

# 1-6 PRACTICE

1)  $|-3x|=18$

$-3x=18$  OR  $-3x=-18$

$x=-6$  OR  $x=6$

2)  $|5y|=35$

$5y=35$  OR  $5y=-35$

$y=7$  OR  $y=-7$

3)  $|t+5|=8$

$t+5=8$  OR  $t+5=-8$

$t=3$  OR  $t=-13$

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

$|z+7|=4$

$z+7=4$        $z+7=-4$

$z=-3$        $z=-11$

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

$2x-1=5$  OR  $2x-1=-5$

$2x=6$  OR  $2x=-4$

$x=3$        $x=-2$

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

$|4-2y|=4$

$4-2y=4$        $4-2y=-4$

$-2y=0$        $-2y=-8$

$y=0$        $y=4$

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

~~$x+5=3x-7$  OR  $x+5=-3x+7$~~

~~$-2x=-12$  OR  $4x=-2$~~

~~$x=6$  OR  $x=\frac{1}{2}$~~

EXTRANEIOUS SOLUTION

check  $|6+5|=3 \cdot 6-7$

$|11|=11$  ✓

$|\frac{1}{2}+5|=3(\frac{1}{2})-7$

$|5\frac{1}{2}|=-5\frac{1}{2}$  FALSE!

8)  $|2t-3|=3t-2$

~~$2t-3=3t-2$  OR  $2t-3=-3t+2$~~

~~$-t=1$        $5t=5$~~

~~$t=-1$        $t=1$~~

EXTRANEIOUS CHECK SO!

$|2(-1)-3|=3(-1)-2$

$|-5|=-5$  FALSE!

$|2 \cdot 1-3|=3 \cdot 1-2$

$|-1|=1$  ✓

$$9) |4w+3|-2=5$$

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

$$4w+3=7 \text{ or } 4w+3=-7$$

$$4w=4 \text{ or } 4w=-10$$

$$\boxed{w=1}$$

$$\text{or } \boxed{w=-\frac{5}{2}}$$

check

$$|4 \cdot 1 + 3| - 2 = 5$$

$$7 - 2 = 5 \quad \checkmark$$

$$\left| 4\left(-\frac{5}{2}\right) + 3 \right| - 2 = 5$$

$$|-7| - 2 = 5 \quad \checkmark$$

In this problem we do not actually need to check because there is only one variable inside of absolute value

$$11) 5|y+3| < 15$$

$$|y+3| < 3$$

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

$$y < 0 \quad y > -6$$



$$(-6, 0)$$

$$10) 2|z+1| - 3 = z - 2$$

$$2|z+1| = z + 1$$

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

$$2 \cdot (z+1) = \left(\frac{z+1}{2}\right) \cdot 2 \quad z+1 = -\left(\frac{z+1}{2}\right)$$

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

$$z = -1$$

$$3z = -3$$

same sol!

$$\boxed{z = -1}$$

check

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

$$2 \cdot 0 - 3 = -3$$

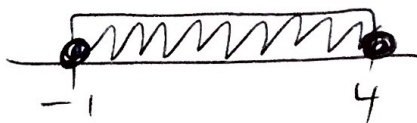
$$-3 = -3 \quad \checkmark$$

$$12) |2t-3| \leq 5$$

$$2t-3 \leq 5 \quad 2t-3 \geq -5$$

$$2t \leq 8 \quad 2t \geq -2$$

$$t \leq 4 \quad t \geq -1$$



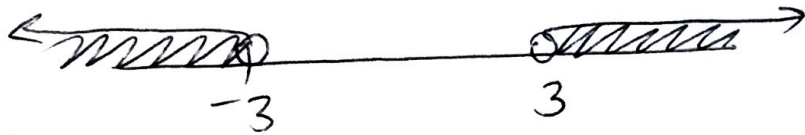
$$[-1, 4]$$

$$13) |4b| - 3 > 9$$

$$|4b| > 12$$

$$4b > 12 \quad \text{or} \quad 4b < -12$$

$$b > 3 \quad \text{or} \quad b < -3$$



$$(-\infty, -3) \cup (3, \infty)$$

$$14) \frac{1}{2} |2w-1| - 3 \geq 1$$

$$\frac{1}{2} |2w-1| \geq 4$$

$$|2w-1| \geq 8$$

$$2w - 1 \geq 8$$

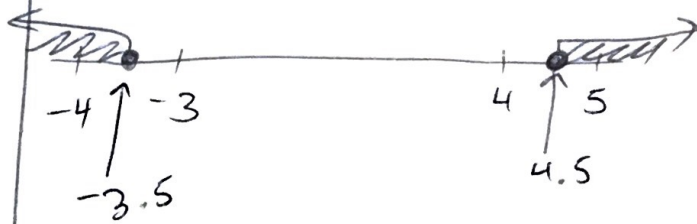
$$2w - 1 \leq -8$$

$$2w \geq 9$$

$$w \geq 4.5$$

$$2w \leq -7$$

$$w \leq -3.5$$



$$(-\infty, -3.5] \cup [4.5, \infty)$$

$$15) 2 |4x+1| - 5 \leq 1$$

$$2 |4x+1| \leq 6$$

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

$$4x+1 \leq 3$$

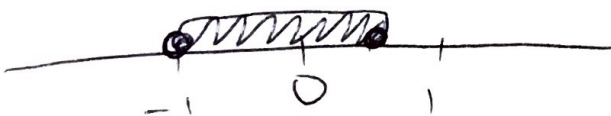
$$4x+1 \geq -3$$

$$4x \leq 2$$

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

$$4x \geq -4$$

$$x \geq -1$$



$$[-1, \frac{1}{2}]$$

$$16) |3z-2| + 4 > 9$$

$$|3z-2| > 4$$

$$3z - 2 > 4$$

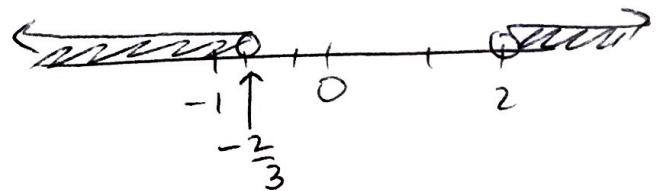
$$3z - 2 < -4$$

$$3z > 6$$

$$3z < -2$$

$$z > 2$$

$$z < -\frac{2}{3}$$

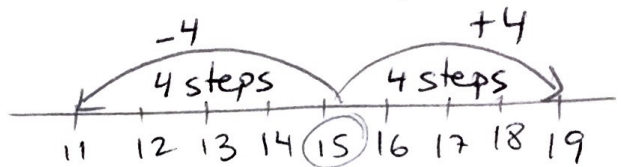


$$(-\infty, -\frac{2}{3}) \cup (2, \infty)$$

$$17) -7.3 \leq a \leq 7.3$$

$$|a| \leq 7.3$$

$$18) 11 \leq m \leq 19$$



$$\frac{11+19}{2} = 15$$

↑  
middle number  
or "average"

$$\frac{19-11}{2} = 4$$

$$|m - 15| \leq 4$$

$$19) 28.6 \leq F \leq 29.2$$

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

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

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

$$20) 0.0015 \leq t \leq 0.0018$$

$$\frac{0.0015 + 0.0018}{2} = \frac{0.0033}{2}$$

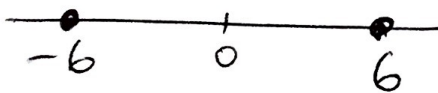
$$= 0.00165$$

$$\frac{0.0018 - 0.0015}{2} = \frac{0.0003}{2}$$

$$= 0.00015$$

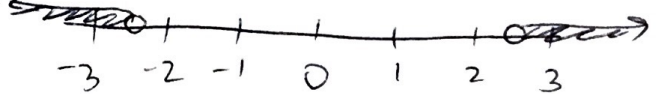
$$|t - 0.00165| \leq 0.00015$$

21)



$$|x| = 6$$

22)



$$|x| > 2.5$$

$$23) \frac{3|2x+5|}{3} = \frac{9x-6}{3}$$

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

$$\begin{array}{r} 2x+5 = 3x-2 \\ -3x \quad -5 \\ \hline -x = -7 \end{array}$$

$$-x = -7$$

$$\boxed{x = 7}$$

$$\begin{array}{r} 2x+5 = -3x+2 \\ +3x \quad -5 \\ \hline 5x = -3 \end{array}$$

$$5x = -3$$

$$x = -\frac{3}{5}$$

extraneous solution!

check  $x=7$  (plug in)

$$3|2 \cdot 7 + 5| = 9 \cdot 7 - 6$$

$$3|14 + 5| = 63 - 6$$

$$3|19| = 57$$

$$57 = 57 \checkmark$$

check  $x = -\frac{3}{5}$

$$3|2 \cdot (-\frac{3}{5}) + 5| = 9 \cdot (-\frac{3}{5}) - 6$$

$$3|-\frac{6}{5} + \frac{25}{5}| = -\frac{27}{5} - \frac{30}{5}$$

$$3|\frac{19}{5}| = -\frac{57}{5} \text{ FALSE!}$$

$$24) |4 - 3m| = m + 10$$

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

$$\begin{array}{r} -4m = 6 \\ \hline -4 \quad -4 \end{array}$$

$$m = -\frac{3}{2}$$

$$\begin{array}{r} -2m = -14 \\ \hline -2 \quad -2 \end{array}$$

$$m = 7$$

check  $m = -\frac{3}{2}$

$$|4 - 3(-\frac{3}{2})| = -\frac{3}{2} + 10$$

$$|\frac{8}{2} + \frac{9}{2}| = -\frac{3}{2} + \frac{20}{2}$$

$$|\frac{17}{2}| = \frac{17}{2} \checkmark$$

check  $m = 7$

$$|4 - 3 \cdot 7| = 7 + 10$$

$$|4 - 21| = 17$$

$$|-17| = 17 \checkmark$$

(both solutions work, so there aren't any extraneous solutions)

$$25) \frac{1}{2} |4w - 5| = \frac{12w - 18}{2}$$

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

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

$$\begin{array}{r} -2w = -4 \\ \hline -2 \quad -2 \end{array}$$

$$w = 2$$

check  $|4 \cdot 2 - 5| = 6 \cdot 2 - 9$   
 $|8 - 5| = 12 - 9$   
 $3 = 3 \checkmark$

OR  $4w - 5 = -6w + 9$

$$\begin{array}{r} 10w = 14 \\ \hline 10 \end{array}$$

$$w = 1.4 \text{ extraneous solution}$$

$$|4 \cdot 1.4 - 5| = 6 \cdot 1.4 - 9$$

$$|5.6 - 5| = 8.4 - 9$$

$$|0.6| = -0.6$$

FALSE!

$$26) \frac{4}{3} |8t - 12| = 6(t - 1) \cdot \frac{4}{3}$$

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

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

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

$$-12 = -8$$

never true!

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

$$\begin{array}{r} 8t - 12 = -8t + 8 \\ +8t \quad +12 \end{array}$$

$$\begin{array}{r} 16t = 20 \\ \hline 16 \end{array}$$

$$t = \frac{5}{4} \checkmark$$

check  $\frac{5}{4}$

$$|8 \cdot \frac{5}{4} - 12| = 8(\frac{5}{4} - 1)$$

$$|10 - 12| = 8 \cdot \frac{1}{4}$$

$$|-2| = 2$$

$\checkmark$

$$27) |5p+3| - 4 = 2p$$

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

$$\begin{array}{r} 5p+3 = 2p+4 \\ -2p \quad -3 \end{array}$$

$$3p = 1$$

$$p = \frac{1}{3}$$

$$\begin{array}{r} 5p+3 = -2p-4 \\ +2p \quad -3 \end{array}$$

$$7p = -7$$

$$p = -1$$

check  $\frac{1}{3}$

$$|5 \cdot \frac{1}{3} + 3| = 2 \cdot \frac{1}{3} + 4$$

$$|\frac{5}{3} + \frac{9}{3}| = \frac{2}{3} + \frac{12}{3}$$

$$|\frac{14}{3}| = \frac{14}{3} \checkmark$$

check -1

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

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

$$|-2| = 2 \checkmark$$

$$28) |7y-3| + 1 = 0$$

$$|7y-3| = -1$$

All absolute values are either 0 or a positive number, therefore there are no solutions.

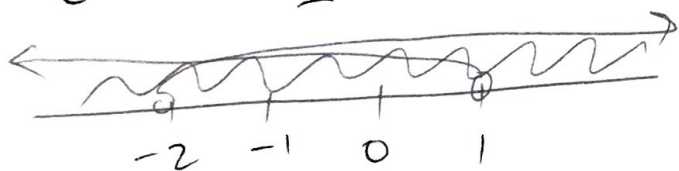
$$29) -3 |2t+1| < 9$$

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

$$2t+1 > -3 \quad \text{or} \quad 2t+1 < 3$$

$$2t > -4 \quad \text{or} \quad 2t < 2$$

$$t > -2 \quad \underline{\text{or}} \quad t < 1$$



$$(-\infty, \infty)$$

all Real numbers

another explanation:

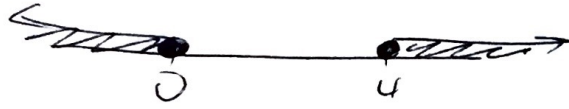
$$-3 |2t+1| < 9$$

-3 times any positive number will result in a negative number, which is always less than 9.

$$30) | -2x + 4 | \geq 4$$

$$-2x + 4 \geq 4 \quad \text{or} \quad -2x + 4 \leq -4$$

$$\begin{array}{l} -2x \geq 0 \\ \frac{-2}{-2} x \leq 0 \end{array} \quad \text{or} \quad \begin{array}{l} -2x \leq -8 \\ \frac{-2}{-2} x \geq 4 \end{array}$$



$$(-\infty, 0] \cup [4, \infty)$$

$$32) \frac{1}{7} | 4z + 5 | + \cancel{z} > 5$$

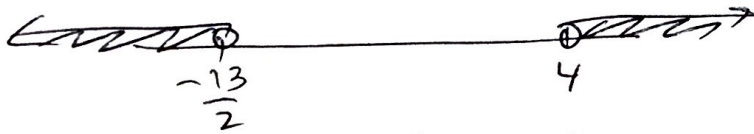
$$\frac{1}{7} | 4z + 5 | > 3 - \cancel{z}$$

$$| 4z + 5 | > 21$$

$$4z + 5 > 21 \quad \text{or} \quad 4z + 5 < -21$$

$$\frac{4z}{4} > \frac{16}{4} \quad \text{or} \quad \frac{4z}{4} < \frac{-26}{4}$$

$$z > 4 \quad \text{or} \quad z < -\frac{13}{2}$$



$$(-\infty, -13/2) \cup (4, \infty)$$

$$31) \left| \frac{y+2}{3} \right| - 1 < 2$$

$$\left| \frac{y+2}{3} \right| < 3$$

$$\frac{y+2}{3} < 3$$

$$\frac{y+2}{3} > -3$$

$$y+2 < 9$$

$$y+2 > -9$$

$$y < 7$$

$$y > -11$$



33-37 EXTRA credit