LESSON 12-7

Reteach

Solving Two-Step Inequalities

Two-step inequalities can be solved by first undoing addition or subtraction, then undoing multiplication or division.

Remember to reverse the inequality symbol if you multiply or divide by a negative number.

Complete the steps to solve the inequality. Then graph the solution set.

1. $-3x + 35 > -10$

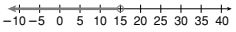
$-3x + 35 \underline{-35} > -10 \underline{-35}$ ← First undo addition or subtraction.

$-3x > \underline{-45}$ ← Then undo multiplication or division.

$\frac{-3x}{-3} \boxed{<} \frac{-45}{-3}$ ← Divide by −3. The inequality symbol is reversed.

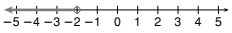
$x \boxed{<} \underline{15}$

Graph the inequality.

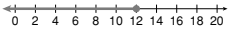


Solve. Then graph each solution set.

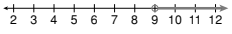
2. $7x + 32 < 18$ $x < -2$



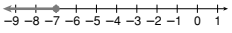
3. $\frac{t}{4} - 8 \le -5$ $t \le 12$



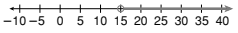
4. $6f - 6 > 48$ $f > 9$



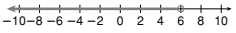
5. $-4w - 13 \ge 15$ $w \le -7$



6. $\frac{k}{-5} - 6 < -9$ $k > 15$



7. $7 - 2p > -5$ $p < 6$



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Challenge

Inequalities With Two Variables

You can determine if an ordered pair is a solution of an inequality by substituting the values into the inequality.

- If the inequality is true, the ordered pair is a solution of the inequality.
- If the inequality is false, the ordered pair is not a solution of the inequality.

Example: Is (1, 1) or (2, −1) a solution of the inequality $y < 3x - 2$?

(1, 1)
$y < 3x - 2$
$1 < 3(1) - 2$
$1 < 1$ False
(1, 1) is not a solution.

(2, −1)
$y < 3x - 2$
$-1 < 3(2) - 2$
$-1 < 4$ True
(2, −1) is a solution.

Solve.

1. Which of the following ordered pairs are solutions of $y < 4x - 3$:
$(-1, 1), (2, 5), (-\frac{1}{2}, -7), (0, -4)$?

$(-\frac{1}{2}, -7), (0, -4)$

2. Which of the following ordered pairs are solutions of $y \ge 6 - 2x$:
$(0, 0), (1, 5), (3, 6), (\frac{1}{2}, 8)$?

$(1, 5), (3, 6), (\frac{1}{2}, 8)$

3. Which of the following ordered pairs are solutions of $4x + 2y \le 20$:
$(3, 0), (0, 12), (5, 5), (2, -4)$?

$(3, 0), (2, -4)$

4. For the inequality $y < 5x - 2$, let $x = 0$. Solve for y.

$y < -2$

5. List 4 ordered pairs that are solutions to $y < 5x - 2$.

Possible answer: $(-1, -9), (1, -3), (0, -5), (3, 0)$

6. List 4 ordered pairs that are solutions of $3x + 2y > 4$.

Possible answer: $(0, 3), (2, 0), (-1, 4), (5, 1)$

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Problem Solving

Solving Two-Step Inequalities

Write the correct answer.

1. Grace earns $7 for each car she washes. She always saves $25 of her weekly earnings. This week, she wants to have at least $65 in spending money. At least how many cars must she wash?

at least 13 cars

2. Monty has saved $400 to spend on a video game player and games. The player he wants costs $275. The games each cost $39. At most, how many games can he buy along with the player?

at most 3 games

3. A video game club charges $8 per month as a membership fee, plus $2.75 for each game rental. Eugenie plans to join and rent no more than 5 games a month. What amount should she budget each month for video games?

at most $21.75

4. Cooper Middle School has a goal of collecting more than 1,000 cans of food in a food drive. So far, 375 cans have been collected. During the last 13 days of the drive, at least how many cans must be collected each day in order to meet the goal?

more than 48 cans

Choose the letter for the best answer.

5. In January 2005, it cost $0.37 to mail a letter weighing up to 1 ounce. Each additional ounce or part of an ounce cost $0.23. At most, what is the weight of a letter with $1.06 in postage?

A $w < 4$ oz
C $w \le 4$ oz
B $w < 3$ oz
D $w \le 3$ oz

6. Martin is planning a hedge along the back of his yard. The total length can be no more than 23 feet, and he will put a 4-foot-wide gate in the hedge. Each plant needs 2.5 feet of space to grow properly. How many plants should he buy?

F $n \le 7$
H $n \le 9$
G $n < 7$
J $n < 9$

7. The 12 members of the Middle School filmmaking club need to raise at least $1,400 to make a short film. They already have raised $650. How much more should each member raise on average?

A $x \ge \$62.50$
C $x < \$62.50$
B $x \le \$62.50$
D $x > \$62.50$

8. The rule of thumb in filmmaking is that you must shoot at least 3 minutes of film for every minute in a movie's "final cut." A 30-minute roll of film costs $250. How much will film cost to make a 90-minute movie?

F $c \ge \$22{,}500$
H $c \le \$67{,}500$
G $c \le \$7{,}500$
J $c \ge \$2{,}250$

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Reading Strategies

Use a Flowchart

You can use a flowchart to solve a two-step inequality.

$4x + 5 < 13$

Step 1: Combine the terms without variables. Use the inverse operation.
$4x + 5 - 5 < 13 - 5$
$4x < 8$

↓

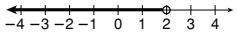
Step 2: Get the variable by itself. Use the inverse operation.
$\frac{4x}{4} > \frac{8}{4}$

↓

Step 3: Simplify.
$x < 2$

↓

Step 4: Graph.



Use the chart to answer the following questions.

1. What is the first step in the flowchart?

Combine terms without variables.

2. Why is 5 subtracted from both sides of the inequality?

to get $4x$ by itself on one side

3. What is the second step in the flowchart?

Use the inverse operation to get x by itself.

4. What operation is used to get x by itself?

division

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