


Grade 8 Mathematics

Algebra: Lesson 8

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol () by them.

Purpose of Lesson 8:

- In this lesson, the tutor and the students will
 - ✓ solve inequalities, and
 - ✓ graph inequalities on a number line.

Equipment/Materials Needed:

- Copies of Student Sheet 94
- Paper and pencils
- Chalkboard


Preparations before beginning Lesson 8:

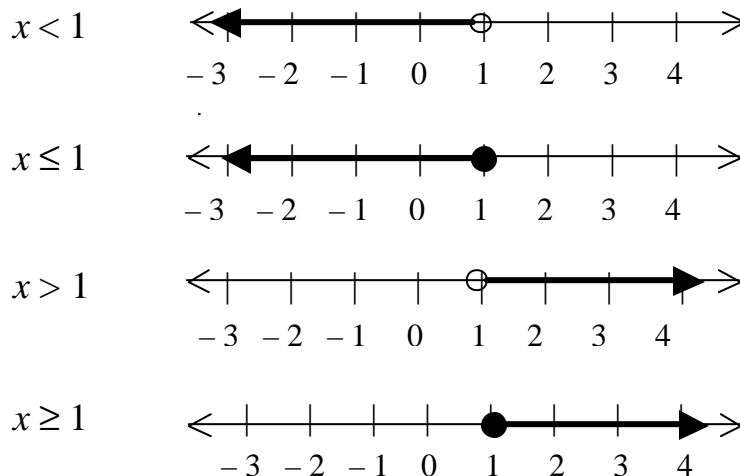
- Run one copy of Student Sheet 94 for each student.
- Have paper and pencils available.

Lesson 8: Algebra

Say:

In Lesson 2 and Lesson 7 of Algebra, you learned to solve equations. An *inequality* is a number sentence that has an inequality sign in it, rather than an equal sign. What are some inequality signs? ($>$, $<$, \neq , \leq , \geq) An inequality can be true or false just like an equation. When you *solve* an inequality, you find the values of the variable that make the inequality true. You can show these solutions on number lines just as you showed the solutions of equations on number lines.

 Write the following inequalities on the board and draw the corresponding number lines.



Say:

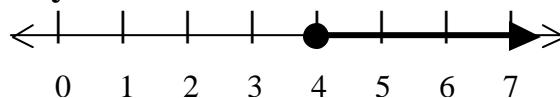
The number 1 is called the boundary point of each of these graphs. If you use a solid dot, 1 is included in the graph. An open dot means 1 is not included. The boundary point is the solution to the equation, $x = 1$.

Say:

If you can solve equations, you can solve inequalities. Let's look at the inequality $x + 6 \geq 10$. To solve the inequality, treat the inequality as if it were an equation. Subtract 6 from both sides.

$$\begin{aligned}x + 6 - 6 &\geq 10 - 6 \\x &\geq 4\end{aligned}$$

Graph the inequality.



Four is the boundary point. The inequality is greater than or equal to 4, so 4 should be included. Draw a darkened circle.

Check a point on the graph. 6 is a point that has been shaded. Try 6 in the inequality. $x + 6 \geq 10$, so $6 + 6 \geq 10$ or $12 \geq 10$. Checking a point will help you know that you have shaded the line in the right direction.

Say:

Write the inequality, $8 > 4$.

What happens when you add 5 to both sides? ($8 > 4$, so $8 + 5 > 4 + 5$, or $13 > 9$) The inequality is still true.

What happens if you subtract 3 from both sides? ($8 > 4$, so $8 - 3 > 4 - 3$, or $5 > 1$) The inequality is still true.

What happens if you multiply both sides by 2? ($8 > 4$, so $8 \times 2 > 4 \times 2$, or $16 > 8$) The inequality is still true.

What happens if you multiply both sides by -2 ? ($8 > 4$, so $8 \times -2 > 4 \times -2$, or $-16 > -8$) Is this true? (No, $-16 < -8$.)

What happens if you divide both sides by 2? ($8 > 4$, so $8 \div 2 > 4 \div 2$, or $4 > 2$) The inequality is true.

What happens if you divide both sides by -2 ? ($8 > 4$, so $8 \div -2 > 4 \div -2$, or $-4 > -2$) But this is not true. $-4 < -2$.

Write $12 > 6$ on the board. Try the following cases.

Add 2.	$12 + 2 > 6 + 2$	$14 > 8$	
Subtract 2.	$12 - 2 > 6 - 2$	$10 > 4$	
Multiply by 2.	$12 \times 2 > 6 \times 2$	$24 > 12$	
Multiply by -2 .	$12 \times -2 > 6 \times -2$, but	$-24 \not> -12$	$-24 < -12$
Divide by 2.	$12 \div 2 > 6 \div 2$	$6 > 3$	
Divide by -2 .	$12 \div -2 > 6 \div -2$, but	$-6 \not> -3$	$-6 < -3$

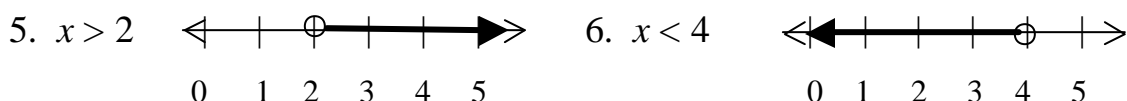
Say:

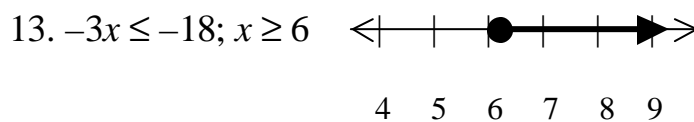
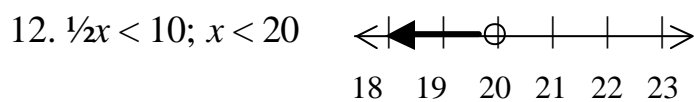
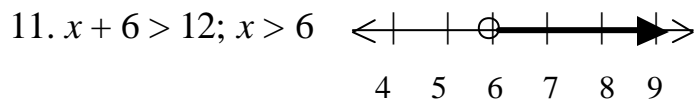
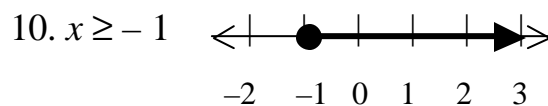
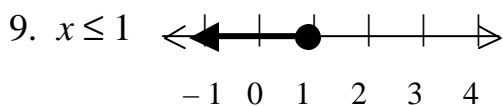
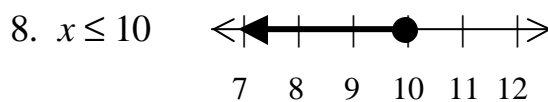
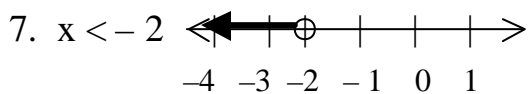
Look at the statement above. When you multiply or divide by an inequality, you must reverse the sign of the inequality.

Give students Student Sheet 94.

Answers:

1. D 2. B 3. A 4. C



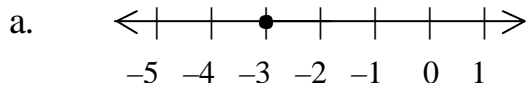


Have one student summarize today's lesson. It is always wise to check a point on the graph of an inequality to make sure that you have shaded in the correct direction.

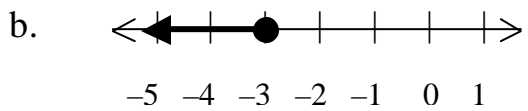
Student Sheet 94 (Algebra: Lesson 8)

Match each statement to its graph.

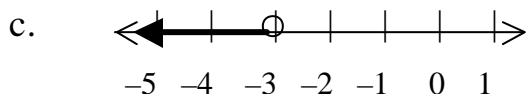
1. $m > -3$



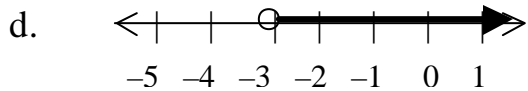
2. $m \leq -3$



3. $m = -3$



4. $m < -3$



Solve and graph each inequality.

5. $5x > 10$

6. $x + 3 < 7$

7. $-5x > 10$

8. $x - 3 \leq 7$

9. $3x + 2 \leq 5$

10. $-3x + 2 \leq 5$

Write an inequality for each statement. Solve and graph each inequality.

11. The sum of a number and 6 is greater than 12. What are the possible values for the number?

12. One-half of the check is less than \$10. What are the possible values for the check?

13. The product of -3 and a number is less than or equal to -18 . What are the possible values for the number?