warm up: page 45

Example 4: Application

Let x = # boxes sold

A troop of girl scouts votes to give .25 cents to a homeless shelter for each box of cookies they sell. How many boxes of cookies do they need to sell to reach or exceed their goal of $120?

$.25(\text{per box}) \geq 120$

$.25x \geq 120$

$x \geq 480$

√ Understanding Check:

Students in the school band are selling calendars. They earn $.80 on each calendar they sell. Their goal is to earn more than $400. Write and solve an inequality to find the fewest number of calendars they can sell and still reach their goal.

Let x = # of calendars sold

$.80x \geq 400$

$x \geq 500$

They have to sell at least 500 calendars.

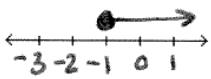
HW page 35

1. $5w + 9 \geq 3w + 7$

$-3w \quad -9$

$\frac{2w}{2} \geq \frac{-2}{2}$

$w \geq -1$

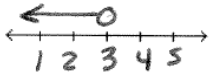


2. $6p - 1 < 3p + 8$

$-3p \quad +1$

$\frac{3p}{3} < \frac{9}{3}$

$p < 3$



3. $3w + 16 > 6 + 4w$

$-4w \quad +16$

$\frac{-w}{-1} > \frac{22}{-1}$

$w < -22$

$-w > -10$

$w < 10$

4. $2k - 3 \leq 5k + 12$

$-5k \quad +3$

$\frac{-3k}{-3} \leq \frac{15}{-3}$

$k \geq -5$

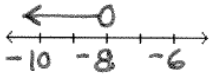
5. $2(p - 8) > -8 + 3p$

$2p - 16 > -8 + 3p$

$-3p \quad +16$

$\frac{-p}{-1} > \frac{8}{-1}$

$p < -8$



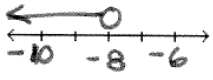
6. $3m + 6 < -5(m + 2)$

$3m + 6 < -5m - 10$

$+5m \quad -6$

$\frac{8m}{8} < \frac{-16}{8}$

$m < -8$



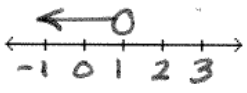
7. $4(3y-1) < 2(y+3)$

$12y-4 < 2y+6$

$-2y \quad\quad -2y \quad +4$

$\frac{10y}{10} < \frac{10}{10}$

$y < 1$



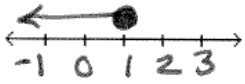
8. $2(3x+7) \leq 4(-2x+7)$

$6x+14 \leq -8x+28$

$+8x \quad\quad +8x \quad -14$

$\frac{14x}{14} \leq \frac{14}{14}$

$x \leq 1$



9. $22-(4x-2) > 2(x+3)$

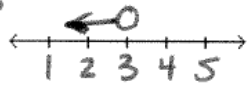
$22-4x+2 > 2x+6$

$-4x+24 > 2x+6$

$-2x \quad\quad -2x \quad -24$

$\frac{-6x}{-6} > \frac{-18}{-6}$

$x < 3$



10. $5c+4(c-1) \geq 2+5(c+2)$

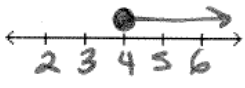
$5c+4c-4 \geq 2+5c+10$

$9c-4 \geq 5c+12$

$-5c \quad\quad -5c \quad +4$

$\frac{4c}{4} \geq \frac{16}{4}$

$c \geq 4$



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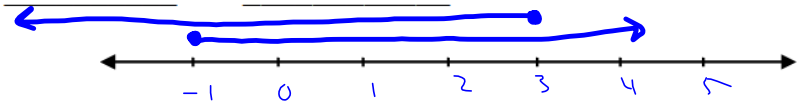
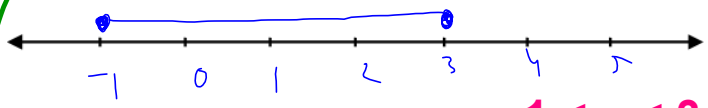
3–5 Compound Inequalities

Two inequalities that are joined by the word ___and___ or the word ___or___ form a ___compound inequality___.

Example:
Graph ___x > -1___ and ___x < 3___ on the same number line.



The solution of ___x ≥ -1 and x ≤ 3___ is the part of the graph that overlaps.



This compound inequality can also be written as: ___-1 ≤ x ≤ 3___

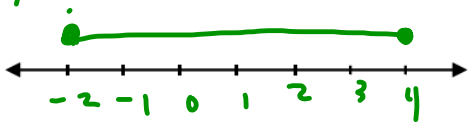
$-1 \leq x$

Example 1: Writing a Compound Inequality with "and"

Write a compound inequality that represents each situation. Graph the solutions.

a. all real numbers that are at least –2 and at most 4

$x \geq -2$ and $x \leq 4$



$-2 \leq x \leq 4$

b. Today's temperatures will be above 52 °F, but not as high as 70°F

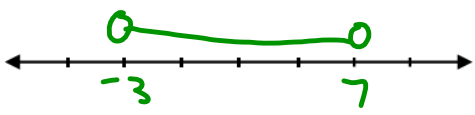
$T > 52$ and $T < 70$

$52 < T < 70$

√ Understanding Check:
Write a compound inequality that represents each situation. Graph your solution.

a. all real numbers greater than –3 but less than 7

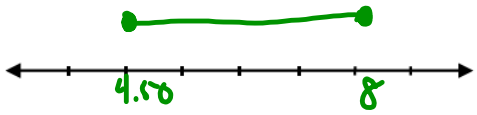
$x > -3$ and $x < 7$



$-3 < x < 7$

b. The books were priced between $4.50 and $8.00, inclusive.

$x \geq 4.50$ and $x \leq 8$



$4.50 \leq x \leq 8$

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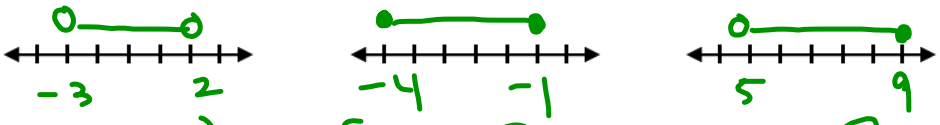
Example 2: Writing in Interval Notation

Another way to make an open point is with parenthesis.
Another way to make a closed point is with brackets.

Examples: a. $-3 < x < 2$ b. $-4 \leq x \leq -1$ c. $5 < x \leq 9$

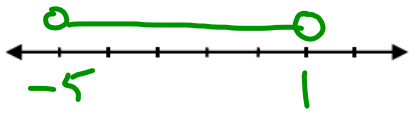


Interval Notation: $(-3, 2)$ $[-4, -1]$ $(5, 9]$

√ Understanding Check:

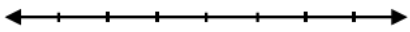
Graph each compound inequality on the number line and then write the inequality in interval notation.

a. $-5 < x < 1$

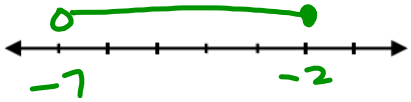


$(-5, 1)$

b. $6 \leq x \leq 10$

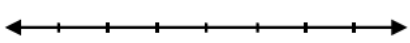


c. $-7 < x \leq -2$



$(-7, -2]$

d. $-3 \leq x < 4$



Going backwards! Write a compound inequality for each interval given:

Example: $[-2, 3]$ $-2 \leq x \leq 3$

a. $[-6, -1]$ b. $(4, 11)$ c. $[-3, 5)$ d. $(-2, 4]$

$-3 \leq x < 5$

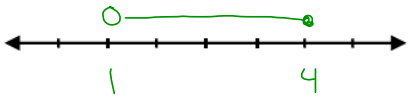
Example 2: Solving a Compound Inequality Containing "and"

Solve: $-4 < r - 5 \leq -1$. Graph your solution. Shortcut: Use the properties of equality to solve all three parts at the same time!

Step 1: add 5 to all parts

$+5 \quad +5 \quad +5$

$1 < r \leq 4$



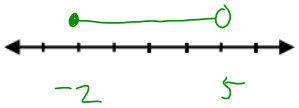
√ Understanding Check:

Solve each compound inequality using the shortcut. Graph your solution.

a. $-6 \leq 3x < 15$

$\frac{}{3} \quad \frac{}{3} \quad \frac{}{3}$

$-2 \leq x < 5$

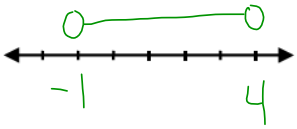


b. $-3 < 2x - 1 < 7$

$+1 \quad +1 \quad +1$

$-2 < 2x < 8$

$-1 < x < 4$

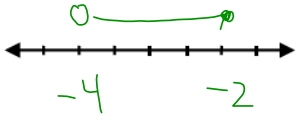


c. $13 > -3n + 1 \geq 7$

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

$12 > -3n \geq 6$

$-4 < n \leq -2$

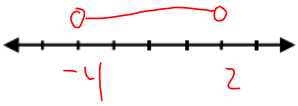


d. $1 < \frac{x}{2} + 3 < 4$

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

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

$-4 < x < 2$



e. $14 \geq -8x - 2 \geq -10$

f. $-17 < -4x + 3 < -5$

Example 3: Application

The acidity of the water in a swimming pool is considered normal if the average of three pH readings is between 7.2 and 7.8, inclusive. The first two readings for a swimming pool are 7.4 and 7.9. What possible values for the third reading (p) will make the pH normal?

$7.2 \leq \text{average} \leq 7.8$

$$3 \cdot (7.2) \leq 3\left(\frac{7.4 + 7.9 + p}{3}\right) \leq 7.8 \cdot 3$$

$$21.6 \leq 15.3 + p \leq 23.4$$
$$-15.3 \quad -15.3 \quad -15.3$$

$$6.3 \leq p \leq 8.1$$

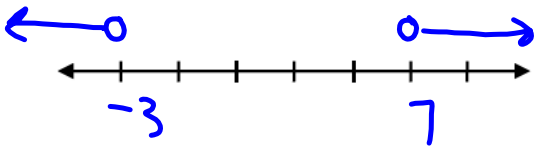
p53

Example 4: Writing Compound Inequalities with "or"

Write a compound inequality that represents each situation. Graph the solution.

a. All real numbers that are less than –3 or greater than 7.

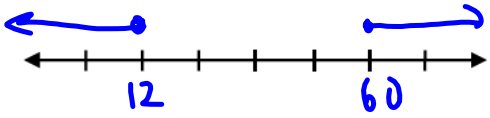
$x < -3$ or $x > 7$



Let a = age

b. Discounted fares are available to children 12 and under or to adults at least 60 years of age.

$a \leq 12$ or $a \geq 60$

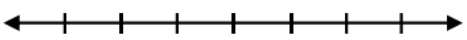


√ Understanding Check:

Write a compound inequality that represents each situation. Graph your solution.

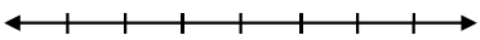
a. All real numbers at most –5 or at least 3.

_____ or _____



b. All real numbers below -12 or above -8.

_____ or _____



Example 5: Solving a Compound Inequality Containing "or"

Solve the compound inequality. Graph the solution.

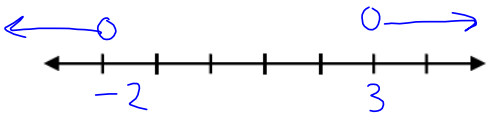
$4v + 3 \leq -5$ OR $-2v + 7 < 1$.

$4v \leq -8$ $\quad -2v < -6$

$v \leq -2$ $\quad v > 3$

Step 1: Solve separately and graph

Step 2: Write with "or".



$v < -2$ or $v > 3$

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