Pre-Calculus w/Trig Peto
Linear Programming Day 3

Name _____
Date _____ Period _____

OBJECTIVE: You will be able to solve a system of linear inequalities.

1. Mrs. Peto decides to open a music shop where she plans to sell guitars and basses. She wants to find out the maximum amount of money she may have to borrow to purchase the instruments.

Each bass will cost her $900 and each guitar will cost her $750. She buys ***x* guitars** and ***y* basses**.

- Her store is small, so she can buy at most 50 instruments total.
- Because guitars are more popular than basses, the number of guitars must be at least two times the number of bases.
- To get started, she must buy at least 20 guitars.
- To get started, she must buy at most 10 basses.

Write an inequality for each constraint.

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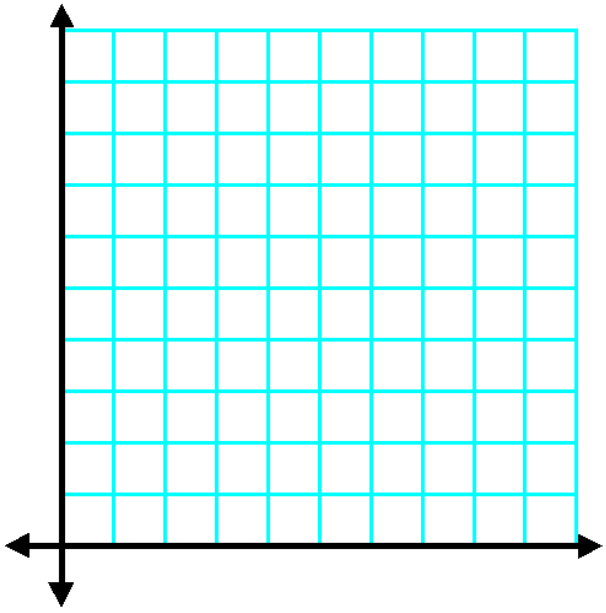
Graph each inequality on the graph provided.



List the vertices of the feasible region.

Write an objective function to show the amount borrowed.

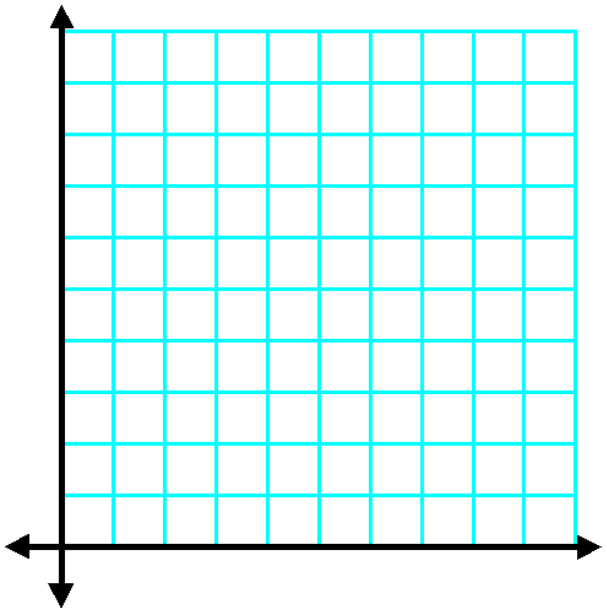
Use your vertices to find the maximum amount Mrs. Peto should borrow.

2. Grace wants to design her own necklace from red and blue beads. She wants to make a necklace that is at least 12 inches long but no more than 24 inches long. Grace also wants her necklace to contain blue beads that are at least twice the length of red beads. Finally, she wants her necklace to have at least 5 inches of blue beads.

Let x = inches of blue beads and y = inches of red beads

Constraints:

1. Describe the meaning of $x \geq 0$ and $y \geq 0$.



2. Describe the meaning of $x + y \geq 12$.

3. What else do you know about $x + y$?

4. Describe the meaning of $x \geq 2y$.

5. Write a constraint for the last sentence.

6. Graph each of the constraints (inequalities) listed in 1 – 5. Shade the region that satisfies them all.

7. List the vertices of the shaded region.

8. Blue beads cost \$0.30 per inch and red beads cost \$0.10 per inch.
   Write an objective function for the cost of the necklace.

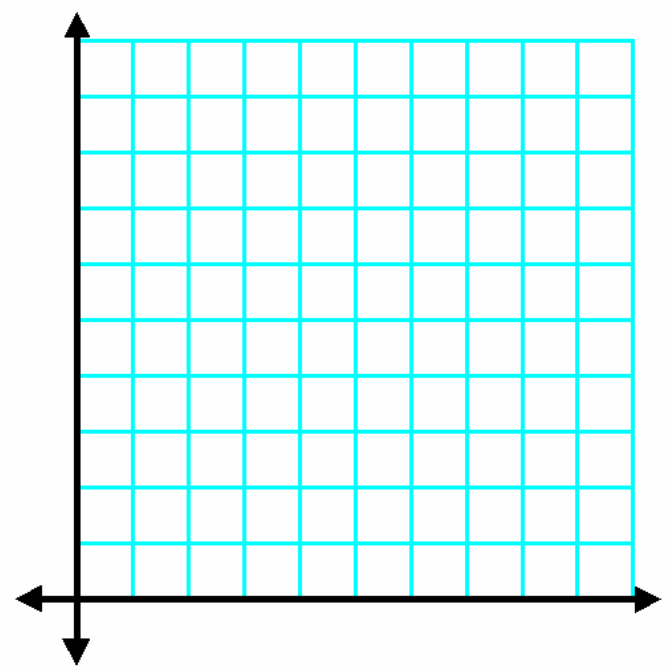
9. Find the length of blue and the length of red beads that minimize the cost.

3. A group of artists has decided to produce hand-drawn cards for Mrs. Peto's Birthday (September 9) and donate the profits to a worthy charity. The artists will produce ink drawings and watercolors.

- The artists have volunteered at most 120 hours towards creating the cards. It will take .3 hours to create each ink drawing and .5 hours to create each watercolor.
- The artists have volunteered a maximum of 60 hours toward packaging the cards, and it takes .2 hours to package each card.
- The artists must produce at least 100 watercolors.

1) Define the variables: $x =$ _____ $y =$ _____

2) Write and graph the constraints to the problem.



3) Shade in the region that satisfies the constraints.

4) Write the vertices of the feasible (shaded) region.

5) The foundation will make a profit of .25 per ink drawing and .50 per watercolor drawing. Write an objective function to model the profit.

6) Using your answers from #4 and #5, find the amount of each type of card needed to maximize profits.