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.

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

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

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

- 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) $|-7|-2$

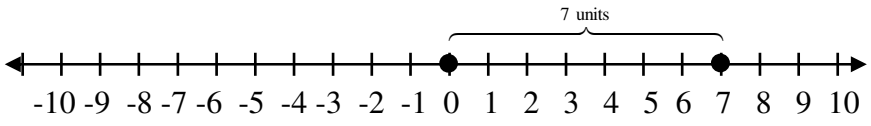
(b) $|26|$ (f) $|-2.25|$ (j) $|5-3\bullet 4|$ (n) $3\bullet|-10|+6$

(c) $|-4|$ (g) $|9-15|$ (k) $\frac{|12|}{|-3|}$ (o) $\sqrt{|1-2\bullet 25|}$

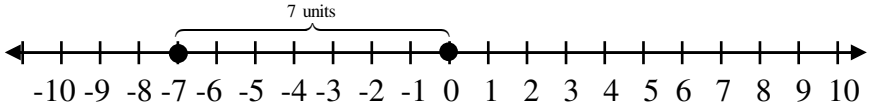
(d) $\left|-\frac{1}{3}\right|$ (h) $|9|-|15|$ (l) $\left|\frac{12}{-3}\right|$ (p) $\sqrt{|6-10|}+\sqrt{|26-10|}$

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.

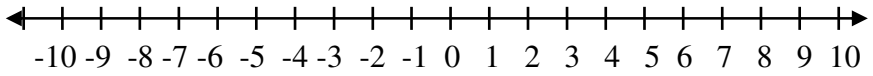
$|7| = 7$ because 7 is 7 units away from zero on the real number line.



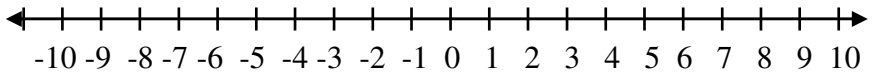
$|-7| = 7$ because -7 is 7 units away from zero on the real number line.



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 $|9-2|$.

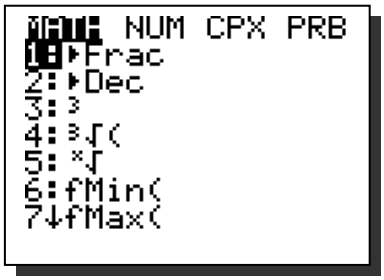
(c) Compute $|2-9|$.

(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?

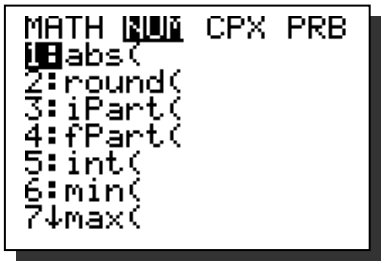
Exercise #5: Explain why $|x| = -3$ has no solutions.

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

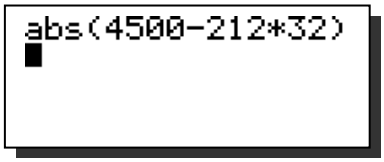
Step #1: Press "MATH."



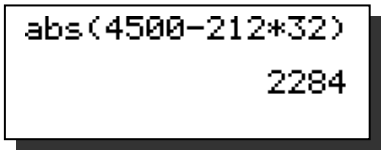
Step #2: Press right arrow to "NUM."



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



Step #4: Press "ENTER" to obtain the answer.



Name: _____ Date: _____

Absolute Value
Algebra 1 Homework

Skills

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

(a) $|18|$

(b) $|-6|$

(c) $|-42|$

(d) $|-\pi|$

(e) $|10-3|$

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

(g) $|18-30|$

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

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

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

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

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

(m) $12-|-10|$

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

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

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

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

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

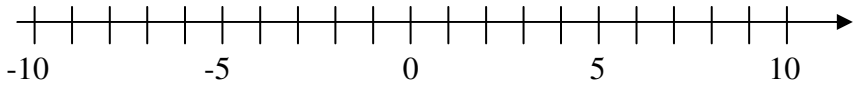
b. $\left|-56\bullet 22^2-18\bullet 12\right|$

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

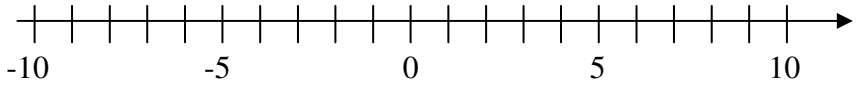
3. Find the value of $\left|a^2b-ab^2\right|$ if $a = 2$ and $b = 5$.

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) $a = 2,\ b = 3$

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

(1) $|a \bullet b| = |a| \bullet |b|$ (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.