
c. $f(x) = 2[\![x]\!]$



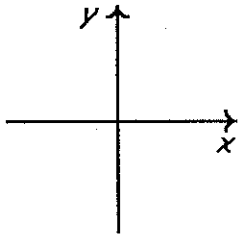
d. $f(x) = (x + 1)^3$



e. $f(x) = 1 + \frac{1}{x^2}$



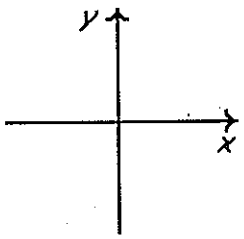
f. $f(x) = \tan\left(x - \frac{\pi}{4}\right)$

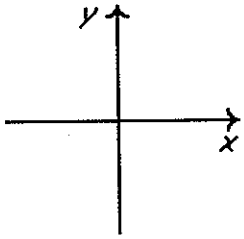


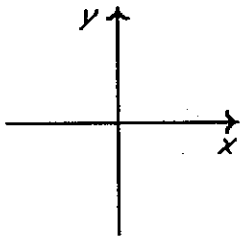
10.a. Using $f(x) = \frac{1}{x}$ as the basic function, describe a sequence of geometric transformations involved in graphing $f_4(x) = \frac{-2}{x - 3}$. Sketch the sequence of transformations below and algebraically describe each function graphed: (NOTE: The sequence of steps may vary.)

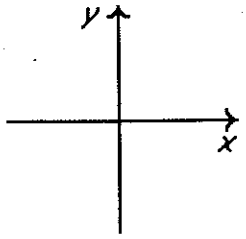
Beginning with → ..... → and ending with

$f_1(x) = \frac{1}{x}$ $f_2(x) =$ _____ $f_3(x) =$ _____ $f_4(x) = \frac{-2}{x - 3}$





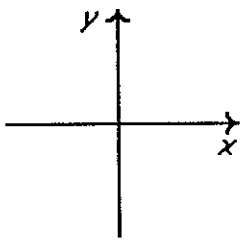


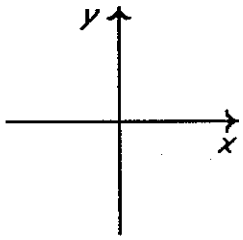


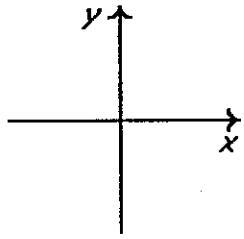
b. Sketch a sequence of geometric transformations and state the algebraic description of each function as done in part(a):

Beginning with → ..... → and ending with

$f_1(x) = \log_2 x$ $f_2(x) =$ _____ $f_3(x) = \log_2(1 - x)$

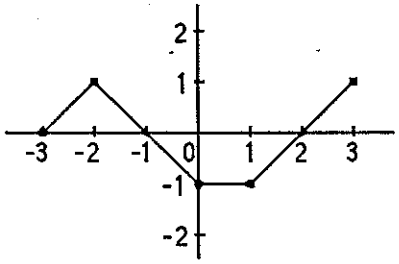






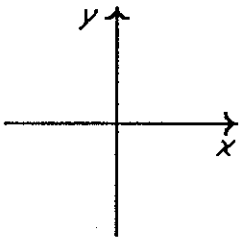
Concept Connectors

11. Given the graph of $f(x)$ as shown below over the domain $-3 \le x \le 3$

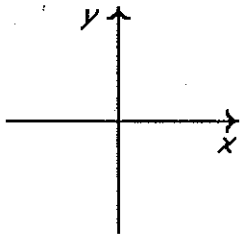


Graph (indicate units on the coordinate axes):

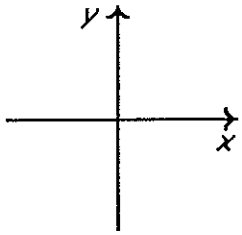
a. $f_1(x) = f(-x)$



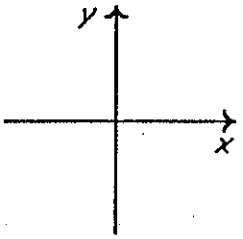
b. $f_2(x) = -f(x)$



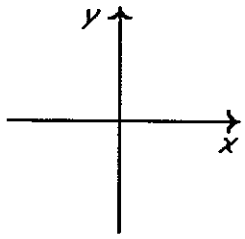
c. $f_3(x) = f(x) - 1$



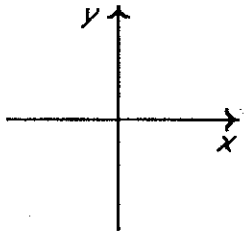
d. $f_4(x) = f(x - 1)$



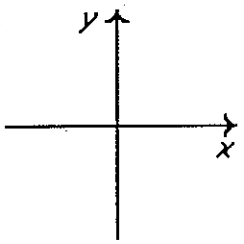
e. $f_5(x) = f(2x)$



f. $f_6(x) = 1 - f(x)$



g. $f_7(x) = f(2 - x)$



h. $f_8(x) = \frac{1}{2} f\left(\frac{x}{2}\right)$