6.2 Solving Multi-Step Linear Inequalities

Goals
- Solve multi-step linear inequalities.
- Use linear inequalities to model and solve real-life problems.

Example 1 *Using More than One Step*

Solve $\frac{5}{6}x - 2 \leq 18$.

Solution

$\frac{5}{6}x - 2 \leq 18$	**Write original inequality.**
$\frac{5}{6}x \leq$ 20	**Add** 2 **to each side.**
$x \leq$ 24	**Multiply each side by** $\frac{6}{5}$.

Answer The solution is all real numbers less than or equal to 24.

Example 2 *Multiplying or Dividing by a Negative Number*

Solve $9 - 3t < 7 + 2t$.

Solution

$9 - 3t < 7 + 2t$	**Write original inequality.**
$-3t <$ -2 $+ 2t$	**Subtract** 9 **from each side.**
$-5t <$ -2	**Subtract** $2t$ **from each side.**
$t > \frac{2}{5}$	**Divide each side by** -5. Reverse **inequality symbol.**

Answer The solution is all real numbers greater than $\frac{2}{5}$.

Example 3 *Writing and Using a Linear Model*

Long Distance Calls You pay \$.045 per minute for long distance calls, and a monthly fee of \$5. How many minutes of long distance can you use to keep within your monthly long distance budget of \$20?

Solution

The amount spent on calls plus the monthly fee must be less than or equal to your monthly budget.

Verbal Model

Cost per minute	$\times$	Number of minutes	$+$	Monthly fee	$\leq$	Monthly budget

Labels

Cost per minute = 0.045 (dollars per minute)

Number of minutes = m (minutes)

Monthly fee = 5 (dollars)

Monthly budget = 20 (dollars)

Algebraic Model

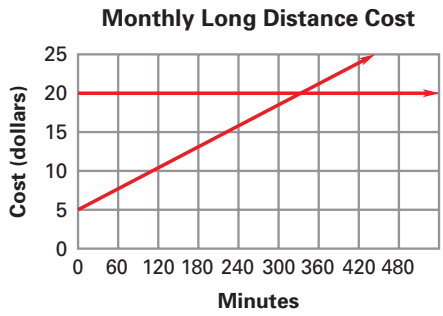
$0.045m + 5 \leq 20$ Write algebraic model.

$0.045m \leq 15$ Subtract 5 from each side.

$m \leq 333.\overline{3}$ Divide each side by 0.045.

Answer You can use 333 minutes or less of long distance per month to keep within your monthly long distance budget.

Check You can check your result graphically by graphing equations for the total cost and the budget separately.



✔ ***Checkpoint*** **Solve the inequality.**

1. $17 - x \geq 12$

$x \leq 5$

2. $3x + 2 > x - 8$

$x > -5$

3. Your school carnival charges \$2 for admission and \$.50 for each game. You go to the carnival with \$5.50. Write and solve an inequality that represents the possible number of games you can play. What is the maximum number of games you can play?

$0.5g + 2 \leq 5.50$; $g \leq 7$; 7 games