SM 2

Name:_____ Period:_____

SM2 1.6 Multiple-Step Transformations

Answer the following questions using the equations: $y = a\sqrt{x-h}+k$, $y = a|x-h|+k$, and $y = a(x-h)^2+k$. Given the following equations find *a*, *h*, and *k*.

1. $y = 3\sqrt{x-6}+8$

a =_____
h =_____
k =_____

2. $y = (x-4)^2-2$

a =_____
h =_____
k =_____

3. $y = -2|x|+7$

a =_____
h =_____
k =_____

4. $y = \sqrt{x}$

a =_____
h =_____
k =_____

5. $y = -|x+2|$

a =_____
h =_____
k =_____

6. $y = 12x^2-6$

a =_____
h =_____
k =_____

For each function, identify the parent graph ($y = \sqrt{x}$, $y = x^2$, or $y = |x|$), then list the transformations needed to get from the parent graph to the final graph. Make sure to list the transformations in the order in which they should be applied.

7. $y = -2|x-1|$

Parent: _____

Transformations:

1.

2.

3.

8. $y = \frac{1}{2}\sqrt{x+5}+3$

Parent: _____

Transformations:

1.

2.

3.

9. $y = -3x^2-4$

Parent: _____

Transformations:

1.

2.

3.

10. $y = \frac{1}{3}(x-2)^2+1$

Parent: _____

Transformations:

1.

2.

3.

11. $y = -|x-1|-7$

Parent: _____

Transformations:

1.

2.

3.

12. $y = -5\sqrt{x+3}-6$

Parent: _____

Transformations:

1.

2.

3.

4.

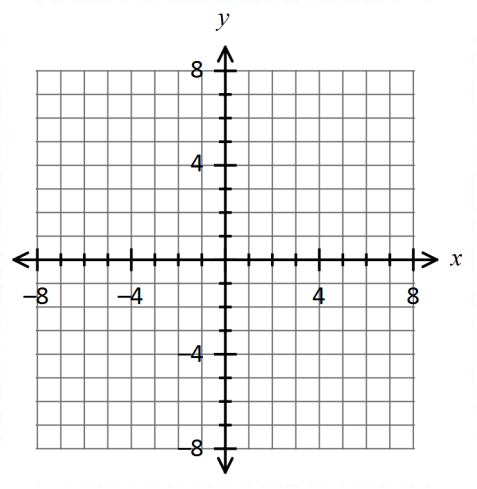
For each graph, do the following:

1. **Identify the parent graph ($y = |x|$, $y = x^2$, or $y = \sqrt{x}$).**
2. **Fill in the *x*, *y* table for the parent graph.**
3. **Draw the graph of the parent graph with a dashed line.**
4. **List the transformations in the correct order.**
5. **Fill in the table to apply the reflections and stretches/compressions (by multiplying the *y*-coordinates by the number in front or multiply by a).**
6. **Fill in the table to apply the translations. (Add or subtract *h* and *k* from the *x*'s and *y*'s to move the graph in the correct directions.)**
7. **Draw the final graph with a solid line.**
8. **State the vertex or endpoint, domain, and range of the final graph.**

13. $y = -(x+5)^2$ a=_____ h=_____ k=_____

Parent Graph:_____

Transformations:



	x	$y = x^2$			
	-2				
	-1				
	0				
	1				
	2				

Vertex:_____

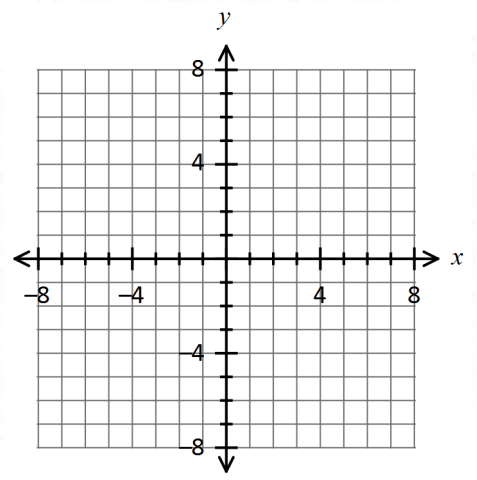
Domain:_____

Range:_____

14. $y = 2\sqrt{x} - 4$ a=_____ h=_____ k=_____

Parent Graph:_____

Transformations:



	x	$y = \sqrt{x}$			
	0				
	1				
	4				
	9				

Endpoint:_____

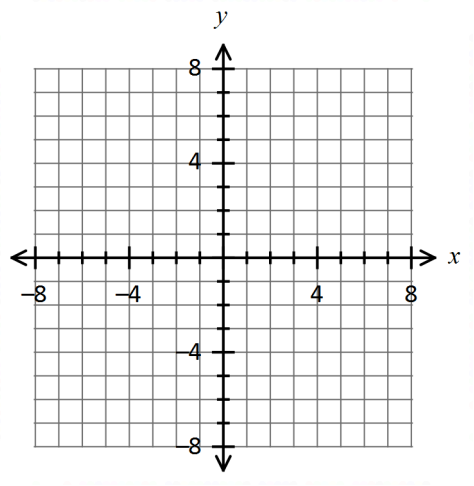
Domain:_____

Range:_____

15. $y = -\frac{1}{2}|x-2|$ a =_____ h =_____ k =_____

Parent Graph:_____

Transformations:



	x	$y = \lvert x \rvert$			
	-2				
	-1				
	0				
	1				
	2				

Vertex:_____

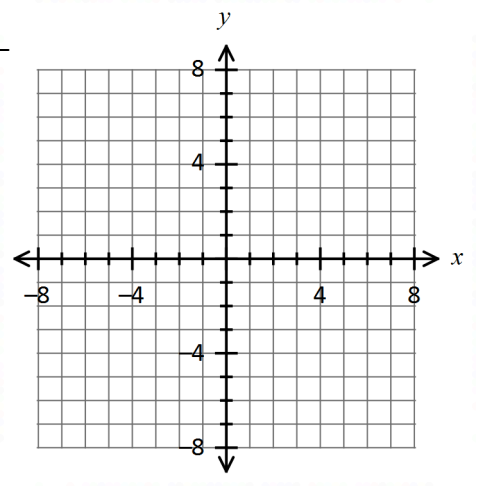
Domain:_____

Range:_____

16. $y = 3|x+2|-3$ a =_____ h =_____ k =_____

Parent Graph:_____

Transformations:



	x	$y = \lvert x \rvert$			
	-2				
	-1				
	0				
	1				
	2				

Vertex:_____

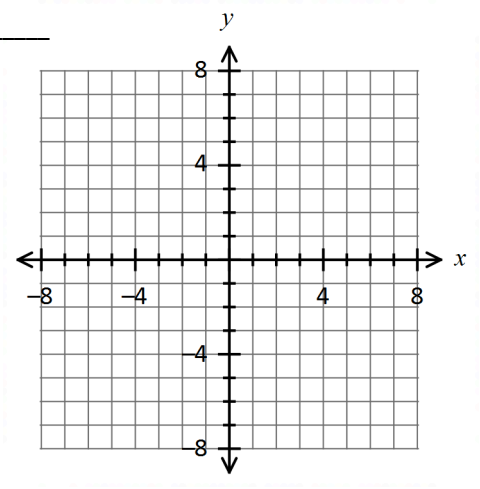
Domain:_____

Range:_____

17. $y = \frac{1}{2}(x-2)^2 + 4$ a =_____ h =_____ k =_____

Parent Graph:_____

Transformations:



	x	$y = x^2$			
	-2				
	-1				
	0				
	1				
	2				

Vertex:_____

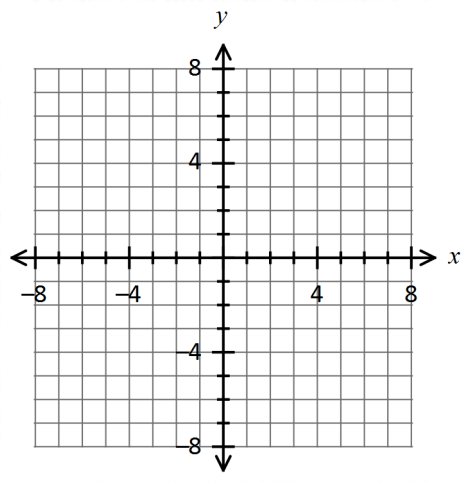
Domain:_____

Range:_____

18. $y = -3\sqrt{x+1} + 2$ a =_____ h =_____ k =_____

Parent Graph:_____

Transformations:



	x	$y = \sqrt{x}$			
	0				
	1				
	4				
	9				

Endpoint:_____

Domain:_____

Range:_____

19. Write an equation for each transformation of the **parent function** $y = \sqrt{x}$.

A: 1 unit up: _____

B: 3 units right: _____

C: 4 units left, 2 units down: _____

D: Reflect over the *x*-axis, vertical compression by a factor of $\frac{1}{2}$: _____

E: Vertical stretch by a factor of 3, 2 units up: _____

20. Write an equation for each transformation of the **parent function** $y = x^2$.

A: Vertical stretch by a factor of 2: _____

B: 5 units left: _____

C: 3 units down: _____

D: 2 units right, 7 units up: _____

E: Reflect over the *x*-axis, 1 unit right: _____

21. Write an equation for each transformation of the **parent function** $y = |x|$.

A: 8 units down: _____

B: 4 units right: _____

C: Reflect over the *x*-axis, 1 unit left: _____

D: Vertical compression by a factor of $\frac{1}{3}$, 2 units right, 3 units down: _____

E: Reflect over the *x*-axis, vertical stretch by a factor of 4, 5 units up: _____