

HOMWORK

Chapter 1.7 – Absolute Value Equations & Inequalities

Problems: # 5-50 (every 5th), 54

By: [Eugene F. Leafly III](#)**1-18: Solve the equation.**

5: $|x - 3| = 2$

$x - 3 = 2$	$x - 3 = -2$
$x = 2 + 3$	$x = -2 + 3$
$x = 5$	$x = 1$

10: $\left|\frac{1}{2}x - 2\right| = 1$

$\frac{1}{2}x - 2 = 1$	$\frac{1}{2}x - 2 = -1$
$\frac{1}{2}x = 1 + 2$	$\frac{1}{2}x = -1 + 2$
$\frac{1}{2}x = 3$	$\frac{1}{2}x = 1$
$x = 3 \cdot 2 = 6$	$x = 1 \cdot 2 = 2$

15: $8 + 5\left|\frac{1}{3}x - \frac{5}{6}\right| = 33$

$5\left|\frac{1}{3}x - \frac{5}{6}\right| = 33 - 8$

$5\left|\frac{1}{3}x - \frac{5}{6}\right| = 25$

$\frac{5\left|\frac{1}{3}x - \frac{5}{6}\right|}{5} = \frac{25}{5}$

$\left|\frac{1}{3}x - \frac{5}{6}\right| = 5$

$\frac{1}{3}x - \frac{5}{6} = 5$	$\frac{1}{3}x - \frac{5}{6} = -5$
$\frac{1}{3}x = 5 + \frac{5}{6}$	$\frac{1}{3}x = -5 + \frac{5}{6}$
$\frac{1}{3}x = \frac{35}{6}$	$\frac{1}{3}x = \frac{-25}{6}$
$x = 3\left(\frac{35}{6}\right) = \frac{105}{6} = \frac{35}{2}$	$x = 3\left(\frac{-25}{6}\right) = \frac{75}{6} = \frac{25}{2}$

19-44: Solve the inequality. Express the answer using interval notation.

20: $|3x| < 15$

$3x < 15$	$3x < -15$
$x < \frac{15}{3}$	$x < -\frac{15}{3}$
$x < 5$	$x > -5$

$(-5, 5)$

25: $|x + 1| \geq 1$

$x + 1 \geq 1$	$x + 1 \leq -1$
$x \geq 1 - 1$	$x \leq -1 - 1$
$x \geq 0$	$x \leq -2$

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

30: $|5x - 2| < 6$

$5x - 2 < 6$	$5x - 2 > -6$
$5x < 6 + 2$	$5x > -6 + 2$
$5x < 8$	$5x > -4$
$x < \frac{8}{5}$	$x > \frac{-4}{5}$

$\left(-\frac{4}{5}, \frac{8}{5}\right)$

$$35: 4|x + 2| - 3 < 13$$

$$4|x + 2| < 13 + 3$$

$$4|x + 2| < 16$$

$$\frac{4|x + 2|}{4} < \frac{16}{4}$$

$$|x + 2| < 4$$

$x + 2 < 4$	$x + 2 > -4$
$x < 4 - 2$	$x > -4 - 2$
$x < 2$	$x > -6$

$$(-6, 2)$$

$$40: 2\left|\frac{1}{2}x + 3\right| + 3 \leq 51$$

$$2\left|\frac{1}{2}x + 3\right| \leq 51 - 3$$

$$2\left|\frac{1}{2}x + 3\right| \leq 48$$

$$\frac{2\left|\frac{1}{2}x + 3\right|}{2} \leq \frac{48}{2}$$

$$\left|\frac{1}{2}x + 3\right| \leq 24$$

$\frac{1}{2}x + 3 \leq 24$	$\frac{1}{2}x + 3 \geq -24$
$\frac{1}{2}x \leq 24 - 3$	$\frac{1}{2}x \geq -24 - 3$
$\frac{1}{2}x \leq 21$	$\frac{1}{2}x \geq -27$
$x \leq 21 \cdot 2$	$x \geq -27 \cdot 2$
$x \leq 42$	$x \geq -54$

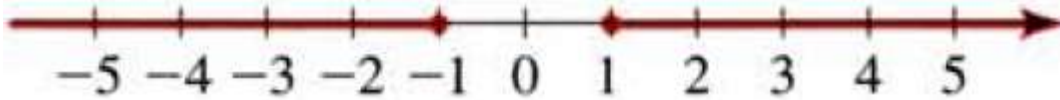
$$(-54, 42)$$

45-48: A phrase describing a set of real numbers is given. Express the phrase as an inequality involving an absolute value.

45: All real numbers x less than 3 units from 0

$$|x| < 3$$

49-52: A set of real numbers is graphed. Find an inequality involving an absolute value that describes the set.



50:

$$(-\infty, -1] \cup [1, \infty)$$

Applications

54: **Range of Height** The average height of adult males is 68.2 in, and 95% of adult males have height h that satisfies the inequality

$$\left|\frac{h - 68.2}{2.9}\right| \leq 2$$

Solve the inequality to find the range of heights.

$\frac{h - 68.2}{2.9} \leq 2$	$\frac{h - 68.2}{2.9} \geq -2$
$h - 68.2 \leq 2 \cdot 2.9$	$h - 68.2 \geq -2 \cdot 2.9$
$h - 68.2 \leq 5.8$	$h - 68.2 \geq -5.8$
$h \leq 5.8 + 68.2$	$h \geq -5.8 + 68.2$
$h \leq 74$	$h \geq 62.4$

$$[62.4, 74]$$