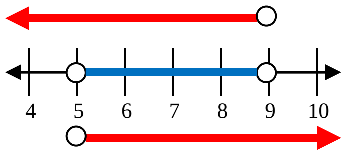
Algebra II
Section A-3

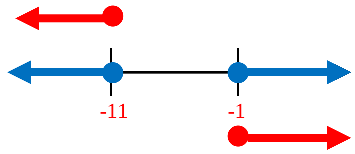
SOLVING COMPOUND INEQUALITIES

Graph each pair of inequalities using the "above & below" method.

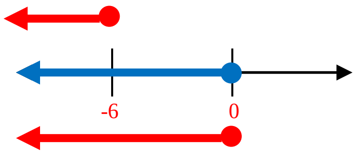
$x < 9$ and $x > 5$



$b \geq -1$ or $b < -11$



$y \leq 0$ or $y \leq -6$



"AND" means shade where the "above" and "below" lines overlap or intersect

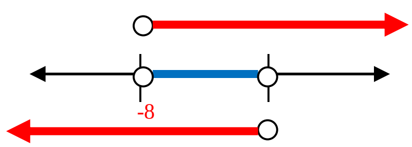
"OR" means shade where either line is graphed (transfer both lines onto the number line)

Examples:
Solve each inequality, then graph the solution set.

If there is no word ("and" or "or") shown, the problem is assumed to be "and". Create two problems to solve by SPLITTING it up.

1) $-1 < 2x + 15 < 21$

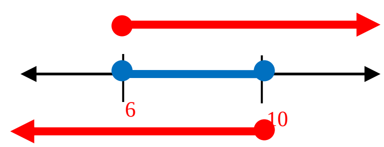
$-1 < 2x + 15$ and $2x + 15 < 21$
$-16 < 2x$ $\quad 2x < 6$
$-8 < x$ $\quad x < 3$
$x > -8$ and $x < 3$



Solution set: $-8 < x < 3$

2) $0 \leq \frac{1}{2}m - 3 \leq 2$

$0 \leq \frac{1}{2}m - 3$ and $\frac{1}{2}m - 3 \leq 2$
$3 \leq \frac{1}{2}m$ $\quad \frac{1}{2}m \leq 5$
$6 \leq m$ $\quad m \leq 10$
$m \geq 6$ and $m \leq 10$

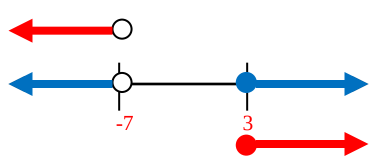


Solution set: $6 \leq m \leq 10$

Don't forget about *switching the inequality* when multiplying or dividing both sides of the inequality by a negative.

3) $8j < 5j - 21$ or $4 \geq 31 - 9j$

$3j < -21$ or $-27 \geq -9j$
$j < -7$ $\quad 3 \leq j$
$j < -7$ or $j \geq 3$



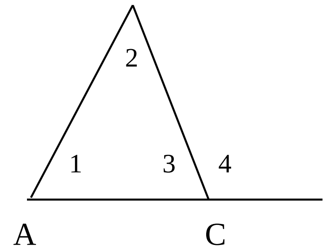
Solution set: $j < -7$ or $j \geq 3$

4) $6 - x < 2$ or $\frac{x - 15}{-3} > 1$

$-x < -4$ or $x - 15 < -3$
$x > 4$ $\quad x < 12$
$x > 4$ or $x < 12$

Solution set: infinite solutions

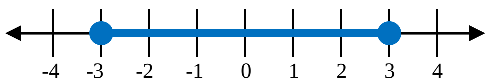
5) The Exterior Angle Inequality Theorem states that an exterior angle measure is greater than the measure of either of its corresponding remote interior angles. Write two inequalities to express the relationship among the measures of the angles in ΔABC.



$\angle 4 > \angle 1$ and $\angle 4 > \angle 2$

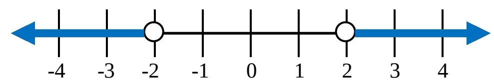
Graph each absolute value inequality on a number line.

$|x| \le 3$



Solution set:

$|x| > 2$



Solution set:

Compound inequality – consists of two inequalities joined by the word "and" or "or".
If an absolute value inequality is considered a compound inequality, there must be *two versions* of the problem to solve!

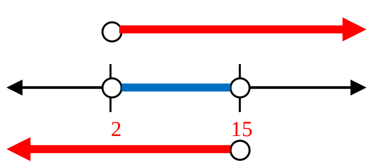
Examples:
Solve each absolute value inequality, the graph the solution set.

< or $\le$ "less thAND"

> or $\ge$ "greatOR"

5) $|2k - 17| < 13$

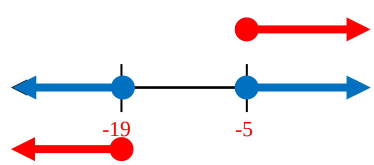
$2k - 17 < 13$ and $2k - 17 > -13$
$2k < 30$ $\quad$ $2k > 4$
$k < 15$ $\quad$ $k > 2$
$k < 15$ and $k > 2$



Solution set: $2 < k < 15$

6) $|b + 12| \ge 7$

$b + 12 \ge 7$ or $b + 12 \le -7$
$b \ge -5$ $\quad$ $b \le -19$
$b \ge -5$ or $b \le -19$



Solution set: $b \le -19$ or $b \ge -5$

Don't forget about *switching the inequality* when multiplying or dividing both sides of the inequality by a negative.

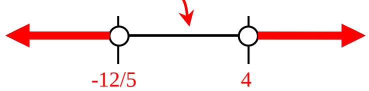
7) | 4 – 5y | > 16

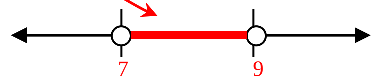
4 – 5y > 16 or 4 – 5y < -16
-5y > 12 -5y < -20
y < -12/5 y > 4
y < -12/5 or y > 4

8) 1 > | 8 – n |

| 8 – n | < 1
8 – n < 1 and 8 – n > -1
-n < -7 -n > -9
n > 7 n < 9
n > 7 and n < 9

Short cut: absolute value "ands" are always shaded between, and "ors" go opposite directions.





Solution set: y < -12/5 or y > 4

Solution set: 7 < n < 9

TOUGH ONE
You can do it!

9) $5\left|\frac{7}{16}+\frac{9}{4}x\right|<-35$

$\left|\frac{7}{16}+\frac{9}{4}x\right|<-7$ absolute values cannot be less than a negative number. Therefore: No Solution!

6) Hypoglycemia (low blood sugar) and hyperglycemia (high blood sugar) are potentially dangerous and occur when a person's blood sugar fluctuates by more than 38mg from the normal level. If the normal level is 88mg, write and solve an absolute value inequality to describe blood sugar levels that are considered potentially dangerous

Since a person can only be above OR below the safe level, we will use a greatOR than sign

| x – 88 | > 38

Solve: x – 88 > 38 or x – 88 < -38
x > 126 x < 50

{ x < 50 or x > 126 }