

# Solutions

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3. Complete the table for the point (1, 1).

$f(x)$	$f(3x)$	$f(-3x)$	$5f(-3x)$	$5f(-3(x-2)) + 4$
(1, 1)	$(\frac{1}{3}, 1)$	$(-\frac{1}{3}, 1)$	$(-\frac{1}{3}, 5)$	$(-\frac{5}{3}, 9)$

$$k=3 \Rightarrow \frac{x}{k} = \frac{1}{3}$$

$$k=-3 \Rightarrow \frac{x}{k} = -\frac{1}{3}$$

$$a=5 \Rightarrow ay = 5(1) = 5$$

$$k=-3 \Rightarrow \frac{x}{k} = -\frac{1}{3}$$

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$$\begin{aligned} d=2 &\Rightarrow \frac{x}{k} + d \\ &= -\frac{1}{3} + 2 \\ &= \frac{5}{3} \end{aligned}$$

$$a=5 \Rightarrow ay = 5(1) = 5$$

$$\begin{aligned} c=4 &\Rightarrow ay + c \\ &= 5(1) + 4 \\ &= 9 \end{aligned}$$

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6. Explain what transformations you would need to apply to the graph of

$y = f(x)$  to graph each function.

a)  $y = f\left(\frac{1}{3}(x + 4)\right)$

HS Factor of 3

HT Left 4

b)  $y = 2f(-(x - 3)) + 1$

Reflection in  $y$ -axis

HT Right 3

VS Factor of 2

VT Up 1

c)  $y = -3f(2(x - 1)) - 3$

HC Factor of  $\frac{1}{2}$

HT Right 1

Reflection in  $x$ -axis

VS Factor of 3

VT Down 3

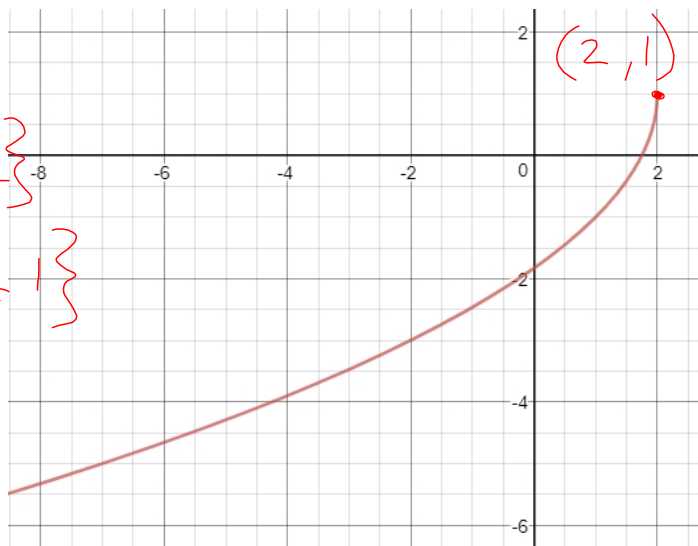
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8. If  $f(x) = \sqrt{x}$ , sketch the graph of each function and state the domain and range.

c)  $y = -2f(-(x - 2)) + 1$

$$D = \{x \in \mathbb{R} \mid x \leq 2\}$$

$$R = \{y \in \mathbb{R} \mid y \leq 1\}$$



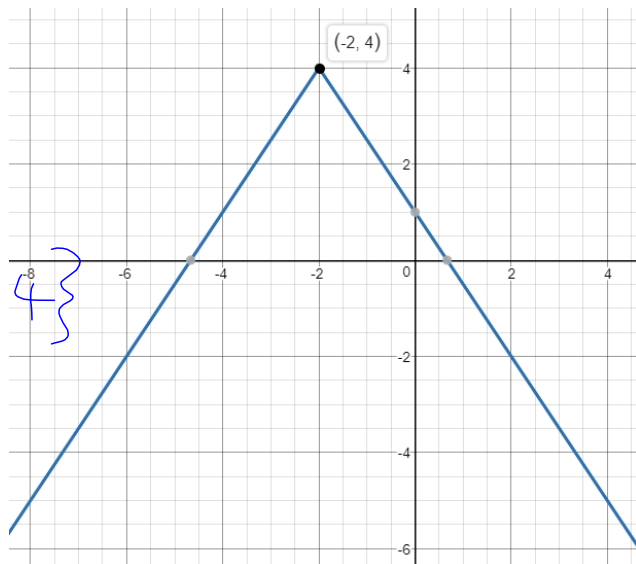
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9. If  $f(x) = |x|$ , sketch the graph of each function and state the domain and range.

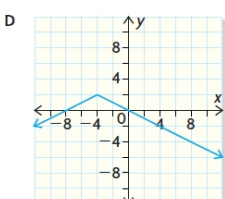
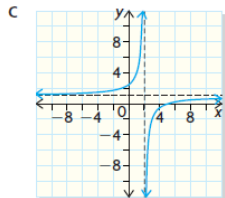
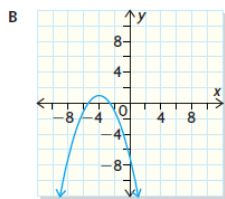
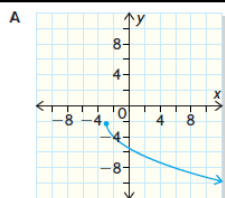
c)  $y = -\frac{1}{2}f(3(x+2)) + 4$

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

$R = \{y \in \mathbb{R} \mid y \leq 4\}$



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18. Match each equation to its graph. Explain your reasoning.

a)  $y = \frac{3}{-(x-2)} + 1$

e)  $y = -\frac{4}{x} - 3$

b)  $y = 2|x - 3| - 2$

f)  $y = -0.5|x + 4| + 2$

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

g)  $y = -0.5\sqrt{1-x} + 1$

d)  $y = (0.25(x-2))^2 - 3$

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

A  $\Rightarrow$  Root function  
Vertex  $(-3, -2) \Rightarrow (c)$

B  $\Rightarrow$  Quadratic function  
Vertex  $(-4, 1) \Rightarrow (h)$

C  $\Rightarrow$  Reciprocal function  
VA  $x=2$ , HA  $y=1 \Rightarrow (a)$

D  $\Rightarrow$  Absolute function  
Vertex  $(-4, 2) \Rightarrow (f)$

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18. Match each equation to its graph. Explain your reasoning.

a)  $y = \frac{3}{-(x-2)} + 1$       e)  $y = -\frac{4}{x} - 3$   
 b)  $y = 2|x - 3| - 2$       f)  $y = -0.5|x + 4| + 2$   
 c)  $y = -2\sqrt{x+3} - 2$       g)  $y = -0.5\sqrt{1-x} + 1$   
 d)  $y = (0.25(x-2))^2 - 3$       h)  $y = -\frac{1}{2}(x+4)^2 + 1$

E  $\Rightarrow$  Absolute function  
 Vertex (3, -2)  $\Rightarrow$  (b)

F  $\Rightarrow$  Reciprocal function  
 VA  $x=0$  HA  $y=-3 \Rightarrow$  (e)

G  $\Rightarrow$  Quadratic function  
 Vertex (2, -3)  $\Rightarrow$  (d)

H  $\Rightarrow$  Root function  
 Vertex (1, 1)  $\Rightarrow$  (g)  
 $[-0.5\sqrt{-(x-1)} + 1]$

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19. The function  $y = f(x)$  has been transformed to  $y = af[k(x-d)] + c$ . Determine  $a$ ,  $k$ ,  $c$ , and  $d$ ; sketch the graph; and state the domain and range for each transformation.

a) A vertical stretch by the factor 2, a reflection in the  $x$ -axis, and a translation 4 units right are applied to  $y = \sqrt{x}$ .

$-2\sqrt{(x-4)}$

D =  $\{x \in \mathbb{R} \mid x \geq 4\}$   
 R =  $\{y \in \mathbb{R} \mid y \leq 0\}$

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19. The function  $y = f(x)$  has been transformed to  $y = af[k(x - d)] + c$ . Determine  $a$ ,  $k$ ,  $c$ , and  $d$ ; sketch the graph; and state the domain and range for each transformation.
- b) A vertical compression by the factor  $\frac{1}{2}$ , a reflection in the  $y$ -axis, a translation 3 units left, and a translation 4 units down are applied to  $f(x) = \frac{1}{x}$ .

3

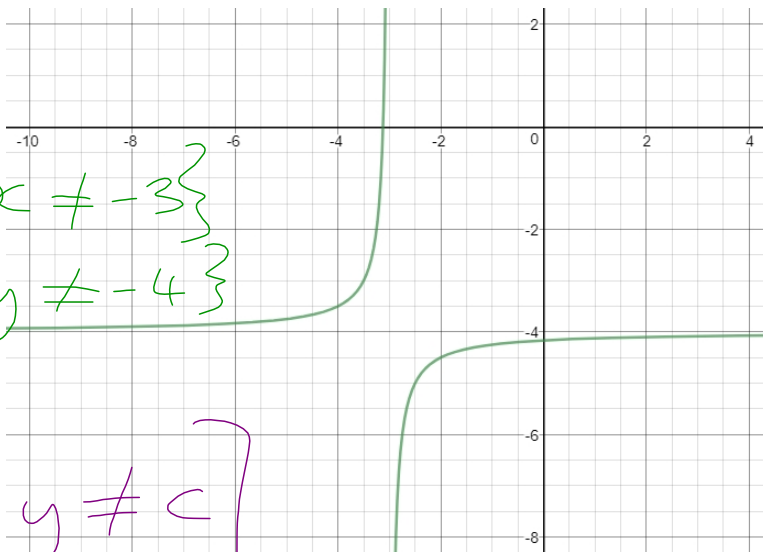


$$0.5 \frac{1}{-(x+3)} - 4$$

$$D = \{x \in \mathbb{R} \mid x \neq -3\}$$

$$R = \{y \in \mathbb{R} \mid y \neq -4\}$$

$$[x \neq d, y \neq c]$$



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19. The function  $y = f(x)$  has been transformed to  $y = af[k(x - d)] + c$ . Determine  $a$ ,  $k$ ,  $c$ , and  $d$ ; sketch the graph; and state the domain and range for each transformation.
- c) A horizontal compression by the factor  $\frac{1}{3}$ , a vertical stretch by the factor 3, a translation 1 unit right, and a translation 6 units down are applied to  $y = |x|$ .

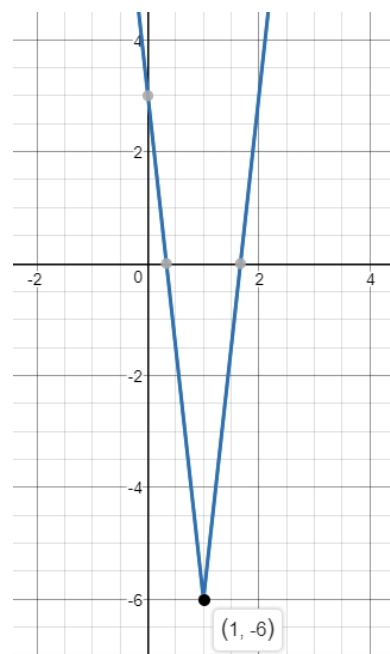
2



$$3|3(x-1)| - 6$$

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

$$R = \{y \in \mathbb{R} \mid y \geq -6\}$$



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