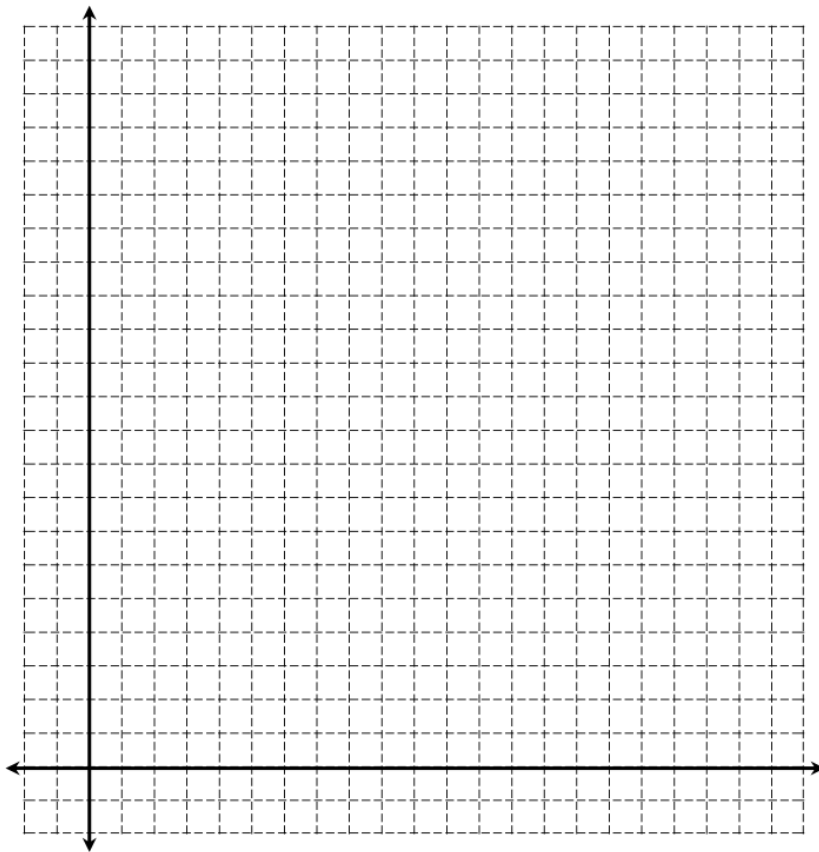Name _____

1. Yawaka manufactures motorcycles and bicycles. They can produce no more than 60 motor-cycles or more than 120 bicycles. The total production of motorcycles and bicycles cannot exceed 160. The profit on a motorcycle is $1340 and the profit on a bicycle is $200. Find the number of each that should be produced in order to maximize profit.

2. The Coffee Peddler has 1440 lb. of Sumatran coffee and 700 lb. of Kona coffee. A batch of Hawaiian Blend requires 8 lb. of Kona and 12 lb. of Sumatran, and yields a profit of $90. A batch of Classic Blend requires 4 lb. of Kona and 16 lb. of Sumatran, and yields a $55 profit. How many batches of each kind should be made in order to maximize profit? What is the maximum profit?
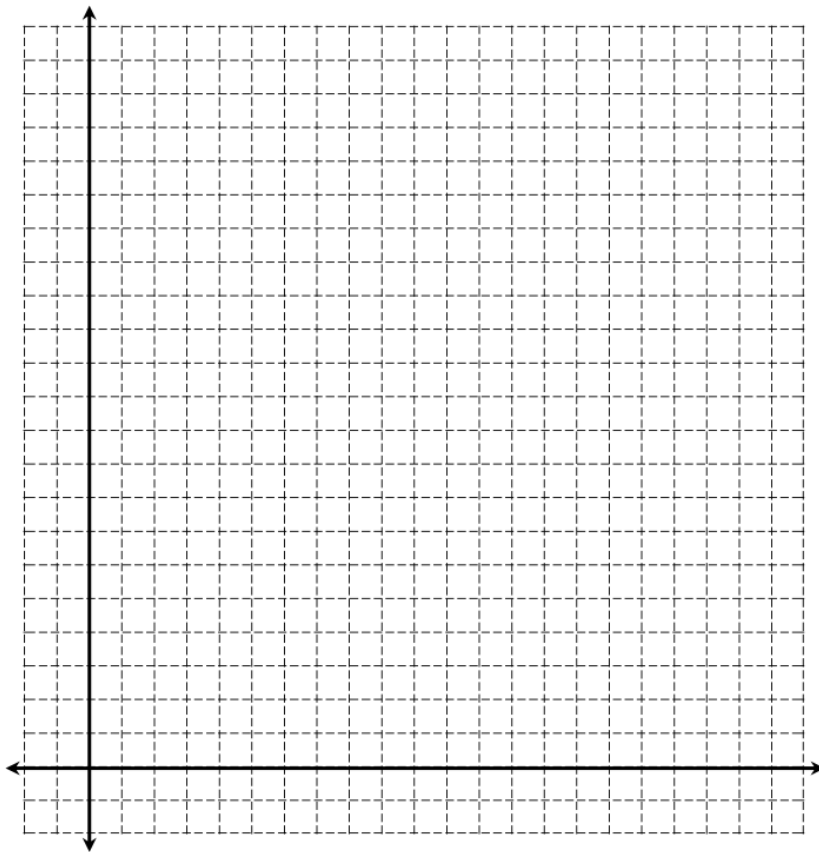
3. John makes regular and deluxe birdhouses. A store has contracted to purchase his birdhouses, up to 8 regular and up to 6 deluxe each day. He will work on them up to 9 hours a day, but it will take him 3/4 hour to make a regular birdhouse and 1 hour to make a deluxe birdhouse. He makes a $10 profit on each regular birdhouse and $16 profit on each deluxe birdhouse. Formulate mathematically the problem of determining how many of each type he should make per day to maximize his profit. Is it feasible for him to make 6 regular and 5 deluxe birdhouses in one day? If so, what is the slack in each constraint?
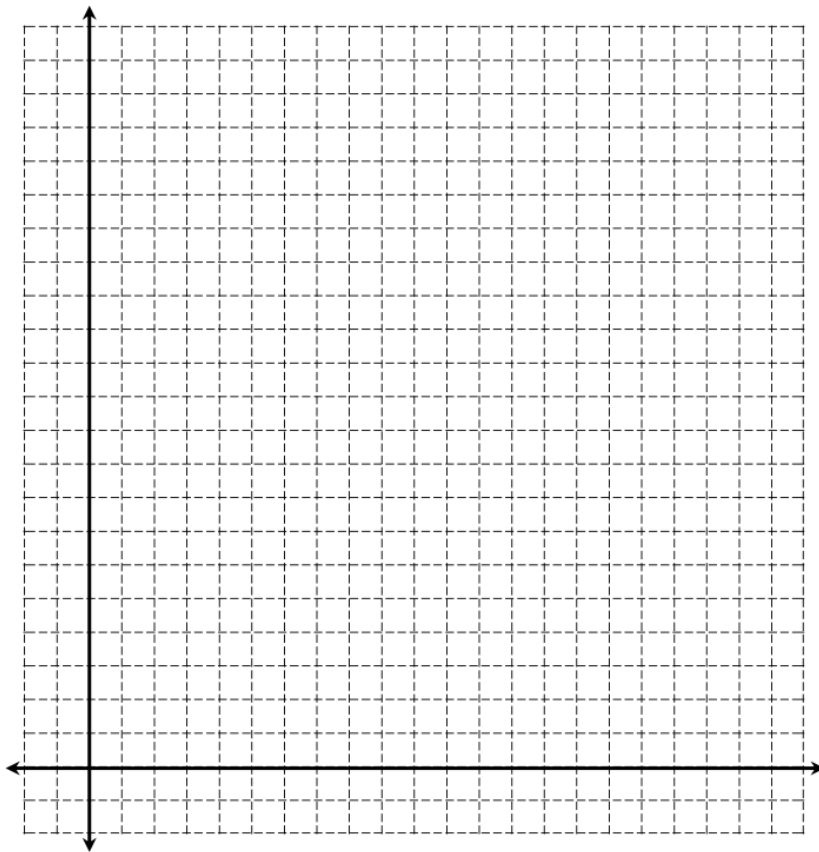
4. A furniture company makes tables and chairs. Each table takes 50 feet of lumber and 3 hours of labor, while each chair takes 20 feet of lumber and 4 hours of labor. On Wednesday, the company has 3300 feet of lumber and staff to provide 380 hours of labor. The company has determined there will be a profit of $60 on each table and $30 on each chair made. Formulate mathematically the problem of determining how many chairs and tables the company should make on Wednesday to maximize its total profit, assuming each item can be made. Is it feasible for the company to make 45 tables and 60 chairs on Wednesday? If so, what is the slack in each constraint?
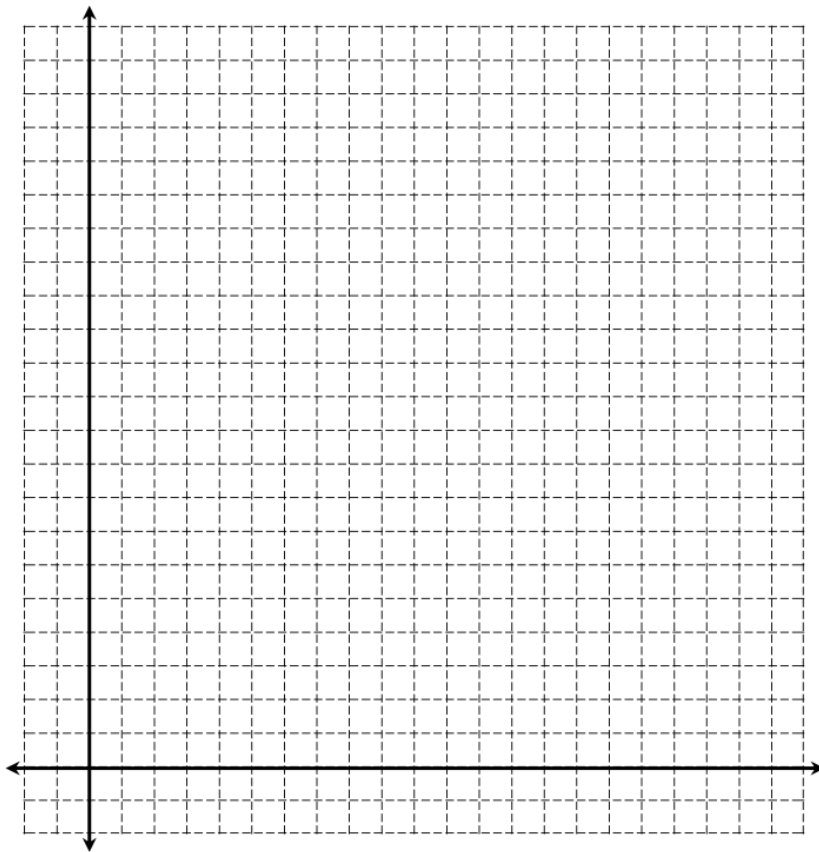
5. A bottler uses pineapple, orange, and grapefruit juice to make two juice mixtures, orange-pineapple and orange-grapefruit. The mixtures are sold in quart bottles, and the bottler makes a profit of $0.50 per bottle on orange-pineapple and $0.40 per bottle on orange-grapefruit. Each juice mixture is made by mixing equal amounts of the two juices in its name. Today, there are 250 gallons of orange juice, 175 gallons of pineapple juice, and 100 gallons of grapefruit juice available. Formulate mathematically the problem of determining how many quart bottles of each juice mixture the bottler should produce today to maximize profit.
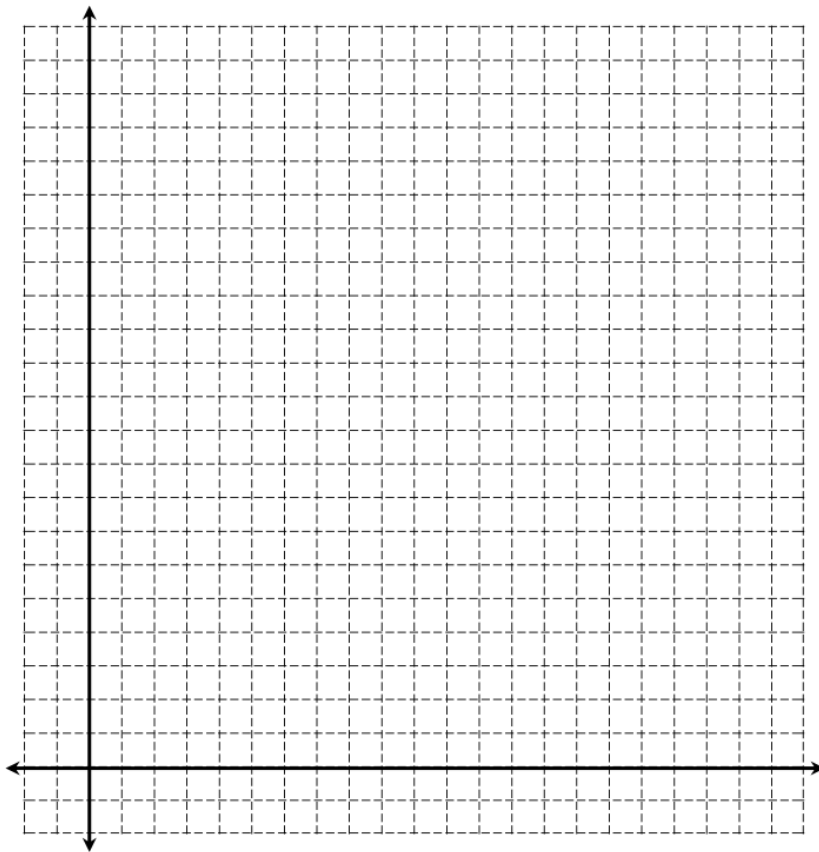
6. A farmer owns a 200-acre farm, and plans to plant oats and/or soybeans on all or part of that land. Oats require 4 lbs. of seed per acre, and soybeans require 5 lbs of seed per acre. He can purchase at most 920 lb. of seed. Oats require 3 workdays per acre, and soybeans require 2 workdays per acre. There are a maximum of 570 workdays available. The farmer will make a profit of $150 per acre on oats and $200 per acre on soybeans. Formulate mathematically the problem of determining how many acres of each crop he should plant to maximize his profit. Is it feasible for the farmer to plant 70 acres of oats and 130 acres of soybeans? If so, what is the slack in each constraint?
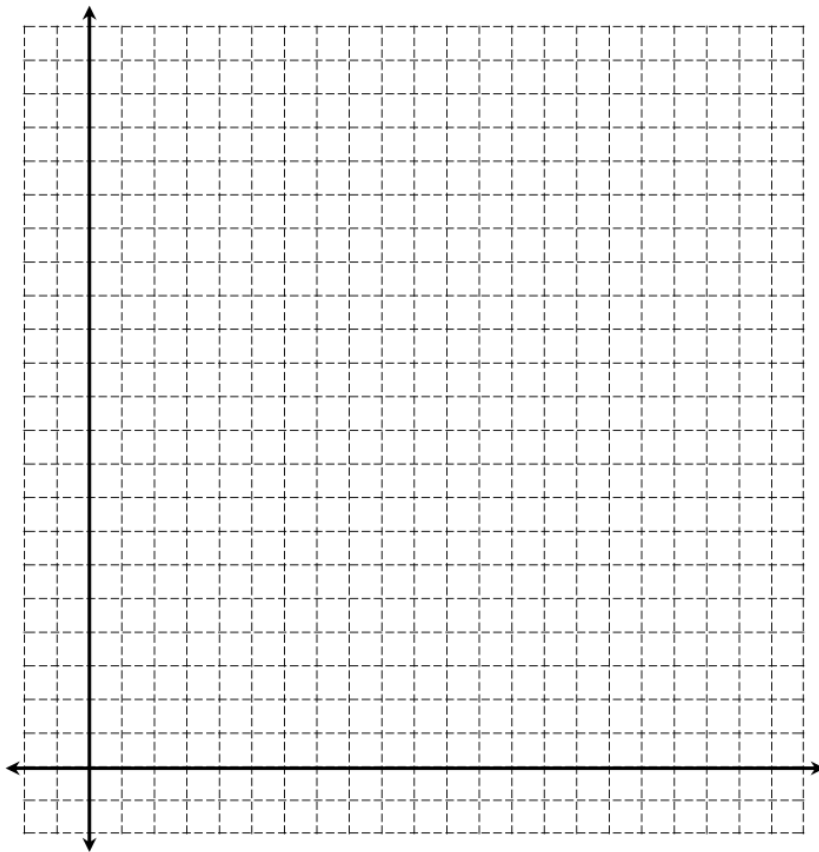
7. The Hockeypuck Biscuit Factory makes two types of biscuits, Biscuit Jumbos and Mitimite Biscuits. The oven can cook at most 200 biscuits per hour. Jumbos require 2 oz. of flour, Mitimites require 1 oz. of flour, and there is at most 1440 oz. of flour available. The income from Jumbos is $1.00 and from Mitimites $0.80. How many of each type of biscuit should be made in an hour in order to maximize income? What is the maximum income?
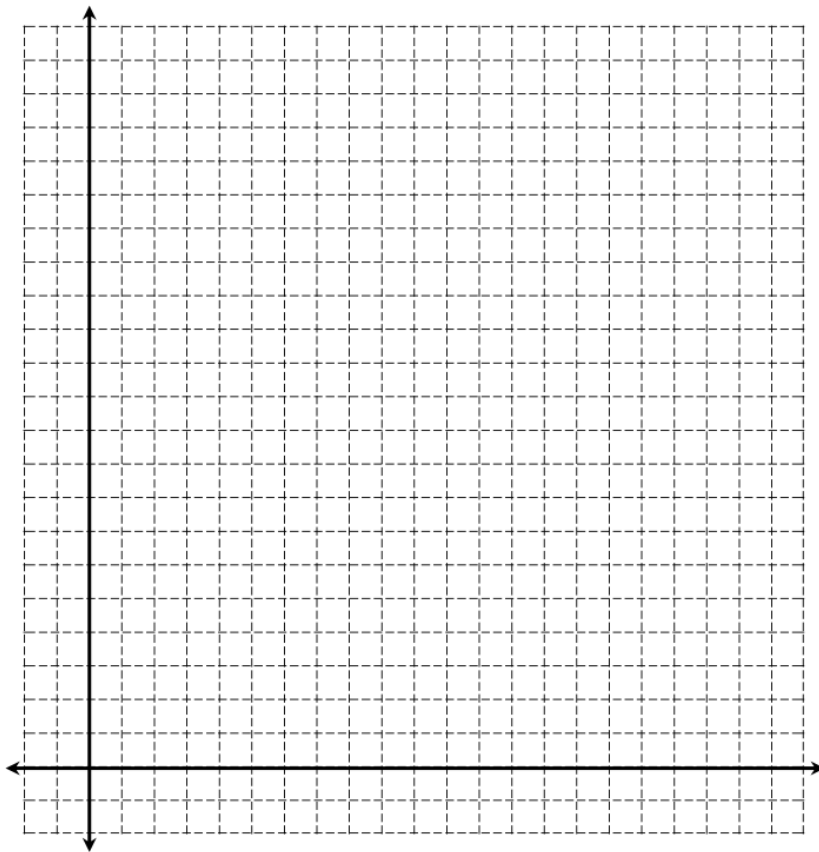
8. It takes Cosmic Stitching 2 hours of cutting and 4 hours of sewing to make a knit suit. To make a worsted suit, it takes 4 hours of cutting and 2 hours of sewing. At most, 20 hours per day are available for cutting and at most 16 hours per day are available for sewing. The profit on a knit suit is $68 and on a worsted suit is $62. How many of each kind of suit should be made in order to maximize profit?