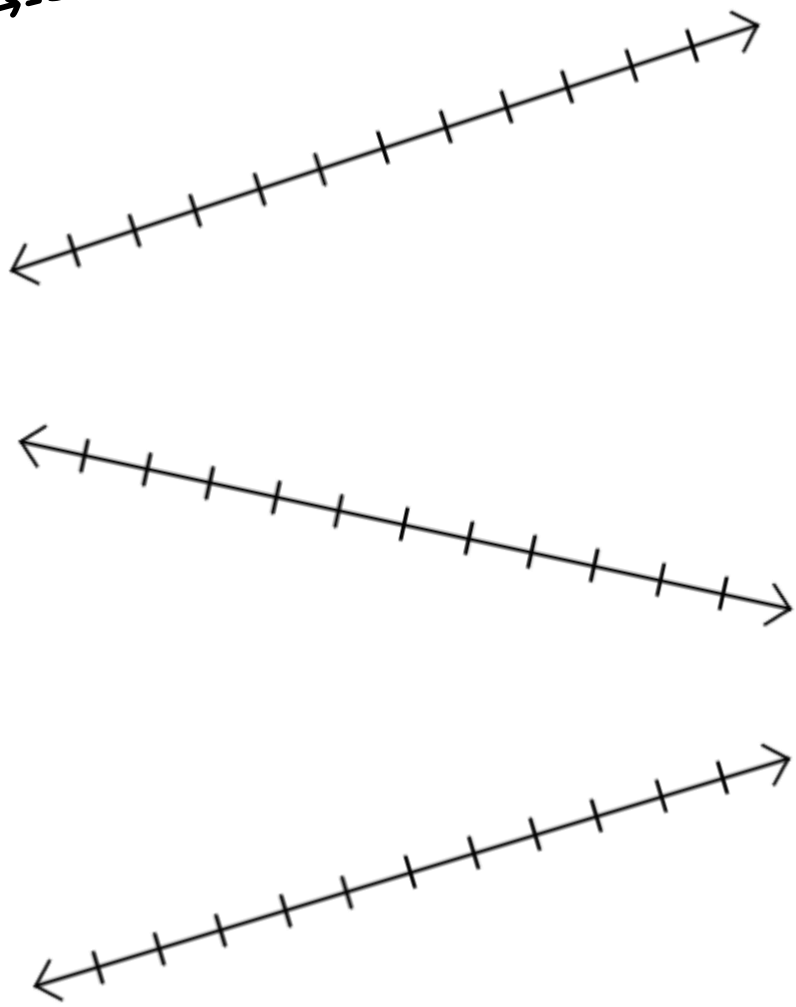
Name: _____

Algebra Unit 5: Linear Inequalities and Systems

Linear Inequalities

LESS THAN/LESS THAN OR EQUAL TO

GREATER THAN/GREATER THAN OR EQUAL TO



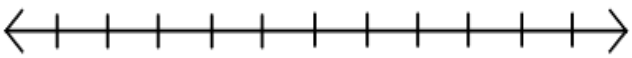
Example 1

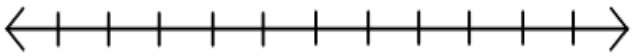
Example 2

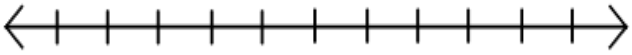
Compound & Absolute Value Inequalities

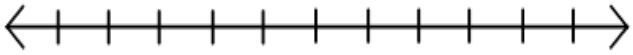
COMPOUND INEQUALITIES

ABSOLUTE VALUE INEQUALITIES

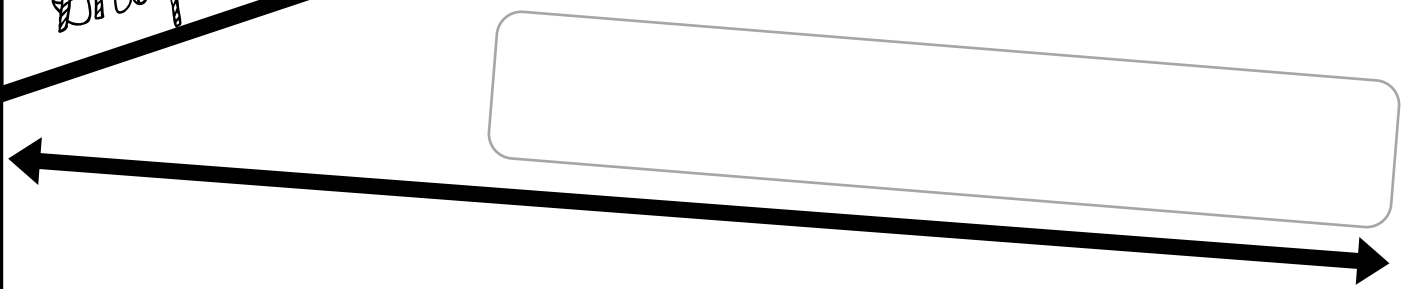


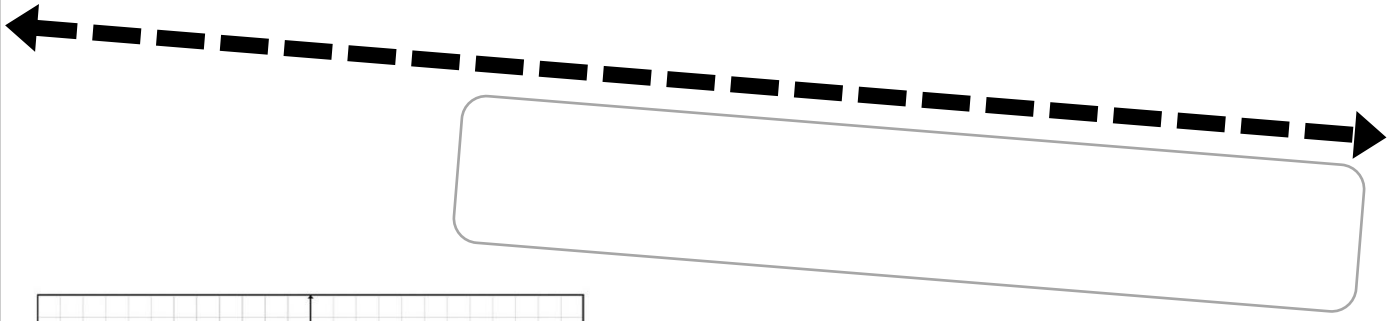


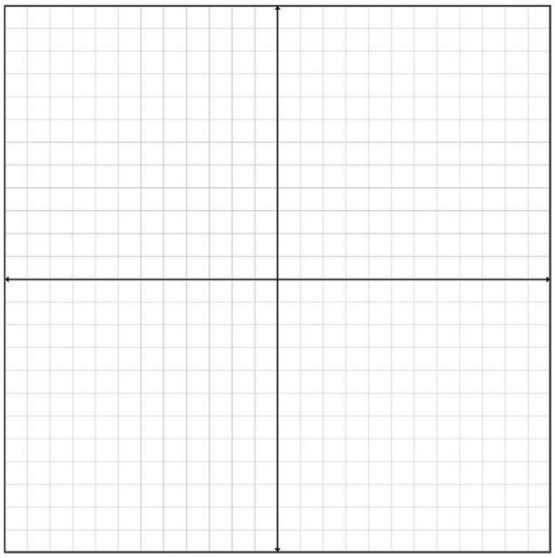


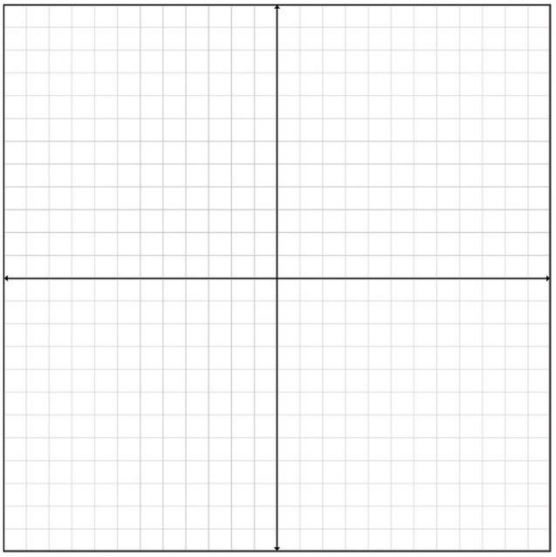


Graphing Inequalities





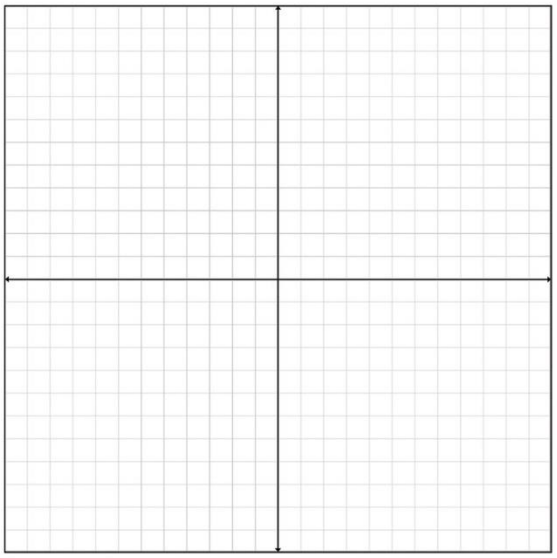


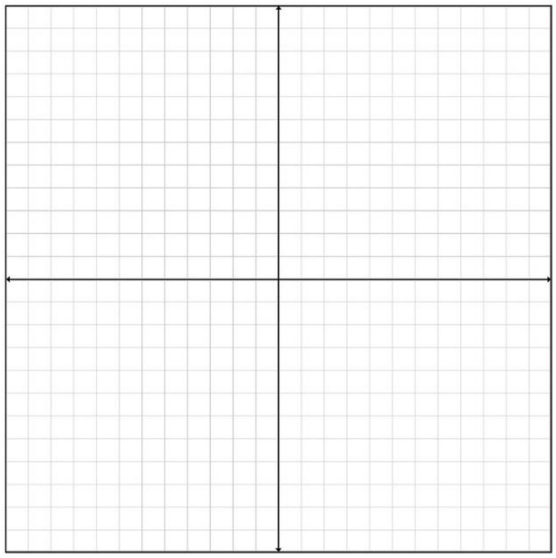


Systems of Linear Inequalities

What is a solution?

FYI: Constraints





Writing, Solving and Graphing Linear Inequalities

1. Solve the following inequality and graph the solution. $2x + 7 \geq 13$

2. Solve the following inequality and graph the solution. $\frac{x}{-8} + 3 < 3x + 5$

3. The cost of tuition at a college is \$76 per credit hour. **Write and solve** an inequality that can be used to determine the number of credit hours a student can take for under \$1000. **Graph** the solution on a number line.

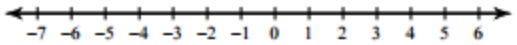
4. Sean owns a business that builds computers. The fixed operating costs for his business are \$2,700 per week. In addition to fixed operating costs, each computer costs \$600 to produce. Each computer sells for \$1,500. **Write and solve** an inequality that can be used to determine the number of computers Sean needs to sell in order make a profit each week. **Graph** the solution on a number line.

5. Gasoline costs \$3.79 per gallon. **Write and solve** an inequality that can be used to determine how many gallons of fuel can be purchased for under \$20. **Graph** the solution on a number line.

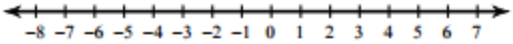
6. Bryan and his band want to record and sell CDs. The recording studio charges an initial set-up fee of \$300, and each CD will cost \$6.50 to burn. The studio requires bands to make a minimum purchase of \$900, which includes the set-up fee and the cost of burning CDs. **Write and solve** an inequality to determine the number of CDs the band needs to buy in order to meet the minimum purchase requirement. **Graph** the solution on a number line.

Graphing Compound Inequalities

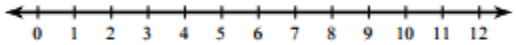
1) $n + 1 \leq -3$ or $-4n < -8$



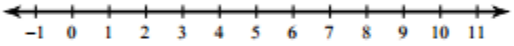
2) $\frac{k}{4} \geq 1$ or $\frac{k}{3} \leq -1$



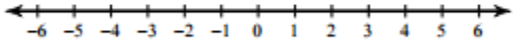
3) $2 < 2x < 6$



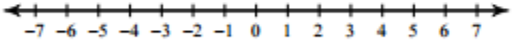
4) $6 \leq x + 6 \leq 11$



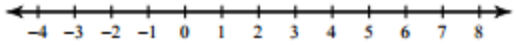
5) $-3 < m - 5 < -1$



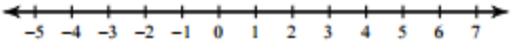
6) $p + 4 \leq 1$ or $p - 1 \geq 1$



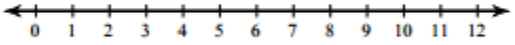
7) $-33 \leq -7n - 12 < -26$



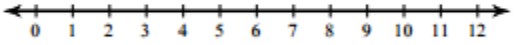
8) $9 + 2b < 7$ or $7 - 5b < -8$



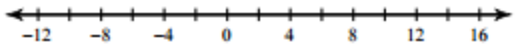
9) $9 - 12r \geq -99$ and $-2r - 4 < -12$



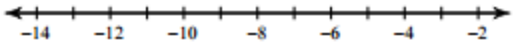
10) $12 + 4n > 44$ or $10 - 12n > -38$



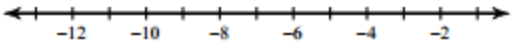
11) $-5b - 8 \leq -68$ or $11b - 12 < -100$



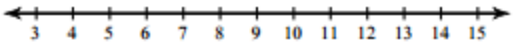
12) $36 \leq 11 - 5x \leq 66$



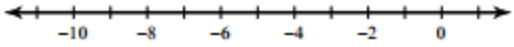
13) $-10 - 2v < 6$ and $6v + 12 < -6$



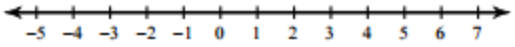
14) $2x - 3 < 11$ or $-8x - 10 < -82$



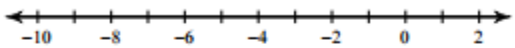
15) $4b + 18 \leq -12b - 14 \leq 14 - 5b$



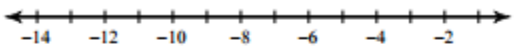
16) $4a + 8 > 11a + 15$ and $13 - 14a \leq 13 - 3a$



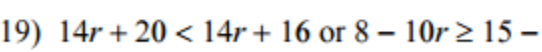
17) $8p - 13 \leq -2 + 7p$ and $20 + 4p < 2p + 14$



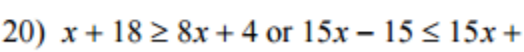
18) $5v + 10 \leq -4v - 17 < 9 - 2v$



19) $14r + 20 < 14r + 16$ or $8 - 10r \geq 15 - 9r$

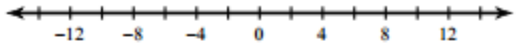


20) $x + 18 \geq 8x + 4$ or $15x - 15 \leq 15x + 5$

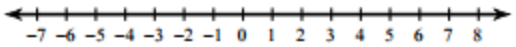


Absolute Value Inequalities

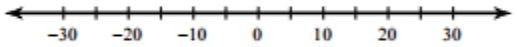
1) $\left|\frac{n}{4}\right| \leq 3$



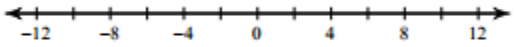
2) $|-9v| \leq 54$



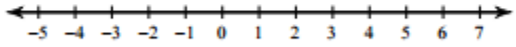
3) $\left|\frac{x}{6}\right| \geq 5$



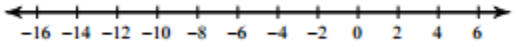
4) $|-6b| \leq 60$



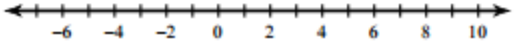
5) $|-8n| < 32$



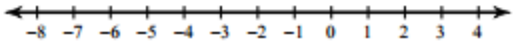
6) $|x+5| < 9$



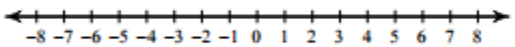
7) $|4v-9| \leq 27$



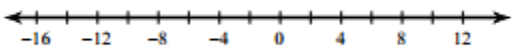
8) $|10+4x| < 14$



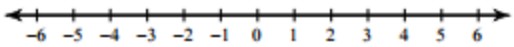
9) $|3-9a| \leq 60$



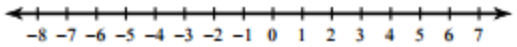
10) $|7x+4| \geq 74$



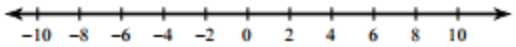
11) $|n| - 3 > -2$



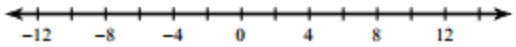
12) $|k| - 6 \leq -1$



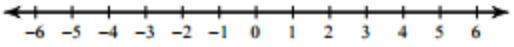
13) $|n| + 4 < 12$



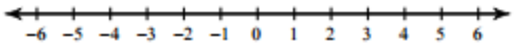
14) $|x| + 7 > 16$



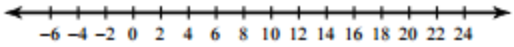
15) $|p| - 3 \leq 0$



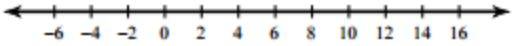
16) $|m| + 5 < 9$



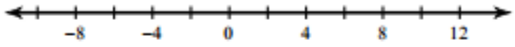
17) $|b - 8| + 10 > 22$



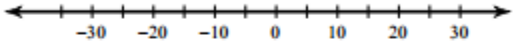
18) $\dfrac{|x-4|}{5} \leq 2$



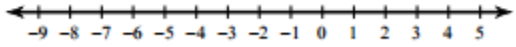
19) $-3 + |n - 2| > 5$



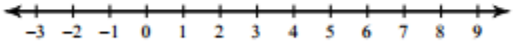
20) $\dfrac{|3+r|}{7} \leq 5$



21) $\dfrac{|2+3x|}{2} \geq 5$



22) $8 + |4v - 7| \geq 17$



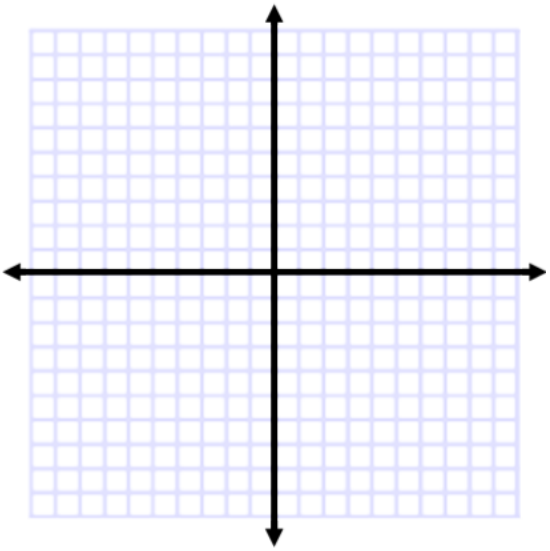
Graphing Linear Inequalities on a Coordinate Plane

1.) When do you use a solid line to graph? What does a solid line mean/represent?

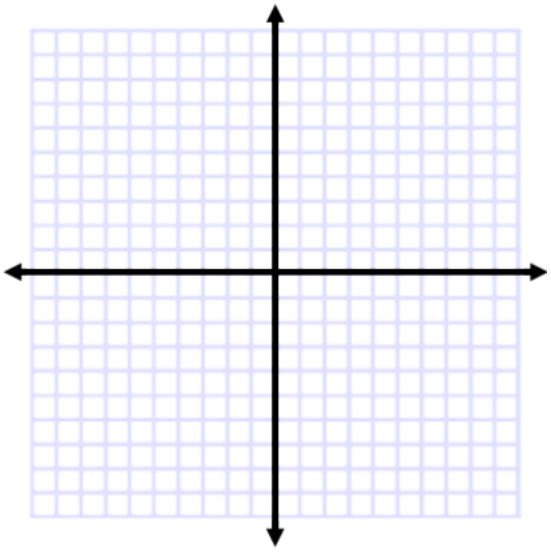
2.) When do you use a dashed line to graph? What does a dashed line mean/represent?

Graph the linear inequalities on the coordinate plane.

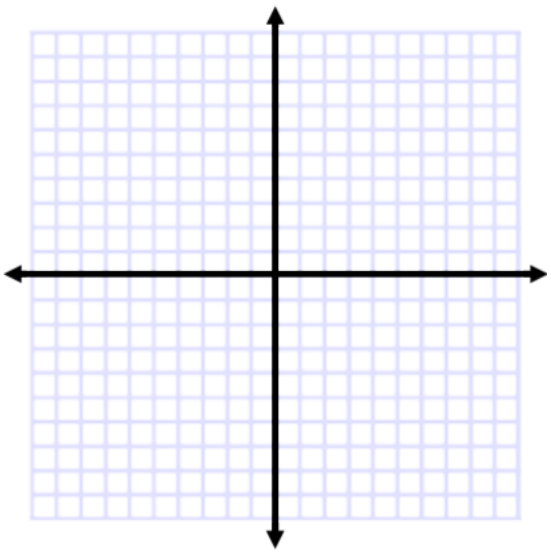
3.) $y < -\frac{1}{2}x$



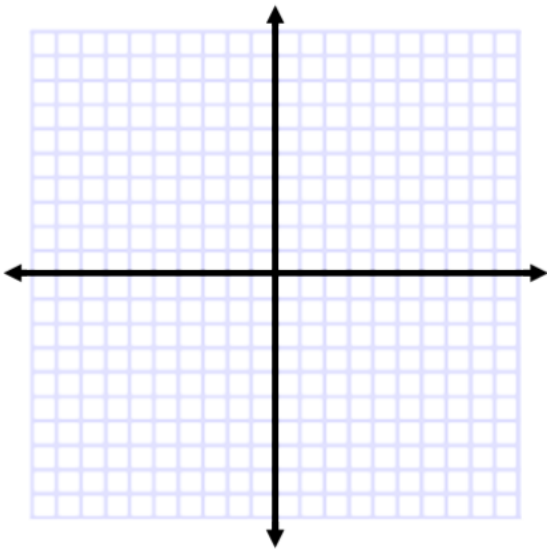
4.) $y \geq -3x - 2$



5.) $x + 2 < y$



6.) $y \leq \frac{5}{4}x + 1$



Graphing Linear Inequalities

Step 1: Convert the inequality to fit slope-intercept form

Step 2: Determine if the line will be solid or dashed

Step 3: Graph the line using y-intercept and slope

Step 4: Choose a test point

Step 5: Shade accordingly

Graph the following inequalities on graph paper.

1.) $y < -4x - 1$

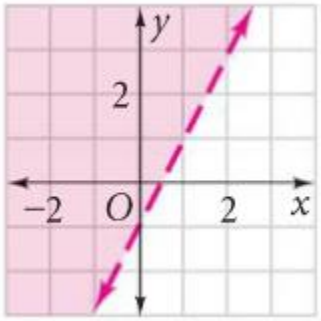
2.) $y \geq \frac{1}{2}x$

3.) $4x - 4y \leq 8$

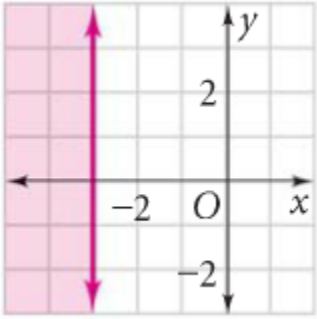
4.) $4x + 5y > 10$

Write an inequality shown in each graph.

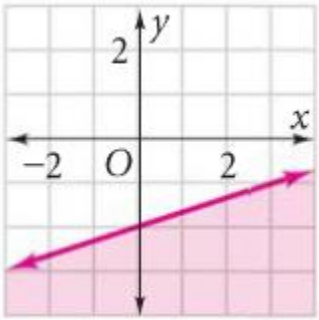
5.)



6.)



7.)



Write the linear inequality that satisfies the statement.

8.) x is positive

9.) y is negative

10.) y is not negative

11.) x is less than y

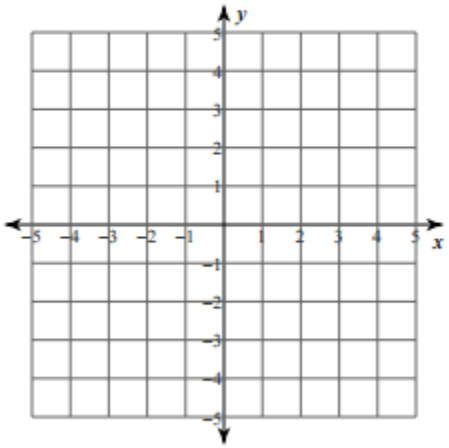
12.) CHALLENGE: Graph the following inequality on graph paper.

$2x + 4y > 5(x + 3) - [(2^2)(5)] + 3y$

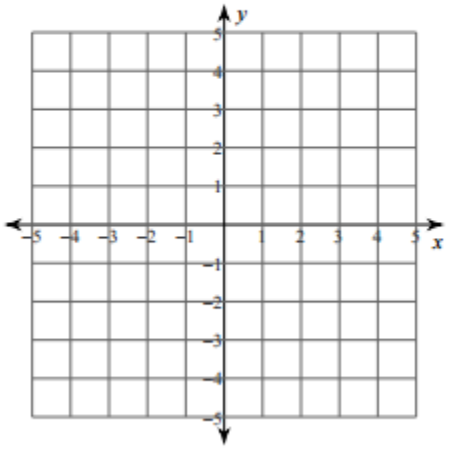
Systems of Inequalities

Sketch the solution to each system of inequalities.

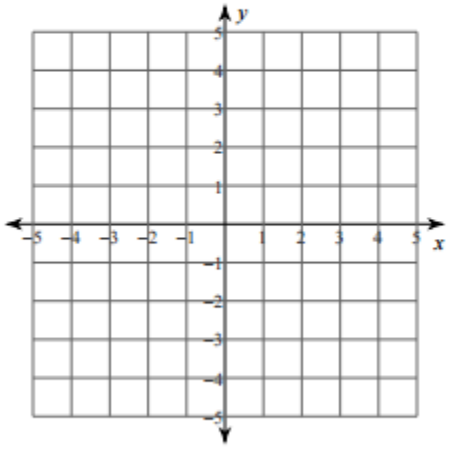
1) $y \le -x - 2$
$y \ge -5x + 2$



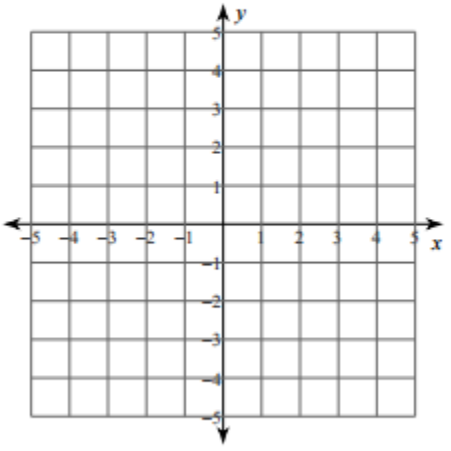
2) $y > -x - 2$
$y < -5x + 2$



3) $y \le \frac{1}{2}x + 2$
$y < -2x - 3$

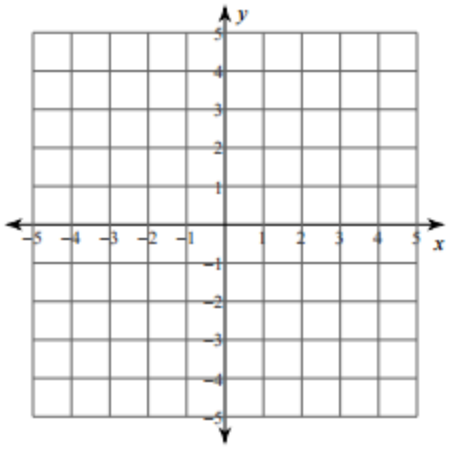


4) $x \le -3$
$y < \frac{5}{3}x + 2$



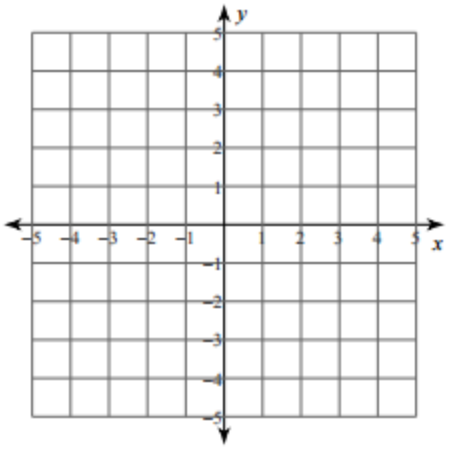
5) $y \le -\frac{5}{2}x - 2$

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



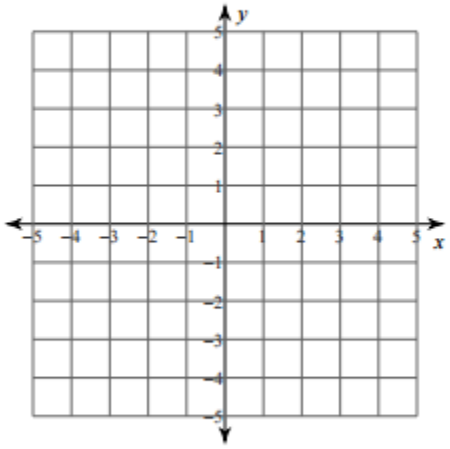
6) $y \ge \frac{2}{3}x + 3$

$y > -\frac{4}{3}x - 3$



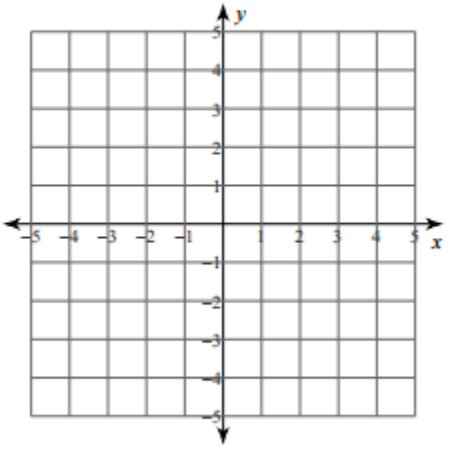
7) $4x + y < 2$

$y > -2$



8) $3x + 2y \ge -2$

$x + 2y \le 2$

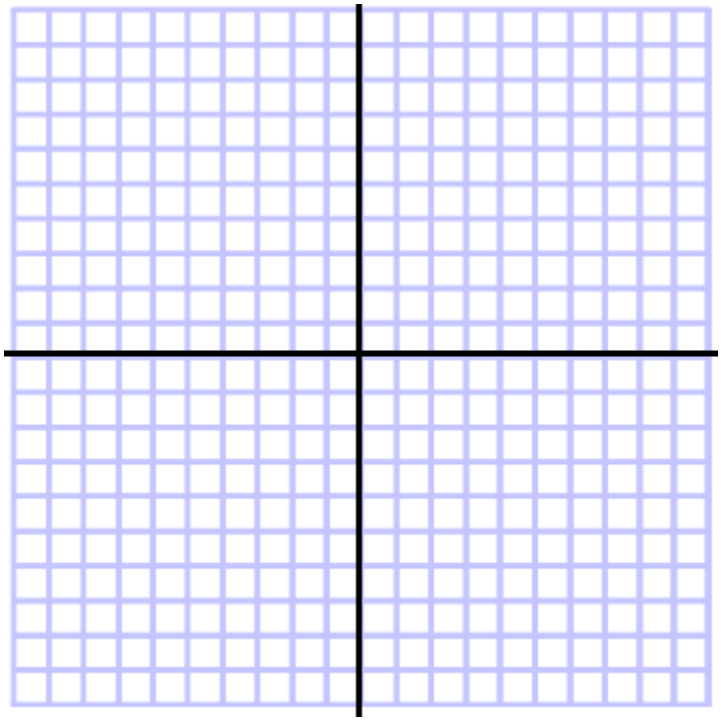


Real World Systems of Linear Inequalities

Situation 1:

Sarah is selling bracelets and earrings to make money for a summer vacation. The bracelets cost $2 and earrings cost $3. She needs to make at least $500.

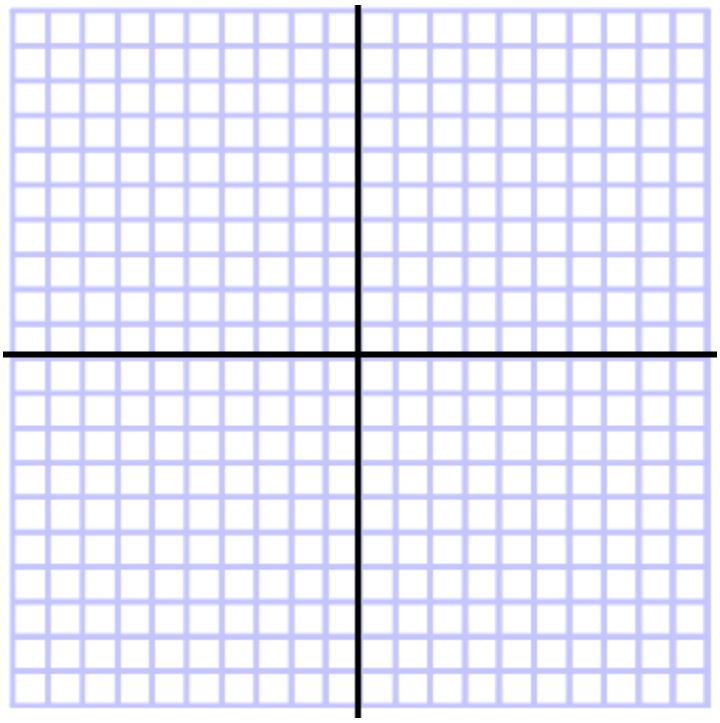
- Write an inequality to represent the income from the jewelry sold.
- Sarah knows that she will sell more than 50 bracelets. Write an inequality to represent the situation.
- Graph the two inequalities and shade.
- Identify a solution. How many bracelets and earrings could Sarah sell in order to be able to go on her trip?
- What are the constraints?



Situation 2:

Jason is buying wings and hot dogs for a party. One package of wings costs $7. Hot dogs cost $4 per pound. He must spend less than $40.

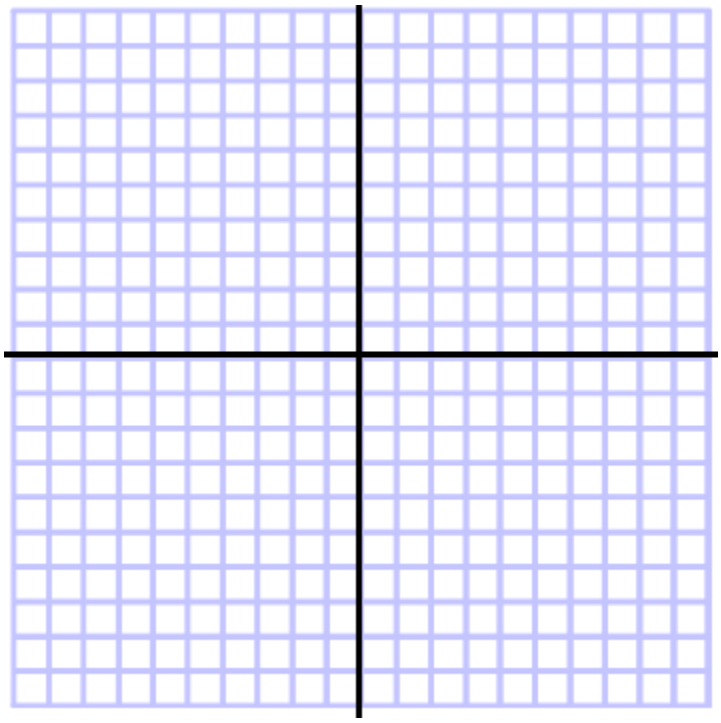
- Write an inequality to represent the cost of Jason's food for the party.
- Jason knows that he will be buying at least 5 pounds of hot dogs. Write an inequality to represent this situation.
- Graph both inequalities and shade.
- Identify two solutions and justify your answers.
- What are the constraints?



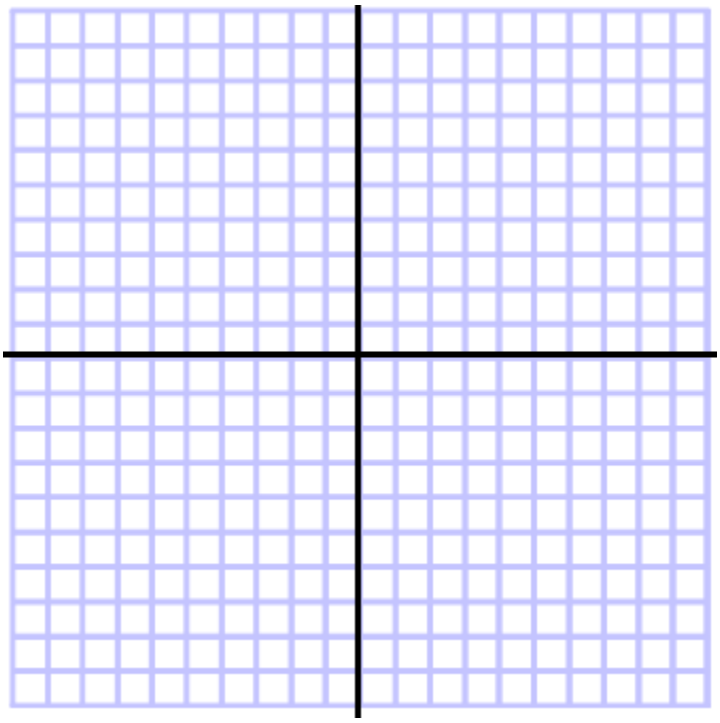
Situation 3:

The boys and girls soccer clubs are trying to raise money for new uniforms. The boys' soccer club is selling candy bars for $2 apiece and the girls' soccer club is selling candles for $4. The must raise more than $800.

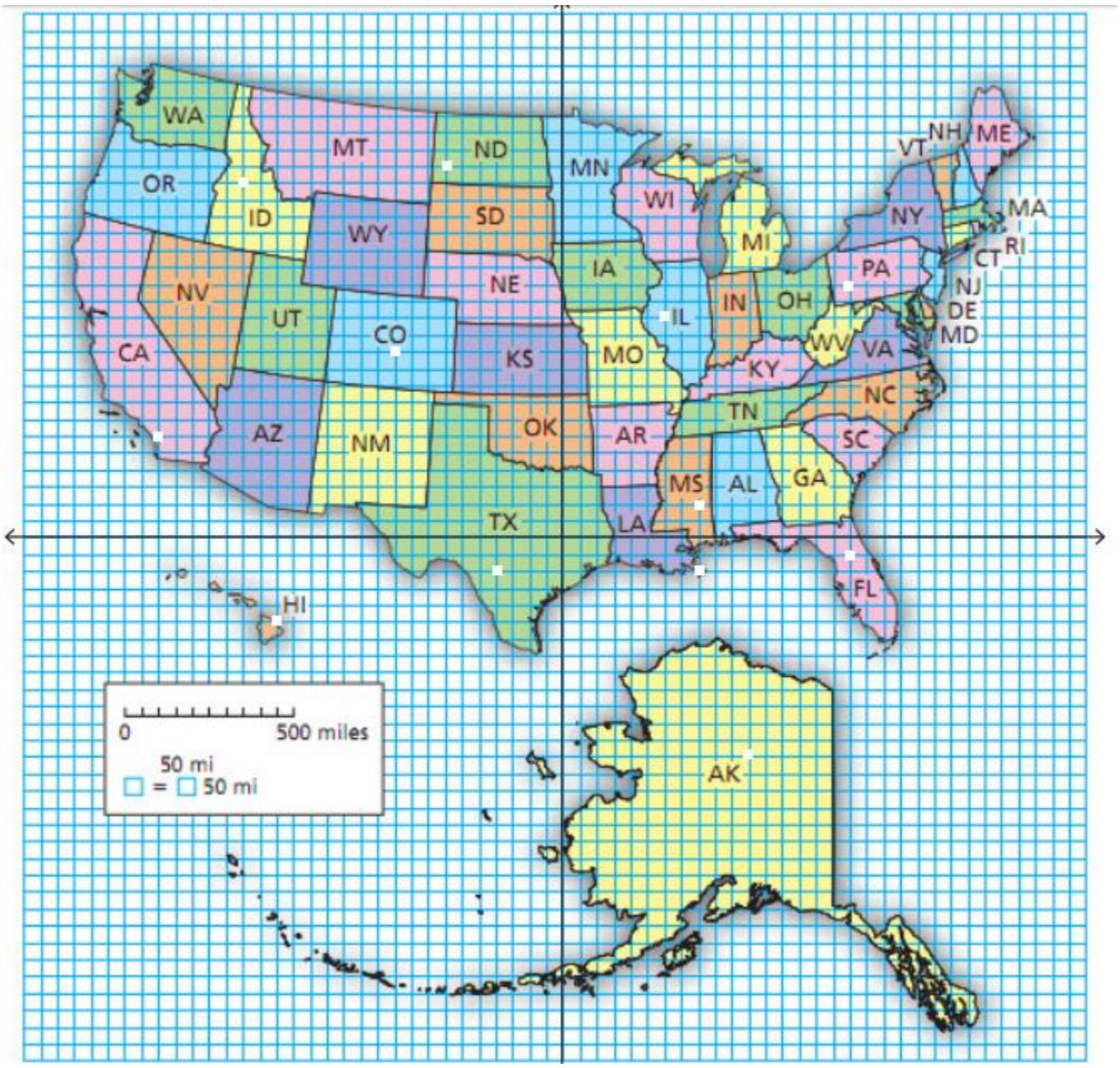
- Write an inequality to represent the income from the two fundraisers.
- The girls are promised, by their principal, that she will buy at least 100 candles. Write an inequality to represent this situation.
- Graph both inequalities and shade.
- Identify two solutions and justify your answers.
- What are the constraints?



Situation 4: (write your own, and solve it).



TREASURE HUNT



There is treasure hidden in one of the locations across the US.

In order to find the location, first you will have to identify the coordinate points:

1. _____, 2. _____, 3. _____, 4. _____, 5. _____, 6. _____, 7. _____ 8. _____, 9. _____,

10. _____ 11. _____, 12. _____

The solution to the linear inequality system will send you right to the location of the treasure!

The treasure will be located at the coordinate point (above) that satisfies the system.

$$2x + 3y < 18, \quad -4x - 4y < 8, \quad -3x + 4y < 12, \quad y > -13, \quad y < 2 \quad and \quad 4x - 5y < 20$$