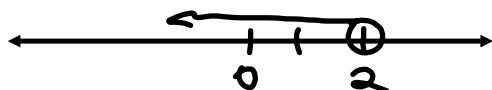


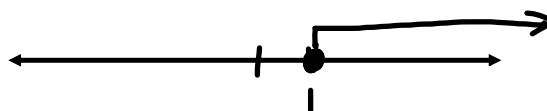
Section 6.6 Linear Inequalities

Solving and graphing inequalities

$x < 2$



$x \geq 1$



$x < 3$

same inequality

$3 > x$

When solving an inequality, if you multiply or divide by a negative number you must *flip* the inequality sign.

Solve

$$-2x + 3 \geq 13$$

$$\begin{aligned} \frac{-2x}{-2} & \geq \frac{-10}{-2} \\ x & \leq -5 \end{aligned}$$

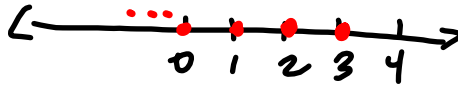
$$3x - 5 > 9$$

$$\begin{aligned} \frac{7}{3} \cdot \frac{2}{5}x - \frac{6}{7}x & < 4 \cdot \frac{5}{3} \\ 14x - 30x & < 140 \\ -16x & < 140 \\ \frac{-16x}{-16} & < \frac{140}{-16} \\ y & > -\frac{35}{4} \end{aligned}$$

Example 6 A solution of only integers

Solve $x + 5 < 9$ where x is an integer, then graph your solution.

$$x < 4$$

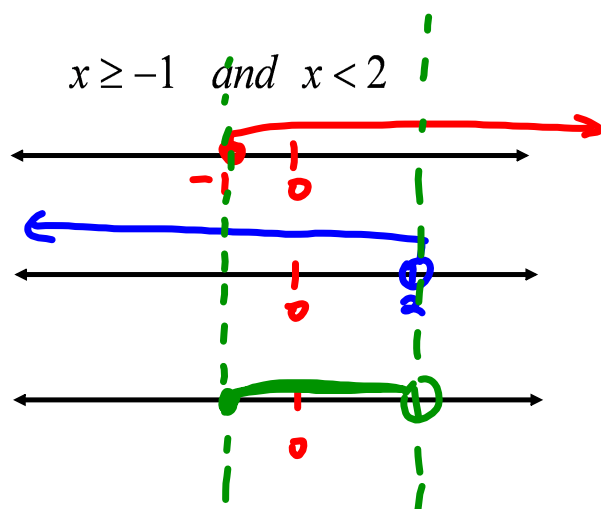


Compound inequalities.

A compound inequality consists of two inequalities joined by the word 'and' or the word 'or'.

Solve each part of the inequality.

The graph of a compound containing the word '*and*' is the *intersection* of the two solutions. Only the solutions that are *common* to both inequalities.

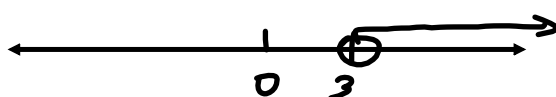


$$-13 < 2x + 7 \leq 17$$

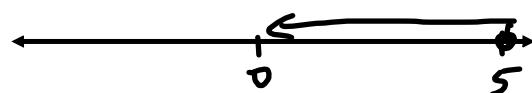
$$\frac{-13}{2} < \frac{2x}{2} \leq \frac{17}{2}$$

$$-6.5 < x \leq 8.5$$

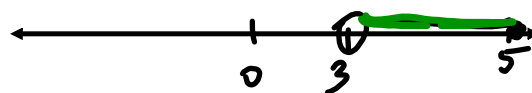
intersection



$$x > 3$$

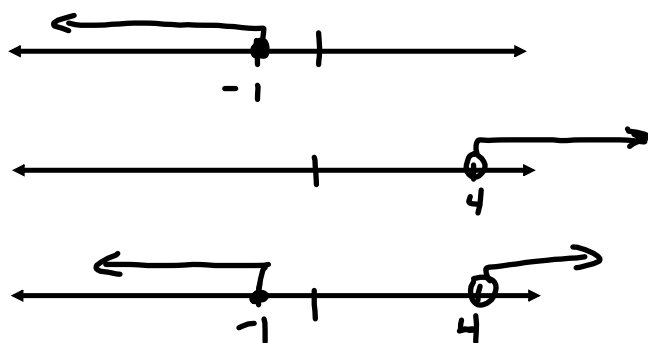


$$x \leq 5$$



Inequalities containing the word 'or' is the *union* of the solution set of the two inequalities.

$$x \leq -1 \text{ or } x > 4$$



$$y - 2 > -3 \text{ or } y + 4 \leq -3$$

$$y > -1 \text{ or } y \leq -7$$



EXAMPLE 9 *Average Grade*

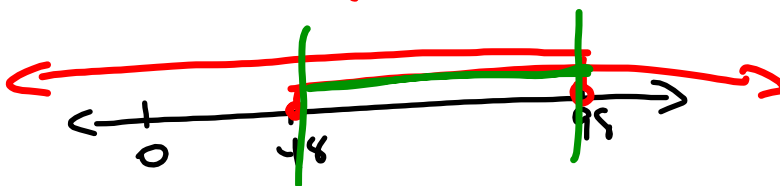
A student must have an average (the mean) on five tests that is greater than or equal to 80% but less than 90% to receive a final grade of B. Devon's grades on the first four tests were 98%, 76%, 86%, and 92%. What range of grades on the fifth test would give him a B in the course?

$$5 \cdot 80 \leq \frac{98 + 76 + 86 + 92 + X}{5} < 90 \cdot 5$$

$$\begin{array}{r} 400 \leq 352 + X < 450 \\ -352 \quad -352 \quad -352 \end{array}$$

$$48 \leq X < 98$$

and



- 49 19. *Video Rental* Movie Mania offers two rental plans. One has an annual fee, and the other has no annual fee. The annual membership fee and the daily charge per video for each plan are shown in the table. Determine the maximum number of videos that can be rented for the no fee plan to cost less than the annual fee plan.

| Rental Plan | Yearly Fee | Daily Charge per Video |
|-------------|------------|------------------------|
| Annual fee | \$30 | \$1.49 |
| No fee | None | \$2.99 |

50. *Salary Plans* Bobby Exler recently accepted a sales position in Portland, Oregon. He can select between the two salary plans shown in the table. Determine the dollar amount of weekly sales that would result in Bobby earning more with Plan B than with Plan A.

| Salary Plan | Weekly Salary | Commission on Sales |
|-------------|---------------|---------------------|
| Plan A | \$500 | 6% |
| Plan B | \$400 | 8% |

55. Finding Velocity The velocity, v , in feet per second, t sec after a tennis ball is projected directly upward is given by the formula $v = 84 - 32t$. How many seconds after being projected upward will the velocity be between 36 ft/sec and 68 ft/sec?

56. *Speed Limit* The minimum speed for vehicles on a highway is 40 mph, and the maximum speed is 55 mph. If Philip Rowe has been driving nonstop along the highway for 4 hr, what range in miles could he have legally traveled?

57. *A Grade of B* In Example 9 on page 359, what range of grades on the fifth test would result in Devon receiving a grade of B if his grades on the first four tests were 78%, 64%, 88%, and 76%?

A student must have an average on five tests that is greater than or equal to 70% but less than 80% to receive a final grade of C. Bobby's grades on the first four tests were 85%, 72%, 65% and 68%. What range of grades on the fifth test would give him a C in the course?

The Uconn Planning Committee wants to rent tents for the spring job fair. Rent-a-Tent charges \$325 for setup and delivery of its tents. This fee is charged regardless of the number of tents delivered and set up. In addition, Rent-a-Tent charges \$125 for each tent rented. If the minimum amount the planning committee wishes to spend is \$950 and the maximum amount they wish to spend is \$1200, determine the minimum and maximum number of tents the committee can rent.