



Algebra 1

Topic: Graphing Absolute Value Functions

Instructions

Solve the following problems based on graphing absolute value functions. Show all your work and check your solutions.

Practice Problems

1. Graph the following absolute value functions:

- | | |
|------------------------|------------------------------|
| (i) $f(x) = x $ | (v) $f(x) = - x $ |
| (ii) $f(x) = x - 3 $ | (vi) $f(x) = x - 4 + 1$ |
| (iii) $f(x) = x + 2 $ | (vii) $f(x) = -2 x + 3 $ |
| (iv) $f(x) = 2 x $ | (viii) $f(x) = 3 x - 1 - 2$ |

2. Write the equation of the absolute value function based on the transformations described:

- (i) Reflection over the x-axis and a shift 4 units right
- (ii) Vertical stretch by a factor of 2 and shift 5 units up
- (iii) Shift 3 units left and 2 units down
- (iv) Horizontal compression by a factor of $1/2$ and shift 3 units up
- (v) Reflection over the y-axis and a shift 2 units left

3. Identify the transformations applied to the graph of $f(x) = |x|$ to obtain the following:

- | | |
|-------------------------|-----------------------------|
| (i) $f(x) = x - 4 $ | (iv) $f(x) = -3 x - 2 - 4$ |
| (ii) $f(x) = - x + 3$ | (v) $f(x) = x - 2$ |
| (iii) $f(x) = 2 x + 1 $ | (vi) $f(x) = x + 2 + 4$ |

Multiple-Choice Questions

- The graph of $f(x) = |x - 5|$ is a transformation of $f(x) = |x|$. What type of transformation is this?
 - Horizontal shift 5 units to the right
 - Horizontal shift 5 units to the left
 - Vertical shift 5 units up
 - Reflection over the y-axis
- The graph of $f(x) = -|x|$ is a transformation of $f(x) = |x|$. What type of transformation is this?
 - Reflection over the x-axis
 - Reflection over the y-axis
 - Vertical stretch by a factor of 2
 - Horizontal compression by a factor of 2
- The graph of $f(x) = 3|x|$ is a transformation of $f(x) = |x|$. What type of transformation is this?
 - Vertical compression by a factor of 3
 - Vertical stretch by a factor of 3
 - Horizontal stretch by a factor of 3
 - Horizontal compression by a factor of 3

Challenge Problem

Graph the following absolute value function and describe the transformation from the parent function $f(x) = |x|$:

$$f(x) = -3|x - 2| + 4$$

What transformations occurred to the graph of $f(x) = |x|$?

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