**Activity: Maximizing Revenue and Profit**

Your school is trying to boost interest in its athletic program. It has decided to sell a pass that will allow the holder to attend all athletic events at the school. The 800 families in the community were surveyed and asked the question, “What is the most you would pay for an all-sports season pass?”[It was assumed that if you were willing to pay a given amount, you would also be willing to pay less than that.] Here are the survey results.

|  |  |  |  |
| --- | --- | --- | --- |
| **Maximum Price** | **Number Who Chose** | **Number Willing** | **Revenue** |
| $50 | 145 | 765 |  |
| $75 | 80 | 620 |  |
| $90 | 45 | 540 |  |
| $100 | 85 | 495 |  |
| $115 | 120 | 410 |  |
| $135 | 80 | 290 |  |
| $150 | 160 | 210 |  |
| $175 | 50 | 50 |  |

1. How can you determine the revenue at each price? Explain how fill in the last column of the table.
2. Make a scatter plot of the revenue versus the price. Label your axes with appropriate units
3. Find a quadratic equation that fits the data in the scatter plot, this is your revenue function R(x). Graph this function both on your calculator and sketch it over the scatterplot of #2. Label this curve R(x).

R(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Using your model from #3, find the prices of the season pass that produces the maximum revenue. How does this compare to the data collected, explain.
2. The cost of the sporting events to the school is also a function of the price of the season pass. Suppose C(x) is a cost function such that. Graph this function on the same set axes as your revenue function R(x) in your calculator and sketch the curve on the scatterplot created for #2, label this curve C(x). What do you notice about the two graphs?
3. Using your graph, explain in words when the school makes a profit?
4. Specifically for this situation, at what price(s) will the school make a profit? (Determine graphically)
5. Find the Profit function in simplified format. Graph this function on the same set of axes as your revenue and cost functions.

P(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Determine graphically were P(x) = 0. How do these values relate to the values you found in #7? Explain.
2. What price would produce the maximum profit for the school? Is this the same price that would produce the maximum revenue? Why or why not?