**A compound inequality** is two simple inequalities joined by "and" or "or".

**Solving an "And" Compound Inequality:**

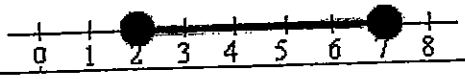
$3x - 9 \le 12$ and $3x - 9 \ge -3$

Also written ...

$[3x-9 \le 12] \wedge [3x-9 \ge -3]$

| Or written ... | The common statement is sandwiched between the two inequalities. Solve as a single unit or solve each side separately. |
|---|---|
| $-3 \le 3x-9 \le 12$ | |
| $6 \le 3x \le 21$ | |
| $2 \le x \le 7$ | |

The solution is $2 \le x \le 7$,
which can be read $x \ge 2$ **and** $x \le 7$.
Interval notation: [2, 7]




**Solving an "Or" Compound Inequality:**

$2x + 3 < 7$ or $5x + 5 > 25$

Also written ...

$[2x + 3 < 7] \vee [5x + 5 > 25]$

| | |
|---|---|
| $2x + 3 < 7$<br>$2x < 4$<br>$x < 2$ | Solve the first inequality |
| $5x + 5 > 25$<br>$5x > 20$<br>$x > 4$ | Solve the second inequality |

The solution is $x < 2$ **or** $x > 4$.
Interval notation: $(-\infty, 2) \cup (4, \infty)$


and $\wedge$

or $\vee$

# Coolmath Algebra

## Solving Inequalities Lesson 6 - Compound Inequalities



---- This algebra lesson explains how to solve compound inequalities

| Graphing Calculator | Scientific Calculator | << a new window will open fo these |
|---|---|---|

**So far, we've just been solving inequalities with two parts: a left side and a right side like this**

$$5x > 2x - 7$$

**But, sometimes we'll have inequalities with three parts:**

$$-3 \leq 2x - 1 \leq 5$$

**Sometimes, these are called compound inequalities.**

**So, what do we do on these?**

**Our goal is the same:**

**Get the X alone!**

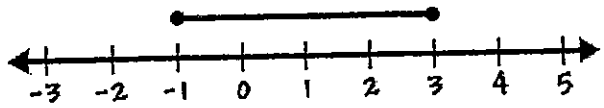
**On these, we just get him alone in the middle section. So, just like before, pretend that there are really = signs and go about your business... We'll just be working all three sections at once.**

**Let's go:**

$$-3 \leq 2x - 1 \leq 5$$

**Get the x alone in the middle...**

$$-3 \leq 2x - 1 \leq 5 \quad \text{ditch the -1}$$
$$+1 \qquad +1 \quad +1$$
$$-2 \leq 2x \leq 6$$
$$\frac{-2}{2} \leq \frac{2x}{2} \leq \frac{6}{2} \quad \text{ditch the 2}$$
$$-1 \leq x \leq 3$$




[-1, 3]

**But, what does this mean?**

**x can be -1... or x can be 3...or x can be a number between -1 and 3... like 0 or 2.315.**

**Continued on the next page**

**Check it:**

$-3 \leq 2x-1 \leq 5$

$x=-1 \longrightarrow -3 \leq 2(-1)-1 \leq 5$

$-3 \leq -3 \leq 5$ Yep!

$x=3 \longrightarrow -3 \leq 2(3)-1 \leq 5$

$-3 \leq 5 \leq 5$ Yep!

$x=0 \longrightarrow -3 \leq 2(0)-1 \leq 5$

$-3 \leq -1 \leq 5$ Yep!

$x=100 \longrightarrow -3 \leq 2(100)-1 \leq 5$

$-3 \leq 199 \leq 5$ NOPE!

---

**TRY IT:**

$$-5 < 3x+1 \leq 10$$

$$0 \leq 5x-2 \leq 7$$

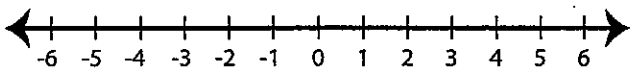
---

Name : _____ Score : _____

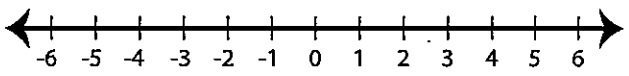
# Graphing Compound Inequalities

Graph the compound inequalities.

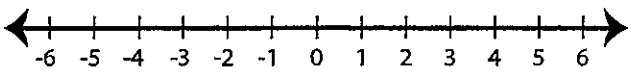
1) $x \leq 0$ or $x > 2$



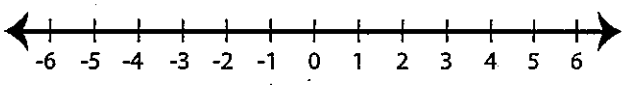

2) $x > -1$ and $x < 3$



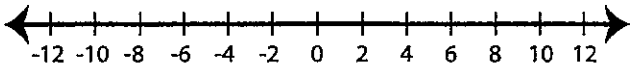

3) $-4 < x \leq 4$



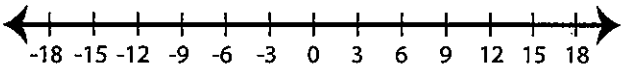

4) $x \geq 5$ or $x \leq -6$



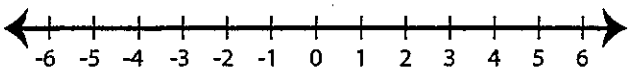

5) $10 > x > -8$



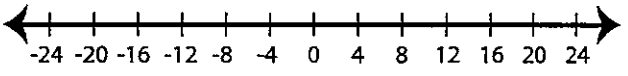

6) $x < 9$ and $x \geq 3$



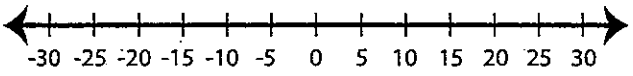

7) $x \leq -2$ and $x \geq -5$



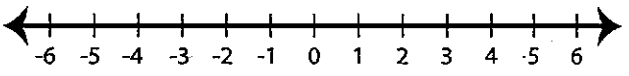

8) $x \geq 12$ or $x < -16$




9) $x > 10$ and $x < 20$




10) $-3 \leq x < 1$

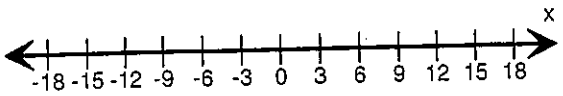


Name: _____ Score:

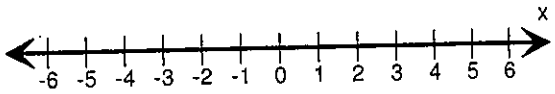
# Compound Inequalities

Solve each problem and graph the solutions:

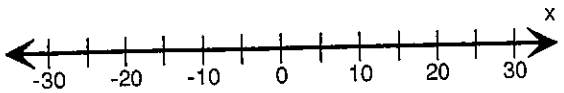
1) $-8 < x + 1 < 4$



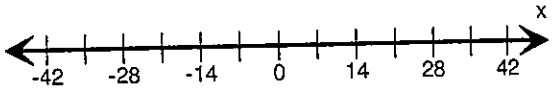

2) $x + 2 > 5$ *or* $\frac{x}{2} \leq -1$



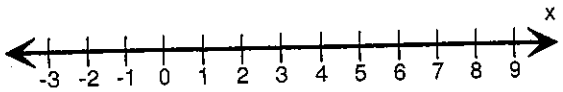

3) $x + 4 \leq 9$ *and* $x + 11 \geq 1$



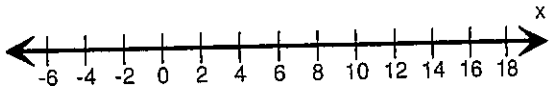

4) $-9 < 5 + x < 12$



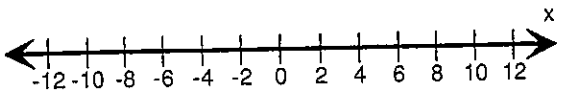

5) $17 \leq 2x + 3$ *or* $2x + 3 \leq 11$



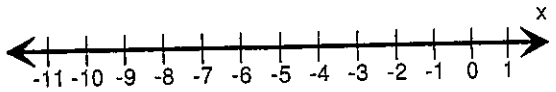

6) $\frac{x}{8} < 2$ *or* $x + 7 > 15$



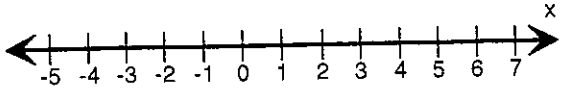

7) $x + 9 \leq 1$ *and* $x - 4 \geq 2$



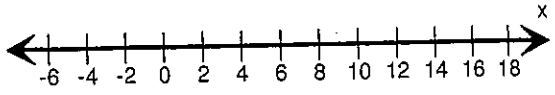

8) $24 > -3x$ *and* $-3x \geq 18$




9) $-11 < -2x + 1$ *and* $3 > -2x + 1$




10) $4x > 16$ *and* $\frac{x}{2} \leq 4$

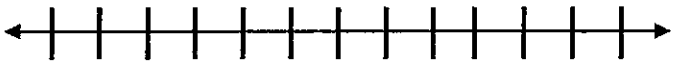


**Algebra 1A – 3-5 Compound Inequalities Worksheet #2**

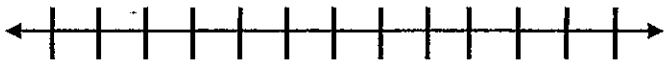
**Name** _____
**Date** _____ **Per** _____

**Solve each compound inequality. Graph your solution.**

1) $-5 < x+5 < 5$



2) $1 < 3x+4 < 10$

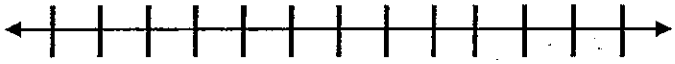


3) $k-3>1$ or $k-3<-1$

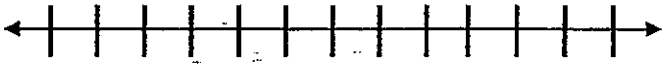
4) $b-2>18$ or $3b<54$

5) $14 < 3h+2 < 2$

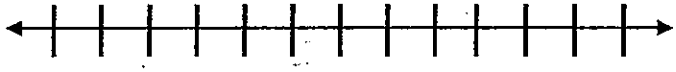
6) $-4 < t+2 \le 4$



7) $-3 \le 3+m \le 7$



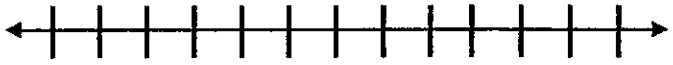
8) $2r+8>16-2r$ and $7r+21<r-9$



9) $-1 \le \frac{1}{2}x < 1$

10) $x+2>-1$ or $x-6<-9$

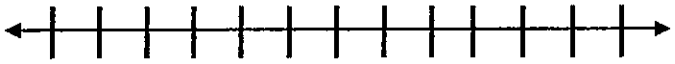
11) $7+2a>9$ or $4a>12$



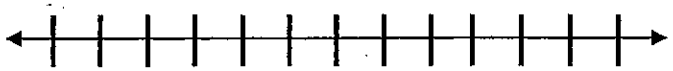
12) $3f>15$ or $2f\leq -4$.

13) $d-3\geq 4$ or $d-3<-4$

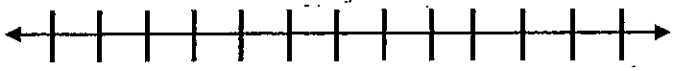
14) $1>2h+3>-1$



15) $-6<9+3y>6$.



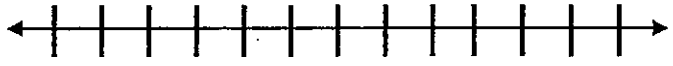
16) $c-1\geq 2$ or $c-1\leq -2$



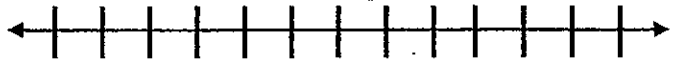
17) $-4d\geq 8$ or $2d\leq -10$

18) $-1+x\leq 3$ or $-x\leq -4$

19) $5x+7>2x+4$ and $3x+3<24-4x$



20) $-3j\geq -6$ or $-3j\leq 6$

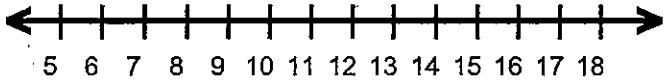


Name : _____ Score : _____

Teacher : _____ Date : _____

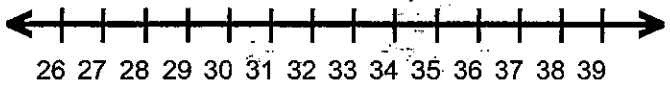
# Solve and Graph the Inequalities

1) $5h < 30$ or $h + 6 > 18$



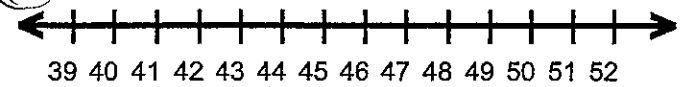

_____

2) $\frac{n}{3} < 9$ or $\frac{n}{7} > 5$



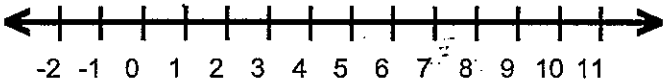

_____

3) $\frac{k}{5} > 8$ and $\frac{k}{6} < 7$



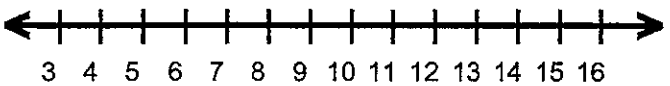

_____

4) $0 < 3y < 12$



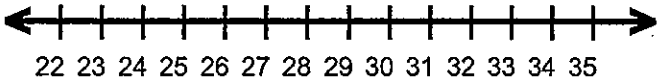

_____

5) $5z \geq 20$ and $z + 2 \leq 9$



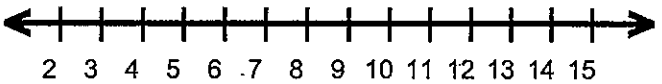

_____

6) $\frac{a}{3} \geq 8$ and $\frac{a}{6} \leq 5$



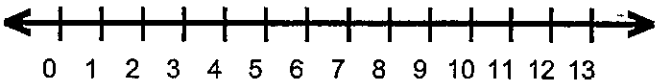

_____

7) $5s \geq 20$ and $s + 4 \leq 13$



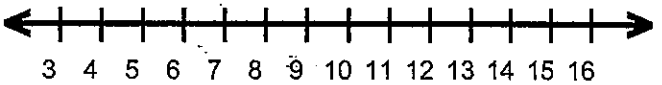

_____

8) $x - 2 \leq -1$ or $x + 5 \geq 15$



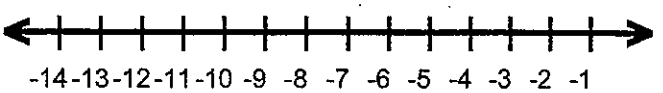

_____

9) $7b \leq 35$ or $7b \geq 77$




_____

10) $-65 < 5c < -40$




_____