3. Find all sets of three consecutive even integers whose sum is between 25 and 45.

8, 10, 12 ; 10, 12, 14 ; 12, 14, 16
#1 #2 #3

4. Jeannie's scores on her first four tests were 80, 65, 87, and 75. What will she have to score on her next test to obtain an average of at least 80 for the term?

Jeannie needs @ least a 93% on the next test

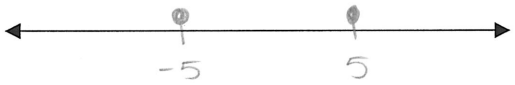
5. The telephone company offers two types of service. With Plan A, you can make an unlimited number of calls per month for $38.50. With Plan B, you pay $26.50 monthly, plus 10 cents for each minute of calls after the first 340 minutes. At least how many minutes would you have to use the telephone each month to make Plan A the better option?

You would need to use the phone more than 460 minutes

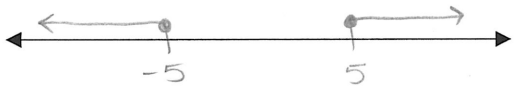
Absolute Value in Open Sentences

The last section in this unit explores equations and inequalities involving absolute value. Remember that absolute value refers to the distance a number is from zero. To begin we will look at three very basic examples.

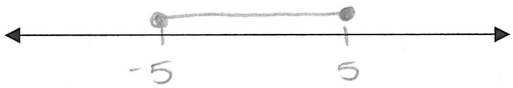
1. $|x| = 5$ What is really being asked is, "What numbers have a distance from zero of 5?"



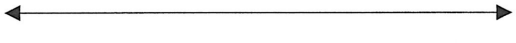
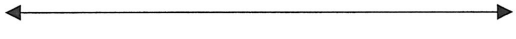
2. $|x| \geq 5$ What is really being asked is, "What part(s) of the number line represents numbers whose distance from zero is greater than or equal to 5 units?"



3. $|x| \leq 5$ What is really being asked is, "What part(s) of the number line represents numbers whose distance from zero is less than or equal to 5 units?"



Summary:

Absolute Value Statement	Rewrite	What the graph looks like
$\|x\| = a$	$x = a \ or \ x = -a$	
$\|x\| \geq a$	$x \geq a \ or \ x \leq -a$	
$\|x\| \leq a$	$-a \leq x \leq a$	

Break for Practice: First rewrite each inequality then THINK if it's possible. If possible, solve and graph the inequality. If it's not possible, say no solution.

1. $|3 - x| = 5$ (possible)

opposite #, same sign

$-5 = 3 - x = 5$

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

$-8 = -x = 2$

$\div -1 \quad \div -1 \quad \div -1$

$8 = x = -2$

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

2. $1 < \left|2 - \frac{x}{3}\right|$ (possible)

same, opposite

$1 < 2 - \frac{x}{3} < -1$

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

$-3 \cdot (-1) < -3\left(-\frac{x}{3}\right) < (-3) \cdot (-3)$

$3 > x > 9$

$x < 3$ or $x > 9$

3. $|x - 1| = -4$ (not possible)

4. $|2y + 1| \leq 5$ (possible)

opposite, same

$-5 \leq 2y + 1 \leq 5$

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

$-6 \leq 2y \leq 4$

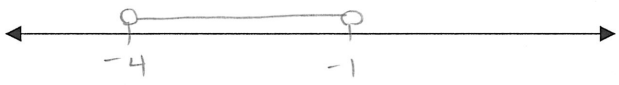
$\div 2 \quad \div 2 \quad \div 2$

$-3 \leq y \leq 2$

Extended Practice: Solve and Graph

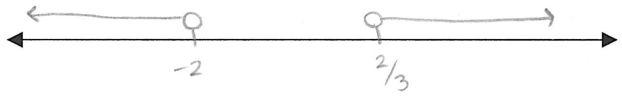
1. $|2t + 5| < 3$

$-4 < t < -1$



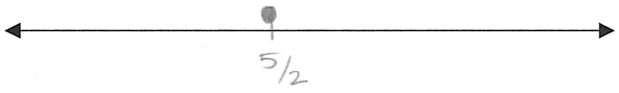
2. $|3x + 2| > 4$

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



3. $|2u - 5| = 0$

$u = 5/2$



4. $8 = |5y + 2|$

$y = 6/5$ or $y = -2$.

5. $\left|1 - \frac{x}{3}\right| \leq -\frac{2}{3}$

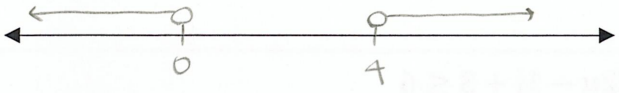
$\emptyset$

6. $\left|1 - \frac{p}{2}\right| \leq 2$

$6 \geq p \geq -2$

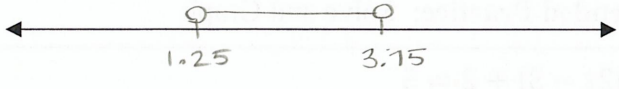
7. $\left|\frac{x-2}{4}\right| > \frac{1}{2}$

$x > 4$ or $x < 0$



8. $1 > |2 - 0.8n|$

$3.75 > n > 1.25$



Some inequalities involving absolute value can be a little harder. It is important to realize that you must isolate the absolute value before you try to rewrite the inequality. Also, don't forget to <u>think</u>. Don't be tricked into working harder than you have to.

Break for Practice: Solve and Graph

1. $|r + 1| - 3 < 1$

$+3 \quad +3$

$|r+1| < 4$ (possible)

(Conjunction)

Rewrite: $-4 < r + 1 < 4$

opposite & same

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

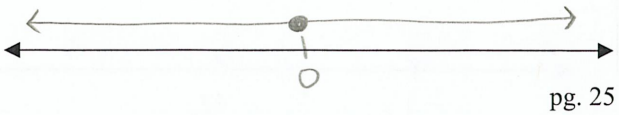
$-5 < r < 3$

2. $|3x + 2| + 4 \geq 2$

$-4 \quad -4$

$|3x+2| \geq -2$ (always true)

$\mathbb{R}$



3. $9 - 2|x + 3| < 3$

$-9 \quad -9$

$-2|x+3| < -6$

$\frac{-2}{-2} \quad \frac{-6}{-2}$

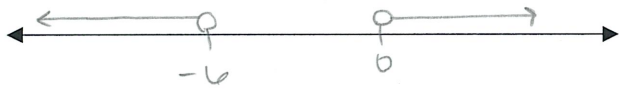
$|x+3| > 3$ (possible)

↑ (disjunction)

Rewrite: $-3 > x + 3 > 3$ (off, same)

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

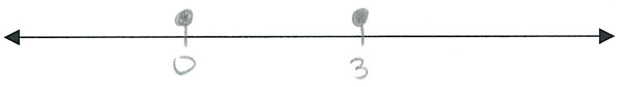
$-6 > x > 0$



Extended Practice: Solve and Graph

1. $|2t - 3| + 2 = 5$

$t = 3$ or $t = 0$



2. $|2u - 1| + 3 \leq 6$

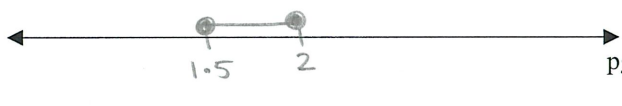
$-1 \leq u \leq 2$

3. $4 - |3k + 1| < 2$

$K > 1/3$ or $K < -1$

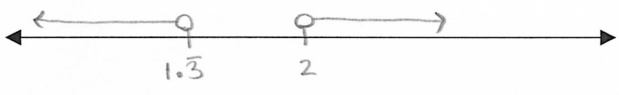
4. $7 - 3|4d - 7| \geq 4$

$\frac{3}{2} \leq d \leq 2$



5. $4 + 2\left|\frac{3t-5}{2}\right| > 5$

$t > 2$ or $t < 4/3$



6. $2\left|\frac{2t-5}{3}\right| - 3 \geq 5$

$t \geq 8.5$ or $t \leq -3.5$