Bell Work:

Jenna's band is going to record a CD at a recording studio. They will pay $225 to use the studio for one day and $80 per hour for sound technicians. Jenna has $200 and can reasonably expect to raise up to an additional $350 by taking pre-orders for the CDs.

$200 \leq 225 + 80x \leq 550$

$-225 \quad -225 \quad -225$

$\frac{-25}{80} \leq \frac{80x}{80} \leq \frac{325}{80}$

$-.31 \leq x \leq 4.06$

Absolute Value Equations and Inequalities

Solve each equation. Check your answers.

1. $|-3x| = 18$

$\frac{-3x}{-3} = \frac{18}{-3}$ $\quad \frac{-3x}{-3} = \frac{-18}{-3}$

$x = -6$ $\quad x = 6$

$|-3(-6)|$ $\quad |-3(6)|$

$|18|$ $\quad |-18|$

18 $\quad 18$

2) **6.** $|t + 5| = 8$

$t + 5 = 8$ $\quad t + 5 = -8$

$-5 \quad -5$ $\quad -5 \quad -5$

$t = 3$ $\quad t = -13$

Solve each equation. Check for extraneous solutions.

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

$x+5=3x-7$

$-3x \quad -3x$

$-2x+5=-7$

$-5 \quad -5$

$\frac{-2x}{-2}=\frac{-12}{-2}$

$x=6$

$x+5=-3x+7$

$+3x \quad +3x$

$4x+5=7$

$-5 \quad -5$

$\frac{4x}{4}=\frac{2}{4}$

$x=0.5$

extraneous solution

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

$|11|=18-7$

$|11|=11$ ✓

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

$|5.5|=1.5-7$

$|5.5|=-5.5$ ✗

4) a $|4w+3|-2=5$

$+2 \quad +2$

$|4w+3| = 7$

$4w+3=7$

$-3 \quad -3$

$\frac{4w}{4} = \frac{4}{4}$

$w=1$

$4w+3=-7$

$-3 \quad -3$

$\frac{4w}{4} = \frac{-10}{4}$

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

or -2.5

5) 9. $2|4w-5| = 12w-18$

$\frac{2}{2} \quad \frac{2}{2}$

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

$4w-5 = 6w-9$ $\quad -6w \quad -6w$

$-2w-5 = -9$

$+5 \quad +5$

$-2w = -4$

$w = 2$

$4w-5 = -6w+9$ $\quad +6w \quad +6w$

$10w-5 = 9$

$+5 \quad +5$

$\frac{10w}{10} = \frac{14}{10}$

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

Both work

$|4(2)-5| = 6(2)-9$

$|8-5| = 12-9$

$|3| = 3$

$|4(1.4)-5| = 6(1.4)+9$

$|5.6-5| = 8.4+9$

$|.6| = .6$ ✓

Bell Work:

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

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

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

$8t-12 = 8t-8$

$-8t \quad -8t$

$-12 = -8$

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

$+8t \quad +8t$

$16t-12 = 8$

$+12 \quad +12$

$\frac{16t}{16} = \frac{20}{16}$ ✓

$t = 1.25$

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

$|10-12| = 10-8$

$|-2| = 2$

Solve each inequality. Graph the solution.

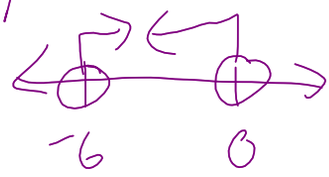
6) 81. $\frac{5}{5}|y+3|<\frac{15}{5}$ And statement

$|y+3|<3$

$y+3<3$ $\quad y+3>-3$

$-3\ -3 \quad -3\ -3$

$y<0 \quad y>-6$



$-6<y<0$

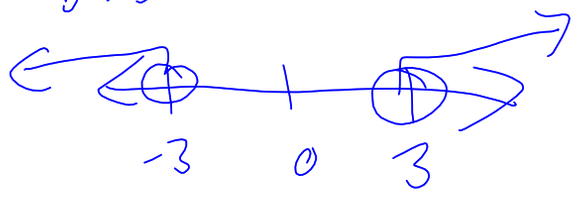
7) 82. $|4b|-3>9$

$+3\ +3$ or statement

$|4b|>12$

$\frac{4b}{4}>\frac{12}{4} \quad \frac{4b}{4}<\frac{-12}{4}$

$b>3$ or $b<-3$



8 15. $2|4x+1|-5 \le 1$

$+5 \quad +5$

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

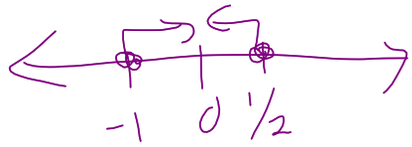
$|4x+1| \le 3$

$4x+1 \le 3 \qquad 4x+1 \ge -3$

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

$\frac{4x}{4} \le \frac{2}{4} \qquad \frac{4x}{4} \ge \frac{-4}{4}$

$x \le \frac{1}{2}$ or 0.5 $\qquad x \ge -1$



9 16. $-3|2t+1| < 9$

$\frac{}{-3} \quad \frac{}{-3}$

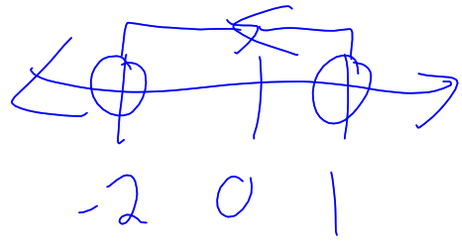
$|2t+1| > -3$

$2t+1 > -3 \qquad 2t+1 < 3$

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

$\frac{2t}{2} > \frac{-4}{2} \qquad \frac{2t}{2} \le \frac{2}{2}$

$t > -2 \qquad t < 1$



Write an absolute value equation * divide both by 2 *

10) $-7.3 \le a \le 7.3$

Average: $\frac{-7.3+7.3}{2} = \frac{0}{2} = 0$

Difference: $\frac{7.3-(-7.3)}{2} = \frac{14.6}{2} = 7.3$

$|a-0| \le 7.3$

$|a| \le 7.3$

11) $28.6 \le F \le 29.2$

Avg: $\frac{28.6+29.2}{2} = \frac{57.8}{2} = 28.9$

Diff: $\frac{29.2-28.6}{2} = \frac{0.6}{2} = 0.3$

$|F-28.9| \le 0.3$

12) $-2 < x < 4$

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

$\frac{4-(-2)}{2} = \frac{6}{2} = 3$

$|x - 1| < 3$

13) $20 \leq y \leq 30$

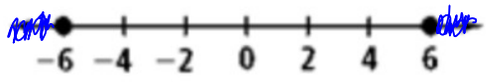
$\frac{20+30}{2} = 25$

$\frac{30-20}{2} = 5$

$|y - 25| \leq 5$

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

14)

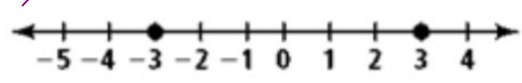


$\frac{-6+6}{2} = 0$

$\frac{6-(-6)}{2} = \frac{12}{2} = 6$

$|x| > 6$

15)



$\frac{-3+3}{2} = 0$

$\frac{3-(-3)}{2} = \frac{6}{2} = 3$

$|x| = 3$

$x = 3 \quad x = -3$

Write an absolute value inequality to represent each situation.

16. 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.

$18 \leq a \leq 60$ $\frac{18+60}{2} = 39$ $\frac{60-18}{2} = 21$ $|a-39| \leq 21$

42½

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

$37 \leq t \leq 62$ $|t-49.5| \leq 12.5$

$\frac{37+62}{2} = \frac{99}{2} = 49.5$ $\frac{62-37}{2} = \frac{25}{2} = 12.5$