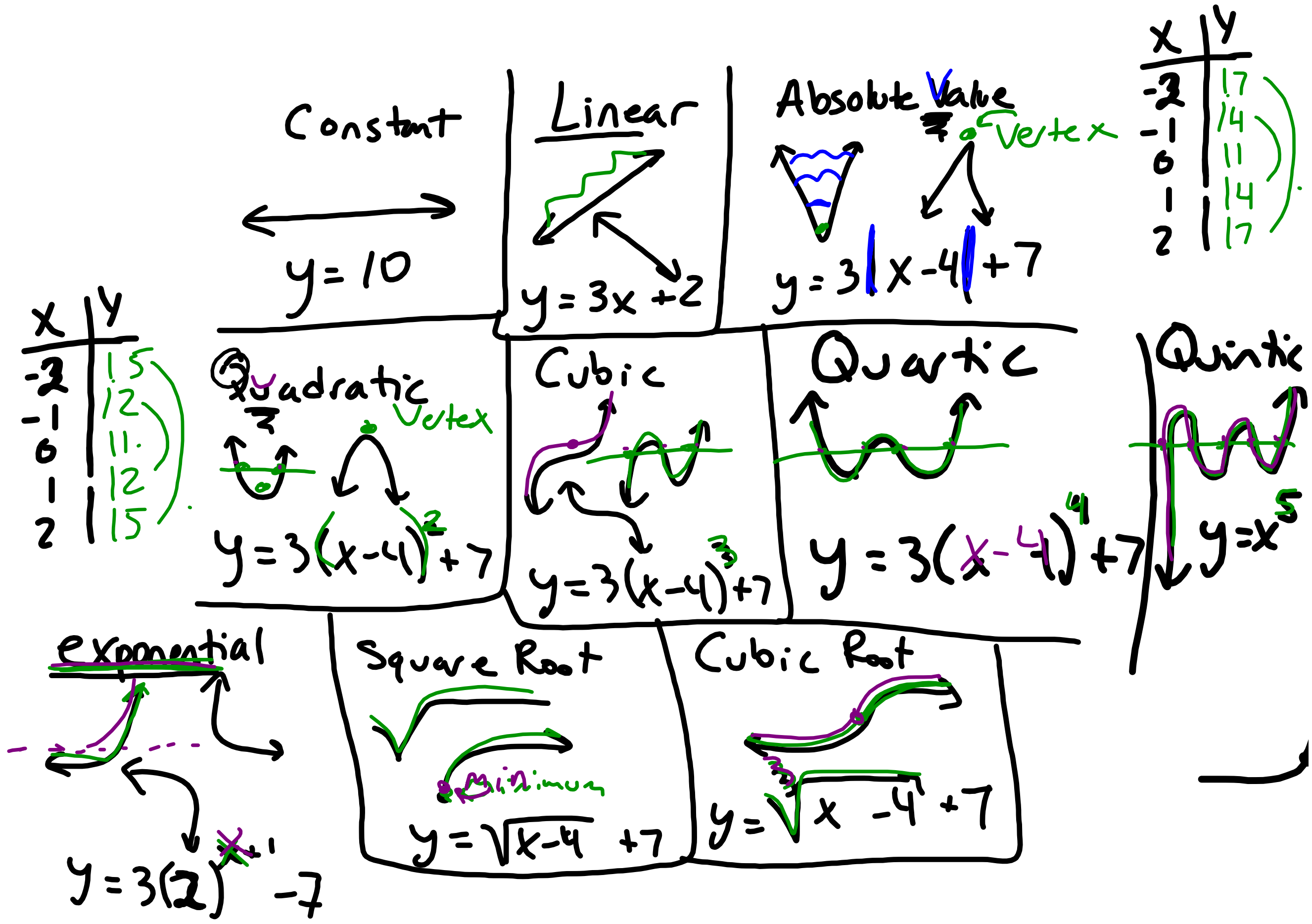
Function Family Summarization

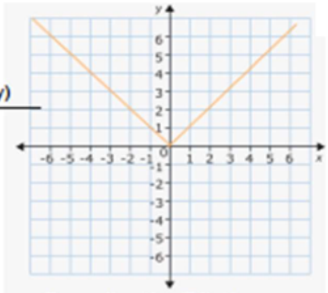


1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

1. Graph $y = 3|x|$

Vertex: ____________

x	y = 3|( )|	(x, y)
-2		
-1		
0		
1		
2		

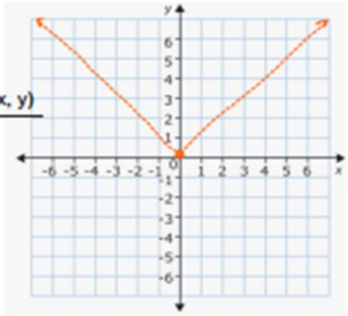


Describe the Dilation

2. Graph $y = |x + 2|$

Vertex: ____________

x	y = |( ) + 2|	(x, y)
-4		
-3		
-2		
-1		
0		

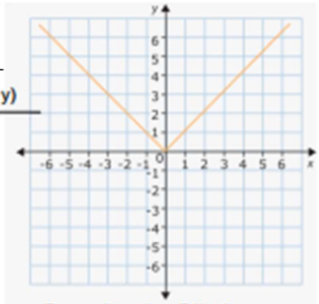


Describe the Shift

3. Graph $y = \frac{5}{2}|x|$

Vertex: ____________

x	y = $\frac{5}{2}$|( )|	(x, y)
-2		
-1		
0		
1		
2		

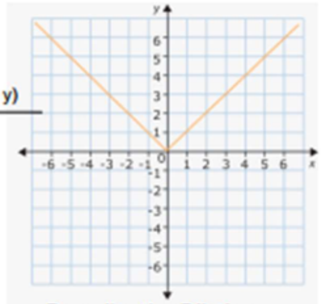


Describe the Dilation

4. Graph $y = \frac{1}{2}|x|$

Vertex: ____________

x	y = $\frac{1}{2}$|( )|	(x, y)
-2		
-1		
0		
1		
2		

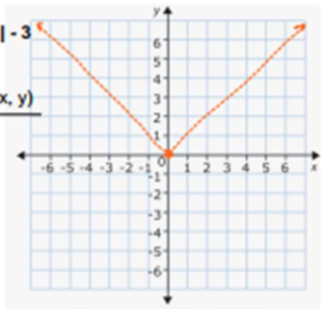


Describe the Dilation

5. Graph $y = |x + 1| - 3$

Vertex: ____________

x	y = |( ) + 1| - 3	(x, y)
-3		
-2		
-1		
0		
1		

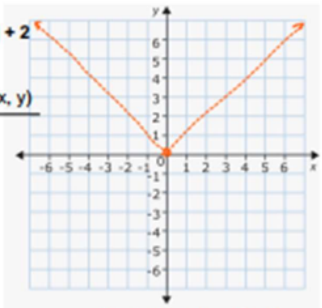


Describe the Shift

6. Graph $y = |x - 4| + 2$

Vertex: ____________

x	y = |( ) - 4| + 2	(x, y)
2		
3		
4		
5		
6		

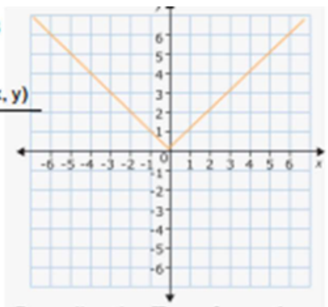


Describe the Shift

7. Graph $y = 4|x| - 3$

Vertex: ____________

x	y = 4|( )| - 3	(x, y)
-2		
-1		
0		
1		
2		



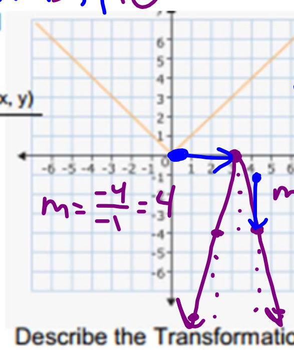
Describe the Transformations

$-4 \cdot |x - (3)| + 0$

8. Graph $y = -4|x - 3|$

Vertex: (3, 0)

x	y = -4|( ) - 3|	(x, y)
1		
2		
3		
4		
5		



a = 4
h = 3
K = 0

Describe the Transformations

Slope → $a \cdot |x - h| + K$

Vertex: (h, K)

a { Vert. Stretch by 4, Vert. Reflection

h → Horizontal shift right 3

-3

Vertex Form: $a \cdot |x-h| + k$

1-2 Transformations of Functions and Absolute Value Graphs Practice Header:

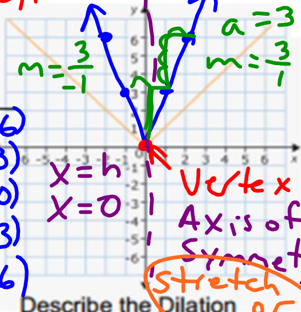
Vertex (h, k)

a = 3
h = 0
k = 0

1. Graph $y = 3|x|$ — $3 \cdot |x-0|+0$

Vertex: (0, 0)

x	y = 3|( )|	(x, y)
-2	3|-2| = 3·2	(-2, 6)
-1	3|-1| = 3·1	(-1, 3)
0	3|0| = 3·0	(0, 0)
1	3|1| = 3·1	(1, 3)
2	3|2| = 3·2	(2, 6)



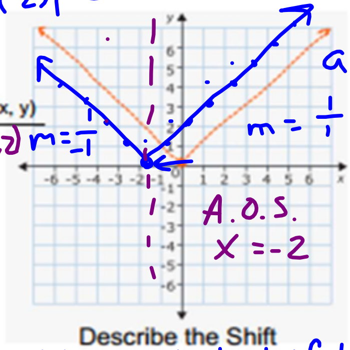
Describe the Dilation (stretch or shrink)

Vertical stretch by 3

2. Graph $y = |x+2|$ — $1 \cdot |x-(-2)|+0$

Vertex: (-2, 0)

x	y = |( ) + 2|	(x, y)
-4	|-4+2| |-2| 2	(-4, 2)
-3		
-2		
-1		
0		



Describe the Shift

Horizontal shift left 2

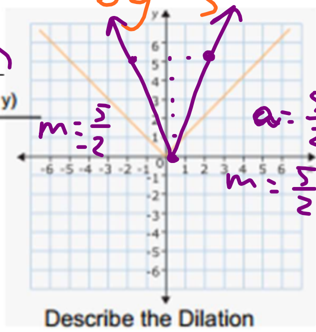
|a| > 1 stretch
0 < |a| < 1 shrink
|a| = 1 None

• a < 0 Reflected
• a > 0 Not Refl.

3. Graph $y = \frac{5}{2}|x|$

Vertex: (0, 0)

x	$y = \frac{5}{2}$|( )|	(x, y)
-2		
-1		
0		
1		
2		



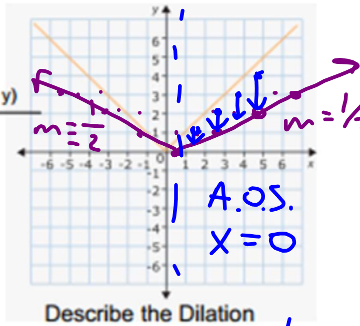
Describe the Dilation

Vert. stretch by 5/2

4. Graph $y = \frac{1}{2}|x|$

Vertex: (0, 0)

x	$y = \frac{1}{2}$|( )|	(x, y)
-2		
-1		
0		
1		
2		



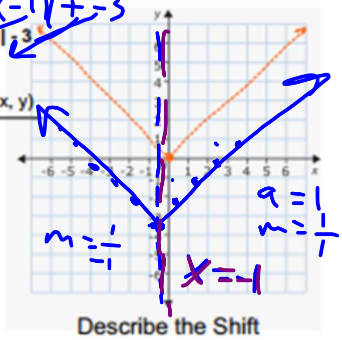
Describe the Dilation

Vert. shrink by 1/2

5. Graph $y = |x+1| - 3$ — $|x-(-1)| + -3$

Vertex: (-1, -3)

x	y = |( ) + 1| - 3	(x, y)
-3		
-2		
-1		
0		
1		



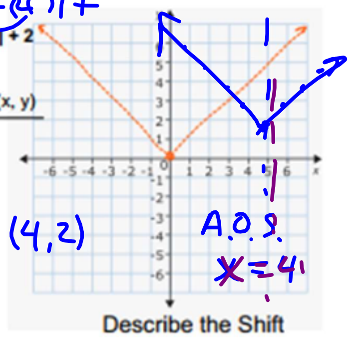
Describe the Shift

horiz shift left 1
Vert. shift down 3

6. Graph $y = |x-4| + 2$ — $|x-(4)| +$

Vertex: (+4, 2)

x	y = |( ) - 4| + 2	(x, y)
2		
3		
4	|4-4|+2 |0| + 2 0 + 2	(4, 2)
5		
6		



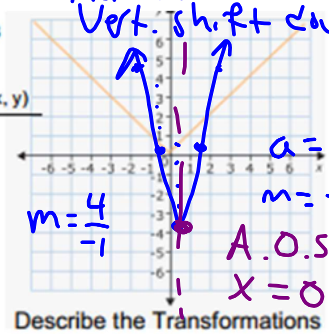
Describe the Shift

horiz. shift right 4
Vert. shift up 2

7. Graph $y = 4|x| - 3$

Vertex: (0, -3)

x	y = 4|( )| - 3	(x, y)
-2		
-1		
0		
1		
2		



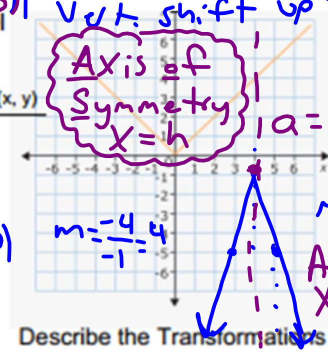
Describe the Transformations

Vert shift down 3
Vert. stretch by 4

8. Graph $y = -4|x-3|$ — $-4 \cdot |x-(3)|$

Vertex: (+3, 0)

x	y = -4|( ) - 3|	(x, y)
1		
2		
3	4|3-3| = 4|0|	
4		
5		



Describe the Transformations

Stretch 4
Reflect
Shift right 3

Agenda:

Have out your Transformations Worksheets, make sure #8 is done

Complete Warm-Up

Practice with Blooket Game

Extend with Transformations Worksheet filling in missing parts with partner

Today: 1. Complete your Desmos (fix the last 5 slides of matching functions and transformations)

2. Complete the Quizizz PW Polynomial Parts Vocab quiz

Warm-Up

With your group, Match the equations with the graphs.

Facilitator B: decide which questions to do, and to go from equation to graph or graph to equation

Question D: Ask guiding questions like:

What is the...

a? h? k?

Vertex? Axis of Symmetry?

Translation left or right?

Dilation Taller/Thinner or Shorter/Wider?

1-2 Transformations of Functions and Absolute Value Graphs Practice

USING TOOLS **In Exercises 35–40, match the function with its graph. Explain your reasoning.**

9. $g(x) = 2(x - 1)^2 - 2$

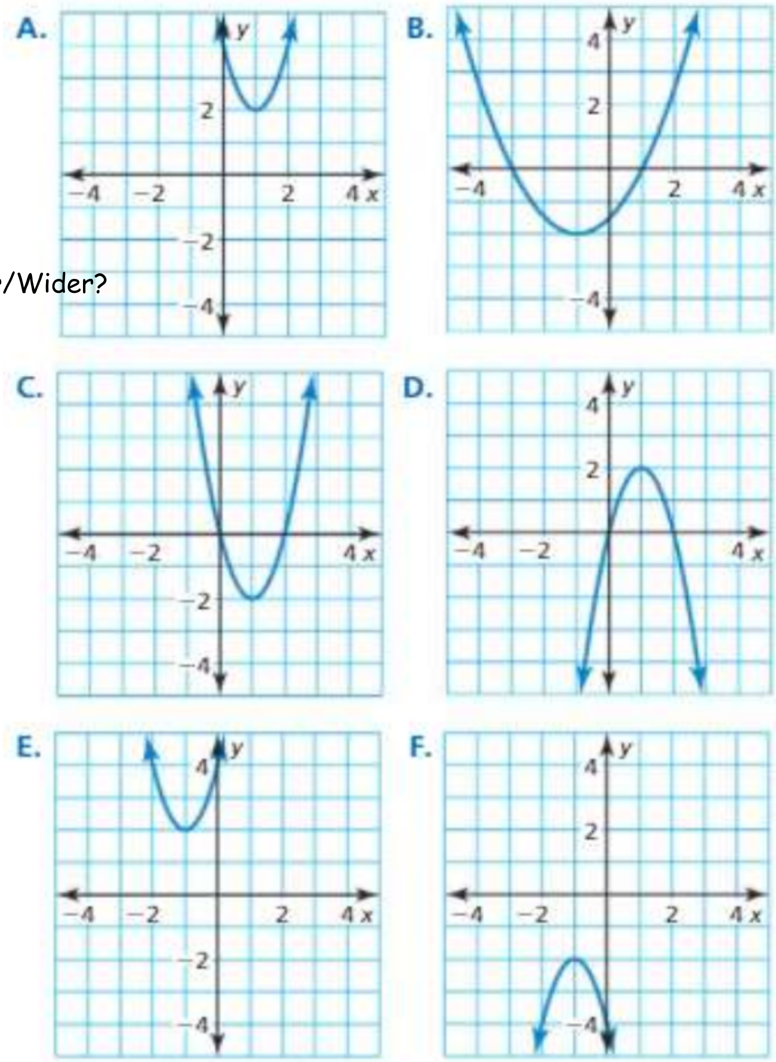
10. $g(x) = \frac{1}{2}(x + 1)^2 - 2$

11. $g(x) = -2(x - 1)^2 + 2$

12. $g(x) = 2(x + 1)^2 + 2$

13. $g(x) = -2(x + 1)^2 - 2$

14. $g(x) = 2(x - 1)^2 + 2$



Warm-Up

With your group, Match the equations with the graphs.

Facilitator B: decide which questions to do, and to go from equation to graph or graph to equation

Question D: Ask guiding questions like:

What is the...

a? h? k?

Vertex? Axis of Symmetry?

Translation left or right?

Dilation Taller/Thinner or Shorter/Wider?

1-2 Transformations of Functions and Absolute Value Graphs Practice

USING TOOLS In Exercises 35–40, match the function with its graph. Explain your reasoning.

9. $g(x) = 2(x - 1)^2 - 2$

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

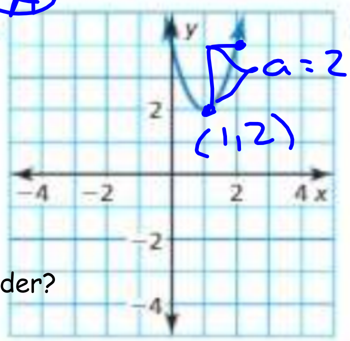
11. $g(x) = -2(x - 1)^2 + 2$

12. $g(x) = 2(x + 1)^2 + 2$

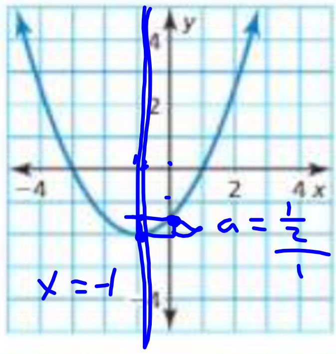
13. $g(x) = -2(x + 1)^2 - 2$

14. $g(x) = 2(x - 1)^2 + 2$

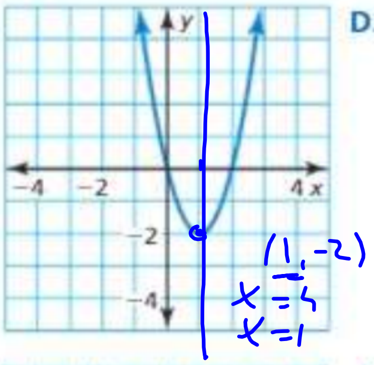
A.



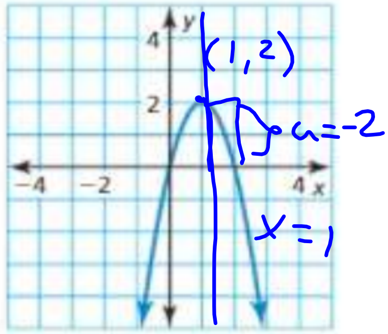
B.



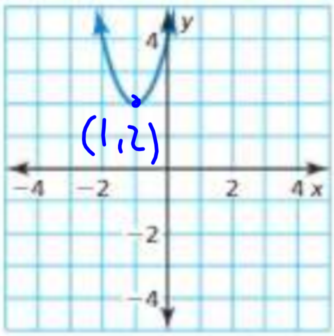
C.



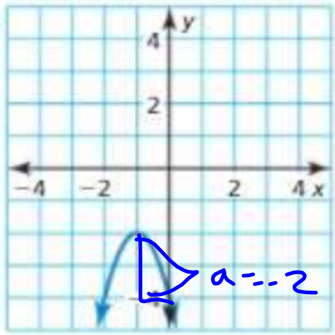
D.



E.



F.



$a \cdot f(x-h)+k$

1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

Fill in the Table's missing parts!

1.) Vertical Translations: Change the Input or Output? (Circle one)

k

$a \cdot f(x-h)+k$

Original Function	New Function	How the parent function is transformed (In words)
$f(x)=x+4$	$f(x)=x+2$	Translated 2 units down $x+4-2$
$g(x)=\lvert x\rvert-10$	$g(x)=\lvert x\rvert-4$ ✓	Reverse: opposite -6 Translated 6 units up $\lvert x\rvert-10+6$
$h(x)=\lvert -6x+1\rvert$		Translated 10 units up
	$k(x) = 2(x-3)^2$	Translated 4 units down
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		

2.) Horizontal Translations: Changes the Input or Output? (Circle one)

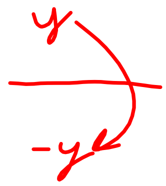
$a \cdot f(x-h)+k$

Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\lvert x-7\rvert$ V: (7,0)	$f(x)=\lvert x-12\rvert$ V: (12,0) ✓	$\lvert x-7-5\rvert$ Translated 5 units to the right
$g(x)=\lvert x-1\rvert-1$ V: (1,-1)	$g(x)=\lvert x+2\rvert-1$ V: (-2,-1)	Reverse: Translated 3 units to the left (1,-1) left 3 → (-2,-1)
$h(x)=\lvert x+11\rvert$		Translated 2 units to the right
	$k(x) = x^2 + 2$	Translated 6 units to the left
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		

1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

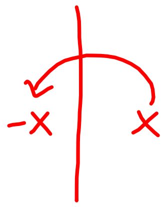
3.) Reflections in/over the *x*-axis: Changes the Input or Output? (Circle one)

$y = -f(x)$



Original Function	New Function	How the parent function is transformed (In words)
$f(x) = \|x+4\|$	$f(x) = -\|x+4\|$	Reflected over the *x*-axis
$g(x) = 7x^2 + 9$	$g(x) = -7x^2 + 9$	Reflected over the *x*-axis
$h(x) = 2\|x-4\|+1$	$h(x) = -2\|x-4\|+1$	Reflected over the *x*-axis
$k(x) = -\frac{4}{3}x^2 + 7$	$k(x) = -4/3x^2 + 7$	Reflected over the *x*-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
		Reflected over the *x*-axis
		Reflected over the *x*-axis

4.) Reflections in/over the *y*-axis: Changes the Input or Output? (Circle one)



$f(-x)$

Original Function	New Function	How the parent function is transformed (In words)
$f(x) = \|x\|+4$	$f(x) = \|-x\|+4$	Reflected over the *y*-axis
$g(x) = \frac{1}{2}x^2 - 4$	$g(x) = ½ (-x)^2 - 4$	Reflected over the *y*-axis
	$h(x) = -6\|x\|+1$	Reflected over the *y*-axis
$k(x) = 2x^2 - 3$		Reflected over the *y*-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
		Reflected over the *y*-axis
		Reflected over the *y*-axis

1-2 Transformations of Functions and Absolute Value Graphs Practice

Header: $a \cdot f(x-h)+k$ (y)

Fill in the Table's missing parts!

1.) Vertical Translations: Change the Input or Output? (Circle one) (y)

a h (k)

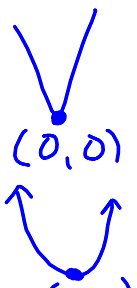
Original Function	New Function	How the parent function is transformed (In words)
$f(x)=x+4$	a. $y = x$	Translated 2 units down $y = x+4-2$
b. $g(x)=\lvert x\rvert-10$	$g(x)=\lvert x\rvert-4$	Translated 6 units up $y=\lvert x\rvert-10+6$
$h(x)=\lvert -6x+1\rvert+0$	c. $h(x)=\lvert -6x+1\rvert+10$	Translated 10 units up add 10 0+10
d. $2(x-3)^2+4$	$k(x) = 2(x-3)^2+0$	Translated 4 units down $2(x-3)^2+4-4$
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		
e. OG		Translated ____
	f. N	Translated ____

[redacted]

2.) Horizontal Translations: Changes the Input or Output? (Circle one)

h

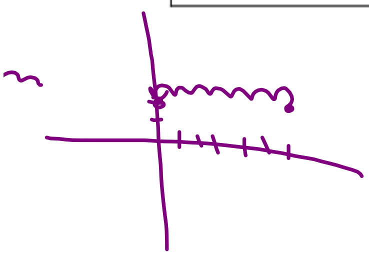
vertex (h, k)



(0,0)

(0,0)

Original Function	New Function	How the parent function is transformed (In words)
$\lvert x-h\rvert+k$		
$f(x)=\lvert x-7\rvert+0$ Vertex: (7, 0)	a. $f(x)=\lvert x-12\rvert$	subtract 5 inside Translated 5 units to the right (7+5, 0) New V: (12, 0)
b. $g(x)=\lvert x-1\rvert+-1$ V: (1, -1)	$g(x)=\lvert x+2\rvert-1$ $\lvert x-(-2)\rvert$ V: (-2, -1)	add 3 inside Translated 3 units to the left (1-3, -1) → (-2, -1)
$h(x)=\lvert x+11\rvert$ $\lvert x-(-11)\rvert$ V: (-11, 0)	c. $h(x)=\lvert x+9\rvert$ V: (-9, 0)	Translated 2 units to the right (-11+2, 0)
d. $k(x)=(x-6)^2+2$ V: (6, 2)	$k(x) = x^2 + 2$ $(x+0)^2+2$ V: (0, 2)	Translated 6 units to the left
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		
e. $y = x-2$	$(x+20)-2$ $x+20-2=x+18$	Translated left 20
	f. New	Translated right 100



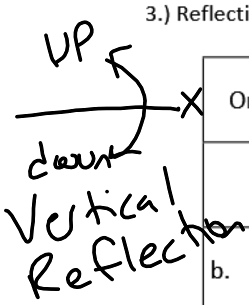
$0 = x+18 \rightarrow (0, 18)$

$-18 = x$

$(-18, 0)$

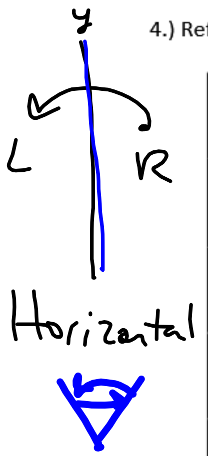
1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

3.) Reflections in/over the *x*-axis: Changes the Input or Output? (Circle one)



Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\|x+4\|$	a. $-\|x+4\|$	Reflected over the *x*-axis
b.	$g(x)= -7x^2 + 9$	Reflected over the *x*-axis
$h(x)=2\|x-4\|+1$	c.	Reflected over the *x*-axis
d.	$k(x) = \frac{4}{3}x^2 + 7$	Reflected over the *x*-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
e.		Reflected over the *x*-axis
	f.	Reflected over the *x*-axis

4.) Reflections in/over the *y*-axis: Changes the Input | Output? (Circle one)



Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\|x\|+4$	a. $\|-x\|+4$	Reflected over the *y*-axis
b.	$g(x) = ½ (-x)^2 - 4$	Reflected over the *y*-axis
c.	$h(x) = -6\|x\|+1$	Reflected over the *y*-axis
$k(x) = 2x^2 - 3$	d.	Reflected over the *y*-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
e.		Reflected over the *y*-axis
	f.	Reflected over the *y*-axis

1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

15. **MODELING WITH MATHEMATICS** The function $h(x) = -0.03(x - 14)^2 + 6$ models the jump of a red kangaroo, where x is the horizontal distance traveled (in feet) and $h(x)$ is the height (in feet). When the kangaroo jumps from a higher location, it lands 5 feet farther away. Write a function that models the second jump. *(See Example 5.)*

16. **MODELING WITH MATHEMATICS** The function $f(t) = -16t^2 + 10$ models the height (in feet) of an object t seconds after it is dropped from a height of 10 feet on Earth. The same object dropped from the same height on the moon is modeled by $g(t) = -\frac{8}{3}t^2 + 10$. Describe the transformation of the graph of f to obtain g. From what height must the object be dropped on the moon so it hits the ground at the same time as on Earth?

17. **MODELING WITH MATHEMATICS** Flying fish use their pectoral fins like airplane wings to glide through the air.

a. Write an equation of the form $y = a(x - h)^2 + k$ with vertex $(33, 5)$ that models the flight path, assuming the fish leaves the water at $(0, 0)$.

b. What are the domain and range of the function? What do they represent in this situation?

c. Does the value of a change when the flight path has vertex $(30, 4)$? Justify your answer.

Problem Solving Method #15

Study

What are they asking me to find?

Determine Unknown Variables

Determine Function

$y = \_\_(x - \_)^2 + \_\_$

Plan

Determine what is given + use to write an equation

$a = -0.03$ $h =$ $k =$

OG Vertex: (14, 6)

Jumps from higher location lands +5 away

$y = -0.03(x - 14 - 5)^2 + 6$

$y = -0.03(x - 14)^2 + 6 + 5$

$-0.03(x - 14 + 5)^2 + 6$

$-0.3(x - 9)^2 + 6$

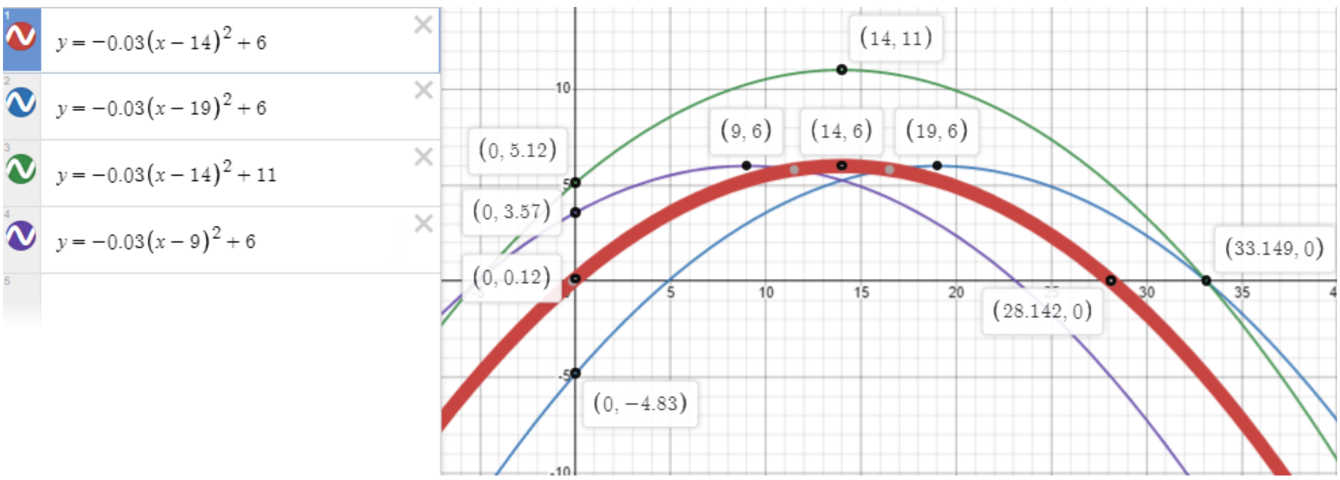
Act

Graph all 4

Reflect

$y = -0.03(x - 14)^2 + 11$

higher y-int = higher jumping off point



Problem Solving Method #16 A

Study → **Plan**

Unknown

- Describe transformation

Earth $f(t) = -16t^2 + 10$

moon $g(t) = -\frac{8}{3}t^2 + 10$

$a = -16 \rightarrow a = -\frac{8}{3}$

$-16 \cdot x = -\frac{8}{3}$

Reflect ← **Act**

$\frac{1}{-16}(-16x) = \left(-\frac{8}{3}\right)\frac{1}{-16}$

$x = \frac{1}{6}$

g(t) is a vertical shrink by 1/6

Problem Solving

#16 B

Study

what are they asking you to find?

Determine variable

K : intial height

in moon : $h(t) = -\frac{8}{3}t^2 + K$

Plan

Use what is given to write equations

$h(t) = 0$ height of object

$t = \frac{\sqrt{10}}{4}$

$0 = -16t^2 + 10$

$0 = -\frac{8}{3}\left(\frac{\sqrt{10}}{4}\right)^2 + K$

Act

$0 = -16t^2 + 10$
$-10 \qquad -10$
$\frac{-10}{-16} = \frac{-16t^2}{-16}$
$\sqrt{\frac{10}{16}} = \sqrt{t^2}$
$\pm\frac{\sqrt{10}}{4} = t$

$0 = -\frac{8}{3}\left(\frac{\sqrt{10}}{4}\right)^2 + K$

$0 = -\frac{8}{3} \cdot \frac{10}{16} + K$

$0 = -\frac{5}{3} + K$

$K = \frac{5}{3}$

$= 1\frac{2}{3}$ ft

Reflect

Makes sense would need to drop Object from a lower height to use same time to reach ground. Things drop slower on the moon.

1-2 Transformations of Functions and Absolute Value Graphs Practice Header: .

15. **MODELING WITH MATHEMATICS** The function $h(x) = -0.03(x - 14)^2 + 6$ models the jump of a red kangaroo, where x is the horizontal distance traveled (in feet) and $h(x)$ is the height (in feet). When the kangaroo jumps from a higher location, it lands 5 feet farther away. Write a function that models the second jump. *(See Example 5.)*

$f(x) = -0.03(x-14)^2+11$

$= -0.03(x-19)^2+6$

-0.0

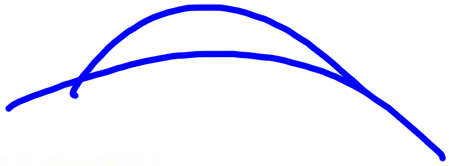
16. **MODELING WITH MATHEMATICS** The function $f(t) = -16t^2 + 10$ models the height (in feet) of an object t seconds after it is dropped from a height of 10 feet on Earth. The same object dropped from the same height on the moon is modeled by $g(t) = -\frac{8}{3}t^2 + 10$. Describe the transformation of the graph of f to obtain g. From what height must the object be dropped on the moon so it hits the ground at the same time as on Earth?

shrink by $\frac{1}{6}$

$-16 \cdot a = -\frac{8}{3}$

$a = -\frac{8}{3} \cdot \frac{1}{-16}$

$= \frac{1}{6}$



17. **MODELING WITH MATHEMATICS** Flying fish use their pectoral fins like airplane wings to glide through the air.

a. Write an equation of the form $y = a(x - h)^2 + k$ with vertex (33, 5) that models the flight path, assuming the fish leaves the water at (0, 0).

b. What are the domain and range of the function? What do they represent in this situation?

c. Does the value of a change when the flight path has vertex (30, 4)? Justify your answer.

Study → Plan

$y = \_(x - \_)^2 + \_$

a =
h = 33
K = 5
Vertex: (33, 5)
Point (0, 0)
x y

Reflect ← Act:

$y = a(x-33)^2+5$

$0 = a(0-33)^2+5$

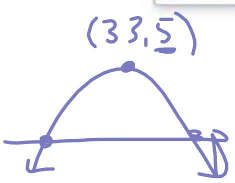
$0 = a(-33)^2+5$

$0 = a \cdot 1089 + 5$

$-5 = a \cdot 1089$

$a = -0.0045$

$y = -0.0045(x-33)^2+5$



D: $(-\infty, \infty)$
R $[0, 5]$

1-2 Transformations of Functions and Absolute Value Graphs Practice

Header:

Fill in the Table's missing parts!

1.) Vertical Translations: Change the Input or Output? (Circle one)

Original Function	New Function	How the parent function is transformed (In words)
$f(x)=x+4$	$f(x)=x+2$	Translated 2 units down
$g(x)=\lvert x\rvert-10$	$g(x)=\lvert x\rvert-4$	Translated 6 units up
$h(x)=\lvert -6x+1\rvert$	$h(x)=\lvert -6x+1\rvert+10$	Translated 10 units up
$K(x)=2(x-3)^2+4$	$k(x)=2(x-3)^2$	Translated 4 units down
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		
$A(x)=\frac{3}{4}x$		Translated 8 units down
$P(x)=$	$P(x)=-\lvert 2x-4\rvert$	Translated 7 units up

2.) Horizontal Translations: Changes the Input or Output? (Circle one)

Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\lvert x-7\rvert$ V: (7,0)	$f(x)=\lvert x-12\rvert$ V: (12,0)	Translated 5 units to the right $\lvert x-7-5\rvert$
$g(x)=\lvert x-1\rvert-1$ V: (1,-1)	$g(x)=\lvert x+2\rvert-1$ V: (-2,-1)	Translated 3 units to the left $\lvert x+2+3\rvert$ b/c $\lvert x-1+3\rvert$
$h(x)=\lvert x+11\rvert$ V: (-11,0)	$h(x)=\lvert x+9\rvert$ V: (-9,0)	Translated 2 units to the right $\lvert x+11-2\rvert$
$K(x)=(x-6)^2+2$ V: (6,2)	$k(x)=x^2+2$ V: (0,2)	Translated 6 units to the left $(x-6+6)^2+2=x^2+2$
Create 2 examples of your own below, one **linear function** and one **absolute value function**.		

1-2 Transformations of Functions and Absolute Value Graphs Practice

Header:

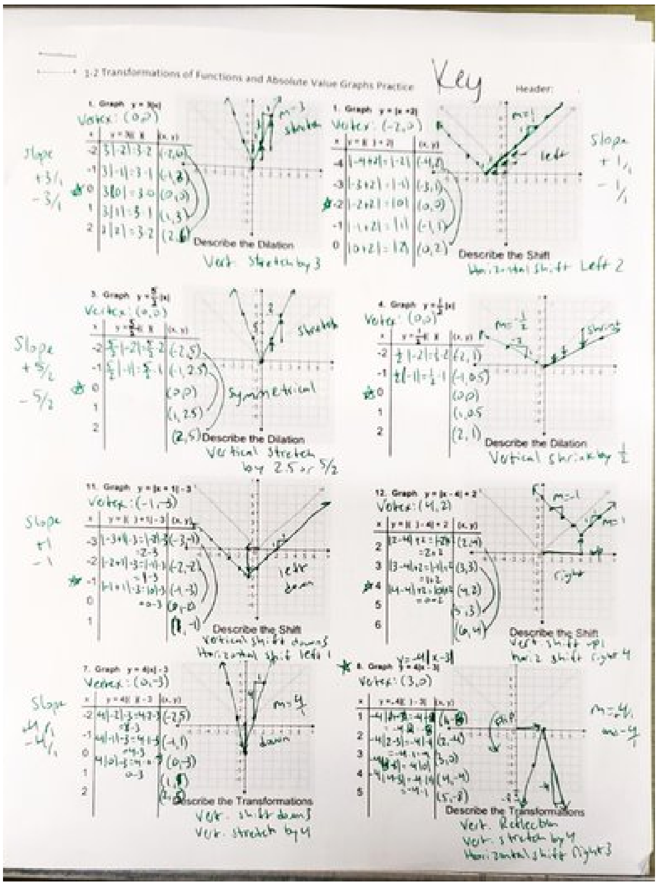
3.) Reflections in/over the x-axis: Changes the Input or Output? (Circle one)

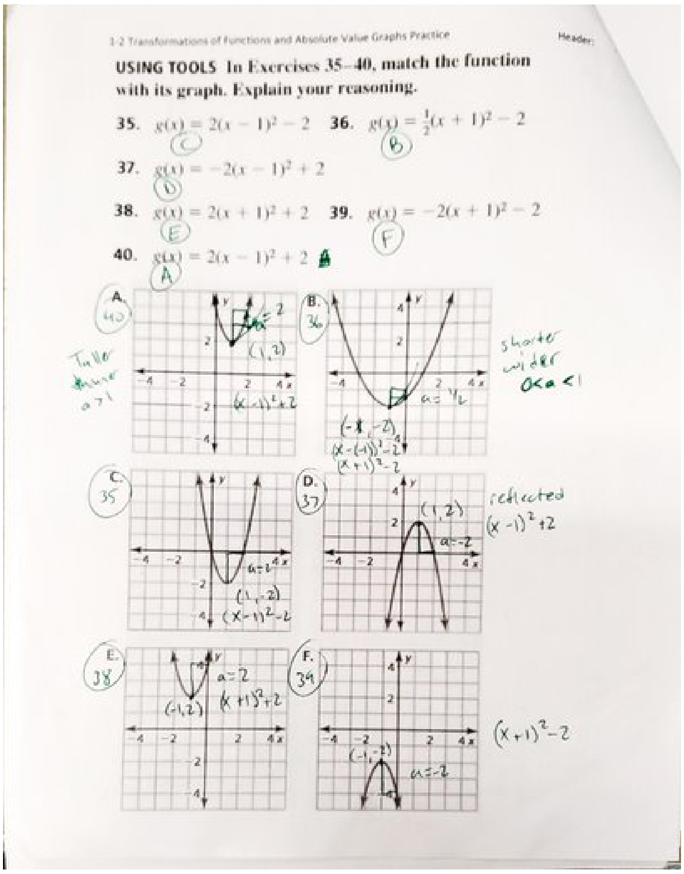
Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\lvert x+4\rvert$	$f(x)=-\lvert x+4\rvert$	Reflected over the x-axis
$g(x)=7x^2+9$	$g(x)=-7x^2+9$	Reflected over the x-axis
$h(x)=2\lvert x-4\rvert+1$	$h(x)=-2\lvert x-4\rvert+1$	Reflected over the x-axis
change $K(x)=-4/3x^2+7$	$k(x)=4/3x^2+7$	Reflected over the x-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
		Reflected over the x-axis
		Reflected over the x-axis

4.) Reflections in/over the y-axis: Changes the Input or Output? (Circle one)

for |x| and x^2 no change will be visible for y-axis reflection due to symmetry

Original Function	New Function	How the parent function is transformed (In words)
$f(x)=\lvert x\rvert+4$	$f(x)=\lvert -x\rvert+4$	Reflected over the y-axis
$g(x)=\frac{1}{2}(x)^2-4$	$g(x)=\frac{1}{2}(-x)^2-4$	Reflected over the y-axis
$h(x)=-6\lvert -x\rvert+1$	$h(x)=-6\lvert x\rvert+1$	Reflected over the y-axis
$k(x)=2x^2-3$	$K(x)=2(-x)^2-3$	Reflected over the y-axis
Create 2 examples of your own below, one **Quadratic function** and one **absolute value function**.		
		Reflected over the y-axis
		Reflected over the y-axis


1-2 Transformations of Functions and Absolute Value Graphs Practice
Key
Header:
1. Graph y = 3|x|
Vertex: (0,0)
Describe the Dilation
Vert. Stretch by 3
1. Graph y = |x + 2|
Vertex: (-2,0)
Describe the Shift
Horizontal Shift Left 2
3. Graph y = 5/2|x|
Vertex: (0,0)
symmetrical
Describe the Dilation
Vertical Stretch by 2.5 or 5/2
4. Graph y = 1/2|x|
Vertex: (0,0)
Describe the Dilation
Vertical Shrink by 1/2
11. Graph y = |x + 1| - 3
Vertex: (-1,-3)
Describe the Shift
Vertical Shift down 3
Horizontal Shift left 1
12. Graph y = |x - 4| + 2
Vertex: (4,2)
Describe the Shift
Vert. Shift up 2
Horiz. Shift right 4
7. Graph y = 4|x| - 3
Vertex: (0,-3)
Describe the Transformations
Vert. shift down 3
Vert. stretch by 4
8. Graph y = -4|x - 3|
Vertex: (3,0)
Describe the Transformations
Vert. Reflection
Vert. stretch by 4
Horizontal shift right 3


1-2 Transformations of Functions and Absolute Value Graphs Practice
Header:
USING TOOLS In Exercises 35–40, match the function with its graph. Explain your reasoning.
35. g(x) = 2(x − 1)² − 2 (C)
36. g(x) = ½(x + 1)² − 2 (B)
37. g(x) = −2(x − 1)² + 2 (D)
38. g(x) = 2(x + 1)² + 2 (E)
39. g(x) = −2(x + 1)² − 2 (F)
40. g(x) = 2(x − 1)² + 2 (A)
A. 40
Taller
B. 36
shorter
wider
0<a<1
C. 35
D. 37
reflected
(x − 1)² + 2
E. 38
a = 2
(x + 1)² + 2
F. 39
(x + 1)² − 2
a = −2

1-2 Transformations of Functions and Absolute Value Graphs Practice Header:

43. MODELING WITH MATHEMATICS The function $h(x) = -0.03(x - 14)^2 + 6$ models the jump of a red kangaroo, where x is the horizontal distance traveled (in feet) and $h(x)$ is the height (in feet). When the kangaroo jumps from a higher location, it lands 5 feet farther away. Write a function that models the second jump. (See Example 5.)

$h(x) = -0.03(x-14.5)^2 + 6$

$h(x) = -0.03(x-19)^2 + 6$ — wrong, starting too low

$h(x) = -0.03(x-14)^2 + 6+5$

$h(x) = -0.03(x-14)^2 + 11$

has correct higher starting height

44. MODELING WITH MATHEMATICS The function $f(t) = -16t^2 + 10$ models the height (in feet) of an object t seconds after it is dropped from a height of 10 feet on Earth. The same object dropped from the same height on the moon is modeled by $g(t) = -\frac{8}{3}t^2 + 10$. Describe the transformation of the graph of f to obtain g. From what height must the object be dropped on the moon so it hits the ground at the same time as on Earth?

Vertical compression/shrink by $\frac{1}{6}$

$0 = -16t^2 + 10$ $\quad 0 = -\frac{8}{3}t^2 + h$

$-10 = -16t^2$ $\quad -\frac{8}{3}t^2 + h = 0$

$\frac{10}{16} = t^2$ $\quad -\frac{8}{3}\left(\frac{\sqrt{10}}{4}\right)^2 = -h$

$t = \pm\frac{\sqrt{10}}{4}$ $\quad -\frac{8}{3}\cdot\frac{10}{16} = -h$

$16 \cdot x = \frac{8}{3}$, $x = \frac{8}{3}\cdot\frac{1}{16}$, $x = \frac{1}{6}$

$-\frac{5}{3} = -h$

$\frac{5}{3} = h = 1.67$ ft

Needs to be dropped at 1.67 ft high on moon to hit ground at same time from 10 ft on earth.

45. MODELING WITH MATHEMATICS Flying fish use their pectoral fins like airplane wings to glide through the air.

a. Write an equation of the form $y = a(x - h)^2 + k$ with vertex (33, 5) that models the flight path, assuming the fish leaves the water at (0, 0).

b. What are the domain and range of the function? What do they represent in this situation?

c. Does the value of a change when the flight path has vertex (30, 4)? Justify your answer.

a) Solve for 'a'. Plug (33,5) and (0,0) in

$y = a(x-33)^2 + 5$

$0 = a(0-33)^2 + 5$

$-5 = a(-33)^2$

$a = \frac{-5}{1089}$

$y = \frac{-5}{1089}(x-33)^2 + 5$

b.) Using a graphing calculator to find x intercepts (33,5), (0,0), (66,0). Flying fish jumps 66 ft away and 5 ft high.

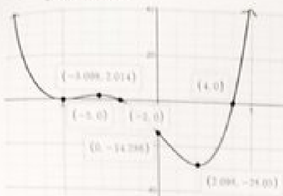
Domain: $x \in [0, 66]$

Range: $y \in [0, 5]$

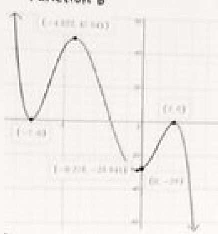
c.) Yes 'a' changes because it would be $\frac{-4}{900}$ instead, which is smaller and less long and high.

Transformations of Functions and Absolute Value Graphs Practice Header: Key

Function A



Function B



For the functions above answer the following.

1) What function Family does it belong to?
Function A: Quartic Function B: Quintic

2) State the x-intercept(s):
Function A: (-5,0), (-2,0), (4,0) — m=2 repeated
Function B: (-7,0), (-2,0), (2,0) — m=2 repeated, m=2 repeated

3) State the y-intercept:
Function A: (0, -14.286) Function B: (0, -28)

4) State the domain and range using interval notation.
Function A: $x \in (-\infty, \infty)$, $y \in [-28.05, \infty)$
Function B: $x \in (-\infty, \infty)$, $y \in (-\infty, \infty)$

5) State any local extremes (local max-"hills" and local min-"valleys")
Function A: local max: (-3.098, 2.014); local min: (-5,0), (2.098, -28.05)
Function B: local max: (-4.322, 47.541), (2,0); local min: (-7,0), (-0.278, -28.0?41)

6) State any absolute extremes if none say none (abs max abs min-the highest or lowest point not infinity)
Function A: (2.098, -28.05) abs min. Function B: None

7) State the intervals for which the function increases.
Function A: $x \in (-5, -3.098) \cup (2.098, \infty)$
Function B: $x \in (-7, -4.322) \cup (-0.278, 2)$

8) State the intervals for which the function decreases.
Function A: $x \in (-\infty, -5) \cup (-3.098, 2.098)$
Function B: $x \in (-\infty, -7) \cup (-4.322, -0.278) \cup (2, \infty)$

9) State the intervals for which the function has positive y values.
Function A: $x \in (-\infty, -5) \cup (-5, -2) \cup (4, \infty)$
Function B: $x \in (-\infty, -7) \cup (-7, -2)$

10) State the intervals for which the function has negative y values.
Function A: $x \in (-2, 4)$
Function B: $x \in (-2, 2) \cup (2, \infty)$