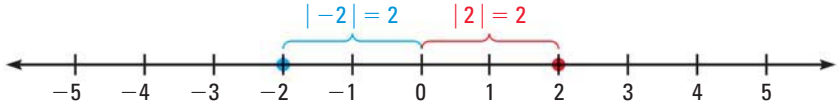
1.7 Absolute Value Equations and Inequalities

TEKS a.2, a.5, a.6, 2A.2.A

MATERIALS • 13 index cards numbered with the integers from −6 to 6

QUESTION What does the solution of an absolute value equation or inequality look like on a number line?

The *absolute value* of a number x, written $|x|$, is the distance the number is from 0 on a number line. Because 2 and −2 are both 2 units from 0, $|2| = 2$ and $|-2| = 2$. The absolute value of a number is never negative.



EXPLORE Find solutions of absolute value equations and inequalities

Work with a partner. Place the numbered index cards in a row to form a number line. Then turn all the cards face down.

STEP 1

Solve equations

Turn over cards to reveal numbers that are solutions of the equations below.

a. $|x| = 2$

b. $|x - 2| = 1$

c. $|x + 1| = 3$

STEP 2

Solve inequalities with ≤

Turn over cards to reveal numbers that are solutions of the inequalities below.

d. $|x| \leq 2$

e. $|x - 2| \leq 1$

f. $|x + 1| \leq 3$

STEP 3

Solve inequalities with ≥

Turn over cards to reveal numbers that are solutions of the inequalities below.

g. $|x| \geq 2$

h. $|x - 2| \geq 1$

i. $|x + 1| \geq 3$

DRAW CONCLUSIONS Use your observations to complete these exercises

1. *Describe* the solutions of the absolute value equations in Step 1. Will all absolute value equations have the same number of solutions? *Explain*.
2. *Compare* the solutions of the absolute value inequalities in Steps 2 and 3. How does the inequality symbol (≤ or ≥) affect the pattern of the solutions?