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Solving Inequalities Review Guide

Check whether the given number is a solution of the inequality.

1. $2a - 9 \geq 13$ $x = 11$

2. $7 + 7x \geq 20$ $x = 2$

Write and solve each inequality.

3. 7 is greater than 21 times y.

4. The ratio of x and 4 is less than or equal to 17.

5. The ratio of 14 and y is less than 21.

6. A number x increased by 5 is less than or equal to 33.

7. A quarter of a number is greater than or equal to 38.

8. The product of negative three and a number is greater than ten or less than one.

9. In a beverage company, the machine is designed to fill a 1.5 liter bottle of soda between 1.48 liter and 1.53 liter. Write the compound inequality that describes the volume of soda the machine must dispense in a 1.5 liter bottle of soda.

10. After buying a burger costing $5, Roy has no more than $23 in his pocket. How much money did Roy have before buying the burger?

11. The area of a rectangle is less than 85 square feet. The length of the rectangle is 20 feet. What is the width of the rectangle?

Solve each inequality.

12. $x - 12 \geq -1$

13. $a - 3 \geq -2$

14. $-2 + y < 5$

15. $5 + a \geq -5$

16. $-3 \leq y + 2$

17. $3a \leq 2a - 5$

18. $2y > -7 + y$

19. $-0.7a > 4.9$

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Solving Inequalities Review Guide

20. $\frac{x}{7} \leq -8$

21. $-\frac{x}{4} < 13$

22. $5 - 3a \leq 26$

23. $-5 - \frac{8y}{9} > 59$

24. $2x + 4 \leq 3(2x - 5)$

25. $8 + 4x \leq 3(2x + 4) - 2(-4 - 2x)$

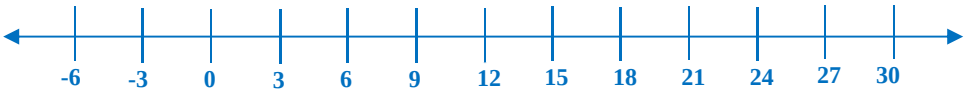
26. $|x + 14| > 52$

27. $|10 - 3x| \leq 2$

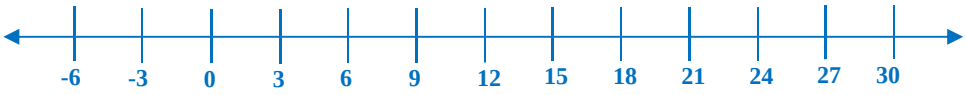
Write, solve and graph each inequality.

28. $x > -2$

29. Five times a number minus fifteen is less than ninety.

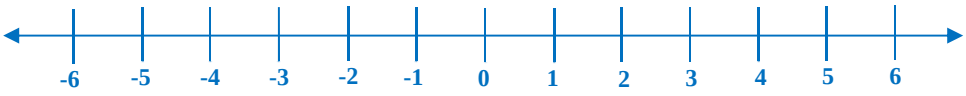


30. $12 < x \leq 27$



31. $x \leq 4$ and $x \geq -9$

32. $3x + 13 \leq 5 + x \leq 3x - 7$



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Solving Inequalities Review Guide

33. $|2 - 3x| < -7$

34. $|x + 3| - 6 > 10$

Solve each equation.

35. $|x + 1| = 7$

36. $|5x + 2| = 27$

Write each set in roster form and in set-builder notation.

37. U is the set of odd natural numbers that are less than 12.

Write the solutions of each inequality in set-builder notation.

38. $-(2x - 3) + 7 \geq -12 - 4x$

39. Suppose $D = \{x \mid x \text{ is a multiple of } 4, x \geq 16\}$ is the universal set and $E = \{16, 20, 24\}$. What is E'?

List all the subsets of each set.

40. $\{19\}$

41. $\{\text{green}, \text{blue}, \text{red}\}$

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Solving Inequalities Review Guide

Find each union or intersection.

Let $A = \{20, 24, 28, 32\}$, $B = \{x | x$ is a positive even integer greater than 25 and less than $35\} = \{26, 28, 30, 32\}$, $C = \{25, 26, 27, 28, 29\}$, and $D = \{x | x$ is a multiple of 3, greater than 20 and less than $31\} = \{21, 24, 27, 30\}$.

42. $A \cup B$

43. $A \cup C$

44. $B \cup D$

45. $C \cup D$

46. $A \cap D$

47. $B \cap C$

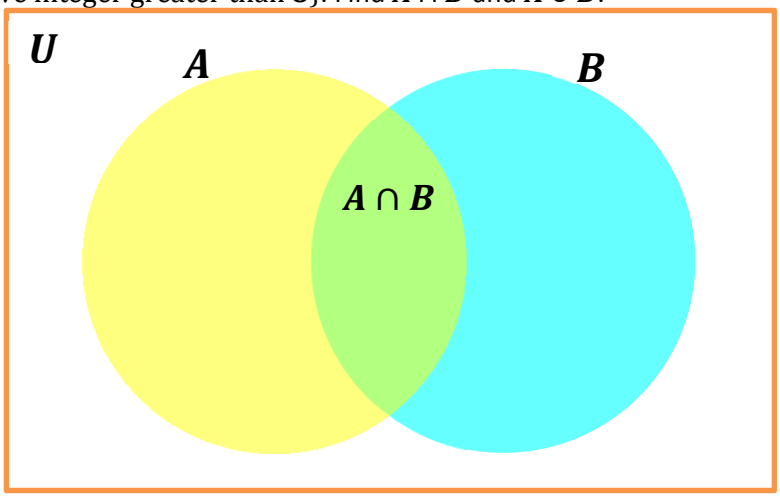
Solve each inequality. Write the solutions as either the union or intersection of two sets.

48. $30 > |3x + 9|$

49. $7x + 2(3x - 11) \leq 17x < 3$

Draw a Venn diagram to represent the union and intersection of these sets.

50. Let $A = \{x | x$ is an positive integer less than or equal to $11\}$ and $B = \{x | x$ is an positive integer greater than $8\}$. Find $A \cap B$ and $A \cup B$.



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Solving Inequalities Review Guide

ANSWER

Check whether the given number is a solution of the inequality.

1. $2a - 9 \geq 13$ $\quad x = 11$

$2(11) - 9 \geq 13$

$22 - 9 \geq 13$

$13 \geq 13$

2. $7 + 7x \geq 20$ $\quad x = 2$

$7 + 7(2) \geq 20$

$7 + 14 \geq 20$

$21 \geq 20$

Write and solve each inequality.

3. 7 is greater than 21 times y.

$$7 > 21 \cdot y$$

4. The ratio of x and 4 is less than or equal to 17.

$$\frac{x}{4} \leq 17$$

5. The ratio of 14 and y is less than 21.

$$\frac{14}{y} < 21$$

6. A number x increased by 5 is less than or equal to 33.

$x + 5 \leq 33$ $\quad x + 5 - 5 \leq 33 - 5$ $\quad x \leq 28$

7. A quarter of a number is greater than or equal to 38.

$\frac{1}{4}x \geq 38$ $\quad (4)\left(\frac{1}{4}x\right) \geq 38(4)$ $\quad x \geq 152$

8. The product of negative three and a number is greater than ten or less than one.

$-3x > 10$

$\frac{-3x}{-3} < \frac{10}{-3}$

$x < -\frac{10}{3}$

$-3x < 1$

$\frac{-3x}{-3} > \frac{1}{-3}$

$x > -\frac{1}{3}$

$x < -\frac{10}{3}$ or $x > -\frac{1}{3}$

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Solving Inequalities Review Guide

9. In a beverage company, the machine is designed to fill a 1.5 liter bottle of soda between 1.48 liter and 1.53 liter. Write the compound inequality that describes the volume of soda the machine must dispense in a 1.5 liter bottle of soda.

$$1.48\ liter \le x \le 1.53\ liter$$

10. After buying a burger costing $5, Roy has no more than $23 in his pocket. How much money did Roy have before buying the burger?

$5 + x \le 23$ $\quad 5 - 5 + x \le 23 - 5$ $\quad x \le 18$

11. The area of a rectangle is less than 85 square feet. The length of the rectangle is 20 feet. What is the width of the rectangle?

$A < 85$ $\quad LW < 85$ $\quad 20W < 85$ $\quad \frac{20W}{20} < \frac{85}{20}$ $\quad W < 4.25$

Solve each inequality.

12. $x - 12 \ge -1$

$x - 12 + 12 \ge -1 + 12$
$x \ge 11$

13. $a - 3 \ge -2$

$a - 3 + 3 \ge -2 + 3$
$a \ge 1$

14. $-2 + y < 5$

$-2 + 2 + y < 5 + 2$
$y < 7$

15. $5 + a \ge -5$

$5 - 5 + a \ge -5 - 5$
$a \ge -10$

16. $-3 \le y + 2$

$-3 - 2 \le y + 2 - 2$
$-5 \le y$

17. $3a \le 2a - 5$

$3a - 2a \le 2a - 2a - 5$
$a \le -5$

18. $2y > -7 + y$

$2y - y > -7 + y - y$
$y > -7$

19. $-0.7a > 4.9$

$\frac{-0.7a}{-0.7} < \frac{4.9}{-0.7}$
$a < -7$

20. $\frac{x}{7} \le -8$

$\frac{x}{7}(7) \le -8(7)$
$x \le -56$

21. $-\frac{x}{4} < 13$

$(-4)\left(-\frac{x}{4}\right) > 13(-4)$
$x > -52$

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Solving Inequalities Review Guide

22. $5 - 3a \leq 26$

$5 - 5 - 3a \leq 26 - 5$
$-3a \leq 21$
$\frac{-3a}{-3} \geq \frac{21}{-3}$
$a \geq -7$

23. $-5 - \frac{8y}{9} > 59$

$-5 + 5 - \frac{8y}{9} > 59 + 5$
$\left(-\frac{9}{8}\right)\left(-\frac{8y}{9}\right) < 64\left(-\frac{9}{8}\right)$
$y < -72$

24. $2x + 4 \leq 3(2x - 5)$

$2x + 5 \leq 6x - 15$
$2x - 2x + 5 \leq 6x - 2x - 15$
$5 \leq 4x - 15$
$5 + 15 \leq 4x - 15 + 15$
$20 \leq 4x$
$\frac{20}{4} \leq \frac{4x}{4}$
$5 \leq x$

25. $8 + 4x \leq 3(2x + 4) - 2(-4 - 2x)$

$8 + 4x \leq 6x + 12 + 8 + 4x$
$8 + 4x \leq 10x + 20$
$8 + 4x - 4x \leq 10x + 20 - 4x$
$8 \leq 10x + 20$
$8 - 20 \leq 10x + 20 - 20$
$-12 \leq 10x$
$-\frac{12}{10} \leq \frac{10x}{10}$
$-\frac{6}{5} \leq x$

26. $|x + 14| > 52$

$x + 14 > 52$
$x + 14 - 14 > 52 - 14$
$x > 38$

$x + 14 < -52$
$x + 14 - 14 < -52 - 14$
$x < -66$

27. $|10 - 3x| \leq 2$

$10 - 3x \leq 2$
$10 - 10 - 3x \leq 2 - 10$
$-3x \leq -8$
$\frac{-3x}{-3} \geq \frac{-8}{-3}$
$x \geq \frac{8}{3}$

$10 - 3x \geq -2$
$10 - 10 - 3x \geq -2 - 10$
$-3x \geq -12$
$\frac{-3x}{-3} \leq \frac{-12}{-3}$
$x \leq 4$

Write, solve and graph each inequality.

28. $x > -2$

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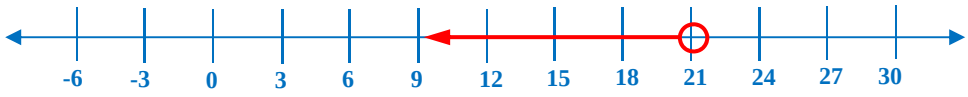
Solving Inequalities Review Guide

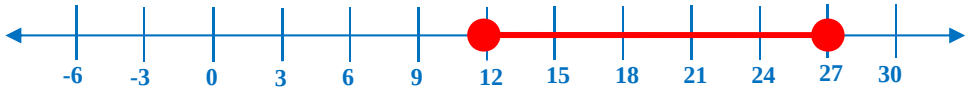
29. Five times a number minus fifteen is less than ninety.



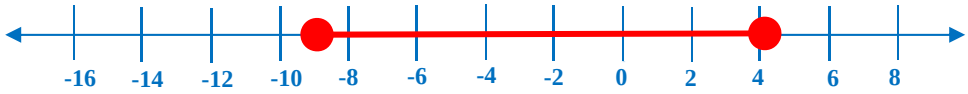
$5x - 15 < 90$ $\quad$ $5x - 15 + 15 < 90 + 15$ $\quad$ $5x < 105$

$\frac{5x}{5} < \frac{105}{5}$ $\quad$ $x < 21$

30. $12 < x \leq 27$



31. $x \leq 4$ and $x \geq -9$



32. $3x + 13 \leq 5 + x \leq 3x - 7$

$3x + 13 \leq 5 + x$

$3x - x + 13 \leq 5 + x - x$

$2x + 13 \leq 5$

$2x + 13 - 13 \leq 5 - 13$

$2x \leq -8$

$\frac{2x}{2} \leq -\frac{8}{2}$

$x \leq -4$

$5 + x \leq 3x - 7$

$5 + x - x \leq 3x - x - 7$

$5 \leq 2x - 7$

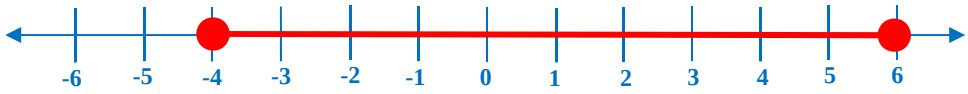
$5 + 7 \leq 2x - 7 + 7$

$12 \leq 2x$

$\frac{12}{2} \leq \frac{2x}{2}$

$6 \leq x$

$6 \leq x \leq -4$



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Solving Inequalities Review Guide

33. $|2-3x|<-7$

$2-3x<-7$ | $2-3x>7$

$2-2-3x<-7-2$ | $2-2-3x>7-2$

$-3x<-9$ | $-3x>5$

$\frac{-3x}{-3}>\frac{-9}{-3}$ | $\frac{-3x}{-3}<\frac{5}{-3}$

$x>3$ | $x<-\frac{5}{3}$

34. $|x+3|-6>10$

$|x+3|-6+6>10+6$

$|x+3|>16$

$x+3>16$ | $x+3<-16$

$x+3-3>16-3$ | $x+3-3<-16-3$

$x>13$ | $x<-19$

Solve each equation.

35. $|x+1|=7$

$x+1=7$ | $x+1=-7$

$x+1-1=7-1$ | $x+1-1=-7-1$

$x=6$ | $x=-8$

36. $|5x+2|=27$

$5x+2=27$ | $5x+2=-27$

$5x+2-2=27-2$ | $5x+2-2=-27-2$

$5x=25$ | $5x=-29$

$\frac{5x}{5}=\frac{25}{5}$ | $\frac{5x}{5}=-\frac{29}{5}$

$x=5$ | $x=-\frac{29}{5}$

Write each set in roster form and in set-builder notation.

37. U is the set of odd natural numbers that are less than 12.

$U=\{1,3,5,7,9,11\}$ $U=\{x|x \text{ is a odd natural number factor and } x<12\}$

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Solving Inequalities Review Guide

Write the solutions of each inequality in set-builder notation.

38. $-(2x-3)+7 \geq -12-4x$

$$\begin{aligned} -(2x-3)+7 &\geq -12-4x \\ -2x+3+7 &\geq -12-4x \\ -2x+10 &\geq -12-4x \\ -2x+4x+10 &\geq -12-4x+4x \\ 2x+10 &\geq -12 \\ 2x+10-10 &\geq -12-10 \\ 2x &\geq -22 \\ \frac{2x}{2} &\geq \frac{-22}{2} \\ x &\geq -11 \end{aligned}$$

$\{x|x \geq -11\}$

39. Suppose $D = \{x \mid x \text{ is a multiple of } 4, x \geq 16\}$ is the universal set and $E = \{16, 20, 24\}$. What is E'?

$E' = \{28, 32, 36, \ldots\}$

List all the subsets of each set.

40. $\{19\}$ $\{\ \}, \{19\}$

41. $\{\text{green, blue, red}\}$ $\{\ \}, \{\text{green}\}, \{\text{blue}\}, \{\text{red}\}, \{\text{green, blue}\}, \{\text{blue, red}\}, \{\text{green, red}\}, \{\text{green, blue, red}\}$

Find each union or intersection.

Let $A = \{20, 24, 28, 32\}$, $B = \{x|x \text{ is a positive even integer greater than } 25 \text{ and less than } 35\} = \{26, 28, 30, 32\}$, $C = \{25, 26, 27, 28, 29\}$, and $D = \{x|x \text{ is a multiple of } 3, \text{ greater than } 20 \text{ and less than } 31\} = \{21, 24, 27, 30\}$.

42. $A \cup B$

$= \{20, 24, 26, 28, 30, 32\}$

43. $A \cup C$

$= \{20, 24, 25, 26, 27, 28, 2932\}$

44. $B \cup D$

$= \{21, 24, 26, 27, 28, 30, 32\}$

45. $C \cup D$

$= \{21, 24, 25, 26, 27, 28, 29, 30\}$

46. $A \cap D$

$= \{24\}$

47. $B \cap C$

$= \{28\}$

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Solving Inequalities Review Guide

Solve each inequality. Write the solutions as either the union or intersection of two sets.

48. $30 > |3x + 9|$

$|3x + 9| < 30$

$\{x|x < 7\} \cap \{x|x > -13\}$

$3x + 9 < 30$

$3x + 9 - 9 < 30 - 9$

$3x < 21$

$\frac{3x}{3} < \frac{21}{3}$

$x < 7$

$\{x|x < 7\}$

$3x + 9 > -30$

$3x + 9 - 9 > -30 - 9$

$3x > -39$

$\frac{3x}{3} > -\frac{39}{3}$

$x > -13$

$\{x|x > -13\}$

49. $7x + 2(3x - 11) \leq 15x < 3$

$7x + 6x - 22 \leq 15x < 3$

$13x - 22 \leq 15x < 3$

$\left\{x\middle|x < \frac{1}{5}\right\} \cap \{x|x \geq -11\}$

$13x - 22 \leq 15x$

$13x - 13x - 22 \leq 15x - 13x$

$-22 \leq 2x$

$\frac{-22}{2} \leq \frac{2x}{2}$

$-11 \leq x$

$\{x|x \geq -11\}$

$15x < 3$

$\frac{15x}{15} < \frac{3}{15}$

$x < \frac{1}{5}$

$\left\{x\middle|x < \frac{1}{5}\right\}$

Draw a Venn diagram to represent the union and intersection of these sets.

50. Let $A = \{x|x$ is an positive integer less than or equal to $11\}$ and $B = \{x|x$ is an positive integer greater than $8\}$. Find $A \cap B$ and $A \cup B$.

$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$ $B = \{9, 10, 11, 12, 13, \dots\}$

$A \cap B = \{9, 10, 11\}$ $A \cup B =$ *the set of all positive integers*