

Study Guide - Section 2.8 Abs Val Eq and Ineq

Solve each equation.

1) $|x-2|=5$

$$\begin{array}{l|l} x-2=5 & x-2=-5 \\ +2 & +2 \\ \hline x=7 & x=-3 \end{array}$$

2) $|3x-9|=-12$

\emptyset NO SOLUTION

3) $\frac{-5|-4k-8|}{-5} = \frac{-80}{-5}$

$|4k-8|=16$

$$\begin{array}{l|l} -4k-8=16 & -4k-8=-16 \\ +8 & +8 \\ \hline -4k=24 & -4k=-8 \\ \frac{-4k}{-4} = \frac{24}{-4} & \frac{-4k}{-4} = \frac{-8}{-4} \\ k=-6 & k=2 \end{array}$$

4) $\frac{|6p-10|-3}{+3} = \frac{-3}{+3}$

$|6p-10|=0$

$$\begin{array}{l} 6p-10=0 \\ +10 \\ \hline 6p=10 \\ \frac{6p}{6} = \frac{10}{6} \\ p=5/3 \end{array}$$

5) $\frac{-5+2|5b+2|}{+5} = \frac{91}{+5}$

$\frac{2|5b+2|}{2} = \frac{96}{2}$

$|5b+2|=48$

$$\begin{array}{l|l} 5b+2=48 & 5b+2=-48 \\ -2 & -2 \\ \hline 5b=46 & 5b=-50 \\ \frac{5b}{5} = \frac{46}{5} & \frac{5b}{5} = \frac{-50}{5} \\ b=9.2 \text{ or } 46/5 & b=-10 \end{array}$$

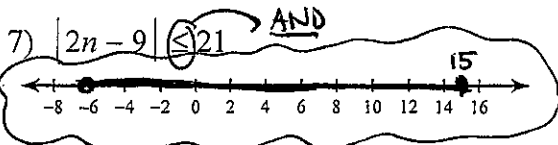
6) $\frac{8|8+2n|+8}{-8} = \frac{24}{-8}$

$\frac{8|8+2n|}{8} = \frac{16}{8}$

$|8+2n|=2$

$$\begin{array}{l|l} 8+2n=2 & 8+2n=-2 \\ -8 & -8 \\ \hline 2n=-6 & 2n=-10 \\ \frac{2n}{2} = \frac{-6}{2} & \frac{2n}{2} = \frac{-10}{2} \\ n=-3 & n=-5 \end{array}$$

Solve each inequality and graph its solution. Write the solution set in interval notation.

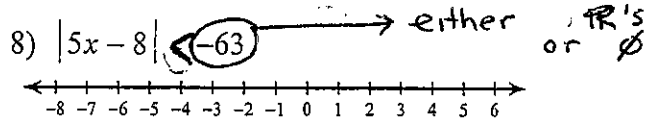


$$\begin{array}{l} 2n-9 \leq 21 \quad \text{AND} \quad 2n-9 \geq -21 \\ +9 \quad +9 \end{array}$$

$$\frac{2n}{2} \leq \frac{30}{2} \quad \frac{2n}{2} \geq \frac{-12}{2}$$

$n \leq 15$ AND $n \geq -6$

$[-6, 15]$



\emptyset

9) $|3a-3|+4 < 19$ (minus 4)

$\Rightarrow |3a-3| < 15$ AND $(-4, 6)$

$$\begin{array}{r} 3a-3 < 15 \\ +3 \quad +3 \\ \hline 3a < 18 \\ \frac{3a}{3} < \frac{18}{3} \\ a < 6 \end{array} \quad \text{AND} \quad \begin{array}{r} 3a-3 > -15 \\ +3 \quad +3 \\ \hline 3a > -12 \\ \frac{3a}{3} > \frac{-12}{3} \\ a > -4 \end{array}$$

$a < 6$ AND $a > -4$

10) $|-3n+3|-2 \geq 10$ (Add 2)

$\Rightarrow |-3n+3| \geq 12$ OR

$$\begin{array}{r} -3n+3 \geq 12 \\ -3 \quad -3 \\ \hline -3n \geq 9 \\ \frac{-3n}{-3} \geq \frac{9}{-3} \\ n \leq -3 \end{array} \quad \text{OR} \quad \begin{array}{r} -3n+3 \leq -12 \\ -3 \quad -3 \\ \hline -3n \leq -15 \\ \frac{-3n}{-3} \leq \frac{-15}{-3} \\ n \geq 5 \end{array}$$

$(-\infty, -3] \cup [5, \infty)$

11) $-9|-8n-7| \leq -81$ (Divide by -9)

$|-8n-7| \geq 9$ OR $(-\infty, -2] \cup [1/4, \infty)$

$$\begin{array}{r} -8n-7 \geq 9 \\ +7 \quad +7 \\ \hline -8n \geq 16 \\ \frac{-8n}{-8} \geq \frac{16}{-8} \\ n \leq -2 \end{array} \quad \text{OR} \quad \begin{array}{r} -8n-7 \leq -9 \\ +7 \quad +7 \\ \hline -8n \leq -2 \\ \frac{-8n}{-8} \leq \frac{-2}{-8} \\ n \geq 1/4 \end{array}$$

12) $\frac{|-4-5x|}{8} \geq -3$ OR \mathbb{R}

$\mathbb{R} (-\infty, \infty)$

13) $6|10n+8|-3 < 69$ (Add 3, Divide by 6)

$|10n+8| < 12$ AND

$$\begin{array}{r} 10n+8 < 12 \\ -8 \quad -8 \\ \hline 10n < 4 \\ \frac{10n}{10} < \frac{4}{10} \\ n < 2/5 (0.4) \end{array} \quad \text{AND} \quad \begin{array}{r} 10n+8 > -12 \\ -8 \quad -8 \\ \hline 10n > -20 \\ \frac{10n}{10} > \frac{-20}{10} \\ n > -2 \end{array}$$

$(-2, 2/5)$

14) $-10|8-8x|-7 < -87$ (Add 7, Divide by -10)

$|8-8x| > 8$ OR

$$\begin{array}{r} 8-8x > 8 \\ -8 \quad -8 \\ \hline -8x > 0 \\ \frac{-8x}{-8} > \frac{0}{-8} \\ x < 0 \end{array} \quad \text{OR} \quad \begin{array}{r} 8-8x < -8 \\ -8 \quad -8 \\ \hline -8x < -16 \\ \frac{-8x}{-8} < \frac{-16}{-8} \\ x > 2 \end{array}$$

$(-\infty, 0) \cup (2, \infty)$