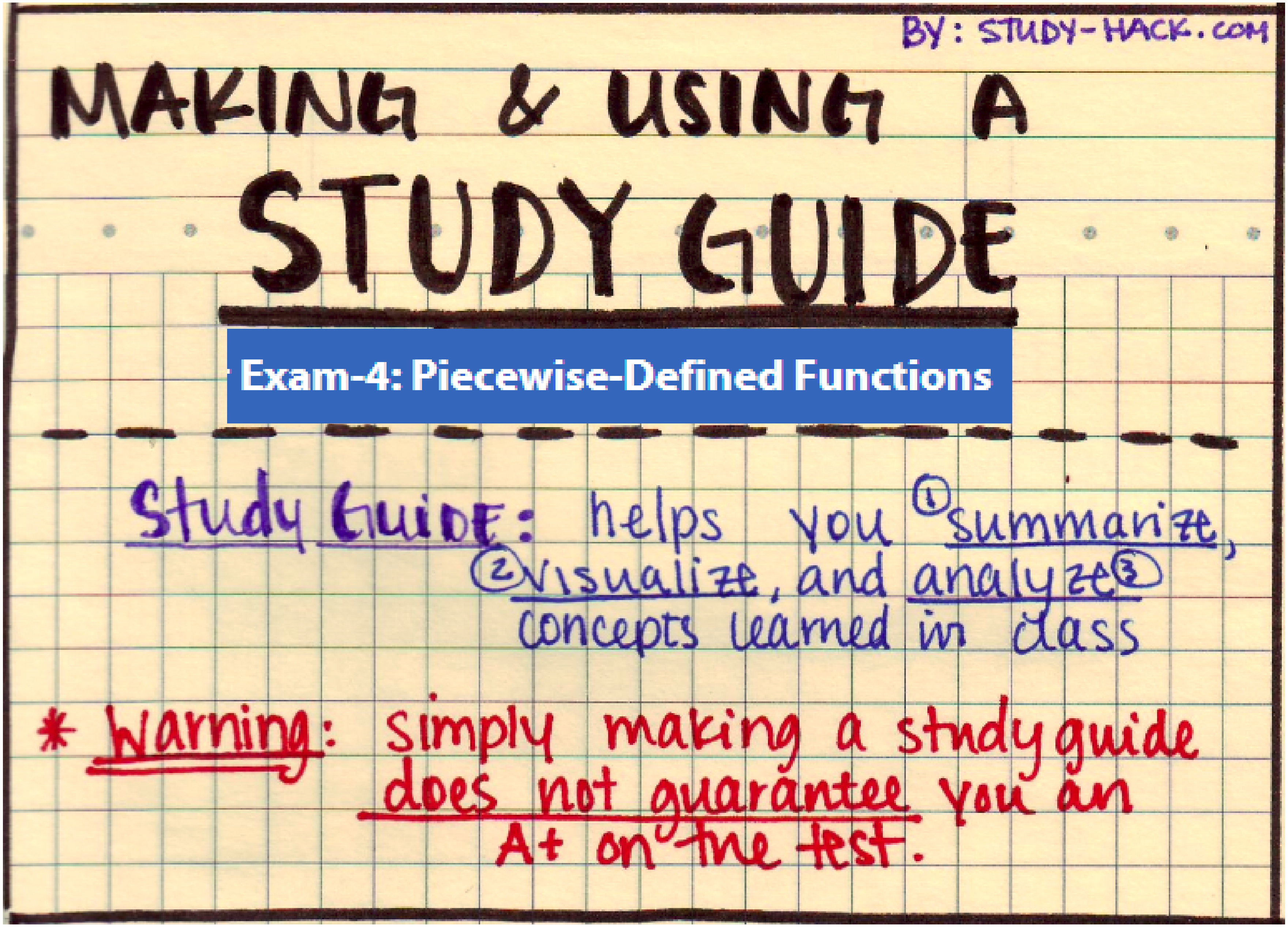

BY: STUDY-HACK.COM
MAKING & USING A
STUDY GUIDE
Exam-4: Piecewise-Defined Functions
Study Guide: helps you ① summarize, ② visualize, and analyze ③ concepts learned in class
* Warning: simply making a study guide does not guarantee you an A+ on the test.

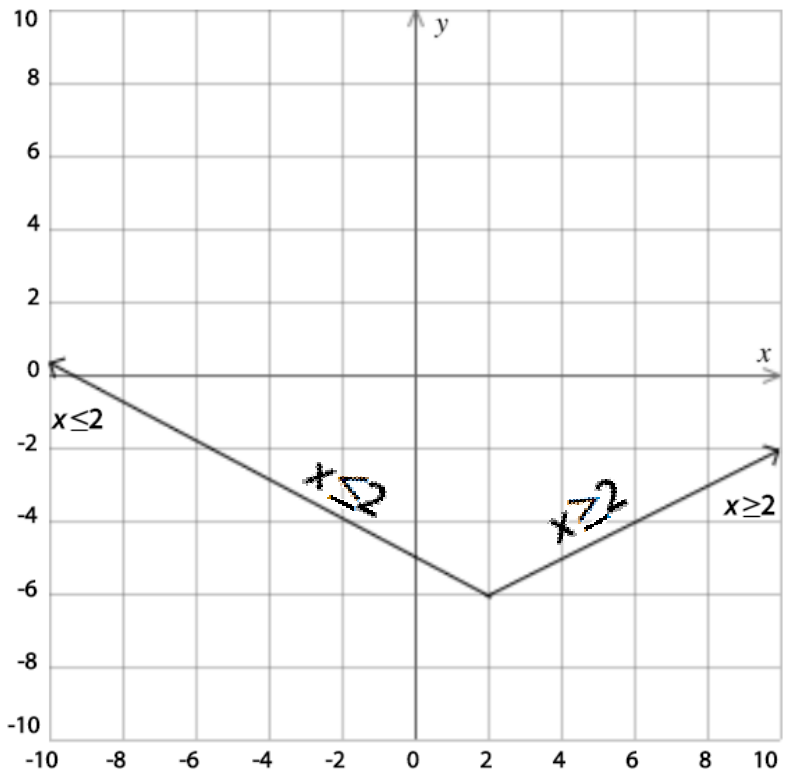
1

Graph $y = \frac{1}{2}|x - 2| - 6$. Is the relation a function? Complete the explanation.

$$y = a|x - h| + k$$

Slope

Vertex (h, k) **For h, read opposite sign*

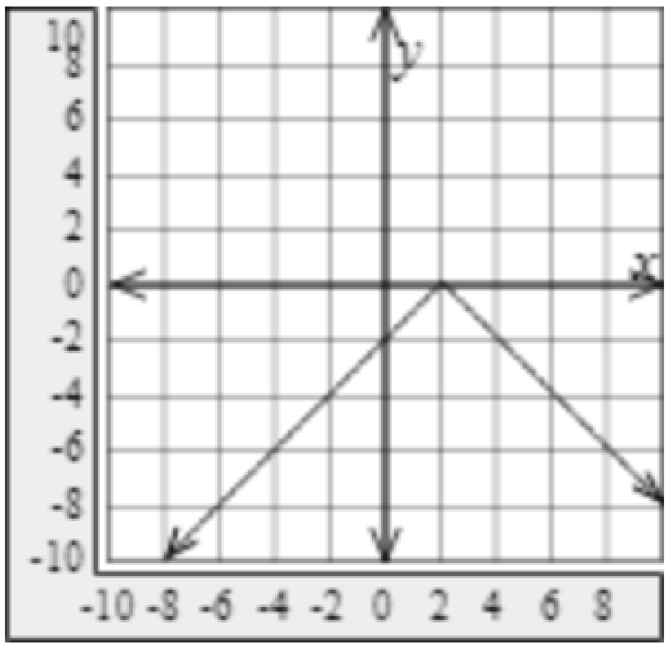


The relation is [a function ▼], because it [passes ▼] the vertical line test. In other words, there is [exactly one ▼] output value for each input value.

2 The graph of $g(x)$ is a transformation of the graph of $f(x) = |x|$ right 2 units and reflected across the x-axis.

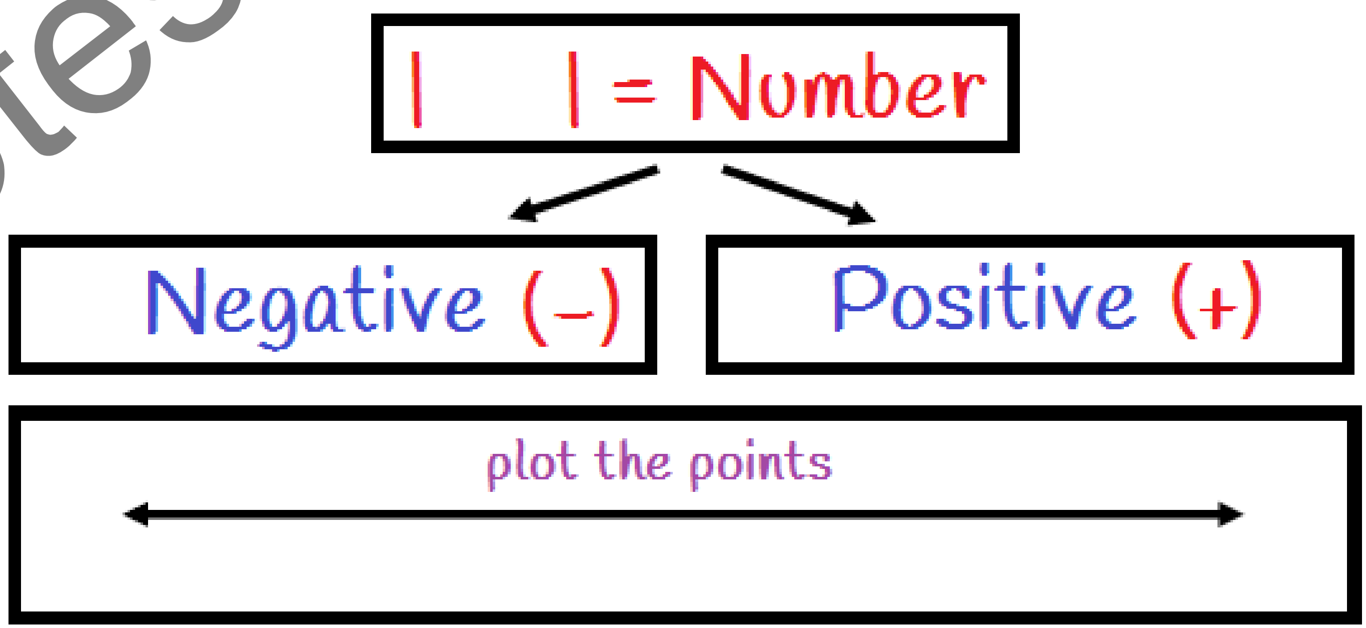
$g(x) = -|x-2|$

Negative



How To Solve & Graph Absolute Value Equations

1. Isolate the absolute value expression.
2. Rewrite as two equations, (– and +)
3. Solve both equations.
4. Plot the point on the number line.



3 Solve the equation. $|5x| + 2 = 32$

$\lvert 5x \rvert + 2 = 32$	Isolate the absolute value
$\lvert 5x \rvert = 30$	Subtract 2 from both sides.
$5x = 30$ or $5x = -30$	Rewrite as two equations.
$x = 6$ or $x = -6$	Solve for x.

4 Solve the inequality. $|x+6|-4<1$

$$|x+6|-4 < 1$$

$$|x+6| < 5$$ Add 4 to both sides.

$$x+6<5 \text{ and } x+6>-5$$ Rewrite as two inequalities.

$$\boxed{x<-1} \text{ and } \boxed{x>-11}$$ Solve for x.

5

Complete the real-world situation that could be modeled by $|x - 4| \leq 11$.

The weather forecast states that it will be [4] degrees Fahrenheit on Friday, but it could be as much as [11] degrees warmer or [11] degrees colder on Friday.

6 **Solve $-2|3x-3|+8=6$ algebraically.**
Graph the solutions on the number line.

$$-2|3x-3| = -2$$ Subtract 8 from both sides.

$$|3x-3| = 1$$ Divide both sides by -2.

Rewrite as two equations.

$3x-3=-1$ or $3x-3=1$

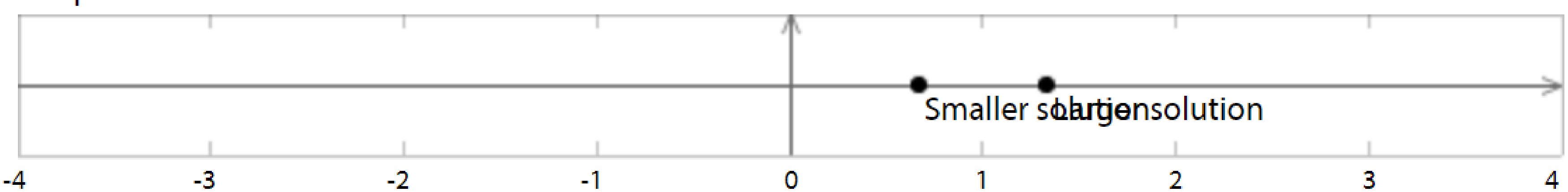
Add 3 to both sides of both equations.

$3x=2$ or $3x=4$

Divide both sides of both equations by 3.

$x=\frac{2}{3}$ or $x=\frac{4}{3}$

Graph the solution.



7 Consider the absolute-value equation $2\left|\frac{1}{2}x+4\right|+9=6$.

Part 1

How many solutions are there to the equation?

$$2\left|\frac{1}{2}x+4\right|+9 = 6$$

$$2\left|\frac{1}{2}x+4\right| = -3 \quad \text{Subtract 9}$$

$$\left|\frac{1}{2}x+4\right| = \frac{-3}{2} \quad \text{Divide by 2}$$

A. There are no solutions.
| absolute | = Negative(−1)

B. There is one solution.
| absolute | = 0

C. There are two solutions.
| absolute | = Positive (+)

D. There are infinitely many solutions.
Inequalities absolute value

Part 2 out of 2
How do you know there are no solutions?

A. An absolute value cannot be equal to a fraction.

B. An absolute value must be equal to a positive number.

C. An absolute value cannot be equal to a negative number.

D. An absolute value must be equal to an integer.

8 Consider the absolute-value equation $5\left|\frac{1}{2}x+2\right|+7=7$.

$$
\begin{aligned}
5\left|\frac{1}{2}x+2\right|+7 &= 7\\
5\left|\frac{1}{2}x+2\right| &= 0\\
\left|\frac{1}{2}x+2\right| &= 0
\end{aligned}
$$

$$
\begin{aligned}
\frac{1}{2}x+2 &= 0\\
\frac{1}{2}x &= -2\\
x &= -4
\end{aligned}
$$

Part 1

How many solutions are there to the equation?

A. There are no solutions.

B. There is one solution.

C. There are two solutions.

D. There are infinitely many solutions.

Part 2 out of 2

Solve for x.

$x = -4$

9 Solve the absolute-value equation $|2(x+6)-4|+5=7$.
If a solution is not an integer, give it in fraction form.

$|2x+8|+5 = 7$ Apply the Distributive Property and simplify.

$|2x+8| = 2$ Subtract 5 from both sides.

Rewrite as two equations.

$2x+8=-2$ or $2x+8=2$

Subtract 8 from both sides of both equations.

$2x=-10$ or $2x=-6$

Divide both sides of both equations by 2.

$x =$ -5 or $x =$ -3

10 Solve the absolute-value equation $-5|-5x+6|-2=-2$.
If the solution is not an integer, give it in fraction form.

$$-5|-5x+6| = 0$$ Add 2 to both sides.

$$|-5x+6| = 0$$ Divide both sides by -5.

Because the absolute value is equal to zero,
you can simply remove the absolute-value signs.
There will be one solution.

$$-5x+6 = 0$$

$$-5x = -6$$

$$x = \frac{6}{5}$$

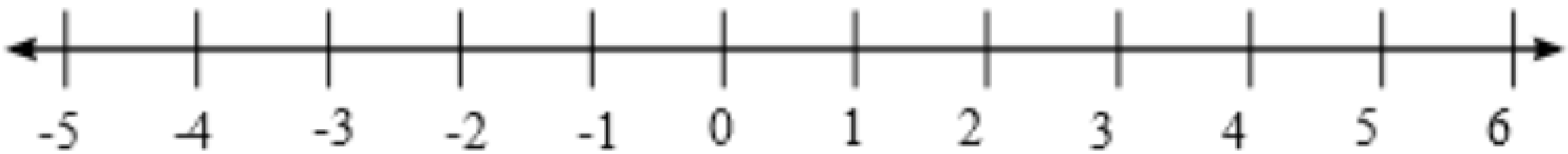
11 Solve the absolute value inequality $6|x+4|+23<5$ algebraically. Select the number line showing the solution.

$$6|x+4|+23 < 5$$

$$6|x+4| < -18$$ Subtract 23 from both sides.

$$|x+4| < -3$$ Divide both sides by 6.

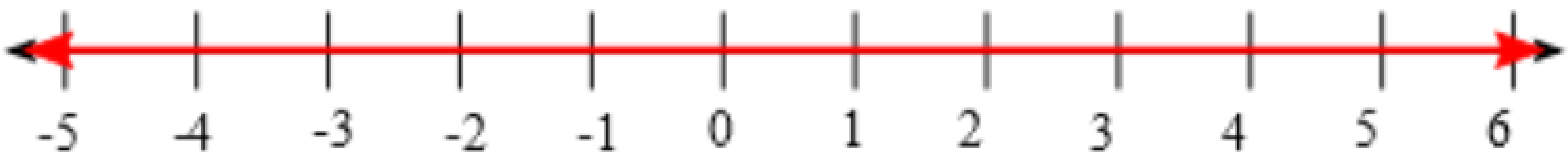
The left-hand side of the inequality is always positive or zero, so it can never be less than -3.
No real numbers are solutions, as shown by the number line.



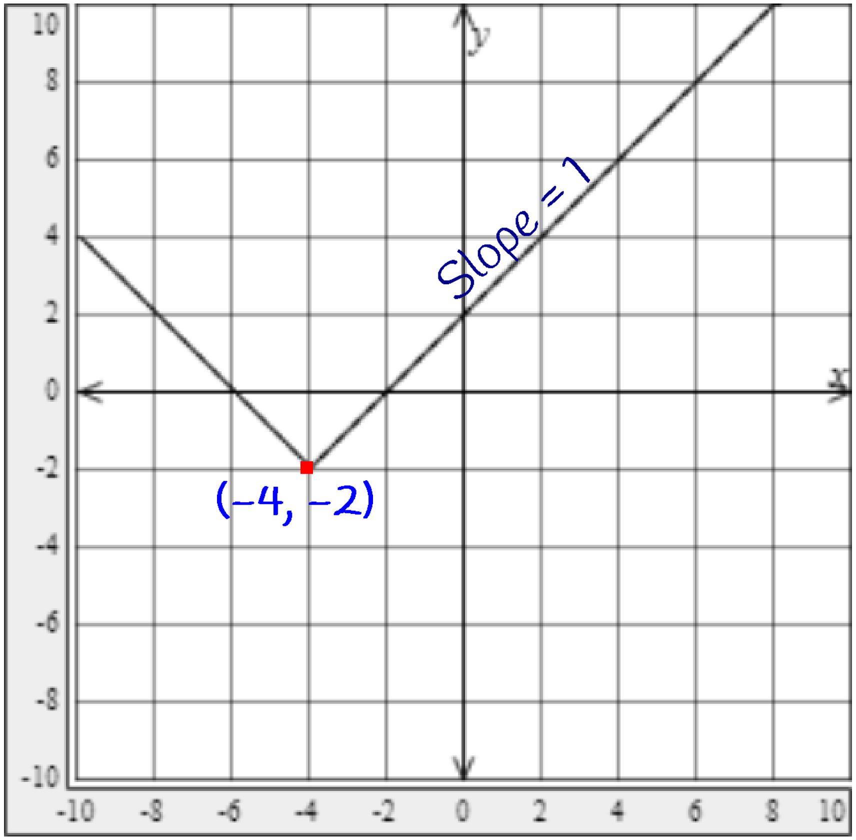
12 Solve the absolute value inequality $-5|x-3|-10<10$ algebraically. Select the number line below that shows the correct solution.

$$-5|x-3|-10 < 10$$
$$-5|x-3| < 20 \quad \text{Add 10 to both sides.}$$
$$|x-3| > -4 \quad \text{Divide both sides by } -5.$$

The left-hand side is always positive or zero, so the inequality is always true.
The number line below shows the solution, all real numbers.



13 Enter an equation for the absolute value function whose graph is shown.



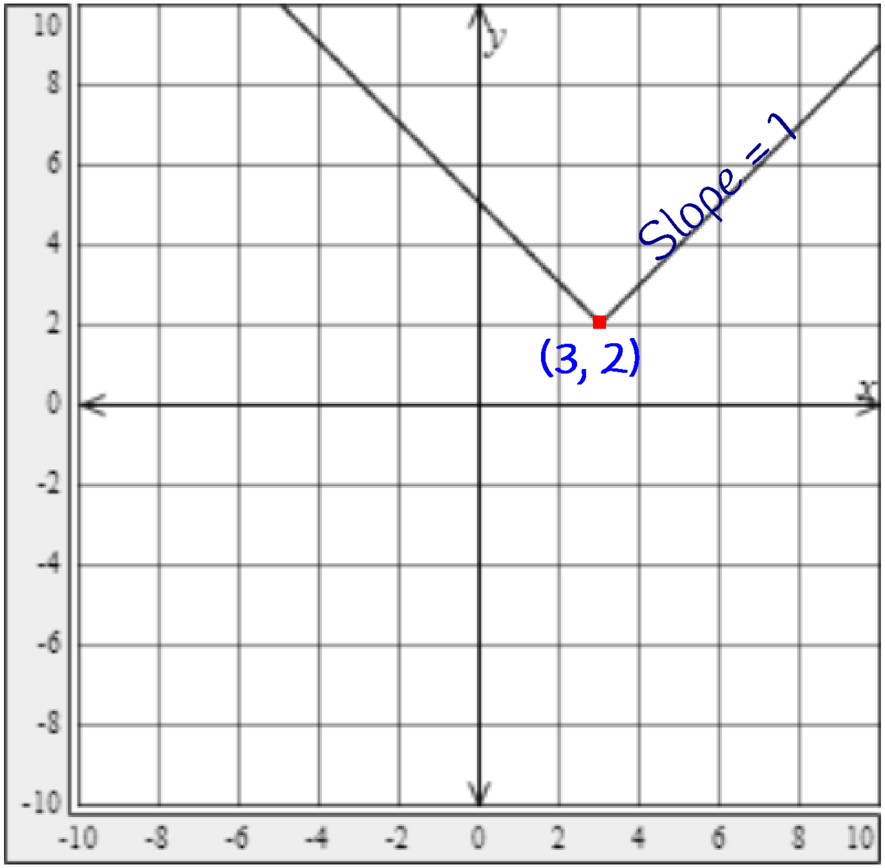
h is the number of units that the graph of the parent function is translated horizontally. For a translation to the right, h is positive; for a translation to the left, h is negative. In this situation, $h = -4$.

k is the number of units that the graph of the parent function is translated vertically. For a translation up, k is positive; for a translation down, k is negative. In this situation, $k = -2$.

If the vertex has coordinates (h, k), then the function has the equation $g(x) = |x - h| + k$.

The function is $g(x) = |x + 4| - 2$.

14 Enter an equation for the absolute value function whose graph is shown.



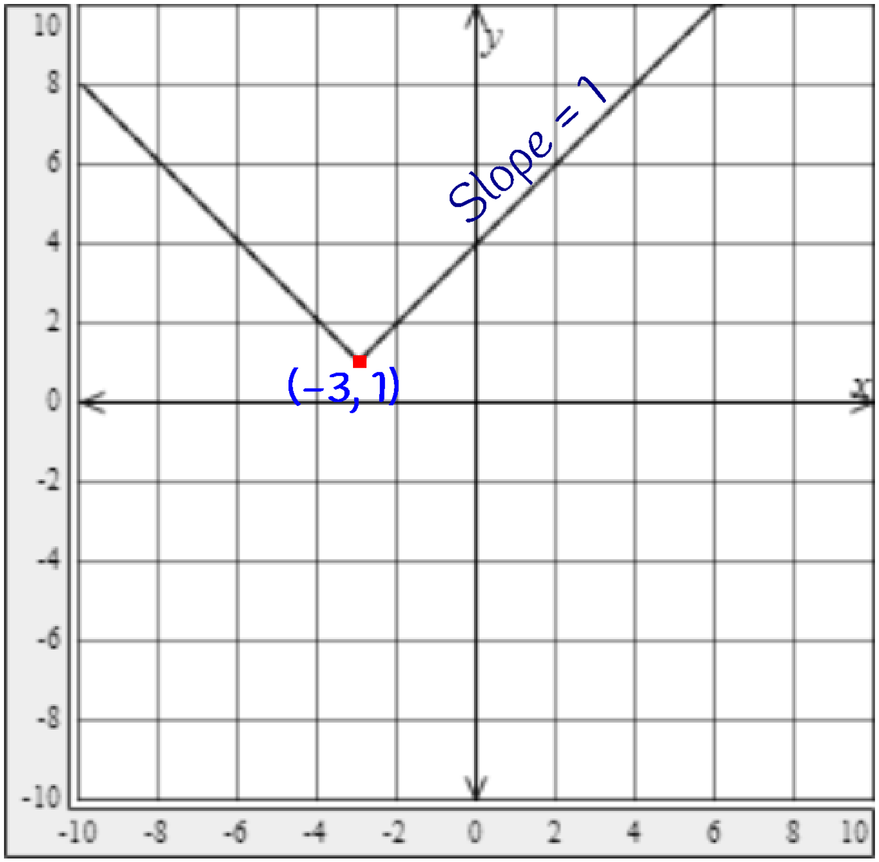
h is the number of units that the graph of the parent function is translated horizontally. For a translation to the right, h is positive; for a translation to the left, h is negative. In this situation, $h = 3$.

k is the number of units that the graph of the parent function is translated vertically. For a translation up, k is positive; for a translation down, k is negative. In this situation, $k = 2$.

If the vertex has coordinates (h, k), then the function has the equation $g(x) = |x - h| + k$.

The function is $g(x) = |x - 3| + 2$.

15 Enter an equation for the absolute value function whose graph is shown.



h is the number of units that the graph of the parent function is translated horizontally. For a translation to the right, h is positive; for a translation to the left, h is negative. In this situation, $h = -3$.

k is the number of units that the graph of the parent function is translated vertically. For a translation up, k is positive; for a translation down, k is negative. In this situation, $k = 1$.

If the vertex has coordinates (h, k), then the function has the equation $g(x) = |x - h| + k$.

The function is $g(x) = |x + 3| + 1$.