

Name: _____

Date: _____

Absolute Value Algebra 1

Recall the following important facts about absolute value:

- The **absolute value** of a positive number equals the number itself.

$$|6| = 6 \qquad |13| = 13 \qquad |121| = 121 \qquad \{\text{note: " | " denotes absolute value}\}$$

- The **absolute value** of a negative number is equal to the additive inverse (opposite) of the number.

$$|-9| = 9 \qquad \left|-\frac{2}{3}\right| = \frac{2}{3} \qquad |-85| = 85$$

- The **absolute value** of zero equals zero ($|0| = 0$).

Exercise #1: Rewrite without using absolute value.

(a) $|15|$

(e) $|0|$

(i) $|(-2)(5)+1|$

(m) $|-7|-2$

(b) $|26|$

(f) $|-2.25|$

(j) $|5-3 \cdot 4|$

(n) $3 \cdot |-10| + 6$

(c) $|-4|$

(g) $|9-15|$

(k) $\frac{|12|}{|-3|}$

(o) $\sqrt{|1-2 \cdot 25|}$

(d) $\left|-\frac{1}{3}\right|$

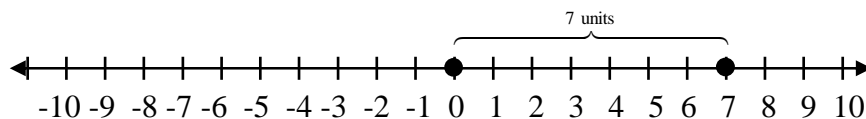
(h) $|9|-|15|$

(l) $\frac{|12|}{|-3|}$

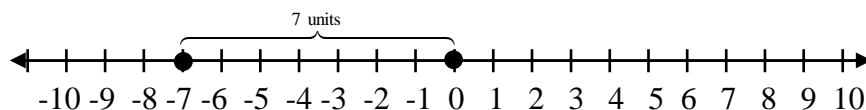
(p) $\sqrt{|6-10|} + \sqrt{|26-10|}$

Absolute value has a *geometric* interpretation. The absolute value of a number represents the **distance** that the number is away from zero on a real number line.

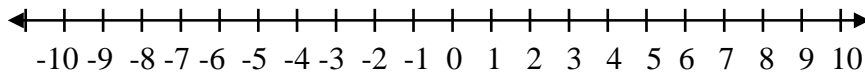
$|7| = 7$ because 7 is 7 units away from zero on the real number line.



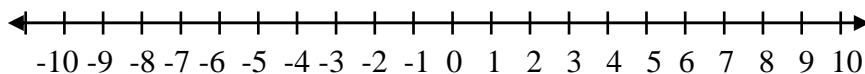
$|-7| = 7$ because -7 is 7 units away from zero on the real number line.



Exercise #2: Graph all solutions to $|x| = 4$ on the number line below.



Exercise #3: Graph all solutions to $|x| = 6$ on the number line below.



Exercise #4: (a) How far apart are the graphs of 2 and 9 on the real number line?

(b) Compute $|9 - 2|$.

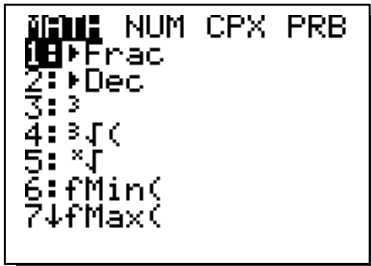
(c) Compute $|2 - 9|$.

(d) Suppose that a and b represent real numbers. What can we say about the value of $|a - b|$ as compared to the distance between the graphs of a and b on the real number line?

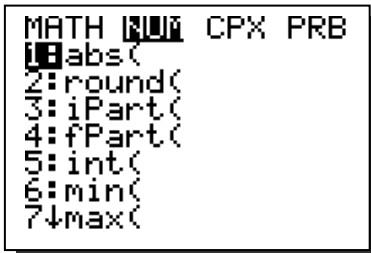
Exercise #5: Explain why $|x| = -3$ has no solutions.

Exercise #6: Compute $|4500 - 212 \cdot 32|$ using a graphing calculator.

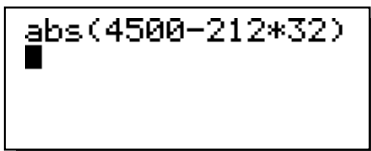
Step #1: Press “MATH.”



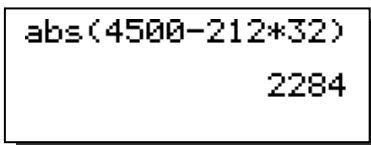
Step #2: Press right arrow to “NUM.”



Step #3: Press “ENTER,” then type the expression.



Step #4: Press “ENTER” to obtain the answer.



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Absolute Value Algebra 1 Homework

Skills

1. Compute each of the following without using a calculator.

(a) $|18|$

(e) $|10 - 3|$

(i) $|-4(-3) - 15|$

(m) $12 - |-10|$

(b) $|-6|$

(f) $\left|-\frac{1}{5}\right|$

(j) $|2 - 6 \cdot 3|$

(n) $-4 \cdot |-2| + 3$

(c) $|-42|$

(g) $|18 - 30|$

(k) $\frac{|-12| - |-8|}{|-4|}$

(o) $\sqrt{|-8 - 8|}$

(d) $|\pi|$

(h) $|2| - |-7|$

(l) $\left|\frac{-36}{9}\right|$

(p) $3 \cdot \sqrt{|9 - 18|}$

2. Compute each of the following using a calculator. Round your answer to the *nearest hundredth*, where appropriate.

a. $\left|\frac{5 - 3.2(4.47)}{-1.2}\right|$

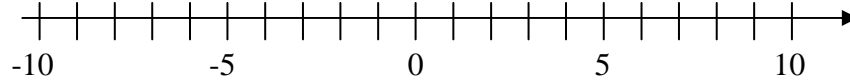
b. $|-56 \cdot 22^2 - 18 \cdot 12|$

c. $\sqrt{45 + 2.2 \cdot |126 - 171|}$

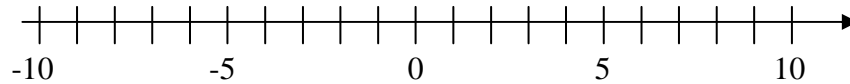
3. Find the value of $|a^2b - ab^2|$ if $a = 2$ and $b = 5$.

4. If $a = 6$ and $b = 14$, then find the value of $\left|\frac{a-b}{b-a}\right|$.

5. Graph all solutions to $|x| = 9$ on the number line below.



6. Graph all solutions to $|x| = 4\frac{1}{2}$ on the number line below.



Reasoning

7. Tanisha claims that $|x| = x$ for any real number. Explain why Tanisha is incorrect.

8. Natasha claims that if x is any integer, then $|x|$ must be positive. Is Natasha correct? Explain.

9. For which values of a and b is $|a - b| = |a| - |b|$?

(1) $a = 8, b = -3$

(3) $a = -5, b = 9$

(2) $a = -6, b = -4$

(4) $a = 2, b = 3$

10. Assuming that a and b represent real numbers, which of the following statements is not always true? Explain your choice.

(1) $|a \cdot b| = |a| \cdot |b|$

(3) $|a| = |-a|$

(2) $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

(4) $|a + b| = |a| + |b|$

11. List all integers x for which $|x|$ is less than π .