

3-5

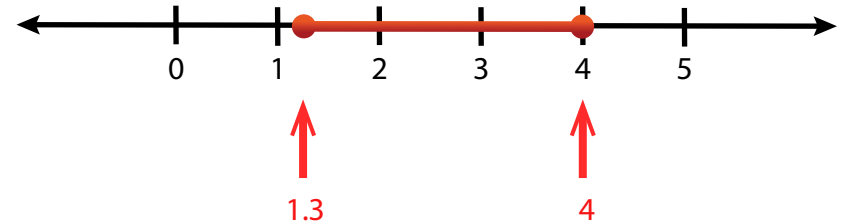
Compound Inequalities

OBJECTIVE: I can solve and graph inequalities containing the word and to solve and graph inequalities containing the word or



Warm-Up

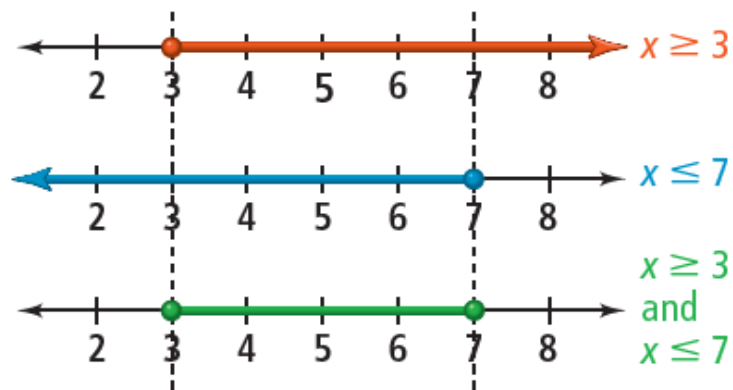
The diagram shows the number of boxes of oranges that an orange tree can produce in 1 year. An orange grower earns \$9.50 for each box of oranges that he sells. How much could the grower expect to earn in 1 year from 1 tree? Explain your reasoning.



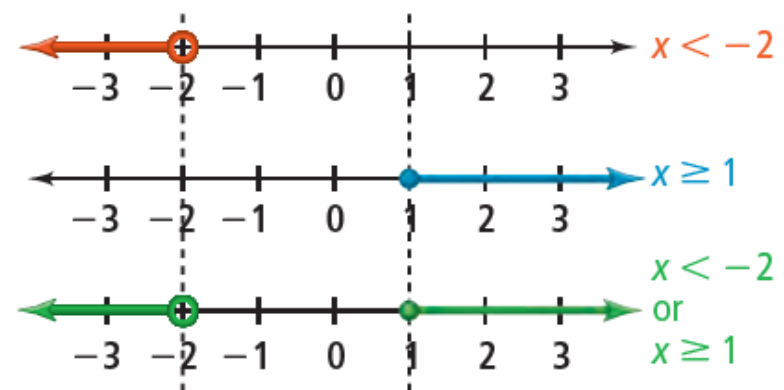
Essential Understanding

Essential Understanding You find the solutions of a compound inequality either by identifying where the solution sets of the distinct inequalities overlap or by combining the solution sets to form a larger solution set.

The graph of a compound inequality with the word **and** contains the overlap of the graphs of the two inequalities that form the compound inequality.



The graph of a compound inequality with the word **or** contains each graph of the two inequalities that form the compound inequality.



You can rewrite a compound inequality involving **and** as a single inequality. For instance, in the inequality above, you can write $x \geq 3$ and $x \leq 7$ as $3 \leq x \leq 7$. You read this as “x is greater than or equal to 3 and less than or equal to 7.” Another way to read it is “x is between 3 and 7, inclusive.” In this example, inclusive means the solutions of the inequality include both 3 and 7.



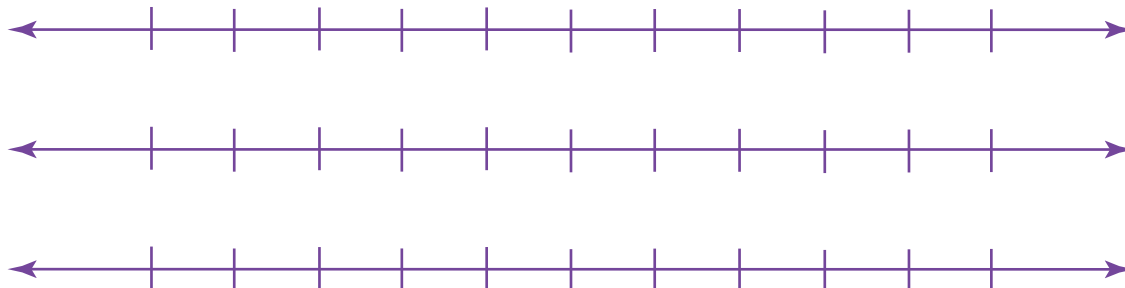
Example

#1 Writing Expressions With Two Operations

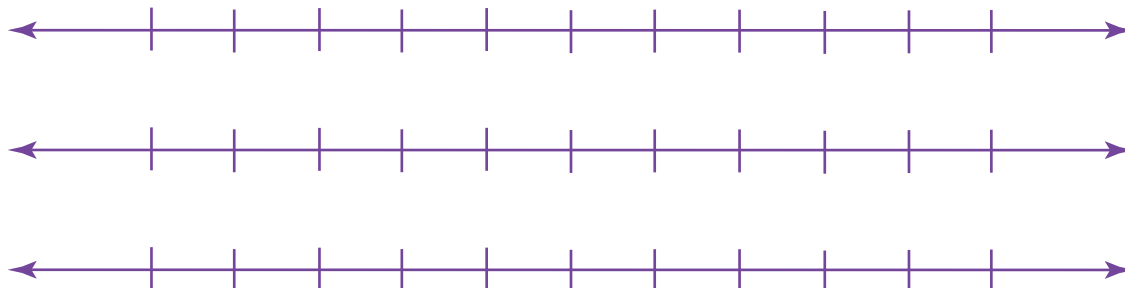


What compound inequality represents the phrase? Graph the solutions.

A all real numbers that are greater than 2 **and** less than 6



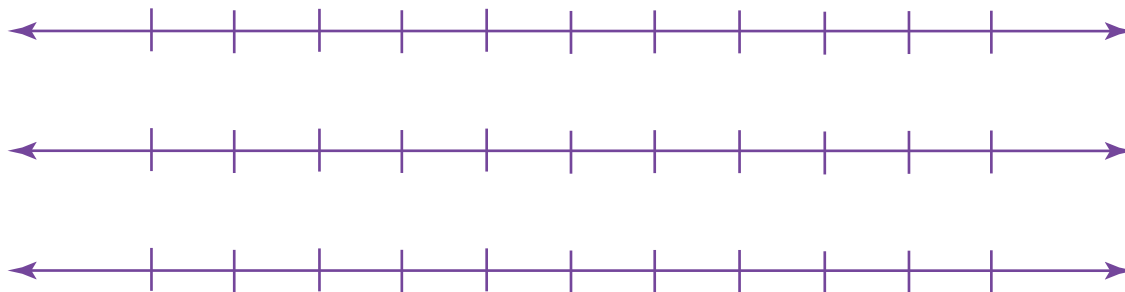
b all real numbers that are less than 0 **or** greater than or equal to 5



Your Turn to Work it Out



1. Write a compound inequality that represents the phrase. Graph the solution.
 - a. all real numbers that are greater than or equal to -4 and less than 6



Example#2 Solving a Compound Inequality Involving And

What are the solutions of $-3 \leq m - 4 < -1$? Graph the solutions.



Your Turn to Work it Out



2. What are the solutions of $-2 < 3y - 4 < 14$? Graph the solutions.



Example

#3 Solving a Compound Inequality Involving Or



What are the solutions of $3t + 2 < -7$ or $-4t + 5 < 1$? Graph the solutions.



Your Turn to Work it Out



3. What are the solutions of $-2y + 7 < 1$ or $4y + 3 \leq -5$? Graph the solutions.



Concept Understanding

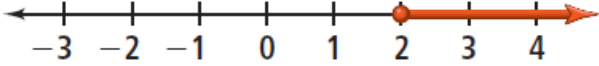


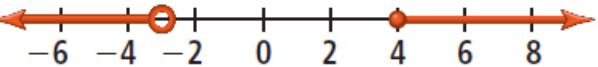


You can use an inequality such as $x \leq -3$ to describe a portion of the number line called an interval. You can also use **interval notation** to describe an interval on the number line. Interval notation includes the use of three special symbols. These symbols include

parentheses: Use (or) when a $<$ or $>$ symbol indicates that the interval's endpoints are not included.

brackets: Use [or] when a \leq or \geq symbol indicates that the interval's endpoints are included.

infinity: Use ∞ when the interval continues forever in a positive direction.
Use $-\infty$ when the interval continues forever in a negative direction.

Inequality	Graph	Interval Notation
$x \geq 2$		$[2, \infty)$
$1 < x \leq 5$		$(1, 5]$
$x < 2$		$(-\infty, 2)$
$x < -3$ or $x \geq 4$		$(-\infty, -3)$ or $[4, \infty)$

Example

#4 Using Interval Notation



A What is the graph of $[-4, 6)$? How do you write $[-4, 6)$ as an inequality?



B What is the graph of $x \leq -1$ or $x > 2$? How do you write $x \leq -1$ or $x > 2$ in interval notation?



Your Turn to Work it Out



4. What is the graph of $(-2, 7]$? How do you write $(-2, 7]$ as an inequality?

