Understanding Inequality Operation Rules

Lesson Plan

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Goal: This lesson is designed to help students understand conceptually how the operations of addition, subtraction, multiplication, and division by integers affect an inequality.

Grade and Course: 8th grade, pre-algebra

KY Standards: MA 08-5.2.1, MA 08-5.3.1

Objectives: The students will know how to correctly apply the four basic operations to inequalities and will have a conceptual understanding of why the sign flips when multiplication or division by a negative integer occurs.

Resources/materials needed: worksheets

Description of Plan: Work through the worksheet with the classroom, engaging as many students as possible in answering the questions it poses.

Lesson Source: original

Instructional Mode: Interactive lecture and discussion

Date Given: February 12, 2009 **Estimated Time:** 45 minutes

Date Submitted to Algebra3: February 25, 2009

Inequality Rules: Lesson 1 Name: _____

1. Complete the following inequality:

3___5

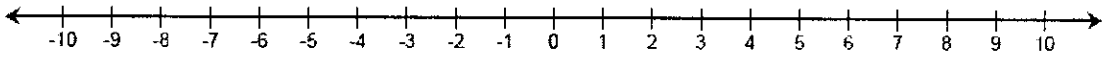
2. Now add 2 to both sides of the inequality. What is our new inequality?

___ ___ ___

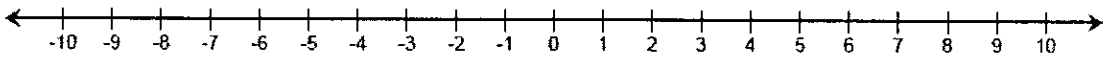
3. Next subtract 4 from both sides of the inequality in number 1. What is our new inequality?

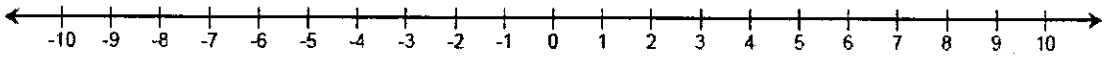
___ ___ ___

4. Plot the points three and five on it. How far apart are they?



5. Now do the same thing for questions 2 and 3. How far apart are the two points on these number lines?





6. Complete the following inequality:

-2 ___ -6

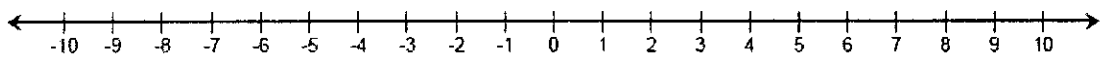
7. Now add 5 to both sides of the inequality. What is our new inequality?

___ ___ ___

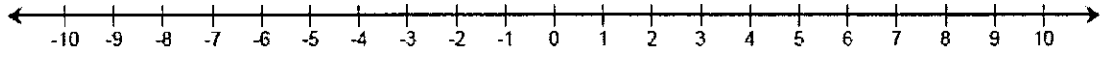
8. Next subtract 3 from both sides of the inequality in number 6. What is our new inequality?

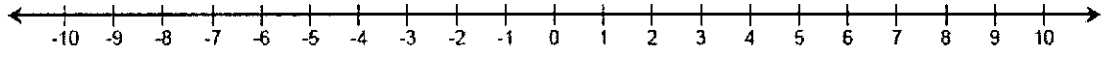
___ ___ ___

9. Plot the points -2 and -6 on it. How far apart are they?



9a. Now do the same thing for numbers 8 and 9. How far apart are the two points on these number lines?





10. Do you think adding or subtracting any number from both sides of an inequality will change the distance between the two points? Why?

Inequality Rules: Lesson 2 Name: _____

11. Complete the following equations:

$3 \cdot 1 =$ ___	$3 \cdot -1 =$ ___
$7 \cdot 1 =$ ___	$7 \cdot -1 =$ ___
$-4 \cdot 1 =$ ___	$-4 \cdot -1 =$ ___
$-6 \cdot 1 =$ ___	$-6 \cdot -1 =$ ___

12. What happens to the sign of a number when it is multiplied by 1?

13. What happens to the sign of a number when it is multiplied by -1?

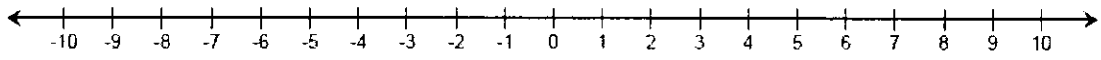
14. Complete the following equations:

$3 \cdot 2 =$ ___	$3 \cdot -2 =$ ___
$7 \cdot 3 =$ ___	$7 \cdot -3 =$ ___
$-4 \cdot 4 =$ ___	$-4 \cdot -4 =$ ___
$-6 \cdot 5 =$ ___	$-6 \cdot -5 =$ ___

15. What happens to the sign of a number when it is multiplied by a positive number?

16. What happens to the sign of a number when it is multiplied by a negative number?

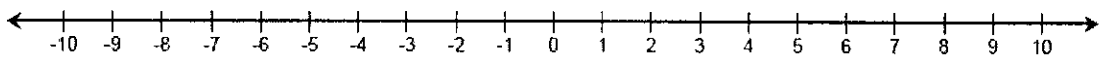
17. Plot all of the answers from number 11. Then put these numbers in order from smallest to largest.



18. Complete the following inequalities:

1 ___ 3 -1 ___ -3

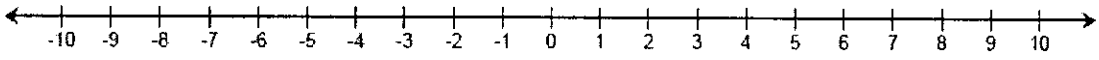
19. Plot 1 and 3 on a number line and see how far apart they are.



20. Now multiply both sides of the first inequality by 2. What is our new inequality?

___ ___ ___

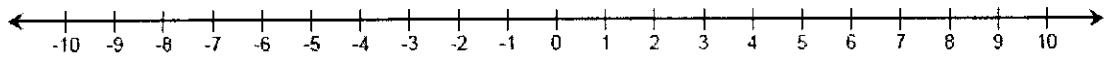
21. Plot number 20 and see how far apart the points are.



22. Multiply both sides of the first inequality in number 18 by 3. What is our inequality now?

___ ___ ___

23. Plot number 22. How far apart are the points?



24. What is the relationship between the distance in the original problem and the distance after multiplication?

25. Complete the inequality:

-2 ___ -5

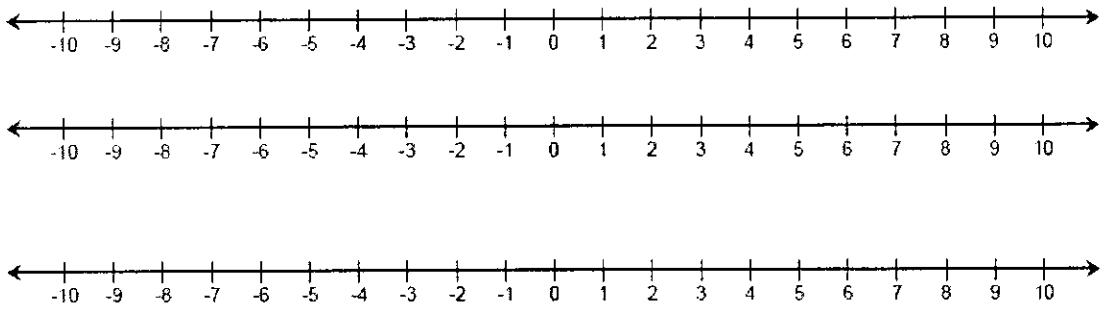
26. Multiply both sides of the inequality in number 25 by -1. What is our new inequality?

___ ___ ___

27. Multiply both sides of the inequality in number 25 by -2. What is our new inequality?

___ ___ ___

28. Complete the plots for numbers 25, 26, and 27. How far apart are the points in each of these cases?



29. What happens to the points when they are multiplied by a negative?

30. What happens to the inequality when we multiply by a negative?

31. Complete the following equations:

$3 \div 1 =$ ___
$6 \div 3 =$ ___
$-4 \div 2 =$ ___
$-10 \div 5 =$ ___

$3 \div -1 =$ ___
$6 \div -3 =$ ___
$-4 \div -2 =$ ___
$-10 \div -5 =$ ___

32. What happens to the sign of a number when it is divided by a positive number?

33. What happens to the sign of a number when it is divided by a negative number?

34. Based on what happened with multiplication, what do you think will happen when we divide an inequality by a negative number?