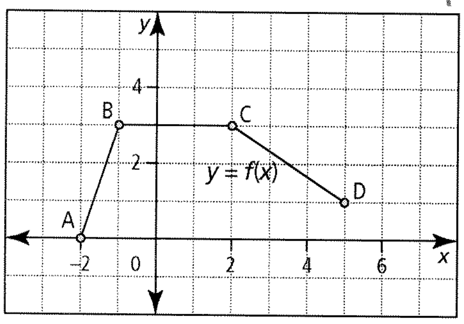
$y = f(x-4) - 2$

Chapter 1 Review

1. Consider the graph of $y = f(x)$. Use the function $y + 2 = f(x - 4)$ to state the coordinates of the image points A′, B′, C′, and D′. (4 marks)



MR ⇒ $(x,y) \to (x+4, y+2)$

A $(-2,0)$ A′ $(2,2)$
B $(-1,3)$ B′ $(3,5)$
C $(2,3)$ C′ $(6,5)$
D $(5,1)$ C′ $(9,3)$

$x^{1/2}$ $x^{1/2}$ $x^{1/5}$ $x^{1/5}$

2. The domain of $y = f(x)$ is $\{x \mid -6 \le x \le 4, x \in R\}$ and the range is $\{y \mid -6 \le y \le 9, y \in R\}$. What are the domain and range of $g(x) = \frac{1}{5}f(2x)$? (4 marks)

D = $\{x \mid -3 \le x \le 2, x \in R\}$ R = $\{y \mid -6/5 \le y \le 9/5, y \in R\}$

3. Consider the function $f(x) = (x+3)(x-7)$. What are the zeros of the function if the graph is transformed by a vertical stretch about the x-axis by a factor of 2 and reflected over the x-axis? (4 marks)

$x = -3$ or $x = 7$ They do not change!

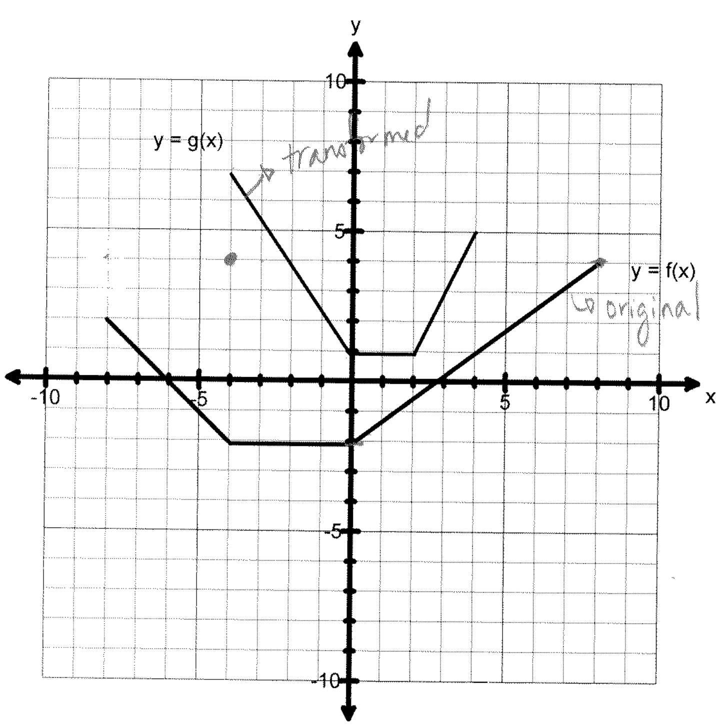
4. Write the equation for the transformation of $y = x^2$ in the form $y = af(b(x-h)) + k$. A horizontal stretch by a factor of 3 translated 4 units left and 2 units up. (3 marks)

equation $y = f(\frac{1}{3}(x+4)) + 2$

5. Describe the combination of transformations that must be applied to the function $y = f(x)$ in order to obtain the transformed function. $y = \frac{1}{2}f(3x+9)$ $f = \frac{1}{2}f(3(x+3))$ (3 marks)

VS = $\frac{1}{2}$ HS = $\frac{1}{3}$ HT = -3

6. The graph of the function $y = g(x)$ represents a transformation of the graph of $y = f(x)$. Determine the equation of $g(x)$ in the form $y = af(b(x-h)) + k$. (8 marks)



$(8,4) \to (4,7)$

f(x): range -6, domain 16
g(x): range 6, domain 8
reflected over y-axis
moved up 3

$y = f(-2(x)) + 3$

7. Determine algebraically the equation of the inverse of the following functions. (6 marks)

a) $f(x) = \frac{6x-12}{2}$

$x = \frac{6y-12}{2}$

$\frac{2x+12}{6} = y$

$\frac{x}{3} + 2 = y$

b) $h(x) = (x+3)^2 - 4$

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

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

$\pm\sqrt{x+4} - 3 = y$

$f^{-1}(x) = \pm\sqrt{x+4} - 3$

$x \geq -3$

8. Determine each of the following given the function, $f(x) = x + 5$ (4 marks)

a) $f^{-1}(4)$ $\quad x = y+5$ $\quad y = -x+5$ $\quad = -4+5 = 1$

b) $f^{-1}(-2)$ $\quad y = -x+5$ $\quad y = -(-2)+5$ $\quad = 7$

9. The key point (24, -6) is on the graph of $y = f(x)$. What is its image point under each transformation of the graph of $f(x)$? (4 marks)

a) $y = -2f(6x)$ $\quad (x,y) \to (\frac{1}{6}x, -2y)$ $\quad (4, 12)$

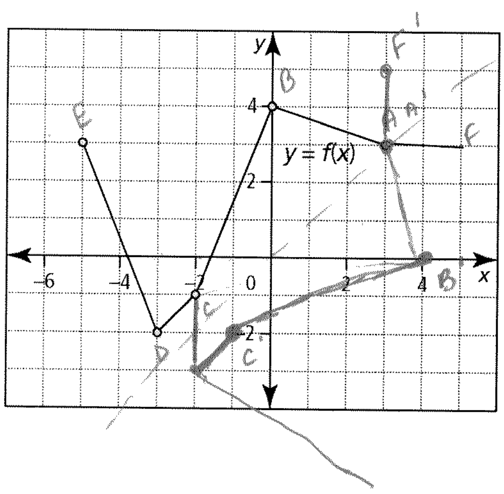
b) $y + 4 = -3f(x - 5)$ $\quad (x,y) \to (x+5, -3y-4)$ $\quad (29, 14)$

10 a) Graph $f(x) = (x+2)^2 + 3$. State the domain and range. (6 marks)

b) Graph the inverse of $f(x) = (x+2)^2 + 3$. State the domain and range.

c) How can you restrict the domain of the relation so that the inverse is a function?

11. Copy the graph of $y = f(x)$. Then, sketch the graph of its inverse, $x = f(y)$. Determine whether the inverse is a function. (4 marks)



#10. $y = (x+2)^2 + 3$

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

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

$\pm\sqrt{x-3} = y+2$

$y = \pm\sqrt{x-3} - 2$

$f^{-1}(x) = \sqrt{x-3} - 2$

restricted domain (vertex of original)

$\boxed{x \geq -2}$