Solving Absolute Value Inequalities
Homework

Name Key
Date _____ Block ____

Solve each absolute value inequality. Graph the solution set and state it using interval notation.

1. $|4x-5|+4>7x+8$

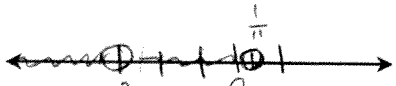
$|4x-5|>7x+4$

$4x-5<-7x-4$ OR $4x-5>7x+4$

$11x<1$ $\quad -3x>9$

$x<\frac{1}{11}$ or $x<-3$

$x<\frac{1}{11}$



Interval Notation: 1. $(-\infty, \frac{1}{11})$

2. $7+|9-5x|>1$

$|9-5x|>-6$

LOOK! ... always true! because distance can't be negative

all real numbers

Interval Notation: 2. $(-\infty, \infty)$

3. $-|x-7|+5\geq 3x-2$

set up: $x-7$; $-(-3x+7)$ 0 $(-3x+7)$

$-|x-7|\geq 3x-7$

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

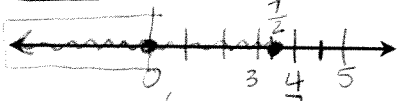
$3x-7\leq x-7\leq -3x+7$

$3x-7\leq x-7$ and $x-7\leq -3x+7$ ✓

$2x\leq 0$ and $4x\leq 14$

$x\leq 0$ and $x\leq \frac{14}{4}$

$x\leq 0$ and $x\leq \frac{7}{2}$



Interval Notation: 3. $(-\infty, 0]$

4. $|x+2|-x\geq 0$

$|x+2|\geq x$

$x+2$ will always be greater than x

all real numbers

Interval Notation: 4. $(-\infty, \infty)$

---

5. For a door to meet specifications at a carpentry shop, the width must be within $\frac{1}{4}$ inch of the expected width of the door. The shop gets an order for doors that are $4\frac{1}{2}$ feet wide. Which of the following is an inequality that expresses the range of widths for acceptable doors?

A. $|x+54|\leq \frac{1}{4}$ B. $\left|x+\frac{1}{4}\right|\leq 4\frac{1}{2}$ C. $|x-54|\leq \frac{1}{4}$ D. $\left|x-4\frac{1}{2}\right|\leq \frac{1}{4}$

$4\frac{1}{2}$ feet = 54 inches

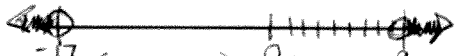
The difference between the ordered door width and the actual width must be less than or equal to $\frac{1}{4}$".

Solve each absolute value inequality. Graph the solution set and state it using interval notation.

6. $|x+5|>12$

$x+5<-12$ OR $x+5>12$

$x<-17$ or $x>7$



Interval Notation: 6. $(-\infty,-17)\cup(7,\infty)$

7. $3|2x-4|-6\le 21$

$3|2x-4|\le 27$

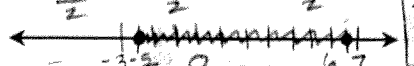
$|2x-4|\le 9$

$-9\le 2x-4\le 9$

$+4 \quad +4 \quad +4$

$-5\le 2x\le 13$

$\frac{-5}{2}\le x\le\frac{13}{2}$ ✓



7. $\left[-\frac{5}{2},\frac{13}{2}\right]$

8. $-2|8x+28|+4\le -60$

$-2|8x+28|\le -64$

$|8x+28|\ge 32$

$8x+28\le -32$ OR $8x+28\ge 32$

$8x\le 60$ OR $8x\ge 4$

$x\le\frac{15}{2}$ OR $x\ge\frac{1}{2}$

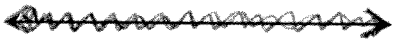
Interval Notation: 8. $(-\infty,\frac{1}{2}]\cup[15/2,\infty)$

9. $2|5x+1|+9>3$

$2|5x+1|>-6$

$|5x+1|>-3$

all real numbers



9. $(-\infty,\infty)$

10. $-3|-2x-3|+5>-16$

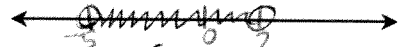
$-3|-2x-3|>-21$

$|-2x-3|<7$

$-7<-2x-3<7$

$-4<-2x<10$

$2>x>-5$, $-5<x<2$



Interval Notation: 10. $(-5,2)$

11. $-2\left|\frac{4}{3}x-5\right|-7\ge 19$

$-2\left|\frac{4}{3}x-5\right|\ge 26$

$\left|\frac{4}{3}x-5\right|\le -13$

Look ... impossible! Distance cannot be less than a negative number

no solution

11. ____

12. $6\left|\frac{5}{2}x-7\right|-\frac{2}{3}>15$ $\quad +2/3$

$15+\frac{2}{3}=\frac{45}{3}+\frac{2}{3}=\frac{47}{3}$

$\frac{1}{6}\cdot 6\left|\frac{5}{2}x-7\right|>\frac{47}{3}\cdot\frac{1}{6}$ $\quad \cdot 1/6$

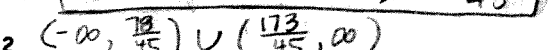
$\left|\frac{5}{2}x-7\right|>\frac{47}{18}$

$18\left(\frac{5}{2}x-7<-\frac{47}{18}\right)$ OR $18\left(\frac{5}{2}x-7>\frac{47}{18}\right)$

$45x-126<-47$ OR $45x-126>47$

$45x<78$ OR $45x>173$

$x<\frac{78}{45}$ OR $x>\frac{173}{45}$



Interval Notation: 12. $(-\infty,\frac{78}{45})\cup(\frac{173}{45},\infty)$

13. $-4|-2x+5|-9\le 12$

$-4|-2x+5|\le 21$

$|-2x+5|\ge -\frac{21}{4}$

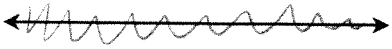
all real numbers

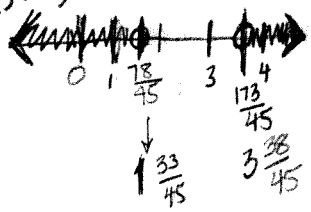
13. $(-\infty,\infty)$

14. $|8x+3|+17\ge 11$

$|8x+3|\ge -6$

all real numbers





Interval Notation: 14. $(-\infty,\infty)$