1.6: Solve Linear Inequalities
"I WILL …
Solve Linear Inequalities."

I. Steps

A. Inequality is an equation where the variable does not equal to each other

B. $>$, $<$, or $\neq$ requires the dot being OPEN

C. $\geq$, $\leq$, or = required the dot being CLOSED hole

II. Inequalities

A. *X* typically comes first or is in the middle of the compound

B. > represents greater than

C. < represents less than

D. $\leq$, $\geq$ represents greater than or equal to, less than or equal to

III. Interval Notation

A. Smallest number, bigger number

B. _____ [,] represents greater than or equal to, less than or equal to

C. _____ (,) represents greater than or less than

D. On the ends, extremes use infinity: ∞; always deals with parenthesis

IV. Set-Builder Notation

A. A representative set is a collection of items

B. **{ *x* | *x* > 0 }** reads "the set of all *x* such that *x* is greater than zero"

C. Applies to inequalities

V. Steps

A. Put the variables onto one side

B. Divide the number(s) in front of the variable

C. Graph on a number line based on the inequality given

D. Follow the arrow of the expression IF the variable comes first

E. Less th**AND**: Shade towards or INSIDE

F. Great**OR**: Shade away or OUTSIDE

G. REMEMBER: When we NEGATIVE DIVIDE, we FLIP THE SIGN

VI. Model Problems

Ex 1: Solve $2x < 12$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____	Ex 2: Solve $x + 8 \geq 4x + 17$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____
Your Turn: Solve $-2 \geq -12x + 8$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____	Ex 3: Solve $-4 < 6x - 10 \leq 14$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____

Your Turn: Solve $0 < 3/4x + 3 \leq 4$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____	Ex 4: Solve $2x - 1 \leq -7$ or $4x + 3 > 7$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____
Your Turn: Solve $2x - 1 \leq -7$ or $4x + 3 > 7$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____	Ex 5: Solve $x + 5 < 10$ or $x - 2 > 1$, graph and label as an inequality, set-builder notation, and internal notation.  Inequality: _____ Set-Builder Notation: _____ Interval Notation: _____

Ex 6: Solve $5x - 10 < 5(x + 2)$	Your Turn: Solve $6(x - 2) > 3(2x - 1)$
Ex 7: A lizard has a temperature that ranges from 18°C to 34°C. Write the range of temperatures as a compound inequality. Then write an inequality giving the temperature range in degrees in Fahrenheit. The conversion of Celsius to Fahrenheit is $5/9(F - 32)$.	Your Turn: In Illinois, the lowest temperature on record is –36°F in January 1999. The highest temperature was recorded in East St. Louis at 117°F. Determine the range of temperatures in Celsius. The conversion of Celsius is 9/5C + 32.

Pg 44: 3-15 odd, 23-45 odd, 49-51 all, 53, 56

29-45: With the inequality, write out in set-builder notation and interval notation

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GRAPHING INEQUALITIES **Graph the inequality.**

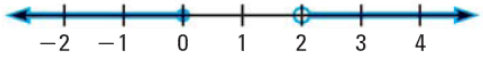
3. $x > 4$ **4.** $x < -1$ **5.** $x \leq -5$ **6.** $x \geq 3$

7. $6 \geq x$ **8.** $-2 < x$ **9.** $x \geq -3.5$ **10.** $x < 2.5$

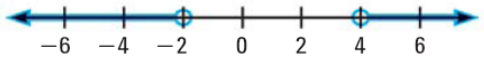
WRITING COMPOUND INEQUALITIES **Write the compound inequality that is represented by the graph.**

11.

12.

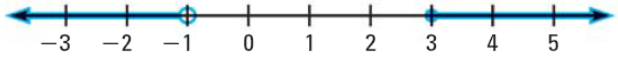


13.



14.

15. MULTIPLE CHOICE What compound inequality is graphed below?



(A) $-1 < x < 3$ (B) $x \leq -1$ or $x > 3$

(C) $x < -1$ or $x \geq 3$ (D) $x > -1$ or $x \leq 3$

SOLVING INEQUALITIES **Solve the inequality. Then graph the solution.**

22. $x + 4 > 10$ **23.** $x - 3 \leq -5$ **24.** $4x - 8 \geq -4$

25. $15 - 3x > 3$ **26.** $11 + 8x \geq 7$ **27.** $4 + \frac{3}{2}x \leq 13$

28. $2x - 6 > 3 - x$ **29.** $4x + 14 < 3x + 6$ **30.** $5 - 8x \leq 19 - 10x$

31. $21x + 7 < 3x + 16$ **32.** $18 + 2x \leq 9x + 4$ **33.** $2(x - 4) > 4x + 6$

ERROR ANALYSIS ***Describe*** **and correct the error in solving the inequality.**

34.

$2x + 8 \leq 6x - 4$

$-4x \leq -12$

$x \leq 3$

35.

$10 + 3x > 5x$

$10 < 2x$

$5 < x$

"AND" COMPOUND INEQUALITIES **Solve the inequality. Then graph the solution.**

37. $-5 < x + 1 < 4$

38. $2 \le x - 3 \le 6$

39. $-3 < 4 - x \le 3$

40. $2 < 3x - 1 \le 6$

41. $-4 \le 2 + 4x < 0$

42. $0 \le \frac{3}{4}x + 3 \le 4$

"OR" COMPOUND INEQUALITIES **Solve the inequality. Then graph the solution.**

43. $x + 1 < -3$ or $x - 2 > 0$

44. $x - 4 \le -6$ or $x + 2 > 5$

45. $2x - 3 \le -4$ or $3x + 1 \ge 4$

46. $2 + 3x < -13$ or $4 + 2x > 7$

CHALLENGE **Solve the inequality. If there is no solution, write *no solution*. If the inequality is always true, write *all real numbers*.**

49. $2(x - 4) > 2x + 1$

50. $4x - 5 \le 4(x + 2)$

51. $2(3x - 1) > 3(2x + 3)$

53. VIDEO CONTEST You and some friends have raised $250 to help make a video for a contest. You need $35 to buy videotapes. It costs $45 per day to rent the video camera. Write and solve an inequality to find the possible numbers of days you can rent the video camera.

56. TAKS REASONING Canoe rental costs $18 for the first two hours and $3 per hour after that. You want to canoe for more than 2 hours but can spend no more than $30. Which inequality represents the situation, where t is the total number of hours you can canoe?

A $18 + t \le 30$

B $18 + 3t \le 30$

C $18 + 3(t + 2) \le 30$

D $18 + 3(t - 2) \le 30$