π CHAPTER 6

Solve One-Step Inequalities
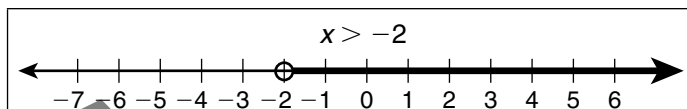
S 6.9(B) Represent solutions for one-variable, one-step equations and inequalities on number lines.
R 6.10(A) Model and solve one-variable, one-step equations and inequalities that represent problems, including geometric concepts.
S 6.10(B) Determine if the given value(s) make(s) one-variable, one-step equations or inequalities true.

Understand the TEKS

When a situation involves a range of values, it can be represented using an **inequality**. An inequality is a statement that represents a range of values that are greater than ($>$), less than ($<$), greater than or equal to ($\geq$), or less than or equal to ($\leq$) a value.

You can solve an inequality in the same way you solve an equation. Use inverse operations to isolate the variable. However, if you multiply or divide both sides by a negative number, the inequality changes direction. For example, to solve $-6x < 48$, divide both sides by -6 and change the direction of the inequality to get $x > -8$.

A number line can model an inequality. An open circle is used for an unknown that can be less than ($<$) or greater than ($>$), a value. A closed circle is used for an unknown that can be less than or equal to ($\leq$), greater than or equal to ($\geq$), or equal

$x > -2$

← | | | | | ⊕ | | | | | | | | →
  −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6

The number line represents all values that are greater than -2.

to ($=$) a value. Values that make the inequality true can be shaded on a number line, or a ray can be drawn to show that the values in that direction make the inequality true.

> Marco can spend up to $18 on games. He has already chosen a game that costs $8.25. The amount he can still spend is modeled by the inequality $g + 8.25 \leq 18$. Graph the inequality on the number line. He is deciding between a puzzle game for $5.89, a role-playing game for $11.75, and a space game for $7.59. Which of these could he buy?

Step 1 Solve the inequality. Use subtraction to undo addition.

$g + 8.25 \leq 18$

$g \leq$ _____

← | | | | | | | | | | | | | | →
  5 6 7 8 9 10 11 12 13 14 15 16 17 18
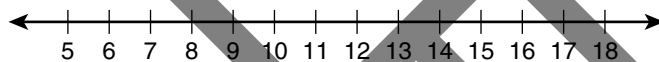
Step 2 Graph the inequality on a number line.

Marco can spend up to $18, so the graph will use a _____ circle for the solution.

Step 3 Check the possible solutions.

Substitute the cost of each new game into your solution to see if it makes the inequality true.

5.89 is a solution. 11.75 is not a solution. 7.59 _____ a solution.

> The solution to the inequality $g + 8.25 \leq 18$ shows that Marco can spend up to _____.
> So Marco could buy _____.

★ Practice

DIRECTIONS   Read and answer each question carefully.

1   Amanda has at most 30 minutes to read before going to bed. It takes her 2 minutes to read each page. The inequality that represents this situation is $2p \leq 30$. How many pages could she read?

Ⓐ   Less than 15 pages

Ⓑ   Up to 15 pages

Ⓒ   Less than 60 pages

Ⓓ   Up to 60 pages

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2   Marian has $10 to spend at the movies. The inequality $f + \$6.75 \leq 10$ represents the amount she can spend on food. Which of the following can she buy?

Ⓐ   Drink for $2.25

Ⓑ   Pretzel for $3.50

Ⓒ   Hot dog for $4.00

Ⓓ   Popcorn for $4.25

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3   Tyra has 52 baseball cards in her collection. Justin has more cards than Tyra. What would a number line modeling Justin's collection look like?

Ⓐ   Closed circle at 52, draw an arrow to the left

Ⓑ   Closed circle at 52, draw an arrow to the right

Ⓒ   Open circle at 52, draw an arrow to the left

Ⓓ   Open circle at 52, draw an arrow to the right

4   Leo eats at least 6 servings of fruit and vegetables a day. He has already eaten 2 servings of fruit and 1 serving of a vegetable. This situation is represented by the inequality $s + 3 \geq 6$.
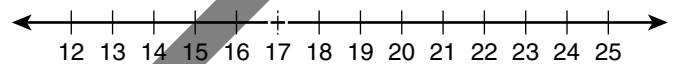
How many more servings should he eat?

Ⓐ   3 servings at most

Ⓑ   9 or more servings

Ⓒ   9 servings at most

Ⓓ   3 or more servings

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5   Jessica is going on a trip to see her cousin in less than 17 days. This situation is modeled by the equation $t < 17$.

Model this situation on the number line.

Select a ray. Draw the ray on the correct place on the number line.

6   Which of the following numbers are solutions to $x - 3 > 8$?

Select **THREE** correct answers.

Ⓐ   10   Ⓓ   14

Ⓑ   11   Ⓔ   16

Ⓒ   12

7 Diana needs to split her time evenly between piano practice and reading for a report. She wants to spend 45 minutes at most on each activity.

What is the greatest amount of time she needs?

Ⓐ 44 minutes   Ⓒ 89 minutes

Ⓑ 45 minutes   Ⓓ 90 minutes

8 Angel has $36 that she earned from different dog-walking jobs. She needs to save at least half of it. In dollars, what is the most that she can spend?

Write your answer in the box.

9 A store sells T-shirts for $8.50 each. Martin has $40 to spend. He says he can buy 5 shirts. Darryl says Martin can only buy 4 shirts.

Who is correct? Why?

Circle the correct answer from each drop-down menu to complete the statement.

| Darryl |
| Martin |

is correct because

| $4 \times \$8.50 = \$34$ |
| $4.7 \times \$8.50 = \$39.95$ |
| $5 \times 850 = \$42.50$ |
| $\$5 \times \$8 = \$40$ |

and Martin will

have

| $0 |
| $3 |
| $6 |
| $8 |

left over.

10 Fiona walked 2 miles on Monday and 1.5 miles on Tuesday. She wants to walk more than 12 miles this week. The number of miles left to walk is represented by the inequality $2 + 1.5 + d > 12$.

Represent Fiona's situation on the number line.

Select a ray. Draw the ray on the correct place on the number line.

6 7 8 9 10 11 12 13 14 15 16 17 18 19

| ←● | ←○ | ○→ | ●→ |
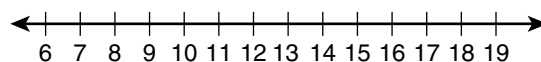
11 Rosco solved the inequality $-11n < 55$. He found a solution of $n < -5$.

Was he correct? Why or why not?

Ⓐ Yes, because $\frac{55}{-11} = -5$

Ⓑ No, because he did not multiply by -11

Ⓒ No, because he did not change $<$ to $>$

Ⓓ Yes, because he did not remove the negative sign

12 Juan is going on a 3-day backpacking trip with his family. He knows they will walk no more than 15 miles each day. They will try to hike one-third the total distance each day. The farthest they will walk on their trip is represented by the inequality $\frac{1}{3}d \le 15$.

Solve this inequality.

Ⓐ $d \le 5$ Ⓒ $d \le 45$

Ⓑ $d \le 18$ Ⓓ $d \ge 45$