

4 Absolute Value

Key Words

absolute value

The **absolute value** of a number is its distance from 0 on a number line. Because a distance can never be negative, the absolute value of a number can never be negative either. Absolute value is written as $|x|$ for any number x .

The absolute value of 10, written as $|10|$, is 10.

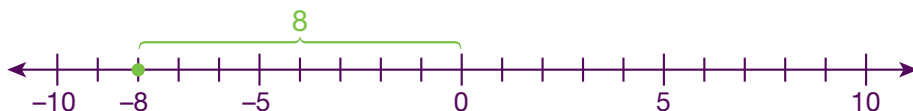
The absolute value of -10 , written as $|-10|$, is also 10.

Both 10 and -10 are 10 units from 0 on a number line.

Example 1

What is the value of $|-8|$?

Find -8 on a number line.



Even though -8 is negative, its distance from 0 is a positive number: $+8$.

$$|-8| = 8$$

Example 2

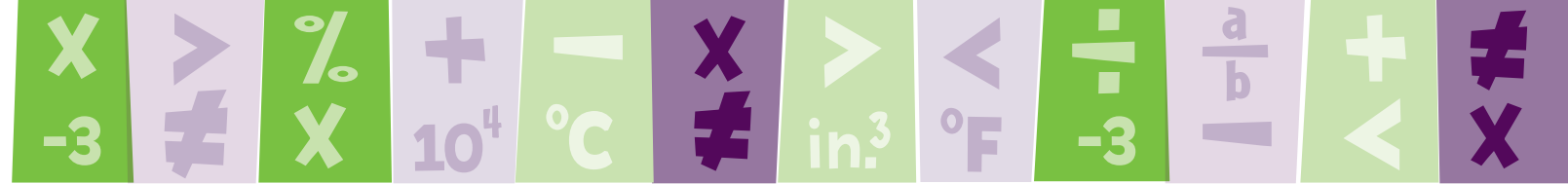
Nicki cannot use her credit card if her balance is less than $-\$750$. Express this amount using absolute value. Then describe what the absolute value represents.

A balance less than 0 is a debt, or the money you owe. Any negative balance, therefore, can be expressed as the absolute value of the number.

Nicki's maximum debt is $|\$750|$, which is $\$750$. She cannot exceed a debt of $\$750$ on her credit card.

EXPLAIN

What type of number is identical to its absolute value? Explain your answer.



Guided Practice

1 What is the value of $|-3\frac{1}{2}|$?

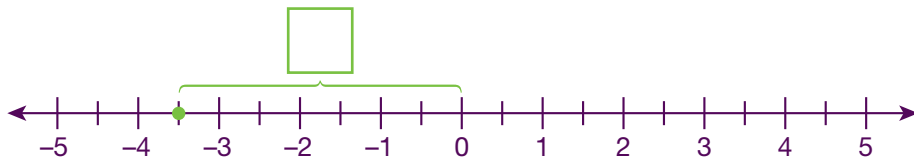
Step 1 Since the absolute value of a number is its distance from 0 on a number line, plot $-3\frac{1}{2}$ on a number line.

THINK

$-3\frac{1}{2}$ is between -3 and -4 on a number line.



Step 2 Count the distance from the $-3\frac{1}{2}$ to 0. Write the distance in the box.



$|-3\frac{1}{2}| = \underline{\hspace{2cm}}$

2 A submarine is -12 feet above sea level. Express the distance from sea level using absolute value. Then describe what the absolute value represents.

Step 1 Interpret the number in the situation.
In this situation, what does the number -12 represent? _____

Step 2 Represent the distance using absolute value.
The submarine's distance from sea level is $|\underline{\hspace{1cm}}|$ feet.

REMEMBER

Some values can be negative, such as "feet above sea level"; however, a *distance* can never be negative.

The submarine's distance below sea level is _____ feet.