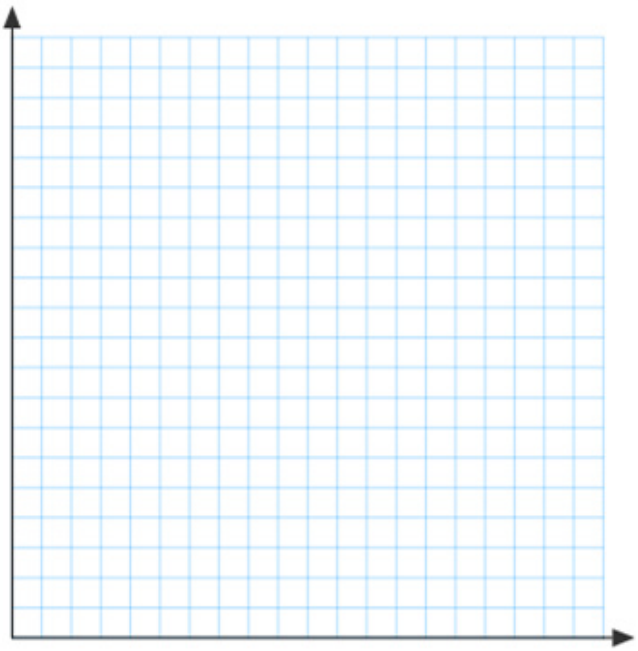
Exploratory Challenge

a. At a state fair, there is a game where you throw a ball at a pyramid of cans. If you knock over all of the cans, you win a prize. The cost is 3 throws for $1, but if have you an armband, you get 6 throws for $1. The armband costs $10.

i. Write two cost equations for the game in terms of the number of throws purchased – one without an armband and one with.

ii. Graph the two cost equations on the same graph. Be sure to label the axes and show an appropriate scale.

iii. Does it make sense to buy the armband?



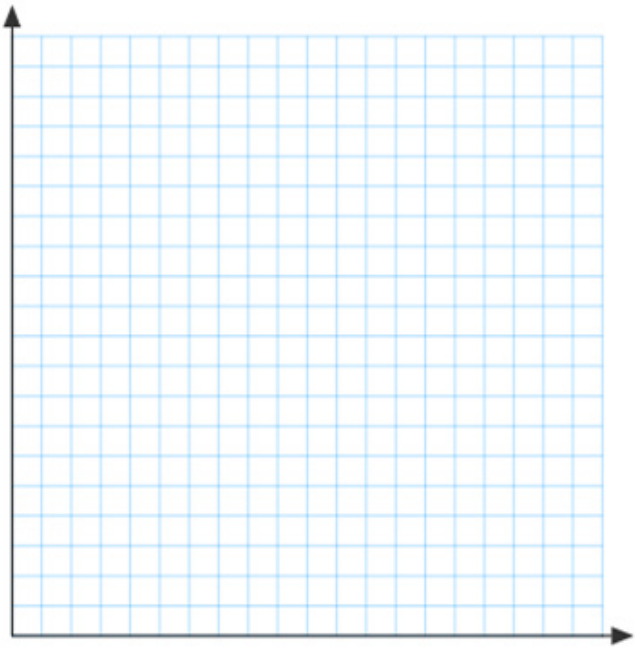
b. A clothing manufacturer has 1000 yd. of cotton to make shirts and pajamas. A shirt requires 1 yd. of fabric and a pair of pajamas requires 2 yd. of fabric. It takes 2 hr. to make a shirt and 3 hr. to make the pajamas, and there are 1600 hr. available to make the clothing.

i. What are the variables?

ii. What are the constraints?

iii. Write inequalities for the constraints.

iv. Graph the inequalities and shade the solution set.



v. What does the shaded region represent?

vi. Suppose he makes a profit of $10 on shirts and $18 on pajamas. How would he decide how many of each to make?

vii. How many of each should he make, assuming he will sell all the shirts and pajamas he makes?

Problem Set

1. Find two numbers such that the sum of the first and three times the second is 5 and the sum of second and two times the first is 8.

2. A chemist has two solutions: a 50% methane solution and an 80% methane solution. He wants 100 ml of a 70% methane solution. How many ml of each solution does he need to mix?

3. Pam has two part time jobs. At one job, she works as a cashier and makes $8 per hour. At the second job, she works as a tutor and makes $12 per hour. One week she worked 30 hours and made $268. How many hours did she spend at each job?

4. A store sells Brazilian coffee for $10 per lb. and Columbian coffee for $14 per lb. If they decide to make a 150-lb. blend of the two and sell it for $11 per lb., how much of each type of coffee should be used?

5. A potter is making cups and plates. It takes her 6 min. to make a cup and 3 min. to make a plate. Each cup uses $\frac{3}{4}$ lb. of clay and each plate uses 1 lb. of clay. She has 20 hr. available to make the cups and plates and has 250 lb. of clay.
   a. What are the variables?
   b. Write inequalities for the constraints.
   c. Graph and shade the solution set.
   d. If she makes a profit of $2 on each cup and $1.50 on each plate, how many of each should she make in order to maximize her profit?
   e. What is her maximum profit?