Name _____ Period _____

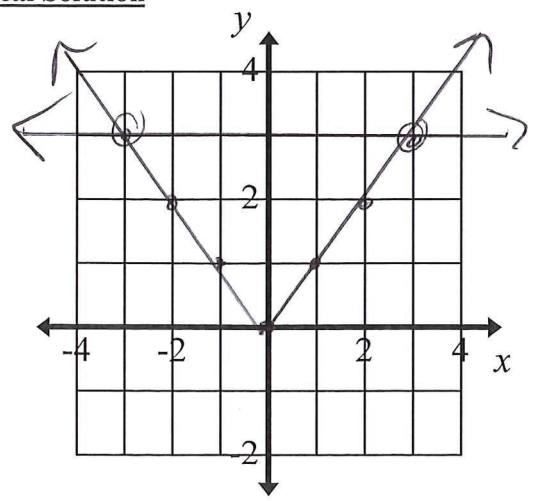
8.2A *Solutions of Absolute Value Equations and Inequalities*

#1 – 4: Solve the following equations graphically and algebraically.

1. $|x| = 3$

Graphical Solution

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



Algebraic Solution

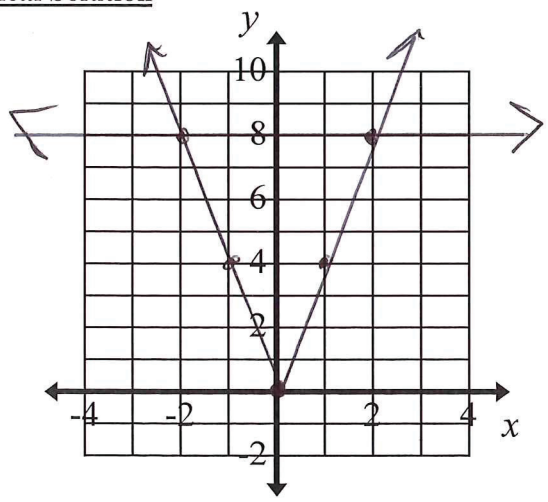
$|x| = 3$

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

2. $|4x| = 8$

Graphical Solution

$x = -2$ or $x = 2$



Algebraic Solution

$|4x| = 8$

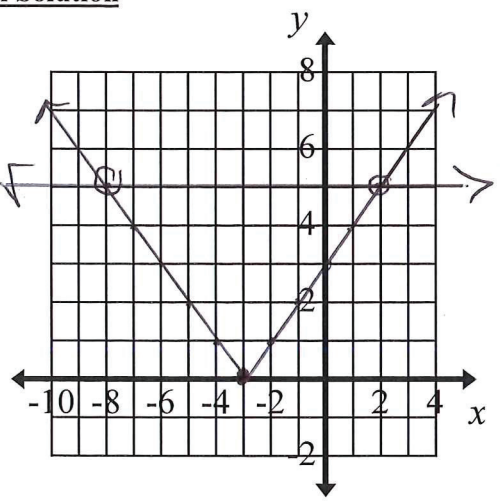
$4x = -8$ or $4x = 8$

$x = -2$ or $x = 2$

3. $|x + 3| = 5$

Graphical Solution

$x = -8$ or $x = 2$



Algebraic Solution

$|x+3| = 5$

$x+3 = -5$ or $x+3 = 5$

$x = -8$ or $x = 2$

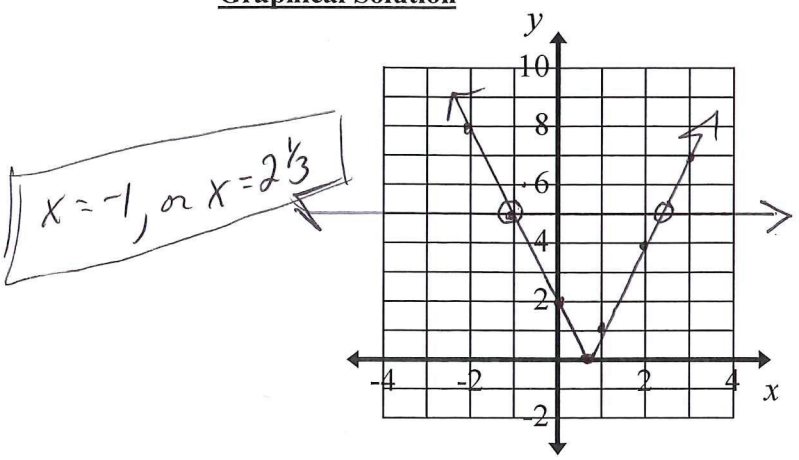
Name _____ Period _____

8.2A *Solutions of Absolute Value Equations and Inequalities*

#1 – 4 (continued): Solve the following equations graphically and algebraically.

4. $|3x-2|=5$

Graphical Solution



$x=-1$, or $x=2\frac{1}{3}$

Algebraic Solution

$3x-2=-5$ or $3x-2=5$

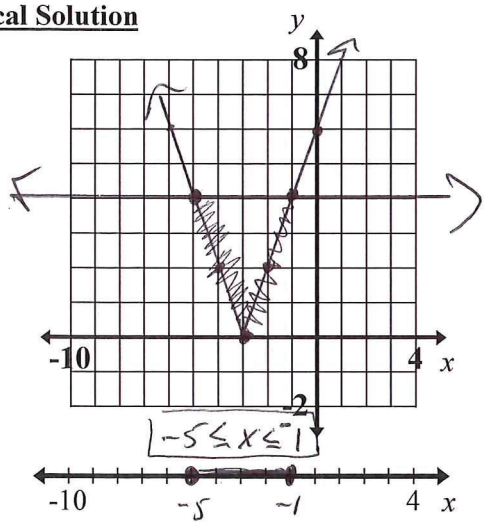
$3x=-3$ $\quad 3x=7$

$x=-1$ or $x=\frac{7}{3}$

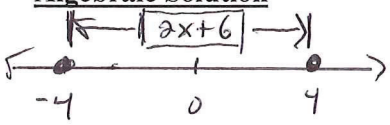
#5 – 9: Solve the following absolute value *inequalities* graphically and algebraically.

5. $|2x+6|\le 4$

Graphical Solution



Algebraic Solution



$-4 \le 2x+6 \le 4$

$-6 \quad -6 \quad -6$

$\frac{-10}{2} \le \frac{2x}{2} \le \frac{-2}{2}$

$-5 \le x \le -1$

6. $|12-3x|-1>5$

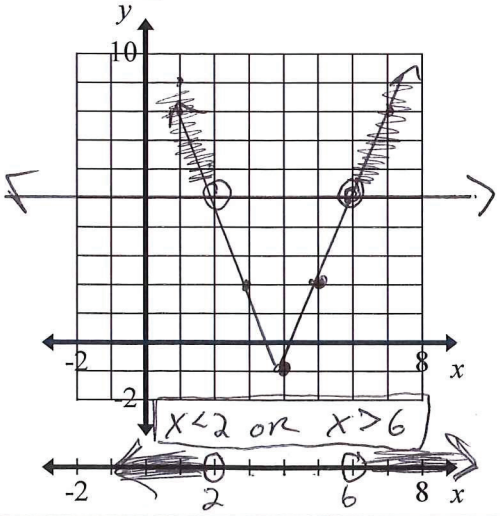
Graphical Solution

$12-3x=0$

$-3x=-12$

$x=4$

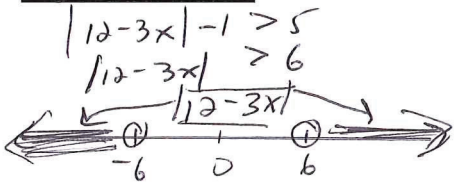
vertex $(4,-1)$



Algebraic Solution

$|12-3x|-1>5$

$|12-3x|>6$



$12-3x<-6$ or $12-3x>6$

$\frac{-3x}{-3} < \frac{-18}{-3}$ $\quad \frac{-3x}{-3} > \frac{-6}{-3}$

$x>6$ or $x<2$

Name _____ Period _____

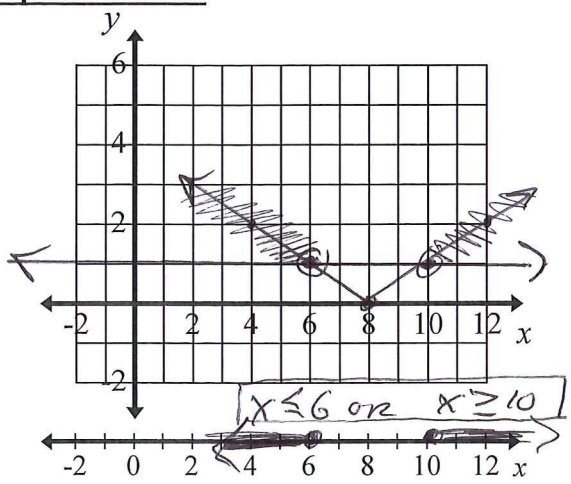
8.2A *Solutions of Absolute Value Equations and Inequalities*

#5 – 9 (continued): Solve the following absolute value *inequalities* graphically and algebraically.

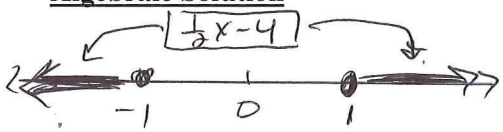
7. $\left|\frac{1}{2}x - 4\right| \geq 1$

$\frac{1}{2}x - 4 = 0$
$(2)\frac{1}{2}x = 4(2)$
$x = 8$
vertex $(8, 0)$

Graphical Solution



Algebraic Solution

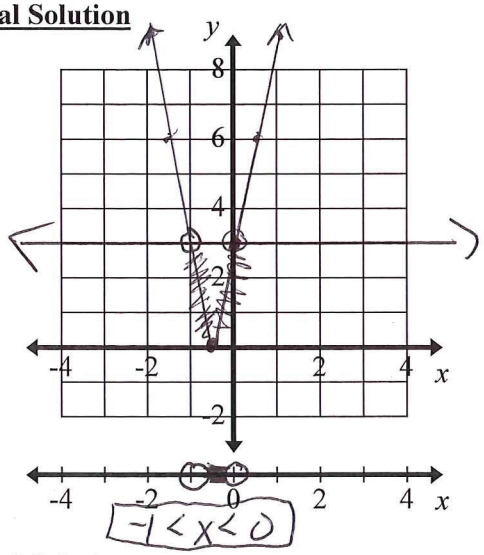


$\frac{1}{2}x - 4 \leq -1$ or $\frac{1}{2}x - 4 \geq 1$
$(\frac{2}{1})\frac{1}{2}x \leq 3(\frac{2}{1})$ $(\frac{2}{1})\frac{1}{2}x \geq 5(\frac{2}{1})$
$x \leq 6$ or $x \geq 10$

8. $|6x + 3| + 3 < 6$
$-3 \quad -3$

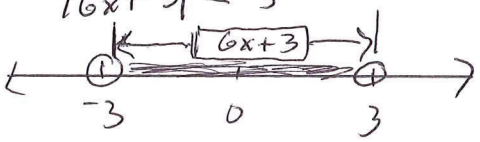
$|6x+3| < 3$
$6x + 3 = 0$
$\frac{6x}{6} = \frac{-3}{6}$
$x = -\frac{1}{2}$
vertex $(-\frac{1}{2}, 0)$

Graphical Solution



Algebraic Solution

$|6x+3| + 3 < 6$
$|6x+3| < 3$

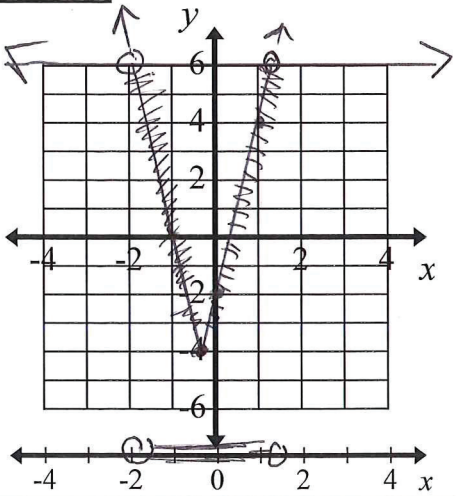


$-3 < 6x + 3 < 3$
$-3 \quad -3 \quad -3$
$\frac{-6}{6} < \frac{6x}{6} < \frac{0}{6}$
$-1 < x < 0$

9. $2|3x + 1| - 4 < 6$
$+4 \quad +4$

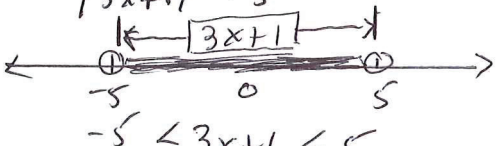
$3x + 1 = 0$
$3x = -1$
$x = -\frac{1}{3}$
vertex $(-\frac{1}{3}, -4)$
$y_1 = 2|3x+1| - 4$
$y_2 = 6$

Graphical Solution



Algebraic Solution

$2|3x+1| - 4 < 6$
$+4 \quad +4$
$2|3x+1| < 10$
$|3x+1| < 5$



$-5 < 3x + 1 < 5$
$-1 \quad -1 \quad -1$
$\frac{-6}{3} < \frac{3x}{3} < \frac{4}{3}$
$-2 < x < \frac{4}{3}$

Name _____ Period _____

8.2A *Solutions of Absolute Value Equations and Inequalities*

#10 – 17: Solve the following inequalities and graph them on a number line.

10. $|x+7| \le 3$

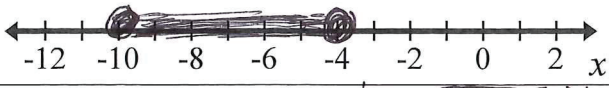
$x+7$

$-3 \quad 0 \quad 3$

$-3 < x+7 < 3$

$-7 \quad -7 \quad -7$

$\boxed{-10 \le x \le -4}$



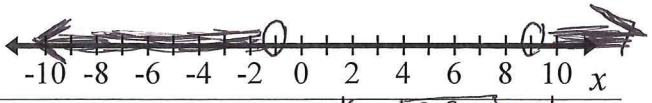
11. $|x-4| > 5$

$x-4$

$-5 \quad 0 \quad 5$

$x-4 < -5$ or $x-4 > 5$

$\boxed{x < -1 \text{ or } x > 9}$



12. $|6x+2| < 9$

$6x+2$

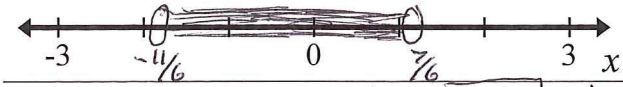
$-9 \quad 0 \quad 9$

$-9 < 6x+2 < 9$

$-2 \quad -2 \quad -2$

$\frac{-11}{6} < \frac{6x}{6} < \frac{7}{6}$

$\boxed{-\frac{11}{6} < x < \frac{7}{6}}$



13. $|5-3x| < 7$

$5-3x$

$-7 \quad 0 \quad 7$

$-7 < 5-3x < 7$

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

$\frac{-12}{-3} < \frac{-3x}{-3} < \frac{2}{-3}$

$4 > x > -\frac{2}{3}$ or

$\boxed{-\frac{2}{3} < x < 4}$

14. $|2x-4|-2 \le 10$

$|2x-4| \le 12$

$2x-4$

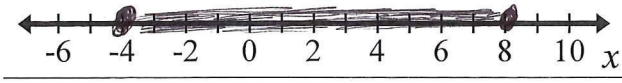
$-12 \quad 0 \quad 12$

$-12 \le 2x-4 \le 12$

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

$\frac{-8}{2} \le \frac{2x}{2} \le \frac{16}{2}$

$\boxed{-4 \le x \le 8}$



15. $|2-x|-3 > 5$

$|2-x| > 8$

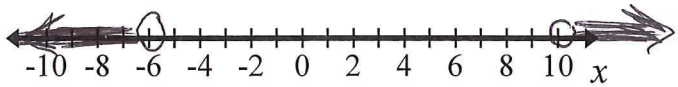
$2-x$

$-8 \quad 0 \quad 8$

$2-x < -8$ or $2-x > 8$

$-x < -10 \qquad -x > 6$

$\boxed{x > 10 \text{ or } x < -6}$



16. $-\left|\frac{1}{4}x+4\right|-2 < 2$

$+2 \quad 2$

$-\left|\frac{1}{4}x+4\right| < 4$

$-1 \quad -1$

$\left|\frac{1}{4}x+4\right| > -4$

* answer on left is ≥ 0, which is always > -4 TRUE So all real numbers are solutions!

Can't place the Box on # line negative distance so either all Reals or no solution. Think about the abs. value of a number is ≥ 0. *

17. $-2|2x-8|+2 \ge -6$

$-2 \quad -2$

$\frac{-2|2x-8|}{-2} \ge \frac{-8}{-2}$

$|2x-8| \le 4$

$2x-8$

$-4 \quad 0 \quad 4$

$-4 \le 2x-8 \le 4$

$+8 \quad +8 \quad +8$

$\frac{4}{2} \le \frac{2x}{2} \le \frac{12}{2}$

$\boxed{2 \le x \le 6}$

Name _____ Period _____

8.2A *Solutions of Absolute Value Equations and Inequalities*

#18 – 20: For each of the following situations:

a) List several values that would satisfy the situation.
b) Graph on a number line all the values that would satisfy the situation.
c) Write a compound inequality that identifies all values that satisfy the situation.
d) Write an absolute value inequality that represents all values that satisfy the situation.

18. A manufacturer allows 0.6 ounces more or less than the advertised amount of 16 ounces in each bottle of salad dressing. Write and solve an absolute value inequality that describes the acceptable volumes for a "16 ounce" bottle.

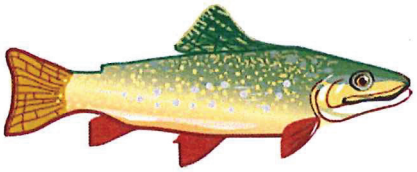
a) 16, 16.6, 15.4, 15.8, 16.2

b) 

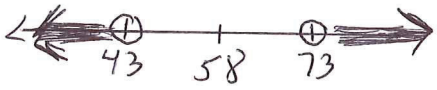
c) $15.4 \leq x \leq 16.6$

d) $|x-16| \leq 0.6$

19. Most fish can adjust to a change in the water temperature of up to 15°F if the change is not sudden. Suppose a lake trout is living comfortably in water that is 58°F. Write an absolute value inequality that represents the range of temperatures at which the lake trout CANNOT survive.



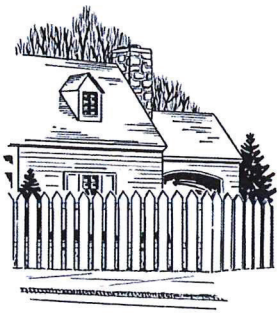
a) 40°, 42°, 75°, 80°

b) 

c) $x < 43$ or $x > 73$

d) $|x-58| > 15$

20. A city ordinance states that pools must be enclosed by a fence that is from 3 to 6 ft high. Write an absolute value inequality describing fences that meet this ordinance.



a) 3', 4', 4.5', 6'

b) 

c) $3 \leq x \leq 6$

d) $|x-4.5| \leq 1.5$

Section 8.2A

8.2A *Solutions of Absolute Value Equations and Inequalities*

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