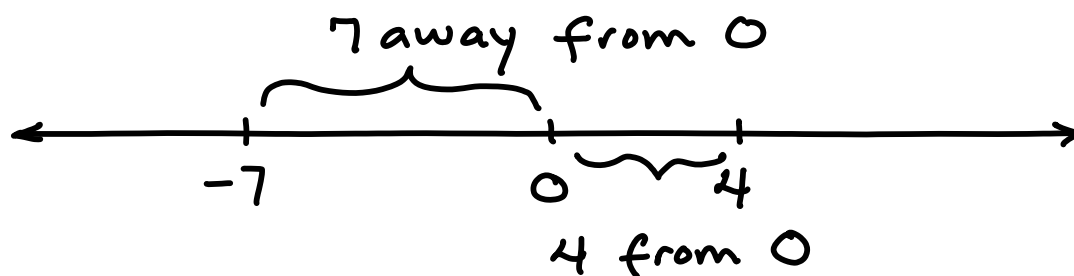


Chapter Review

What is absolute value? It's the distance a number is from zero



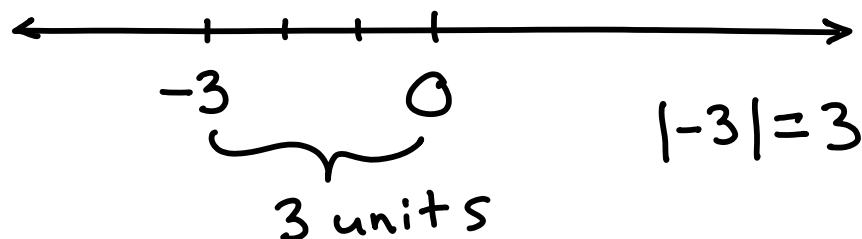
Absolute value is always positive because distance is always measured in positive units.



Evaluating absolute value expressions

$|-3|$ the bars around the -3 is the absolute value symbol

So, for example $|-3|$ means "how far is -3 from zero?"
answer: 3 units





Sketch the graph of an absolute value equation

Basic shape of an absolute value graph is a "V"

Steps

1. Find the vertex of the graph
2. Determine if the graph is V-shaped or upside down V, i.e. \wedge -shaped.
3. Graph equation, plot more points to make a more accurate graph

Example, graph $y = |x - 5| + 7$

vertex, (x, y) point of the "V"

Step 1 $y = |x - 5| + 7$
Find by setting to zero, solve for x

$$\begin{aligned}x - 5 &= 0 \\x &= 5\end{aligned}$$

Now, find (x, y)

$$y = |x - 5| + 7$$

Vertex located at $(5, 7)$

Step 2

$$y = |x - 5| + 7$$

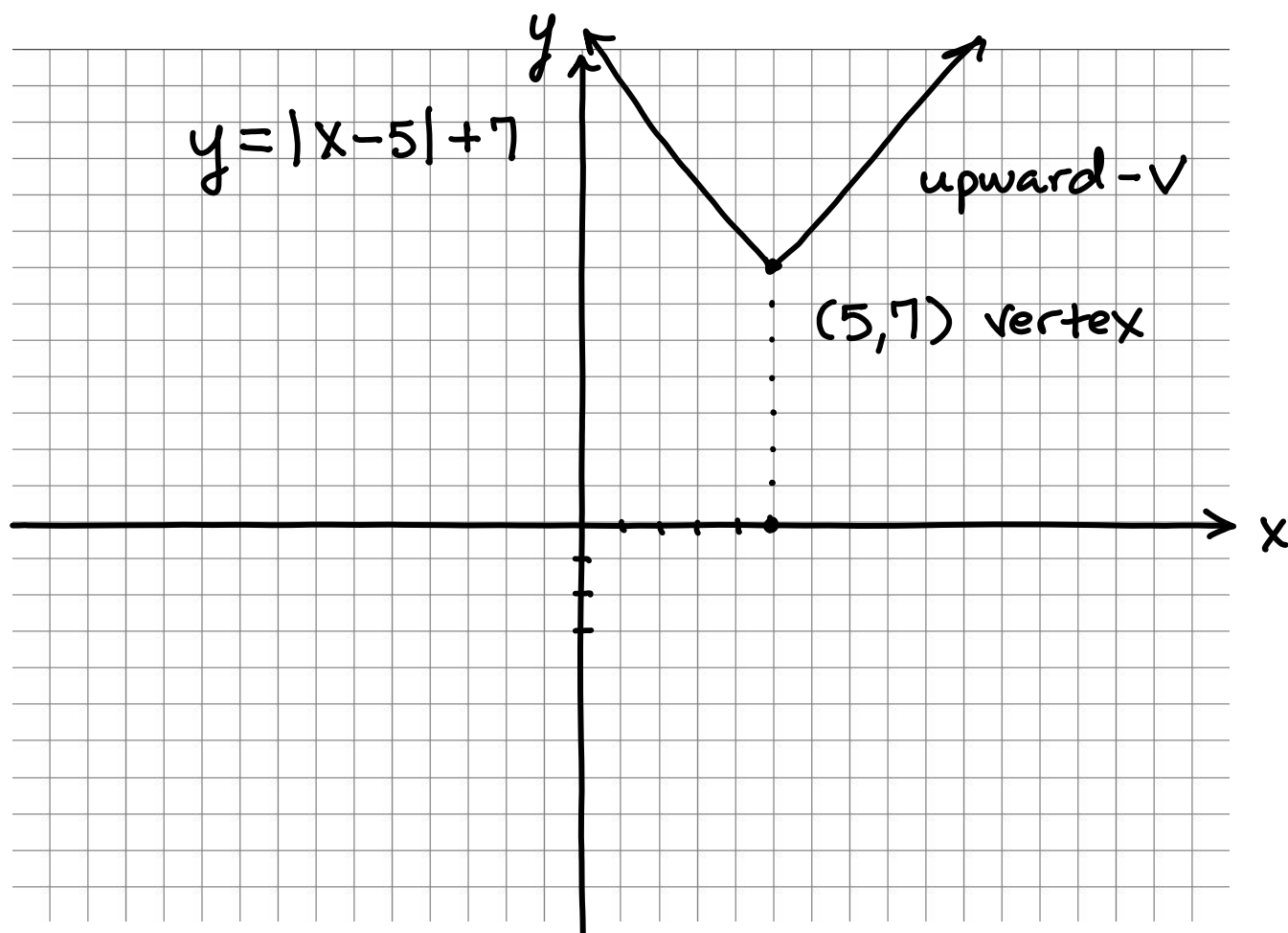
sign is positive, upward \vee graph

when sign is negative upside-down \vee ,

Step 3

Graph $y = |x - 5| + 7$

vertex $(5, 7)$, upward- \vee graph





Solving absolute value equations

Steps

1. Isolate the absolute value part of the equation
2. Set-up two equations
3. Solve both equations - absolute value equations always have two solutions

Example,

Solve the absolute value equation

$$2|x + 9| - 4 = 12$$

Step 1
isolate
 $|x + 9|$

$$\frac{2|x + 9| - 4 = 12}{+4 \quad +4}$$

$$\frac{2|x + 9|}{2} = \frac{16}{2}$$

$$|x + 9| = 8 \quad \begin{array}{l} \text{two equations -} \\ = \pm 8 \end{array}$$

Step 2 $x + 9 = 8$

$x + 9 = -8$

Step 3

$$\frac{x + 9 = 8}{-9 \quad -9}$$

$$\frac{x + 9 = -8}{-9 \quad -9}$$

$x = -1$ ← solutions → $x = -17$



Solving absolute value inequalities

Two cases - less than and greater than

Steps

1. Isolate the absolute value part of the inequality
2. Set up compound inequality
3. Solve compound inequality - solutions
4. Graph solution

Example

$$3|2x + 2| < 9$$

Step 1

$$\frac{3|2x + 2| < 9}{3 \quad 3}$$

$$|2x + 2| < 3$$

Step 2

$$|2x + 2| < 3$$

- take out of abs. val.
- surround by ± 3
- keep same inequality sign

Step 3

$$-3 < 2x + 2 < 3$$

$$\begin{array}{r} -3 < 2x + 2 < 3 \\ -2 \quad \quad -2 \quad -2 \\ \hline \end{array}$$

$$\frac{-5 < 2x < 1}{2 \quad 2 \quad 2}$$

$$-\frac{5}{2} < x < \frac{1}{2}$$

Solutions

Step 4

