# Section 3.5 Absolute Value Equations and Inequalities

$|7| = 7$

$|-7| = 7$

## Equations

$$|x| = 5$$

$x = 5$ or $-5$

$\{-5, 5\}$

---

$$|3x| = 9$$

$x = 3$ or $x = -3$

$\{-3, 3\}$

---

$|3x| = 9$ split into 2 equations

$\frac{3x}{3} = \frac{9}{3}$ or $\frac{3x}{3} = \frac{-9}{3}$

$x = 3$ or $x = -3$

$\{-3, 3\}$

42. $|1-2z| + 5 = 10$ Isolate the absolute value first

$-5 \quad -5$

~~$|1-2z| = 5$~~

$|1-2z| = 5$

$1-2z = 5$ or $1-2z = -5$

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

$-2z = 4 \qquad -2z = -6$

$\frac{-2z}{-2} = \frac{4}{-2} \qquad \frac{-2z}{-2} = \frac{-6}{-2}$

$z = -2 \qquad z = 3$

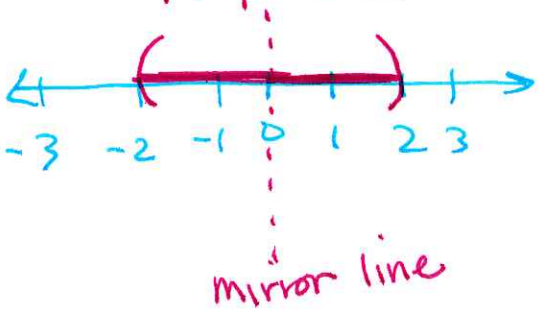
$\{-2, 3\}$

$|1-2z| = -5$ can't have a negative

No solution

## Inequalities

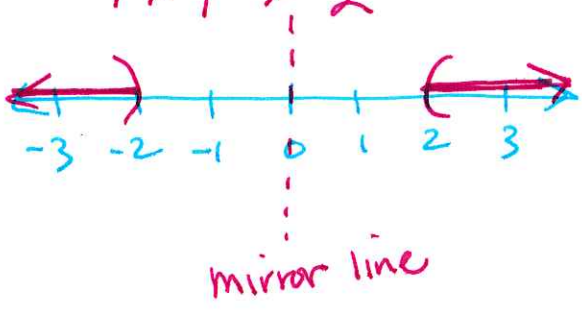
$|x| < 2$




$\{x \mid -2 < x < 2\}$

$(-2, 2)$

$|x| > 2$




$\{x \mid x < -2 \text{ or } x > 2\}$

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

50b. $|3x-9| \leq 6$

mirror point

$-6 \leq 3x-9 \leq 6$

$+9 \qquad +9 \quad +9$

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

$1 \leq x \leq 5$

$\{x \mid 1 \leq x \leq 5\}$

$[1, 5]$

50c. $|3x-9| \geq 6$

$3x-9 \geq 6$ or $3x-9 \leq -6$

mirror point

$+9 \quad +9 \qquad +9 \quad +9$

$\frac{3x}{3} \geq \frac{15}{3} \qquad \frac{3x}{3} \leq \frac{3}{3}$

$x \geq 5 \qquad x \leq 1$

$\{x \mid x \geq 5 \text{ or } x \leq 1\}$

$(-\infty, 1] \cup [5, \infty)$