C3L7 Notes
Absolute Value Equations and Inequalities

Solve each equation.

1. $|x| = 4$

$x = 4$ or $x = -4$

2. $4 = |x| - 3$

$|x| - 3 = 4$

$+3 \quad +3$

$|x| = 7$

$x = 7$ or $x = -7$

3. $-3|x| = -12$

$\frac{-3}{-3} \quad \frac{-12}{-3}$

$|x| = 4$

$x = 4$ or $x = -4$

4. $\frac{|x|}{-2} = -3$

$-2 \cdot \frac{|x|}{-2} = -3 \cdot -2$

$|x| = 6$

$x = 6$ or $x = -6$

5. $|x - 2| = 8$

$x - 2 = 8$ or $x - 2 = -8$

$+2 \quad +2 \qquad +2 \quad +2$

$x = 10$ or $x = -6$

6. $-5|2x| = -20$

$\frac{-5}{-5} \quad \frac{-20}{-5}$

$|2x| = 4$

$2x = 4$ or $2x = -4$

$x = 2$ or $x = -2$

7. $|x - 5| = -2$

ABSOLUTE VALUE CANNOT BE NEGATIVE. THEREFORE, THERE IS NO SOLUTION.

8. $|3x - 2| + 4 = 11$

$-4 \quad -4$

$|3x - 2| = 7$

$3x - 2 = 7$ or $3x - 2 = -7$

$+2 \quad +2 \qquad +2 \quad +2$

$3x = 9 \qquad 3x = -5$

$\frac{3x}{3} = \frac{9}{3} \qquad \frac{3x}{3} = \frac{-5}{3}$

$x = 3$ or $x = \frac{-5}{3}$

9. $4|2y - 3| - 1 = 15$

$+1 \quad +1$

$4|2y-3| = 16$

$|2y-3| = 4$

$2y-3=4$ OR $2y-3=-4$

$+3 \quad +3 \qquad +3 \quad +3$

$2y = 7 \qquad 2y = -1$

$y = \frac{7}{2}$ OR $y = \frac{-1}{2}$.

10. $-3|n + 1| = 6$

$\frac{-3|n+1|}{-3} = \frac{6}{-3}$

$|n+1| = -2.$

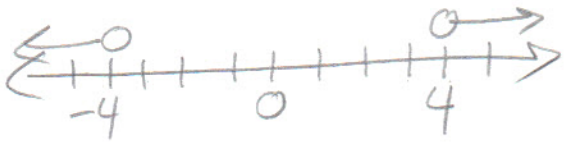
NO SOLUTION.

$<, \leq$: AND $\quad >, \geq$: OR.

Solve and graph each inequality.

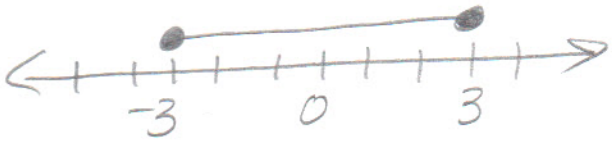
11. $|x| > 4$

$x > 4$ OR $x < -4$



12. $|x| \leq 3$

$-3 \leq x \leq 3$

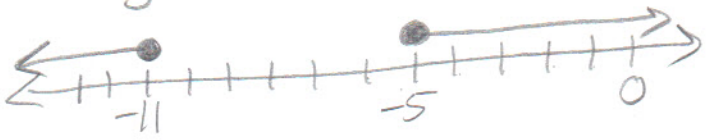


13. $|y + 8| \geq 3$

$y+8 \geq 3$ OR $y+8 \leq -3$

$-8 \quad -8 \qquad -8 \quad -8$

$y \geq -5$ OR $y \leq -11$

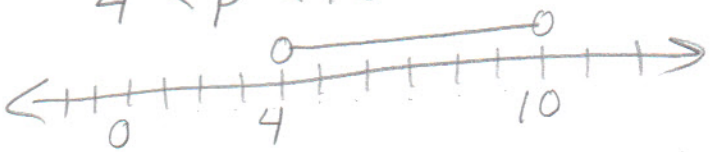


14. $|p - 7| < 3$

$-3 < p-7 < 3$

$+7 \quad +7 \quad +7$

$4 < p < 10$



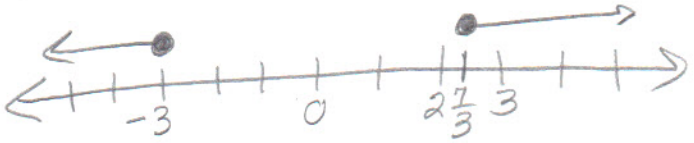
15. $|3t + 1| \geq 8$

$3t+1 \geq 8$ OR $3t+1 \leq -8$

$-1 \quad -1 \qquad -1 \quad -1$

$3t \geq 7 \qquad 3t \leq -9$

$t \geq \frac{7}{3}$ OR $t \leq -3$



16. $|5n| + 1 < 16$

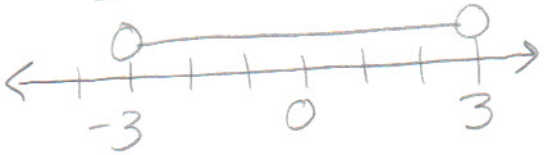
$-1 \quad -1$

$|5n| < 15$

$-15 < 5n < 15$

$\frac{-15}{5} < \frac{5n}{5} < \frac{15}{5}$

$-3 < n < 3$



17. Write an unsolved two step inequality with a solution of all numbers greater than or equal to 14.

$n + 4 \geq 18$

18. Explain how to solve $|3x| - 7 < 6$. Use complete sentences.

ADD 7 TO BOTH SIDES, AND YOU WILL GET $|3x| < 13$. THIS IS A COMPOUND "AND" STATEMENT, SO YOU WILL WRITE $-13 < 3x < 13$. DIVIDE BY THREE, AND THE ANSWER IS $\frac{-13}{3} < x < \frac{13}{3}$

$|3x| - 7 < 6$

$+7 \quad +7$

$|3x| < 13$

$-13 < 3x < 13$

$\frac{-13}{3} < \frac{3x}{3} < \frac{13}{3}$

$\frac{-13}{3} < x < \frac{13}{3}$

19. Explain how to solve $|n + 5| + 3 > 5$. Use complete sentences.

SUBTRACT 3 FROM BOTH SIDES, AND YOU WILL GET $|n+5| > 2$. THIS IS A COMPOUND "OR" STATEMENT, SO YOU WILL WRITE $n+5 > 2$ OR $n+5 < -2$. SUBTRACT 5 FROM BOTH SIDES ON EACH INEQUALITY, AND THE ANSWER IS $n > -3$ OR $n < -7$.

$|n+5| + 3 > 5$

$-3 \quad -3$

$|n+5| > 2$

$n+5 > 2$ OR $n+5 < -2$

$-5 \quad -5 \qquad -5 \quad -5$

$n > -3$ OR $n < -7$

20. Use complete sentences to explain why the following equation has no solution: $|4x + 3| = -7$.

ABSOLUTE VALUE CAN ONLY BE POSITIVE. IT CANNOT BE NEGATIVE. THEREFORE, THERE IS NO SOLUTION.