Homework 1.6: Absolute Value Equations

Name: _____

Math 3

Solve each equation. Check your answers.

1. $|-3x| = 18$

$\{\pm 6\}$

2. $|5y| = 35$

$\{\pm 7\}$

3. $|t+5| = 8$

$\{-13, 3\}$

4. $3|z+7| = 12$

$\{-3, -11\}$

5. $|2x-1| = 5$

$\{3, -2\}$

6. $|4-2y|+5 = 9$

$\{0, 4\}$

Solve each equation. Check for extraneous solutions.

7. $|4w+3|-2 = 5$

$\{1, -2.5\}$

8. $2|z+1|-3 = z-2$

$\{-1\}$

9. $3|2x+5|=9x-6$

$\{7\}$

10. $2|4w-5|=12w-18$

$\{2\}$

11. $|5p+3|-4=2p$

$\{1/3, -1\}$

12. $|4-3m|=m+10$

$\{-1.5, 7\}$

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

$\{1.25\}$

14. $|7y-3|+1=0$

No solution!

Homework 1.6

1. $|-3x| = 18$

$-3x = 18$ $\quad -3x = -18$

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

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

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

✓ ✓

2. $|5y| = 35$

$5y = 35$ $\quad 5y = -35$

$y = 7$ $\quad y = -7$

$|5(7)| = 35$ $\quad |5(-7)| = 35$

$|35| = 35$ $\quad |-35| = 35$

✓ ✓

3. $|x+5| = 8$

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

$x = 3$ $\quad x = -13$

$|3+5| = 8$ $\quad |-13+5| = 8$

$|8| = 8$ $\quad |-8| = 8$

✓ ✓

4. $3|x+7| = 12$

$|x+7| = 4$

$x+7 = 4$ $\quad x+7 = -4$

$x = -3$ $\quad x = -11$

$3|-3+7| = 12$ $\quad 3|-11+7| = 12$

$3|4| = 12$ $\quad 3|-4| = 12$

$12 = 12$ $\quad 12 = 12$

✓ ✓

5. $|2x-1| = 5$

$2x-1 = 5$ $\quad 2x-1 = -5$

$2x = 6$ $\quad 2x = -4$

$x = 3$ $\quad x = -2$

$|2(3)-1| = 5$ $\quad |2(-2)-1| = 5$

$|5| = 5$ $\quad |-5| = 5$

✓ ✓

6. $|4-2y| + 5 = 9$

$|4-2y| = 4$

$4-2y = 4$ $\quad 4-2y = -4$

$-2y = 0$ $\quad -2y = -8$

$y = 0$ $\quad y = 4$

$|4-2(0)| + 5 = 9$ $\quad |4-2(4)| + 5 = 9$

$|4| + 5 = 9$ $\quad |4-8| + 5 = 9$

$9 = 9$ $\quad 4 + 5 = 9$

✓ ✓

7. $|4x+3|-2=5$

$|4x+3|=7$

$4x+3=7$ $\quad 4x+3=-7$

$4x=4$ $\quad 4x=-10$

$x=1$ $\quad x=-2.5$

$|4(1)+3|-2=5$

$7-2=5$

$5=5$ ✓

$|4(-2.5)+3|-2=5$

$|-7|-2=5$

$7-2=5$ ✓

8. $2|x+1|-3=x-2$

$2|x+1|=x+1$

$|x+1|=\frac{x}{2}+\frac{1}{2}$

$x+1=\frac{x+1}{2}$ $\quad x+1=\frac{-x-1}{2}$

$2x+2=x+1$ $\quad 2x+1=-x-1$

$x+2=1$ $\quad 3x+1=-1$

$x=-1$ $\quad 3x=-2$

~~$x=-2/3$~~

$2|-1+1|-3=-1-2$

$2(0)-3=-3$

$-3=-3$ ✓

$2|-\frac{2}{3}+1|-3=\frac{-2}{3}-2$

$2|1/3|-3=-8/3$

$-7/3 \neq -8/3$

9. $3|2x+5|=9x-6$

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

$2x+5=3x-2$ $\quad 2x+5=-3x+2$

$-1x+5=-2$ $\quad 5x+5=2$

$-1x=-7$ $\quad 5x=-3$

$x=7$ $\quad$ ~~$x=3/5$~~

$3|2(7)+5|=9(7)-6$

$3|19|=57$

$57=57$ ✓

$3|2(-0.6)+5|=9(-0.6)-6$

$3|3.8|=-5.4-6$

$11.4 \neq -11.4$

10. $2|4w-5| = 12w-18$

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

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

$-2w-5 = -9$ $\quad 10w-5 = 9$

$-2w = -4$ $\quad 10w = 14$

$w = 2$ $\quad w = 1.4$

$2|4(2)-5| = 12(2)-18$

$2|3| = 24-18$

$6 = 6$ ✓

$2|4(1.4)-5| = 12(1.4)-18$

$2|0.6| = 16.8-18$

$1.2 \neq -1.2$

11. $|5p+3|-4 = 2p$

$|5p+3| = 2p+4$

$5p+3 = 2p+4$ $\quad 5p+3 = -2p-4$

$3p+3 = 4$ $\quad 7p+3 = -4$

$3p = 1$ $\quad 7p = -7$

$p = 1/3$ $\quad p = -1$

$|5(1/3)+3|-4 = 2(1/3)$

$2/3 = 2/3$ ✓

$|5(-1)+3|-4 = 2(-1)$

$-2 = -2$ ✓

12. $|4-3m| = m+10$

$4-3m = m+10$ $\quad 4-3m = -m-10$

$4-4m = 10$ $\quad 4-2m = -10$

$-4m = 6$ $\quad -2m = -14$

$m = -1.5$ $\quad m = 7$

$|4-3(-1.5)| = -1.5+10$

$8.5 = 8.5$ ✓

$|4-3(7)| = 7+10$

$17 = 17$ ✓

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

$\frac{3}{4}|8x-12| = 6x-6$

$3|8x-12| = 24x-24$

$|8x-12| = 8x-8$

$8x-12 = 8x-8$ $\quad 8x-12 = -8x+8$

$-12 \neq -8$ $\quad 16x-12 = 8$

$16x = 20$

$x = 1.25$

$\frac{3}{4}|8(1.25)-12| = 6(1.25-1)$

$\frac{3}{4}|-2| = 1.5$

$1.5 = 1.5$ ✓

14. $|7y-3|+1=0$

$|7y-3|=-1$

NO SOLUTION