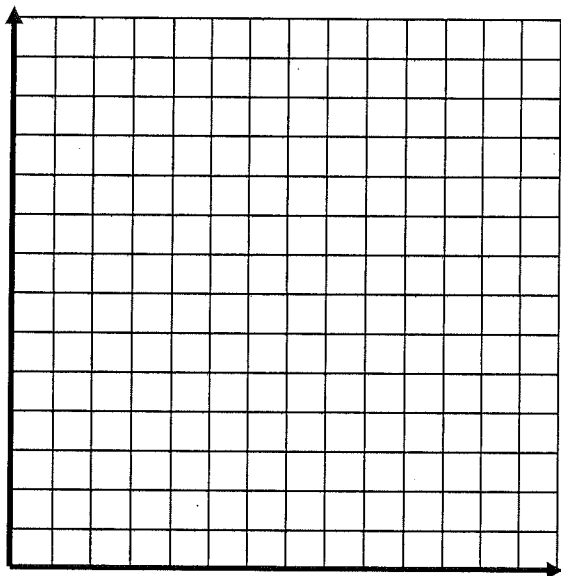
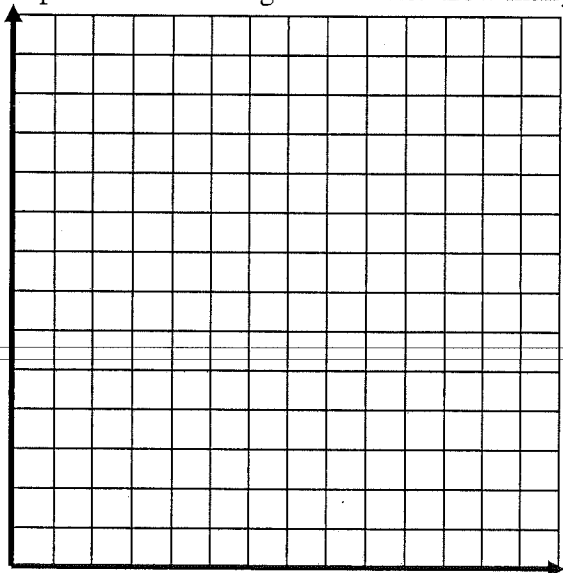


Honors Algebra II
Linear Programming Word Problems Worksheet II

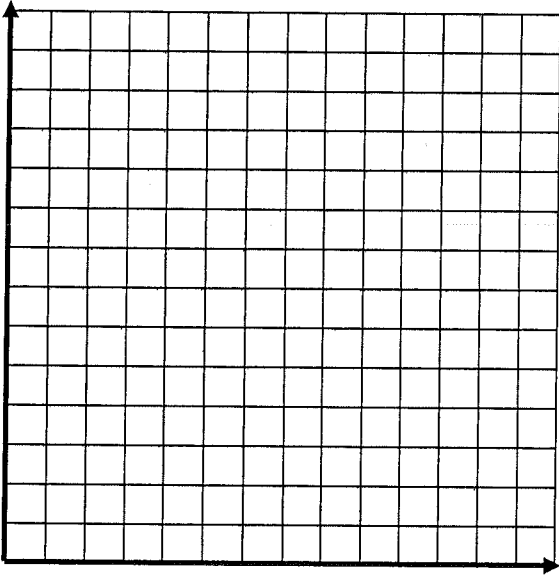
- 1) You need to buy some filing cabinets. You know that Cabinet X costs \$10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs \$20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given \$140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. How many of which model should you buy, in order to maximize storage volume?



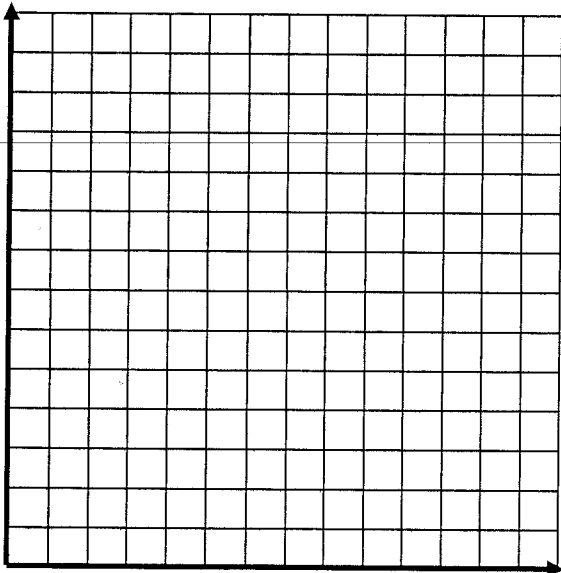
- 2) A snack bar cooks and sells hamburgers and hot dogs during football games. To stay in business, it must sell at least 10 hamburgers but can not cook more than 40. It must also sell at least 30 hot dogs, but can not cook more than 70. The snack bar can not cook more than 90 items total. The profit on a hamburger is 33 cents, and the profit on a hot dog is 21 cents. Low many of each item should it sell to make the maximum profit?



- 3) In order to ensure optimal health (and thus accurate test results), a lab technician needs to feed the rabbits a daily diet containing a minimum of 24 grams (g) of fat, 36 g of carbohydrates, and 4 g of protein. But the rabbits should be fed no more than five ounces of food a day. Rather than order rabbit food that is custom-blended, it is cheaper to order Food X and Food Y, and blend them for an optimal mix. Food X contains 8 g of fat, 12 g of carbohydrates, and 2 g of protein per ounce, and costs \$0.20 per ounce. Food Y contains 12 g of fat, 12 g of carbohydrates, and 1 g of protein per ounce, at a cost of \$0.30 per ounce. What is the optimal blend of Food X and Food Y?

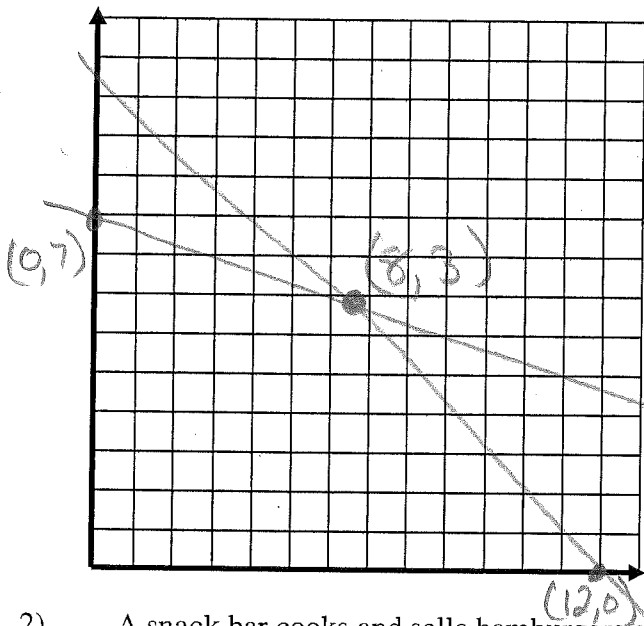


- 4) You are about to take a test that contains questions of type A worth 4 points and type B worth 7 points. You must answer at least 4 of type A and 3 of type B, but time restricts answering more than 10 of either type. In total, you can answer no more than 18. How many of each type of question must you answer, assuming all of your answers are correct, to maximize your score? What is your maximum score?



Honors Algebra II
 Linear Programming Word Problems Worksheet II

- 1) You need to buy some filing cabinets. You know that Cabinet X costs \$10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs \$20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given \$140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. How many of which model should you buy, in order to maximize storage volume?



$$10x + 20y \leq 140 \rightarrow -\frac{1}{2}x + 7$$

$$6x + 8y \leq 72 \rightarrow -\frac{3}{4}x + 9$$

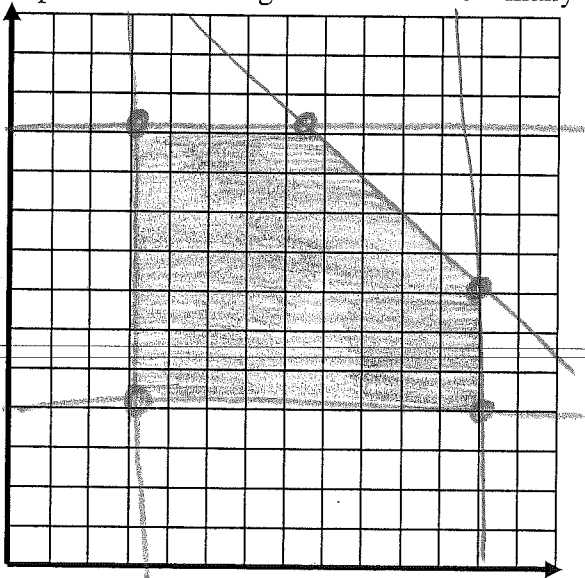
$$8x + 12y = V$$

$$V = 8x + 12y$$

$(0, 7)$
 $(8, 3)$
 $(12, 0)$

$(0, 7): 84$
 $(8, 3) = 100$
 $(12, 0): 96$

- 2) A snack bar cooks and sells hamburgers and hot dogs during football games. To stay in business, it must sell at least 10 hamburgers but can not cook more than 40. It must also sell at least 30 hot dogs, but can not cook more than 70. The snack bar can not cook more than 90 items total. The profit on a hamburger is 33 cents, and the profit on a hot dog is 21 cents. Low many of each item should it sell to make the maximum profit?



x: hamburgers
 y: hot dogs

$$10 \leq x \leq 40$$

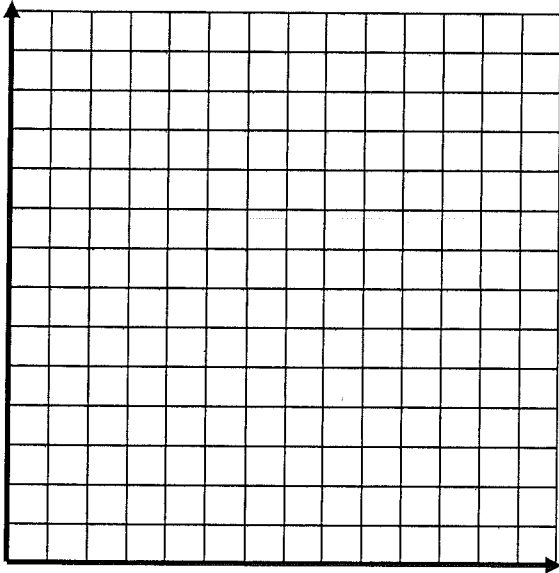
$$30 \leq y \leq 70$$

$$x + y \leq 90 \rightarrow y \leq -x + 90$$

$$P = .33x + .21y$$

$(10, 70)$ $(40, 50)$ $(10, 30)$
 $(20, 70)$ $(40, 30)$

- 3) In order to ensure optimal health (and thus accurate test results), a lab technician needs to feed the rabbits a daily diet containing a minimum of 24 grams (g) of fat, 36 g of carbohydrates, and 4 g of protein. But the rabbits should be fed no more than five ounces of food a day. Rather than order rabbit food that is custom-blended, it is cheaper to order Food X and Food Y, and blend them for an optimal mix. Food X contains 8 g of fat, 12 g of carbohydrates, and 2 g of protein per ounce, and costs \$0.20 per ounce. Food Y contains 12 g of fat, 12 g of carbohydrates, and 1 g of protein per ounce, at a cost of \$0.30 per ounce. What is the optimal blend of Food X and Food Y?



$$8x + 12y \geq 24 : \text{fat} \rightarrow y \geq -\frac{2}{3}x + 2$$

$$12x + 12y \geq 36 : \text{carbs} \rightarrow y \geq -x + 3$$

$$2x + y \geq 4 : \text{protein} \rightarrow y \geq -2x + 4$$

$$x + y \leq 5 : \text{total food} \rightarrow y \leq -x + 5$$

$$P = .2x + .3y$$

$$(0, 4) : 1.2$$

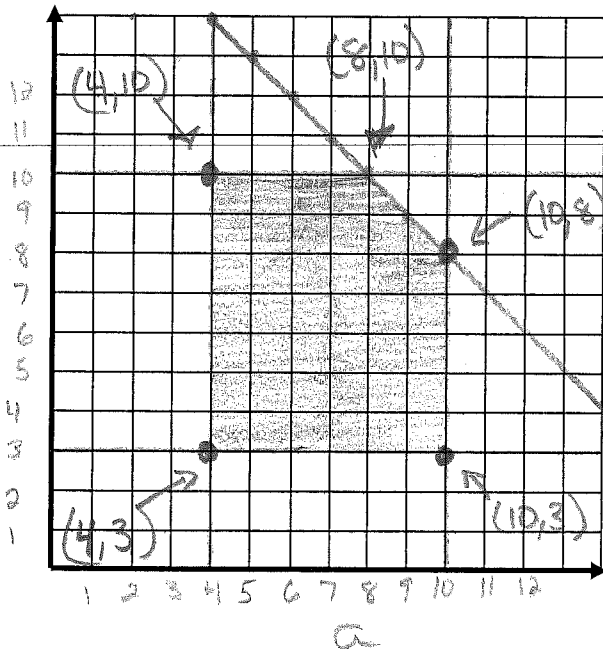
$$(0, 5) : 1.5$$

$$(3, 0) : .6 \rightarrow \text{Min}$$

$$(5, 0) : 1.0$$

$$(1, 2) : .8$$

- 4) You are about to take a test that contains questions of type A worth 4 points and type B worth 7 points. You must answer at least 4 of type A and 3 of type B, but time restricts answering more than 10 of either type. In total, you can answer no more than 18. How many of each type of question must you answer, assuming all of your answers are correct, to maximize your score? What is your maximum score?



$$\text{Objective: Max score} = 4a + 7B$$

$$4 \leq a \leq 10$$

$$3 \leq B \leq 10$$

$$a + B \leq 18 \rightarrow B \leq -a + 18$$

$$(4, 3) : 37$$

$$(4, 10) : 86$$

$$(8, 10) : 102 \leftarrow \text{Max}$$

$$(10, 8) : 96$$

$$(10, 3) : 61$$