

Bell Work:

A student believes she can earn between \$5200 and \$6250 from her summer job. She knows that she will have to buy four new tires for her car at \$90 each. She estimates her other expenses while she is working at \$660. How much can the student save from her summer wages?

$$5200 \leq x + 4(90) + 660 \leq 6250$$

$$\begin{array}{r} 5200 \leq x + 1020 \leq 6250 \\ -1020 \quad -1020 \quad -1020 \end{array}$$

$$4180 \leq x \leq 5230$$

Absolute Value Equations and Inequalities

Solve each equation. Check your answers.

1. $|-3x| = 18$

$$\begin{array}{rcl} -3x = 18 & & -3x = -18 \\ \hline -3 & & -3 \end{array}$$

$$\boxed{x = -6 \quad x = 6}$$

$$|-6(-3)| = |18| = 18$$

$$|6(-3)| = |-18| = 18$$

2) $|t + 5| = 8$

$$\begin{array}{rcl} t + 5 = 8 & & t + 5 = -8 \\ \hline -5 & -5 & -5 & -5 \end{array}$$

$$\boxed{t = 3 \quad t = -13}$$

$$|3 + 5| = 8$$

$$|8| = 8$$

$$8 = 8$$

$$|-13 + 5| = 8$$

$$|-8| = 8$$

$$8 = 8$$

Solve each equation. Check for extraneous solutions.

one or both will work
 x on both sides (1 outside of absolute value)

$$3) |x+5| = 3x-7$$

$$\begin{array}{r} x+5 = 3x-7 \\ -3x-5 \quad -3x-5 \end{array}$$

$$-2x = -12$$

$$\begin{array}{r} -2 \\ \hline x = 6 \end{array}$$

$$|6+5| = 3(6)-7$$

$$|11| = 18-7$$

$$|11| = 11 \checkmark$$

$$\begin{array}{r} x+5 = -3x+7 \\ +3x-5 \quad +3x-5 \end{array}$$

$$4x = 2$$

$$\begin{array}{r} 4 \\ \hline x = \frac{1}{2} = 0.5 \end{array}$$

$$|0.5+5| = 3(0.5)-7$$

$$|5.5| = 1.5-7$$

$$|5.5| = -5.5 \text{ No}$$

$$4) \textcircled{a} |4w+3|-2=5$$

$+2+2$

$$|4w+3|=7$$

$$4w+3=7$$

$$4w=4$$

$$w=1$$

$$4w+3=-7$$

$$4w=-10$$

$$w = \frac{-10}{4} = -\frac{5}{2} = -2.5$$

$$5) 9. \frac{2|4w-5|}{2} = \frac{12w-18}{2}$$

$$|4w-5| = 6w-9$$

$$\begin{array}{r} 4w-5 = 6w-9 \\ -6w+5 \quad -6w+5 \\ \hline -2w = -4 \end{array}$$

$$w = 2$$

$$\begin{array}{l} |4(2)-5| = 6(2)-9 \\ |8-5| = 12-9 \\ |3| = 3 \checkmark \end{array}$$

$$\begin{array}{r} 4w-5 = -6w+9 \\ +6w+5 \quad +6w+5 \\ \hline 10w = 14 \end{array}$$

$$w = \frac{14}{10} = \frac{7}{5} = 1.4$$

$$\begin{array}{l} |4(1.4)-5| = 6(1.4)-9 \\ |5.6-5| = 8.4-9 \\ |0.6| = -0.6 \end{array}$$

Bell Work: $6 \cdot \frac{4}{3} = \frac{24}{3} = 8$

$t = 1.25$

~~$\left(\frac{4}{3}\right) |8t - 12| = 6(t - 1) \left(\frac{4}{3}\right)$~~

$|8t - 12| = 8(t - 1)$

$|8t - 12| = 8t - 8$

$|8(1.25) - 12| = 8(1.25) - 8$

$|10 - 12| = 10 - 8$

$| -2 | = 2$

~~$8t - 12 = 8t - 8$~~

~~$-12 = -8$~~


$8t - 12 = -8t + 8$

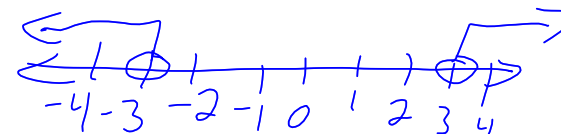
$16t - 12 = 8$

$+12 \quad +12$

$\frac{16t}{16} = \frac{20}{16} \quad t = \frac{5}{4} = 1.25$

Solve each inequality. Graph the solution.

6
11. $5|y+3| < 15$ / 5
 $|y+3| < 3$ and statement
 $y+3 < 3$ $y+3 > -3$
 $\quad -3 \quad -3$
 $y < 0$ and $y > -6$
 $-6 < y < 0$


7
12. $|4b|-3 > 9$
 $\quad +3 \quad +3$
 $|4b| > 12$
 $\frac{4b}{4} > \frac{12}{4}$ $\frac{4b}{4} < \frac{-12}{4}$
 $b > 3$ $b < -3$


$$8) \text{ 16. } 2|4x+1|-5 \leq 1$$

$$\frac{2|4x+1|}{2} \leq \frac{6}{2}$$

$$|4x+1| \leq 3$$

$$4x+1 \leq 3$$

$$4x \leq 2$$

$$x \leq \frac{1}{2}$$

$$4x+1 \geq -3$$

$$4x \geq -4$$

$$x \geq -1$$



$$9) \text{ 17. } -3|2t+1| < 9$$

$$|2t+1| > -3$$

$$2t+1 > -3$$

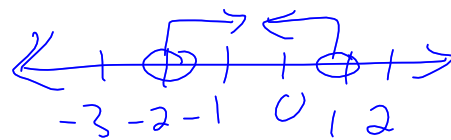
$$2t > -4$$

$$t > -2$$

$$2t+1 < 3$$

$$2t < 2$$

$$t < 1$$



And

$$10) -7.3 \leq a \leq 7.3$$

Avg Difference

$$\frac{-7.3 + 7.3}{2} \quad \frac{7.3 - (-7.3)}{2}$$

$$\frac{0}{2} = 0 \quad \frac{14.6}{2} = 7.3$$

$$|a - 0| \leq 7.3$$

$$|a| \leq 7.3$$

$$11) \underline{28.6} \leq F \leq 29.2$$

$$\frac{\text{Avg}}{\frac{29.2 + 28.6}{2}} = 28.9$$

$$\frac{\text{Diff}}{\frac{29.2 - 28.6}{2}} = 0.3$$

$$|F - 28.9| \leq 0.3$$

$$12) -2 < x < 4$$

$$\frac{-2+4}{2} = \frac{2}{2} = 1$$

$$\frac{4-(-2)}{2} = 3$$

$$|x-1| < 3$$

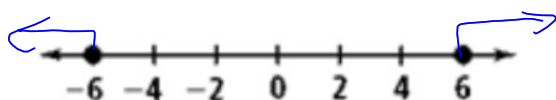
$$13) 20 \leq y \leq 30$$

$$\frac{20+30}{2} = 25 \quad \frac{30-20}{2} = 5$$

$$|y-25| \leq 5$$

Write an absolute value equation or inequality to describe each graph.

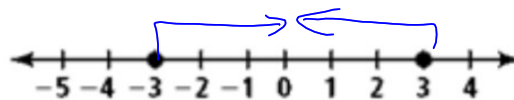
14)



$$|x| \geq 6$$

$$x \geq 6 \quad x \leq -6$$

15)



$$|x| \leq 3$$

$$x \leq 3 \quad x \geq -3$$

Write an absolute value inequality to represent each situation.

$$18 \leq a \leq 60$$

To become a potential volunteer donor listed on the National Marrow Donor Program registry, a person must be between the ages of 18 and 60. Let a represent the age of a person on the registry.

$$\frac{18+60}{2} = 39$$

Avg

$$\frac{60-18}{2} = 21$$

diff

$$|a - 39| \leq 21$$

The outdoor temperature ranged between 37°F and 62°F in a ~~24~~ hour period. Let t represent the temperature during this time period.

$$\frac{37+62}{2} = 49.5$$

$$\frac{62-37}{2} = 12.5$$

$$|t - 49.5| \leq 12.5$$

