

Study Guide Supplemental Lesson 1

Inequalities

Write Inequalities A mathematical sentence that contains any of the symbols listed below is called an **inequality**.

• is less than	• is greater than	• is less than or equal to	• is greater than or equal to
• is fewer than	• is more than	• is no more than	• is no less than
	• exceeds	• is at most	• is at least

Example 1 Write an inequality for the sentence.

Fewer than 70 students attended the last dance.

Words	<i>Fewer than 70 students attended the last dance.</i>
Symbols	Let s = the number of students.
Inequality	$s < 70$

You can substitute a value for a variable in an inequality and determine whether the value makes the inequality true or false.

Example 2 For the given value, state whether each inequality is true or false.

a. $5y - 6 < 14; y = 5$

$$5y - 6 < 14$$

$$5(5) - 6 < 14$$

$$19 < 14$$

Write the inequality.

Replace the variable with the given value.

Simplify.

b. $r - 16 \geq -12; r = 4$

$$r - 16 \geq -12$$

$$4 - 16 \geq -12$$

$$-12 \geq -12$$

This sentence is false.

Although $-12 > -12$ is false, $-12 = -12$ is true. So, this sentence is true.

Exercises

Write an inequality for each sentence.

- The maximum diving depth is no more than 45 feet below sea level.
- Adult male elephants can weigh over 12,000 pounds.
- The maximum fee for any student is \$15.
- You must be at least 38 inches tall to ride the roller coaster.

For the given value, state whether the inequality is true or false.

5. $m + 8 \geq 5; m = -3$

6. $4 - p < -2; p = 6$

7. $b + 12 \leq 15; b = -1$

8. $j - 7 < -8; j = 0$

Study Guide Supplemental Lesson 1 (page 2)

Inequalities

Graph Inequalities Inequalities can be graphed on a number line. This helps you see which values make the inequality true. You can also write inequalities for a graph.

An *open dot* indicates that the number marked *does not* make the sentence true.
 A *closed dot* indicates that the number marked *does* make the sentence true.
 The direction of the line indicates whether numbers *greater than* or *less than* the number marked make the sentence true.

Example 1 Graph each inequality on a number line.

a. $x > 8$



The **open dot** means 8 *does not* make the sentence true. The line means that numbers greater than 8 make the sentence true.

b. $x \leq 8$



The **closed dot** means 8 *does* make the sentence true. The line means that numbers less than 8 make the sentence true.

Example 2 Write an inequality for each graph.



The open dot means -2 is not included in the graph. The arrow points left, so the graph includes all numbers less than -2.
 The inequality is $x < -2$.

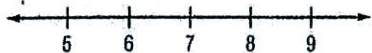


The closed dot means 5 is included in the graph. The arrow points right, so the graph includes all numbers greater than 5.
 The inequality is $x \geq 5$.

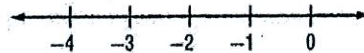
Exercises

Graph each inequality on a number line.

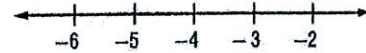
1. $x > 7$



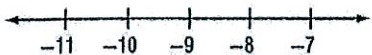
2. $a \leq -2$



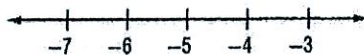
3. $d < -4$



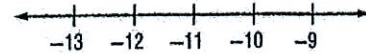
4. $w > -9$



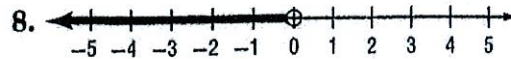
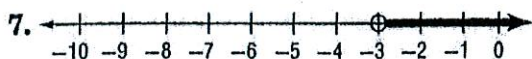
5. $t \geq -5$



6. $n < -11$



Write the inequality for each graph.



Skills Practice Supplemental Lesson 1

Inequalities

Write an inequality for each sentence.

- More than 100,000 fans attended the opening football game at The Ohio State University.
- Her earnings at \$16 per hour were no more than \$96.
- A savings account decreased by \$50 is now less than \$740.
- A number increased by 7 is at least 45.

For the given value, state whether each inequality is *true* or *false*.

5. $\frac{18}{c} < 9, c = 2$

6. $\frac{x}{5} \geq 3, x = 5$

7. $6k \geq 42, k = 7$

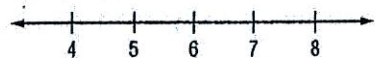
8. $10 - x < 3, x = 7$

9. $11 + n < 32, n = 4$

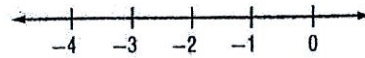
10. $9 + c > 19, c = 10$

Graph each inequality on a number line.

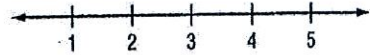
11. $a < 6$



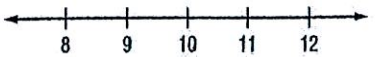
12. $t \geq -2$



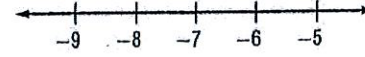
13. $d \leq 3$



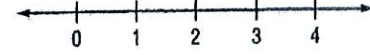
14. $b \geq 10$



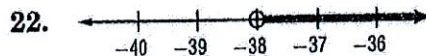
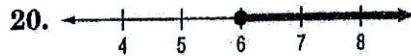
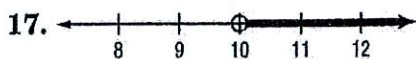
15. $x \geq -7$



16. $x > 2$



Write the inequality for each graph.



Study Guide Supplemental Lesson 2

Solving Inequalities

Solve Inequalities by Adding or Subtracting Use the Addition and Subtraction Properties of Inequalities to solve inequalities. When you add or subtract a number from each side of an inequality, the inequality remains true.

Example Solve $12 + y > 20$. Check your solution.

$$12 + y > 20$$

Write the inequality.

$$\begin{array}{r} 12 + y > 20 \\ -12 \quad -12 \\ \hline \end{array}$$

Subtraction Property of Inequality

$$y > 8$$

Simplify.

To check your solution, try any number greater than 8.

CHECK

$$12 + y > 20$$

Write the inequality.

$$12 + 9 > 20$$

Replace y with 9.

$$21 > 20 \quad \checkmark \quad \text{This statement is true.}$$

Any number greater than 8 will make the statement true. Therefore, the solution is $y > 8$.

Exercises

Solve each inequality. Show your work on a piece of loose leaf ☺

1. $-12 < 8 + b$

2. $t - 5 > -4$

3. $p + 5 < -13$

4. $5 > -6 + y$

5. $21 < n - (-18)$

6. $s - 4 \leq 3$

7. $14 > w + (-2)$

8. $j + 6 \geq -4$

9. $z + (-4) < -2.5$

10. $b - \frac{1}{4} < 2\frac{1}{4}$

11. $g - 2\frac{1}{3} \geq 3\frac{1}{6}$

12. $-2 + z < 5$

13. $-10 \leq x - 5$

14. $-23 \geq a + (-6)$

15. $20 < m - 6$

16. $1\frac{1}{2} + b > 7$

17. $k + 5 \geq -7$

18. $\frac{2}{3} \leq w - 2$

Study Guide Supplemental Lesson 2 (page 2)

Solving Inequalities

Solve Inequalities by Multiplying or Dividing Use the Multiplication and Division Properties of Inequalities to solve inequalities.

- When you multiply or divide each side of an inequality by a positive number, the inequality remains true. The direction of the inequality sign does not change.
- For an inequality to remain true when multiplying or dividing each side of the inequality by a negative number, however, you must reverse the direction of the inequality symbol.

Example 1 Solve $8x \geq 72$.

$$8x \geq 72 \quad \text{Write the inequality.}$$

$$\frac{8x}{8} \geq \frac{72}{8} \quad \text{Division Property of Inequality}$$

$$x \geq 9 \quad \text{Simplify.}$$

The solution is $x \geq 9$. You can check this solution by substituting 9 or a number greater than 9 into the inequality.

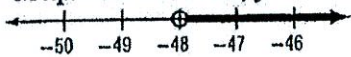
Example 2 Solve $\frac{y}{-12} < 4$. Then graph the solution on a number line.

$$\frac{y}{-12} < 4 \quad \text{Write the inequality.}$$

$$-12\left(\frac{y}{-12}\right) > 4(-12) \quad \text{Multiplication Property of Inequality}$$

$$y > -48 \quad \text{Simplify.}$$

Graph the solution, $y > -48$.

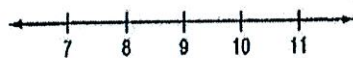


Exercises

Solve each inequality. Show your work on a piece of loose leaf ☺

Then, graph the solution on the given number line.

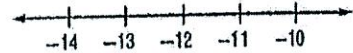
1. $81 < 9d$



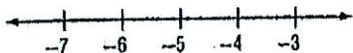
2. $\frac{p}{3} < -12$



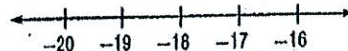
3. $\frac{h}{-4} \geq 3$



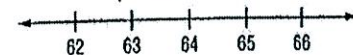
4. $-20t \leq 100$



5. $-\frac{2}{3}x > 12$



6. $-16 \leq -\frac{1}{4}b$



7. $-8 < \frac{c}{-2.5}$



8. $\frac{n}{3} > 0.5$



Skills Practice Supplemental Lesson 2

Solving Inequalities

Solve each inequality. Show your work on a piece of loose leaf ☺

1. $p + 9 > 13$

2. $t + 7 < -4$

3. $-12 \geq 7 + x$

4. $f + (-7) \leq 9$

5. $5 > -3 + y$

6. $r + 7 \leq -3$

7. $b - 15 > 11$

8. $z + (-4) < -8$

9. $j - 4 \leq -10$

10. $-5 > h - 3$

11. $13 > w - (-14)$

12. $g - 7 > -4$

13. $-15 \leq d + (-2)$

14. $2 + c \leq -8$

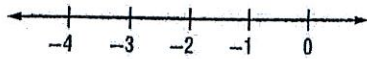
15. $15 > c + 3$

16. $j + 9 \leq -10$

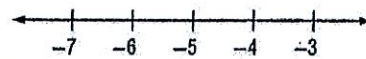
Solve each inequality. Show your work on a piece of loose leaf ☺

Then, graph the solution on the given number line

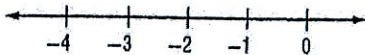
17. $-8x > 16$



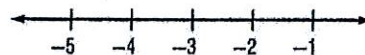
18. $7y < -35$



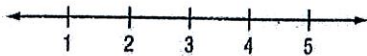
19. $12a \geq -24$



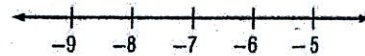
20. $-12 \leq 4a$



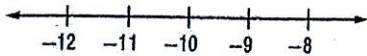
21. $-6z < -18$



22. $14 > -2k$



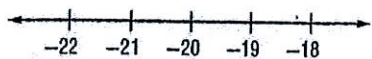
23. $5 > \frac{x}{-2}$



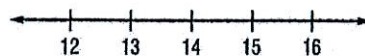
24. $\frac{r}{-3} \leq -4$



25. $-10t \geq 200$



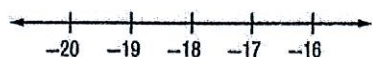
26. $\frac{y}{7} < 2$



27. $\frac{-1}{2}x \leq -6$



28. $\frac{b}{-3} \leq 6$



29. **SHOPPING** Chantal would like to buy a new pair of running shoes. Shoes that she likes start at \$85. If she has already saved \$62, what is the least amount she must still save?

Name _____ Date _____ Pd _____

Supplemental Unit (part 1) Bringing It All Together #1

Graphing and Solving Inequalities

Write an inequality for each sentence.

- _____ 1) Diego must get at least 30 points on his test to get an A.
 _____ 2) Mario is more than 72 inches tall.
 _____ 3) Lacrosse practice will be no more than 34 minutes.
 _____ 4) There are less than 45 students in Intramurals.

For the given value, state whether each inequality is *true* or *false*. Show your work.

- _____ 5) $a + 6 \geq 9$; $a = 4$ _____ 6) $13 - s < 29$; $s = -30$
 _____ 7) $2c + 18 \leq 50$; $c = 15$ _____ 8) $-3p - 7 \leq -11$; $p = -5$

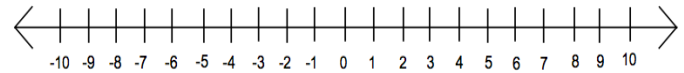
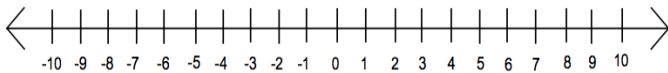
Write an inequality for each graph.



Solve each inequality. Show your work ☺ Graph the solution on the number line.

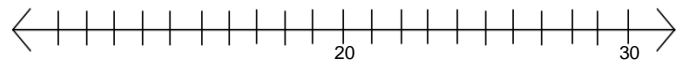
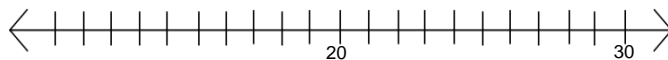
13) $t + 8 \geq 11$

14) $-9r < 27$



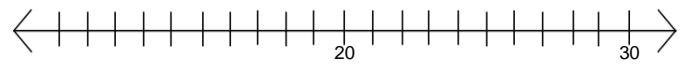
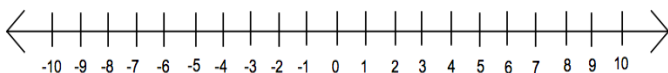
15) $\frac{4}{5}y > 16$

16) $p - 14 \leq 7$



17) $d + 4 \leq -1$

18) $\frac{3}{8}k < 9$



19) $g - 15 > -19$

20) $5h \geq -90$

