5-1 The Absolute Value Functions

Monday, September 23, 2019 7:46 AM

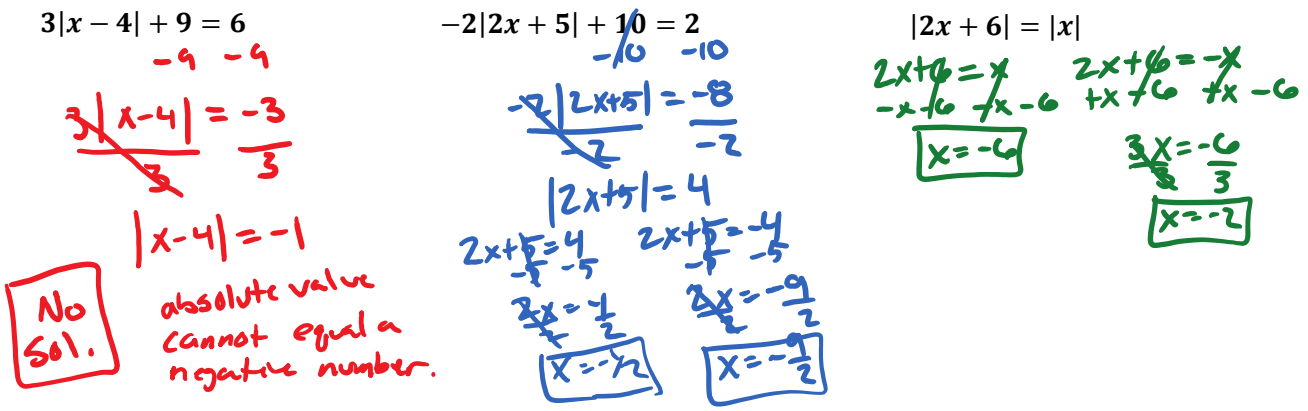
Warm Up

Solve the following for x.

$3|x-4|+9=6$

$-2|2x+5|+10=2$

$|2x+6|=|x|$



Essential Question

What are the key features of the graph of the absolute value function?

Needed Vocab:

- **Absolute Value Function**
- **Axis of Symmetry**
- **Vertex**

Goal: "I can. . .

Analyze functions that include absolute value expressions."

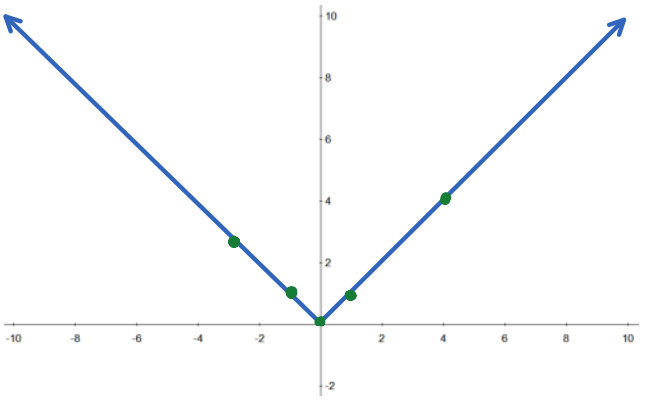
Example 1

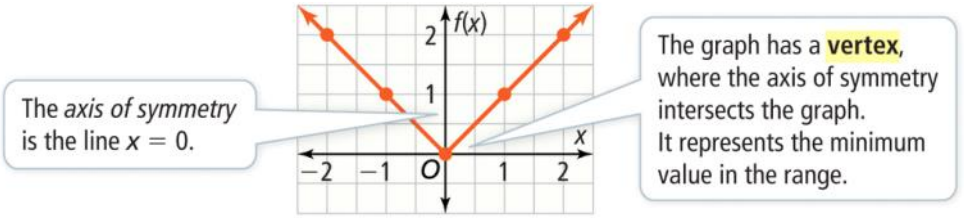
What are the features of the graph of $f(x) = |x|$?

Make a table of values

What does the graph look like?

X	Y
-3	3
-1	1
∅	∅
1	1
4	4



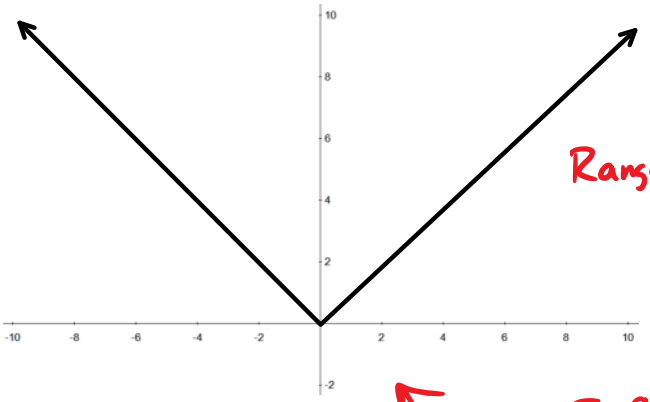


The graph has an **axis of symmetry**, which intersects the vertex and divides the graph into two sections, or pieces, that are images of each other under a reflection.

What is the domain and range of $f(x) = |x|$?

Domain: Possible values of x.

D: All real #'s
$\mathbb{R}$



Range: Possible values of y

R: $y \geq 0$

↖ never goes below ∅.

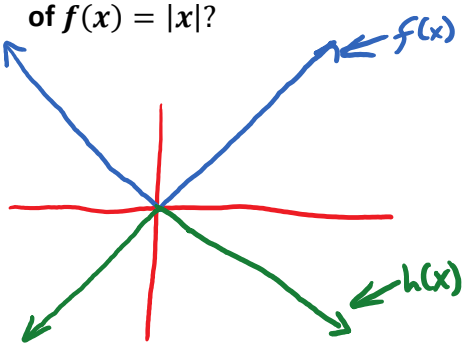
Example 2

How does the Domain and Range of $g(x) = 2|x|$ compare to the Domain and Range of $f(x) = |x|$?

Dilates f(x) vertically while the vertex remains @ ∅,∅.

Domain and Range are the same for both.

How does the Domain and Range of $h(x) = -1|x|$ compare to the Domain and Range of $f(x) = |x|$?



flips the graph vertically while the vertex remains the same.

f(x)
D: ℝ
R: y≥∅

h(x)
D: ℝ
R: y≤∅

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2. How do the domain and range of each function compare with the domain and range of $f(x) = |x|$?

a. $g(x) = \frac{1}{2}|x|$

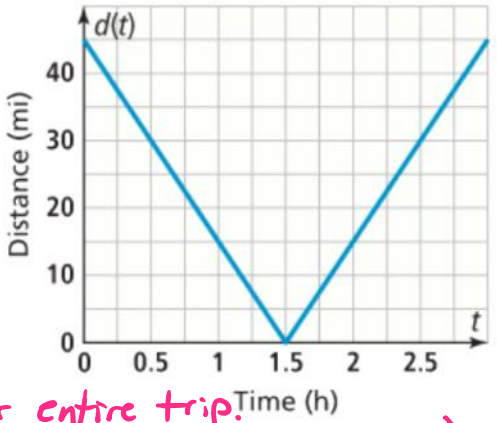
D: ℝ same
R: y≥∅

b. $h(x) = -2|x|$

D: ℝ
R: y≤∅ ← changed.

Example 3

Jay rides in a boat from his home to his friend's home in a neighboring state. The graph of the function $d(t) = 30|t - 1.5|$ shows the distance of the boat in miles from the state line at t hours. Assume the graph shows Jay's entire trip.



A. How far does Jay travel to visit his friend?

B. How does the graph relate to the domain and range of the function?

a) graph shows distance from border for entire trip. Starts 45 miles away and ends 45 miles away. (From border)
Total trip is 45+45 = 90 miles

only the R has a lower limit.

b) Domain and Range of the function are D: $\mathbb{R}$, R: $y \geq 0$. But for the application they are each only a portion of the functions Domain and Range. D: $0 \leq x \leq 3$, R: $0 \leq y \leq 45$

Both D and R have upper and lower limits.

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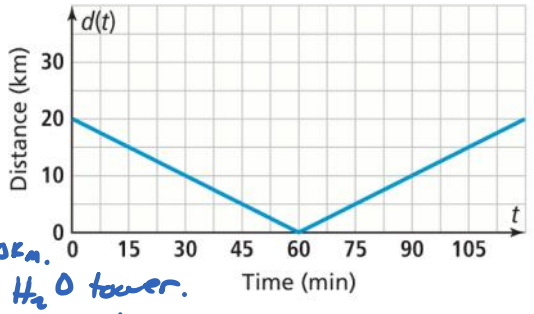
3. A cyclist competing in a race rides past a water station. The graph of the function $d(t) = \frac{1}{3}|t - 60|$ shows her distance from the water station at t minutes. Assume the graph represents the entire race. What does the graph tell you about her race?

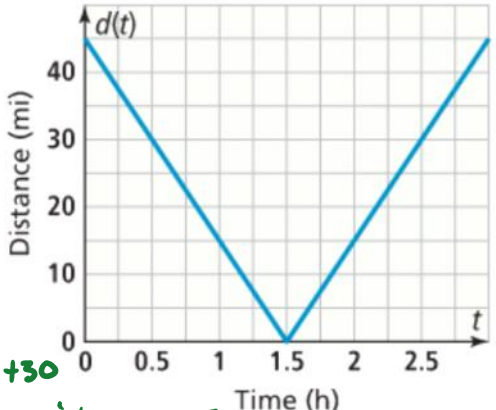


- The distance to the H_2O tower @ the start was 20km.
- it took 60 min. to get to the H_2O tower.
- She traveled @ a constant rate of 20 Km/hr
- the H_2O tower is the half-way point of the race.
- it took her 2 hrs to complete the race.
- total race distance was 40Km.

Example 4

According to the graph what is the rate at which the object is moving?

Does the objects speed change at any point during the trip?



$\frac{45 \text{ mi}}{1.5 \text{ hrs}} = 30 \text{ mi/hr}$

the slope does change from $-30 \rightarrow +30$ and looking that to the situation it means

but applying that to the situation it means
30 mph towards something and 30 mph away, so the rate does not change.

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https://tinyurl.com/rjcmxbj

Homework

Pg. 188
10-12, 17-25 odd, 34
