Name: _____ Date: _____

Absolute Value Transformations

$$f(x) = a|x - h| + k \quad (b)$$

- **a:** reflect x-axis, Vertical stretch $a>1$, vertical shrink $a<1$
- **h:** right (-), left (+) *unless reflected y-axis **Vertex:** (h, k)
- **k:** up (+), down (-)
- **b:** reflect y-axis, horizontal stretch $b<1$, horizontal shrink $b>1$

Describe the transformations:

1. $f(x) = |x+1| - 3$
   - Left 1
   - Down 3

2. $f(x) = -|x| + 4$
   - Reflect x-axis
   - up 4

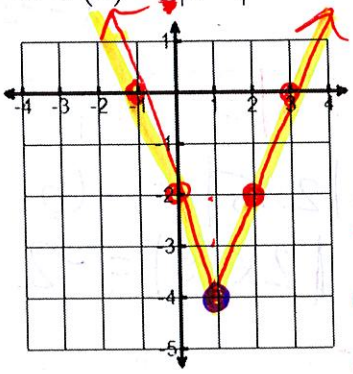
3. $f(x) = 2|-x+1|$
   - Vertical stretch 2
   - Reflect y-axis
   - Right 1

*4. $f(x) = |2x+6| - 1$
   - Horizontal shrink $\frac{1}{2}$
   - Left 3
   - Down 1

$2x+6=0$
$2x=-6$
$x=-3$

Graph the following absolute value functions using transformations

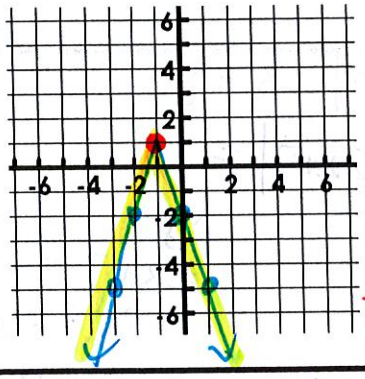
5. $f(x) = 2|x-1| - 4$



Vertex (1, -4)

Transformations:
- Vert stretch 2
- Right 1
- Down 4

6. $f(x) = -|3x+3| + 1$

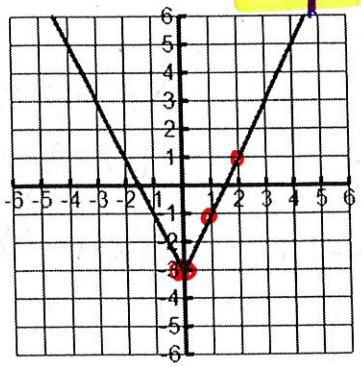


Vertex (-1, 1)

Transformations:
- Reflect x-axis
- ~~Horiz. shrink $\frac{1}{3}$~~
- ~~Left 1~~
- ~~Up 1~~

Write the equation of the absolute value given the graph.

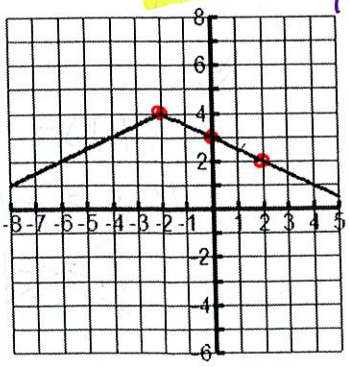
7. f(x) = $2|x|-3$



Vertex (0, -3)

a: 2

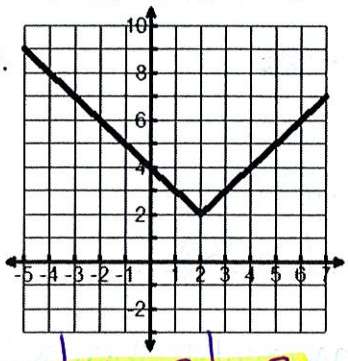
8. f(x) = $-\frac{1}{2}|x+2|+4$



Vertex (-2, 4)

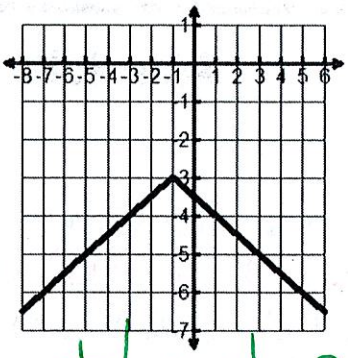
a: $-\frac{1}{2}$

You try!! Write the equation of the absolute value given the graph.

9. 

$V: (2, 2)$
$a = 1$

$f(x) = |x - 2| + 2$

10. 

$V: (-1, -3)$
$a = -\frac{1}{2}$

$f(x) = -\frac{1}{2}|x + 1| - 3$

Solving Absolute Value Equations: $|ax + b| = c$, *where* $c > 0$

- Isolate the absolute value, then split into 2 equations: $ax + b = c$ or $ax + b = -c$
- ALWAYS check for extraneous solutions!

11. Solve for x: $|x - 3| = 6$

$x - 3 = 6$ ✓ $x - 3 = -6$ ✓

$x = 9$ $x = -3$

12. Solve for x: $|6x - 3| = 15$

$6x - 3 = 15$ $6x - 3 = -15$

$6x = 18$ $6x = -12$

$x = 3$ $x = -2$

13. $|2x + 7| - 3 = 8$

$|2x + 7| = 11$

$2x + 7 = 11$ $2x + 7 = -11$

$2x = 4$ $2x = -18$

$x = 2$ $x = -9$

14. $3|2x - 5| + 7 = 1$

$3|2x - 5| = -6$

$|2x - 5| = -2$

* Can't have $|\ | = -\#$

No Solution

15. $|4x + 10| = 6x$

$4x + 10 = 6x$ $4x + 10 = -6x$

$10 = 2x$ $10x = -10$

$5 = x$ ~~$x = -1$~~

16. $|x + 2| = x^2$

$x + 2 = x^2$

$0 = x^2 - x - 2$

$(x - 2)(x + 1)$

$x = 2, -1$

~~$x + 2 = -x^2$~~

~~$x^2 + x + 2 = 0$~~

~~$(x + \quad)(x + \quad)$~~