

Absolute Value Functions

Name: _____

Date: _____

Concepts

- Finding the Rule of an Absolute Value Function
- Graphing an Absolute Value Function
- Properties of the Absolute Value Function
- Solving Problems Involving the Absolute Value Function
- The Absolute Value Function (theory)
- The Inverse of an Absolute Value Function
- The Role of the Parameters in an Absolute Value Function (theory)

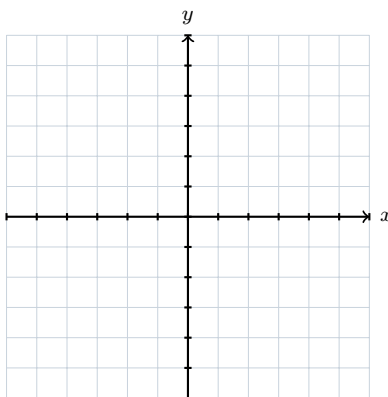
Finding the Rule of an Absolute Value Function

1. An absolute value function has its vertex at $(-1, 6)$ and its curve passes through $(3, -2)$.
 - a) Find its rule in the form $f(x) = a|x - h| + k$.
 - b) Find the zeroes of f .
 - c) State the extremum of f and the interval over which f is increasing.

Graphing an Absolute Value Function

2. Consider $f(x) = 2|x + 1| - 6$.

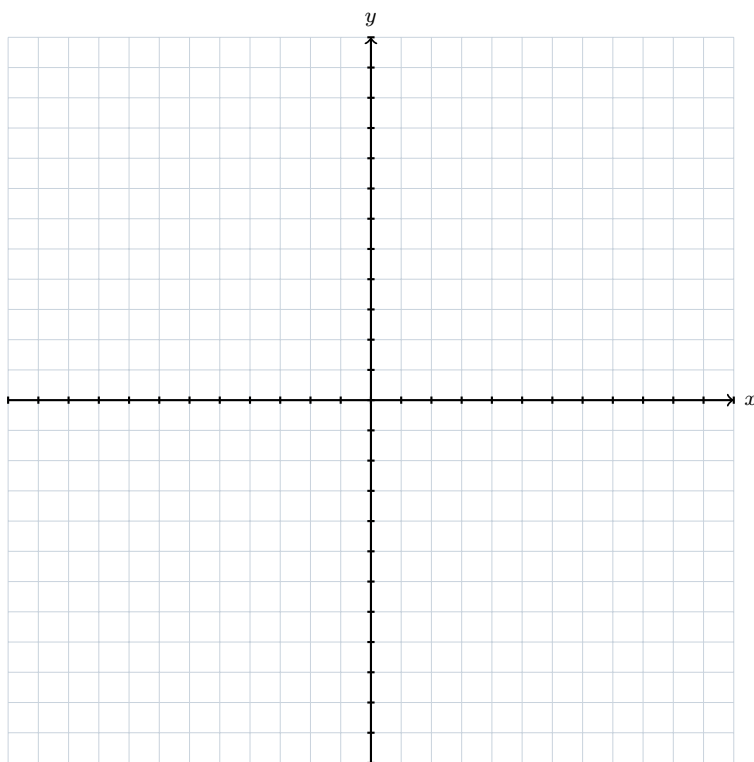
- a) Give the vertex, the zeroes and the y -intercept.
- b) Sketch the graph on the grid below.
- c) Give the range of f and the interval over which f is decreasing.



Properties of the Absolute Value Function

3. Let $f(x) = -3|x + 2| + 12$.

- a) Give the vertex, the range and the zeros of f .
- b) State the intervals of increase and decrease.
- c) Sketch the graph on the grid below.



Solving Problems Involving the Absolute Value Function

4. A delivery drone hovers near a landing pad. Its horizontal distance from the pad, in metres, is $d(t) = |2t - 14| + 1$, where $t \in [0, 12]$ is the time in seconds.

- a) What is the smallest distance reached, and when?
- b) At what times is the drone exactly 5 m from the pad?

The Absolute Value Function

5. Rewrite $f(x) = |3x - 12| + 2$ as a function defined piecewise, without absolute value bars. Then give the coordinates of its vertex and the equation of its axis of symmetry.

The Inverse of an Absolute Value Function

6. Consider $f(x) = 2|x - 1| - 6$.

- a) Find the rule of the inverse relation of f and give the values of x for which it is defined.
- b) Explain why this inverse relation is not a function.
- c) Restrict the domain of f to $[1, +\infty[$ and give the rule of the resulting inverse function.

The Role of the Parameters in an Absolute Value Function

7. Compare the base function $f(x) = |x|$ with $g(x) = -\frac{1}{2}|3(x + 2)| - 1$. Give the vertex of g , the direction in which it opens, its range, and the slope of each of its two branches. Then explain why changing b from 3 to 5 would leave the vertex unchanged.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Absolute Value Functions — with the reasoning written out in full — are available at tutorinmontreal.ca.