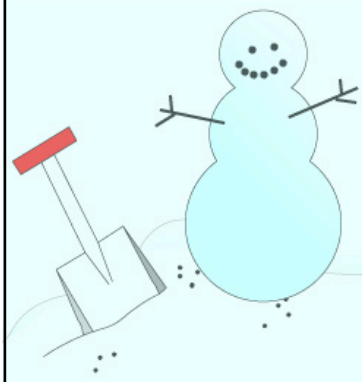
Algebra I
Lesson 6-4

- I can solve compound inequalities containing the word *and* and graph their solution sets.
- I can solve compound inequalities containing the word *or* and graph their solution sets.



Compound Statements

Two simple statements connected by the words *and* or *or* form a compound statement. Before you can determine whether a compound statement is true or false, you must understand what the words *and* and *or* mean. Consider the statement below.

A triangle has three sides, *and* a hexagon has five sides.
For a compound statement connected by the word *and* to be true, both simple statements must be true. In this case, it is true that a triangle has three sides. However, it is false that a hexagon has five sides; it has six. Thus, the compound statement is false.

Both must be true

false statement

A compound statement connected by the word *or* may be *exclusive* or *inclusive*. For example, the statement "With your dinner, you may have soup *or* salad," is exclusive. In everyday language, *or* means one or the other, but not both. However, in mathematics, *or* is inclusive. It means one or the other or both. Consider the statement below.

either one is true or both are true

A triangle has three sides, *or* a hexagon has five sides.
For a compound statement connected by the word *or* to be true, at least one of the simple statements must be true. Since it is true that a triangle has three sides, the compound statement is true.

True

True or False???

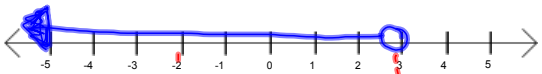
1. A hexagon has 6 sides, or an octagon has 7 sides. T
2. An octagon has 8 sides, and a pentagon has 6 sides. F
3. A pentagon has 5 sides, and a hexagon has 6 sides. T
4. A triangle has 4 sides, or an octagon does not have 7 sides. T
5. A pentagon has 3 sides, or an octagon has 10 sides. F
6. A square has 4 sides, or a hexagon has 6 sides. T
7. $5 < 4$ or $8 < 6$ F
8. $-1 > 0$ and $1 < 5$ F
9. $4 > 0$ and $-4 < 0$ T
10. $0 = 0$ or $-2 > -3$ T
11. $5 \neq 5$ or $-1 > -4$ T
12. $0 > 3$ and $2 > -2$ F

A compound inequality containing "and" is true only if both inequalities are true. The graph of a compound inequality containing "and" is the intersection of the graphs of the two inequalities. The solution must be a solution of both inequalities.

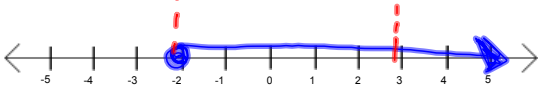
Graph the solution set of $x < 3$ and $x \geq -2$

$\{x \mid -2 \leq x < 3\}$

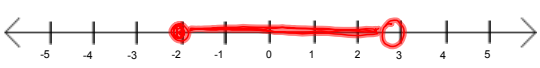
$x < 3$



$x \geq -2$



$x < 3$ and $x \geq -2$



Solve $-5 < x - 4 < 2$. Then graph the solution set.

$-5 < x - 4$ $\quad$ $x - 4 < 2$

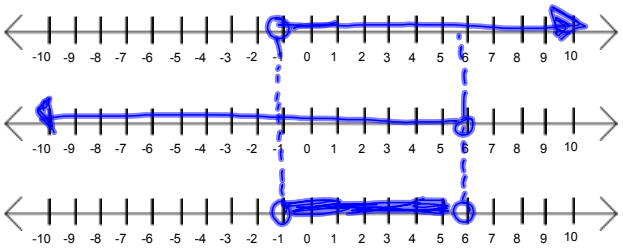
$+4 \quad +4$ $\quad$ $+4 \quad +4$

$-1 < x$ $\quad$ $x < 6$

$\{x \mid -1 < x < 6\}$

$-1 < x$

$x < 6$



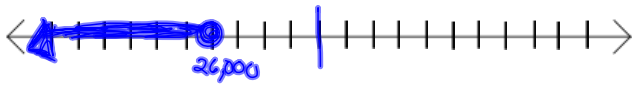
A compound inequality containing "or" is true if one or more of the inequalities is true. The graph of a compound inequality containing "or" is the union of the graphs of the two inequalities. The solution of the compound inequality is a solution of either inequality, not necessarily both.

An airplane is experiencing heavy turbulence while flying at 30,000 feet. The control tower tells the pilot that he should increase his altitude to at least 33,000 feet or decrease his altitude to no more than 26,000 feet to avoid the turbulence.

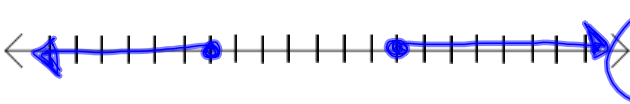
$a \geq 33{,}000$ or $a \leq 26{,}000$

$\{a \mid a \leq 26{,}000 \text{ or } a \geq 33{,}000\}$

$a \geq 33{,}000$



$a \leq 26{,}000$



$a \leq 26{,}000$ or $a \geq 33{,}000$

Solve $-3h + 4 < 19$ or $7h - 3 > 18$. Then graph the solution set.

$-3h + 4 < 19$

$-4 \quad -4$

$\frac{-3h}{-3} < \frac{15}{-3}$

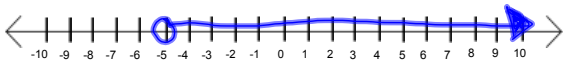
$h > -5$

$7h - 3 > 18$

$+3 \quad +3$

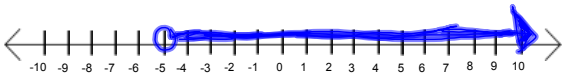
$\frac{7h}{7} > \frac{21}{7}$

$h > 3$



$h > -5$

$h > 3$



$\{h \mid h > -5\}$

Assignment:

Pg. 342 #14-38 even, 44-47