1 EXAMPLE **Solve and check $|a| - 3 = 5$.**

$|a| - 3 + 3 = 5 + 3$ Add 3 to each side.

$|a| = 8$ Simplify.

$a = 8$ or $a = -8$ Definition of absolute value.

Check: $|a| - 3 = 5$

$|8| - 3 \stackrel{?}{=} 5$ ← Substitute 8 and -8 for a. → $|-8| - 3 \stackrel{?}{=} 5$

$8 - 3 = 5$ ✔ $8 - 3 = 5$ ✔

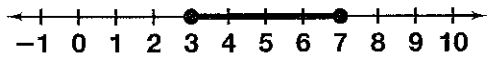
2 EXAMPLE **Solve $|3c - 6| = 9$.**

$3c - 6 = 9$	← Write two equations. →	$3c - 6 = -9$
$3c - 6 + 6 = 9 + 6$	← Add 6 to each side. →	$3c - 6 + 6 = -9 + 6$
$3c = 15$		$3c = -3$
$\frac{3c}{3} = \frac{15}{3}$	← Divide each side by 3. →	$\frac{3c}{3} = \frac{-3}{3}$
$c = 5$		$c = -1$

The value of c is 5 or -1.

3 EXAMPLE Solve $|y - 5| \leq 2$. Graph the solutions.

$y - 5 \geq -2$	and	$y - 5 \leq 2$	Write a compound inequality.
$y - 5 + 5 \geq -2 + 5$	|	$y - 5 + 5 \leq 2 + 5$	Add 5 to each side.
$y \geq 3$	and	$y \leq 7$	Simplify.
$3 \leq y \leq 7$			



4 EXAMPLE The ideal diameter of a piston for one type of car is 88.000 mm. The actual diameter can vary from the ideal diameter by at most 0.007 mm. Find the range of acceptable diameters for the piston.

Relate: greatest difference between actual and ideal | is at most | 0.007 mm

Define: Let d = actual diameter in millimeters of the piston.

Write: $|d - 88.000|$ | $\leq$ | 0.007

$|d - 88.000| \leq 0.007$

$-0.007 \leq d - 88.000 \leq 0.007$ Write a compound inequality.

$-0.007 + 88.000 \leq d - 88.000 + 88.000 \leq 0.007 + 88.000$ Add 88.000.

$87.993 \leq d \leq 88.007$ Simplify.

The actual diameter must be between 87.993 mm and 88.007 mm, inclusive.