dnp V17

1. Multiple choice (circle the correct answer):

- The relation that is also a function is:

  a) $x^2 + y^2 = 25$ circle b) $f(x) = x^2$ parabola c) $\sqrt{y^2} = \sqrt{x}$ $y = \mp\sqrt{x}$ d) $g(x) = \pm\sqrt{x}$

- Given $f(x) = x^2 - x + 3$, then:

  $f(-1) = (-1)^2 - (-1) + 3 = 1 + 1 + 3 = 5$

  a) $f(-1) = -5$ b) $f(-1) = 1$ c) $f(-1) = -1$ d) $f(-1) = 5$

- The range that best corresponds to $f(x) = \dfrac{1}{x+3}$ is: $f(x) = \frac{1}{x+3} + 0 \rightarrow$ range

  a) $\{y \in \Re, y \neq 3\}$ b) $\{y \in \Re\}$ c) $\{y \in \Re, y \neq -3\}$ d) $\{y \in \Re, y \neq 0\}$

- If $f(x) = \dfrac{1}{2}x - 8$, then the proper equation of its inverse is:

  $x = \frac{y}{2} - 8$

  $x + 8 = \frac{y}{2}$

  $y = 2(x+8)$

  $f(x) = 2(x+8)$

  a) $y = -\dfrac{1}{2}x + 8$ b) $x = \dfrac{1}{2}y - 8$ c) $f^{-1}(x) = 2(x+8)$ d) $f^{-1}(x) = 2x + 8$

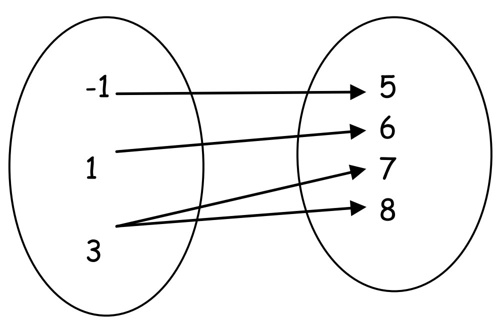
- For the graph of $f(x) = \sqrt{x}$, identify the transformation that would ***not*** be applied to $f(x)$ to obtain the graph of $y = 2f(-2x) + 3$:

  a) Vertical stretch by a factor of 2 b) ~~Vertical~~ horizontal reflection
  c) Vertical translation up 3 units d) Horizontal compression by a factor of ½

- The range of $f(x) = -\sqrt{x-2}$ is: $f(x) = -\sqrt{x-2} + 0$

  a) $\{y \in \Re, y \leq 2\}$ b) $\{y \in \Re, y \geq 0\}$ c) $\{y \in \Re, y \leq 0\}$ d) $\{y \in \Re, 0 \leq y \leq 2\}$

2. Determine if each relation represents a function, then state its domain and range:



x	y
0	- 4
1	- 4
2	8
3	1

Function? (yes / no) x repeats	Function? (yes / no)
D: {-1, 1, 3}	D: {0, 1, 2, 3}
R: {5, 6, 7, 8}	R: {-4, 8, 1}

3. Consider the parent function $f(x)=\sqrt{x}$. Write the equation of the function after the following transformations: a horizontal reflection, a vertical stretch by a factor of 2, and a vertical translation 4 units up. Use the notation $g(x)$ for the new function.

$g(x)=2\sqrt{-x}+4$

4. If $g(x)=\frac{1}{2}(x-4)^2-1, \quad x\le 4$, determine:

a) the equation of its inverse, $g^{-1}(x)$

$x=\frac{1}{2}(y-4)^2-1$

$2\cdot(x+1)=\frac{1}{2}(y-4)^2\cdot 2$

$\sqrt{2(x+1)}=\sqrt{(y-4)^2}$

$-\sqrt{2(x+1)}=y-4$

$-\sqrt{2(x+1)}+4=y$

$\therefore g^{-1}(x)=-\sqrt{2(x+1)}+4$

b) $g^{-1}(7)$

$g^{-1}(7)=-\sqrt{2(7+1)}+4$

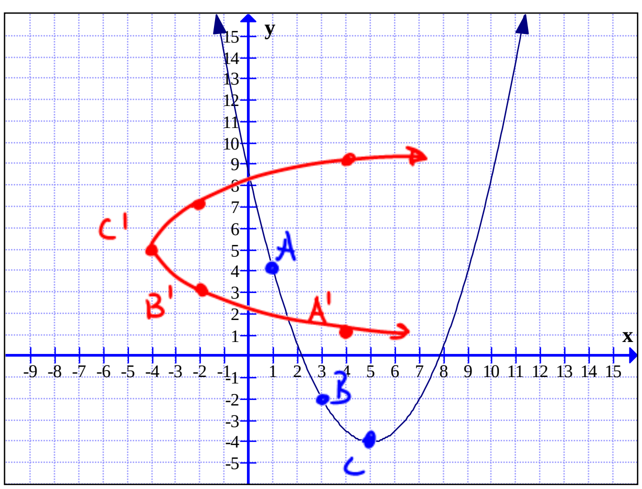
$=-\sqrt{2\cdot 8}+4$

$=-4+4$

$g^{-1}(7)=0$

5. The graph of $h(x)$ is shown below.

a) Graph $h^{-1}(x)$ on the same grid then state its domain and range.



$A(1,4)\rightarrow A'(4,1)$

$B(3,-2)\rightarrow B'(-2,3)$

$C(5,-4)\rightarrow C'(-4,5)$

Domain of $h^{-1}(x)$: $\{x\in\mathbb{R}\mid x\geq -4\}$

Range of $h^{-1}(x)$: $\{y\in\mathbb{R}\}$

a) Is $h^{-1}(x)$ a function? If yes, justify. If not, state the restriction on the domain of $h(x)$ such that both $h(x)$ and $h^{-1}(x)$ would be functions.

No, b/c it does not pass VLT

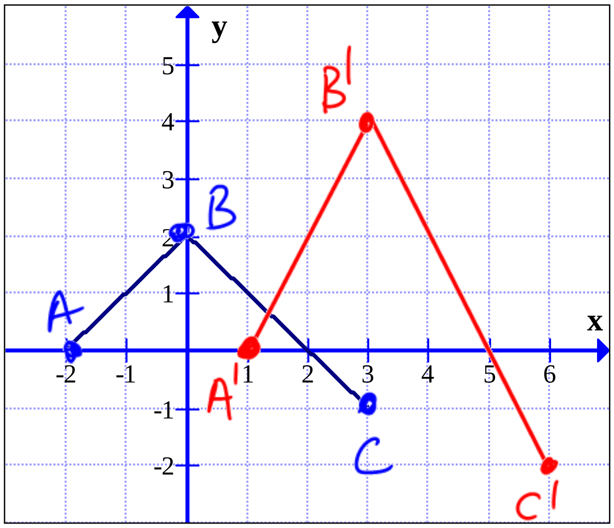
Restriction D: $\{x\in\mathbb{R}\mid x\leq 5\}$ or D: $\{x\in\mathbb{R}\mid x\geq 5\}$

6\. a) The graph of $f(x)$ is shown below. Sketch the graph of $g(x)=2f(x-3)$ $+0$

a, $k=1$, $d=3$, c

$(x,y)\rightarrow\left(\frac{x}{k}+d,\ a\cdot y+c\right)$

$(x,y)\rightarrow(x+3,\ 2y+0)$



$A(-2,0)\rightarrow A'(-2+3,\ 2\cdot0)=(1,0)$

$B(0,2)\rightarrow B'(0+3,\ 2\cdot2)=(3,4)$

$C(3,-1)\rightarrow C'(3+3,\ 2\cdot-1+0)=(6,-2)$

b) Write the mapping notation of the point (x,y) on $f(x)$ transformed into its image point on $g(x)$:

$(x,y)\longrightarrow($, $)$

7\. Sketch each relation on the grids provided. State the domain and range of each:

a) $f(x)=\left(\frac{2}{x-5}\right)+4$

asymptotes: $x\neq5$, $y\neq4$

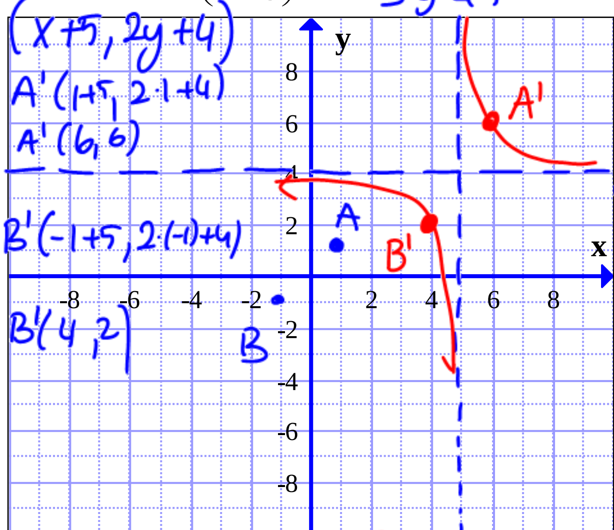
$(x,y)\rightarrow(x+5,\ 2y+4)$

$A(1,1)\rightarrow A'(1+5,\ 2\cdot1+4)$

$A'(6,6)$

$B(-1,-1)\rightarrow B'(-1+5,\ 2(-1)+4)$

$B'(4,2)$



D: $\{x\in\mathbb{R}\mid x\neq5\}$

R: $\{y\in\mathbb{R}\mid y\neq4\}$

b) $g(x)=3\sqrt{-(x+5)}$

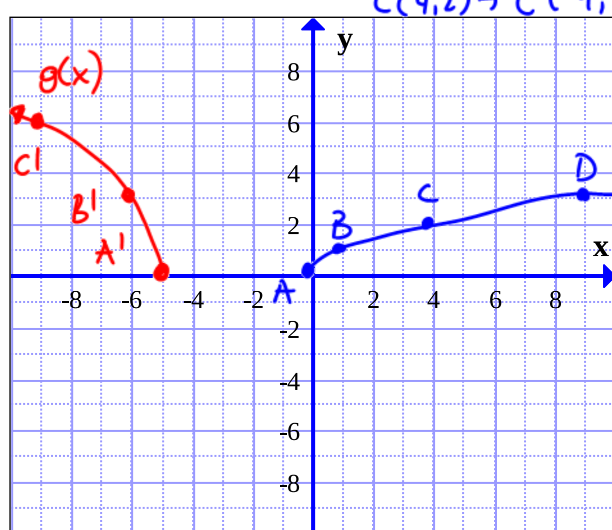
$d=-5$

$(x,y)\rightarrow(-x-5,\ 3y)$

$A(0,0)\rightarrow A'(-5,0)$

$B(1,1)\rightarrow B'(-1-5,\ 3\cdot1)=$ (6

$C(4,2)\rightarrow C'(-9,6)$



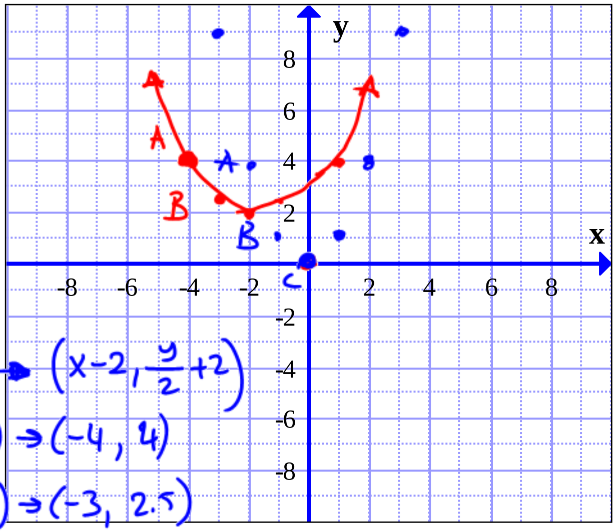
D: $\{x\in\mathbb{R}\mid x\leq-5\}$

R: $\{y\in\mathbb{R}\mid y\geq0\}$

$f(x) = \sqrt{x}$

x	$\sqrt{x}$
0	0
1	1
4	2
9	3

c) $h(x) = \frac{1}{2}(x+2)^2 + 2$



$(x,y) \to \left(x-2, \frac{y}{2}+2\right)$

$A(-2,4) \to (-4,4)$

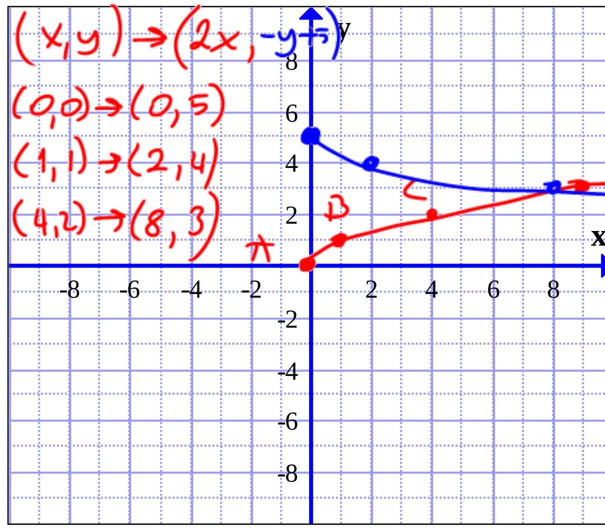
$B(-1,1) \to (-3, 2.5)$

$C(0,0) \to (-2,2)$

D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R} \mid y \geq 2\}$

d) $k(x) = -\sqrt{\frac{1}{2}(x)} + 5$



$(x,y) \to (2x, -y+5)$

$(0,0) \to (0,5)$

$(1,1) \to (2,4)$

$(4,2) \to (8,3)$

$f(x) = \sqrt{x}$

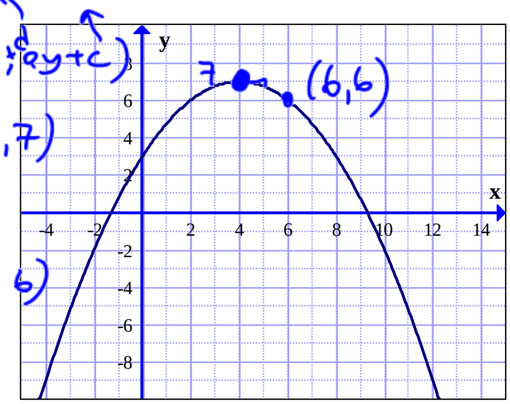
$k(x)$

D: $\{x \in \mathbb{R} \mid x \geq 0\}$

R: $\{y \in \mathbb{R} \mid y \leq 5\}$

9. State the parent function $f(x)$ and the equation of each of the graphs below, $g(x)$ and $h(x)$, after the transformations applied to the parent function.

a)



$(x,y) \to \left(\frac{x}{k}+d, ay+c\right)$

$(0,0) \to (4,7)$

$(1,1) \to ?$

$(2,4) \to (6,6)$

$\frac{2}{k} + 4 = 6$

$\frac{2}{k} = 2$

$\boxed{k=1}$

$4a + 7 = 6$

$4a = -1$

$\boxed{a = -1/4}$

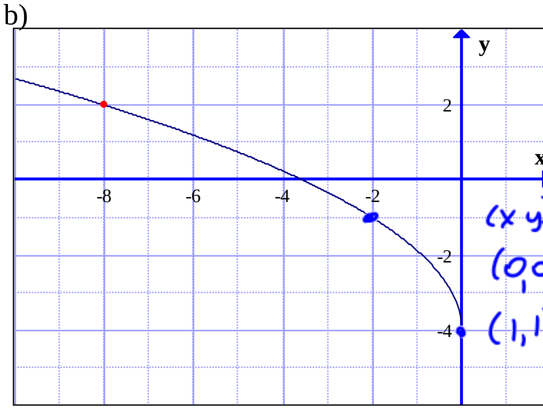
$f(x) =$ x^2

$g(x) =$ $-\frac{1}{4}(x-4)^2 + 7$

$y = af[k(x-d)] + c$

$= -\frac{1}{4}(x-4)^2 + 7$

b)



$d = 0 \quad c = -4$

$(x,y) \to \left(\frac{x}{k}+d, ay+c\right)$

$(0,0) \to (0,-4)$

$(1,1) \to (-2,-1)$

$\frac{1}{k} + 0 = -2$

$\frac{1}{k} = -2$

$\boxed{k = -1/2}$

$f(x) =$ $\sqrt{x}$

$h(x) =$ $3\sqrt{-\frac{1}{2}x} - 4$

$a(1) - 4 = -1$

$\boxed{a = 3}$