

Answer on Question #47800 – Math - Algebra

A farm supply store carries 50-lb bags of both grain pellets and grain mash for pig feed. It can store 600 bags of pig feed. At least twice as many of its customers prefer the mash to the pellets. The store buys the pellets for \$3.75 per bag and sells them for \$6.00. It buys the mash for \$2.50 per bag and sells it for \$4.00. If the store orders no more than \$1,400 worth of pig feed, how many bags of mash should the store order to make the most profit? Need to graph as well.

Solution:

In our problem, we can immediately find the profit on mash and profit on pellets. We know that the store buys the pellets for \$3.75 per bag and sells them for \$6.00, this mean the profit equal to $\$6.00 - \$3.75 = \$2.25$. The profit on pellets is \$2.25. Now we can note the profit on mash, which is equal to $\$4.00 - \$2.50 = \$1.5$.

It should be noted that maximum profit will come when a store provides the consumer demand. This mean if 2 out of three customers want mash, then it is reasonable that maximum profits will be obtained when the store carries 2 bags of mash for every 1 bag of pellets, or $\frac{2}{3}$ of the bags are mash. Applying to our problem we have the total cost is the \$2.50 purchase price times $\frac{2}{3}$ of total bags for mash, plus \$3.75 times $\frac{1}{3}$ of total bags for pellets.

Thus we can construct an equation. Then if x is the number of bags the equation will be

$$2.5 \cdot \frac{2}{3}x + 3.75 \frac{1}{3}x = 1400$$

Simplify our equation by multiplying the equation by 3. We obtained the following.

$$5x + 3.75x = 4200$$

Now we can add terms with x .

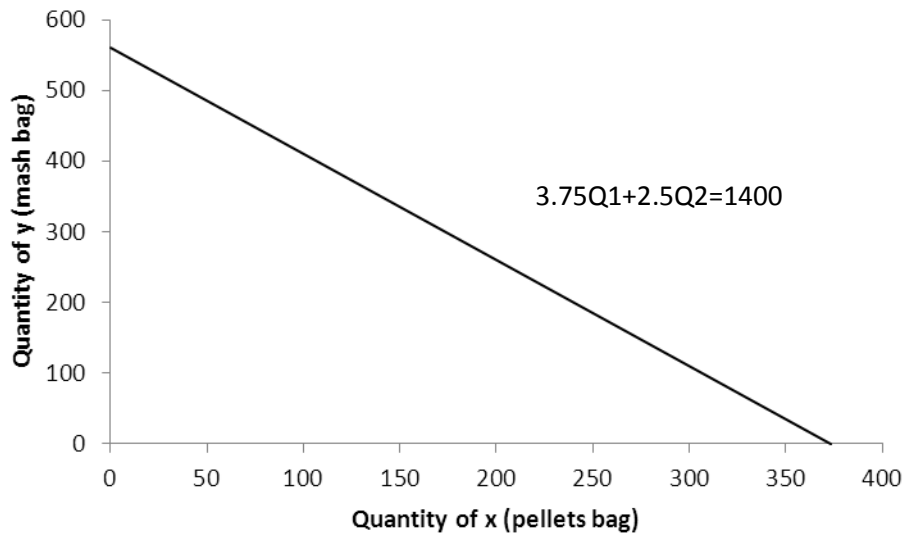
$$8.75x = 4200$$

Now we can find the value of x . We divide both sides of the equation by 8.75 and obtained the following result.

$$x = 480$$

This is the total number of bags to order, as we noted earlier the $\frac{2}{3}$ of the bags should be mash, so they should order $480 \cdot \frac{2}{3} = 320$ bags of mash and $\frac{1}{3} \cdot 480 = 160$ bags of pellets.

As we have noted in the first part of work the profit of each bags, so we can determine in what amount the store can purchase 160 bags of pellets, which will be equal to $160 \cdot \$3.75 = \600 and then we can find in what amount the store can purchase 320 bags of mash, which will be equal to $320 \cdot \$2.5 = \800 .



We use a cost function.

$$C(x) = 3.75x_1 + 2.5x_2$$

In our case the function equal to $3.75x_1 + 2.5x_2 = \$1400$. Then we write a revenue equation.

$$R(x) = p_1x_1 + p_2x_2$$

In our case we have the equation of revenue, which is equal to

$$R(x) = 2.25x_1 + 1.5x_2 = \$840$$

Then the profit is given by the revenue minus the costs. We can write the following.

$$P(x) = R(x) - C(x)$$

We substitute into the formula value of cost and revenue and subtract. Thus we obtained the following result.

$$P(x) = 1.5x_1 + x_2 = \$560$$