LESSON 5.7

Solving Inequalities Using Addition or Subtraction

CA Standards
AF 1.1
AF 1.4

Goal: Solve inequalities using addition and subtraction.

Vocabulary

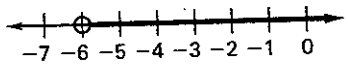
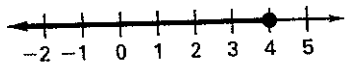
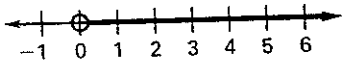
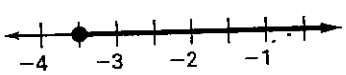
Inequality: A statement formed by placing an inequality symbol between two expressions

Solution of an inequality: A number that you can substitute for the variable to make the inequality true

Equivalent inequalities: Inequalities that have the same solution

EXAMPLE 1 Graphing Inequalities

Notice that when you graph an inequality with $>$ or $<$, you use an open circle. When you graph an inequality with $\geq$ or $\leq$, you use a closed circle.

Inequality	Graph	Verbal Phrase
a. $a > -6$		All numbers greater than -6
b. $t \leq 4$		All numbers less than or equal to 4
c. $x > 0$		All numbers greater than 0
d. $q \geq -3\frac{1}{2}$		All numbers greater than or equal to $-3\frac{1}{2}$

Guided Practice Graph the inequality.

1. $y \geq 5$	**2.** $1 > n$
3. $p \leq -2.5$	**4.** $z > -1\frac{1}{2}$

Addition and Subtraction Properties of Inequality

Words Adding or subtracting the same number on each side of an inequality produces an equivalent inequality.

Algebra If $x - a > b$, then $x - a + a >$ [b] $+ a$, or $x >$ [$b + a$].

If $x + a > b$, then $x + a - a >$ [b] $- a$, or $x >$ [$b + a$].

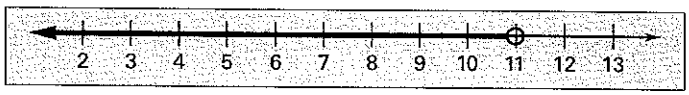
EXAMPLE 2 Solving Inequalities

Solve the inequality. Then graph its solution.

a. $m - 3 < 8$ — Original inequality

$m - 3$ [$+ 3$] < 8 [$+ 3$] — [Add 3] to each side. (Addition property of inequality)

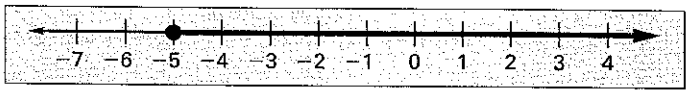
$m <$ [11] — Simplify.



b. $x - 9 \geq -14$ — Original inequality

$x - 9$ [$+ 9$] ≥ -14 [$+ 9$] — [Add 9] to each side. (Addition property of inequality)

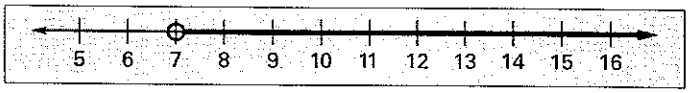
$x \geq$ [-5] — Simplify.



c. $6 + a > 13$ — Original inequality

6 [$- 6$] $+ a > 13$ [$- 6$] — [Subtract 6] from each side. (Addition property of inequality)

$a >$ [7] — Simplify.



Guided Practice **Solve the inequality. Then graph its solution.**

5. $y - 7 \leq -2$	**6.** $4 < t - 10$
7. $15 > z + 18$	**8.** $7.5 + r > 3$

EXAMPLE 3 Writing and Solving an Inequality

Shopping You want to buy a DVD player that costs \$89. You have \$110 to spend. You also want to buy a DVD. What can the cost of the DVD be in order for you to buy both the DVD player and the DVD?

Solution

Let d be the cost of the DVD.

Cost of DVD + Cost of DVD player ≤ Amount to spend

$d + 89 \leq 110$ Write an algebraic model.

$d + 89 - 89 \leq 110 - 89$ Subtract 89 from each side.

$d \leq 21$ Simplify.

Answer The cost of the DVD must be less than or equal to \$21.

Homework