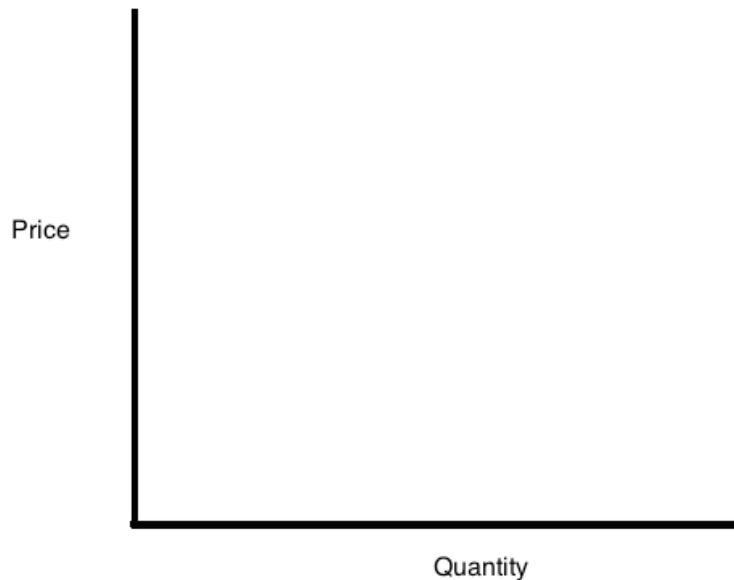


On Dollar Dog night at Citizens Bank Park, Philadelphia Phillies Phans buy 60,000 hot dogs. On a normal night, hot dogs cost \$4 and 15,000 are purchased. This data reveals the Law of Demand: that people will buy more when the price is less. Plot the two points on the graph below. If we assume that demand of hot dogs is linear, we can find the equation of the line between those two points, which will give us an equation for demand. (hint: points are (15,000 , 4) and (60,000 , 1))



1. Find the equation of the Demand for hot dogs.
2. If the Phillies gave hot dogs away for free, how many hot dogs would they give away?
3. How many hot dogs will people buy if the price is \$2?
4. At what price will no one buy any hot dogs?

## Create a Business

**What is your product?** Your product must incorporate a hobby from each person in your group.

**What is the demand for your product?** The demand curve for a product is a relationship between price and quantity sold. To determine the demand curve (actually a line:  $P = mQ + b$ ) for your product, you need two “points” ( $Q, P$ ) that represent the price and quantity relationship. To determine these points, first decide upon the price at which you will sell none of your product. Call this the sell none price and label it the point  $(0, P)$ . Next, determine the quantity you would sell if your price was zero; call this point  $(Q, 0)$ .

Now, create a demand curve by calculating the equation of the line through those two points.

**How much money will your business bring in?** Revenue is the total amount of money your business collects from customers. It is calculated by multiplying the price of the product by the quantity sold ( $R = P \cdot Q$ ). Note that your demand curve (found above) is a linear relationship between **Price** and **Quantity**. So, if  $R = P \cdot Q$  and  $P = mQ + b$ , then  $R = (mQ + b)Q$ .

Determine an equation for Revenue in terms of **Quantity** sold.

**How much money will it cost your company to produce?** There are two components of cost: fixed and variable. First determine how much it will cost to start your business, no matter how much you create. Be sure to include any machines that will be used for production. Next, determine how much it will cost to produce each product. Create a linear equation for **Cost** using the variable cost as the slope and fixed cost as the intercept.

**How much profit will you make?** Profit is Revenue minus Cost. Combine your earlier equations to generate a profit function with **Quantity** as your independent variable (Use \$ as the variable name, since P is already used for price). Your function should look like a quadratic equation. Use it to answer the following questions:

1. How much should your company produce to maximize profit?
2. How much should you sell your product for in order to maximize profit? (hint: Use the Demand Curve)

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Credit Card Offer:

Offer 1:

2% for 15 months, then 16%

Offer 2:

0% for 12 months, then 16%