

Name: Answer key Per: _____ Date: _____
 Serafino • Algebra 2E

Absolute Value Functions, Equations & Inequalities

2C

Skills Check: NO CALCULATORS

1. Rank the following absolute value functions from narrowest (1) to widest (5)

5 $y = 1/3|x|$ 4 $y = -1/2|x|$ 1 $y = -2|x|$ 3 $y = |x|$ 2 $y = 3/2|x|$

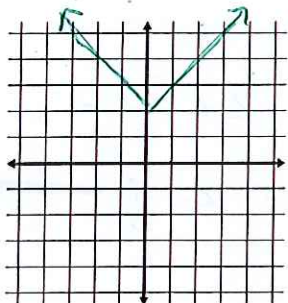
2. What is the domain and range of the following functions

a. $f(x) = 2|x - 5|$ $x \in \mathbb{R}$ b. $f(x) = -4.7|x - 3| - 2$ $x \in \mathbb{R}$
 $y \geq 0$ $y \leq -2$

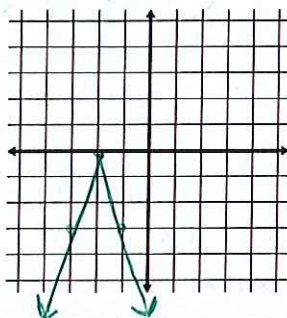
3. Write the equation for the axis of symmetry for $f(x) = -|x - 5| - 6$ $x = 5$

4. Graph the following absolute value functions:

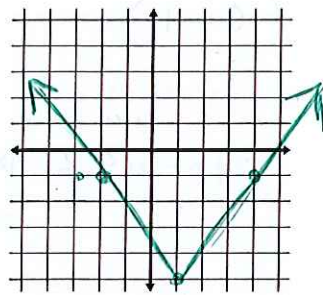
a. $f(x) = |x| + 2$



b. $f(x) = -3|x + 2|$



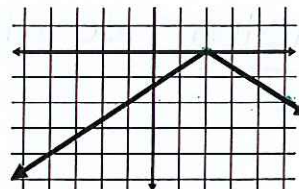
c. $f(x) = 4/3|x - 1| - 5$



5. In function notation, write the absolute value function of the following:

a. Vertex: $(-2, 5)$ -6
 Point: $(-7, -1)$ -5

b.



$f(x) = \frac{6}{5}|x + 2| + 5$

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

6. Tell if the ordered pair is a solution to the inequality (write yes or no)

$y > -2|x| + 10$

a) $(0, 11)$ yes

b) $(-2, 14)$ yes

$11 > -2|0| + 10$
 $11 > 10$ ✓

$14 > -2|-2| + 10$
 $14 > -2(2) + 10$
 $14 > -4 + 10$
 $14 > 6$

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

a) $f(2) = -2$

$$\begin{aligned} 3|2-2|-2 \\ 3(0)-2 \\ 0-2 \end{aligned}$$

b) $f(15) = 37$

$$\begin{aligned} 3|15-2|-2 \\ 3|13|-2 \\ 39-2 \end{aligned}$$

c) $f(-8) = 28$

$$\begin{aligned} 3|-8-2|-2 \\ 3|-10|-2 \\ 3(10)-2 \rightarrow 30-2 \end{aligned}$$

e) Where is $f(x) = 25$?

$$\begin{aligned} 3|x-2|-2 &= 25 \\ +2 \quad +2 \\ 3|x-2| &= 27 \\ |x-2| &= 9 \end{aligned}$$

$$\begin{aligned} x-2 &= 9 & x-2 &= -9 \\ +2 \quad +2 & & +2 \quad +2 & \end{aligned}$$

$$x = 11 \text{ or } x = -7$$

f) Where is $f(x) = -5$?

No solution!
(it's below the vertex)

g) What is the y-intercept?

$$\begin{aligned} f(0) &= 3|0-2|-2 \\ 3|-2|-2 \\ 3(2)-2 \\ 6-2 &= 4 \\ (0, 4) \end{aligned}$$

h) What is/are the x-intercept(s)?

$$\begin{aligned} 3|x-2|-2 &= 0 \\ +2 \quad +2 \\ 3|x-2| &= 2 \end{aligned}$$

$$\begin{aligned} 3(x-2) &= 2 \\ 3x-6 &= 2 \\ 3x &= 8 \\ x &= \frac{8}{3} \end{aligned}$$

$$\begin{aligned} 3(x-2) &= -2 \\ 3x-6 &= -2 \\ 3x &= 4 \\ x &= \frac{4}{3} \end{aligned}$$

$$x = \frac{4}{3} \text{ or } x = \frac{8}{3}$$

8. Solve: $2|x-3|-4 < -2$

$$\frac{2}{2}|x-3| < \frac{-2+4}{2} \quad |x-3| < 1$$

$$\begin{aligned} x-3 < 1 & \quad x-3 > -1 \\ +3 \quad +3 & \quad +3 \quad +3 \\ x < 4 & \quad x > 2 \end{aligned}$$

a) Answer as inequality: $2 < x < 4$

b) Answer on number line:



9. Smarty-pants Stella looks at $|x+5| \leq -4$ and knows the answer without doing any work. Without doing any work, what is the answer and how do you know? Explain.

No solution; No absolute value is less than -4

10. If $g(x) = 2|x+1| - 6$ was transformed to $k(x) = -\frac{1}{2}g(x-6) + 5$

a. Name all transformations performed to $g(x)$

b. Write the equation of $k(x)$

① Reflect over x-axis

② Vertical compression

③ Right 6

④ Up 5

$$\begin{aligned} k(x) &= -\frac{1}{2}(2|x+1|-6) \\ &= -|x+1|+3 \end{aligned}$$

$$k(x) = -|x-5|+8$$