In[ ]:=

Tupper High

The football team at the Tupper High School is trying to raise money to support their program by selling a season ticket that will allow someone to attend all football games at the school for one year. The captains of the football teams are trying to decide the best price for a full season ticket. Some captains are suggesting that the team set the price low, believing that a low price would bring a large response. Others want to set a high price, thinking if not many tickets are sold, the team will still make money. The students decided to ask the parents of the student body what price they would be willing to pay for a season ticket to the football games. The captains assume the parents would want the sale to be a success and have provided accurate information. The survey was sent to all of the 914 families of students in the school.

The question was “What is the most that you would be willing to pay for a football season ticket for the school year?”

The results are shown below. From this information, determine the best price for a full season ticket.

Max price ($)	55	80	95	100	120	135	155	180
Expected ticket sales	140	85	45	90	115	80	65	155

In[ ]:=

In[ ]:=

My Start

The Data

In[ ]:=
```
price = {55, 80, 95, 100, 120, 135, 155, 180};
```

In[ ]:=
```
sales = {140, 85, 45, 90, 115, 80, 65, 155};
```

In[ ]:=
```
list1 = Transpose[{price, sales}];
```

In[ ]:=
```
Text[Grid[Prepend[list1, {"price", "sales"}],
  Alignment → Center, Dividers → {2 → True, 2 → True}, Spacings → {1, 1}]]
```

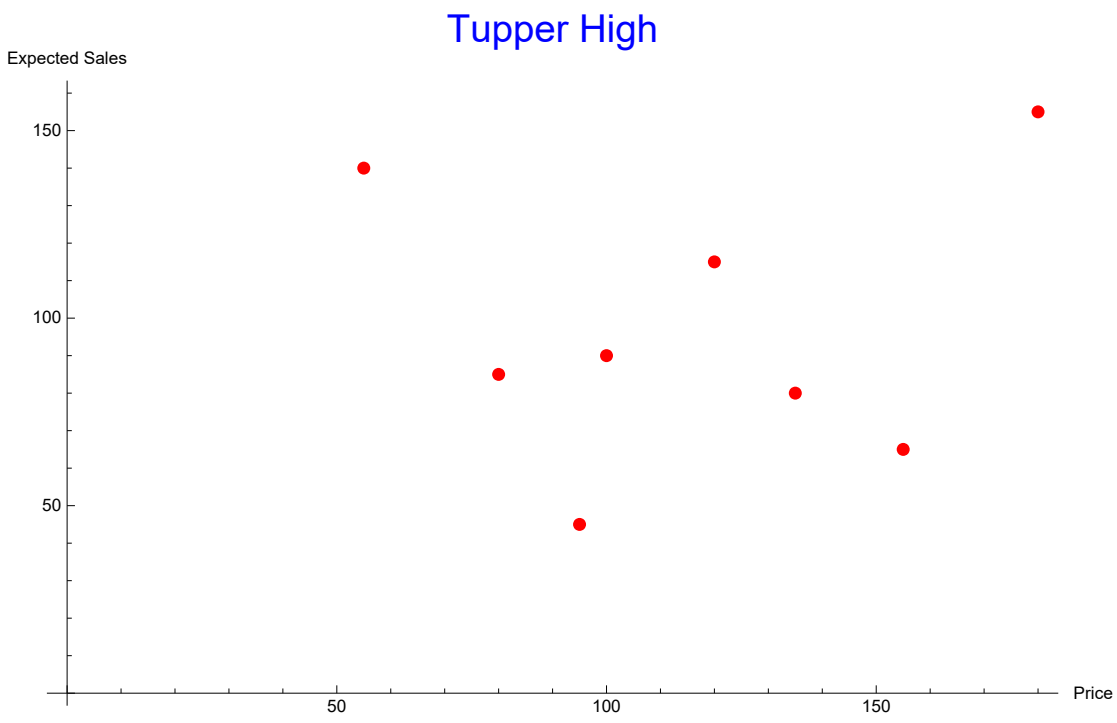
Out[ ]=

price	sales
55	140
80	85
95	45
100	90
120	115
135	80
155	65
180	155

A List Plot

In[ ]:=
```
lp1 = ListPlot[list1, AxesLabel → {"Price", "Expected Sales"},
  ImageSize → Large, PlotStyle → {Red, Point},
  AxesOrigin → {0, 0}, PlotLabel → Style["Tupper High", 20, Blue]]
```

Out[ ]=



In[ ]:=

A Curve of Best Fit

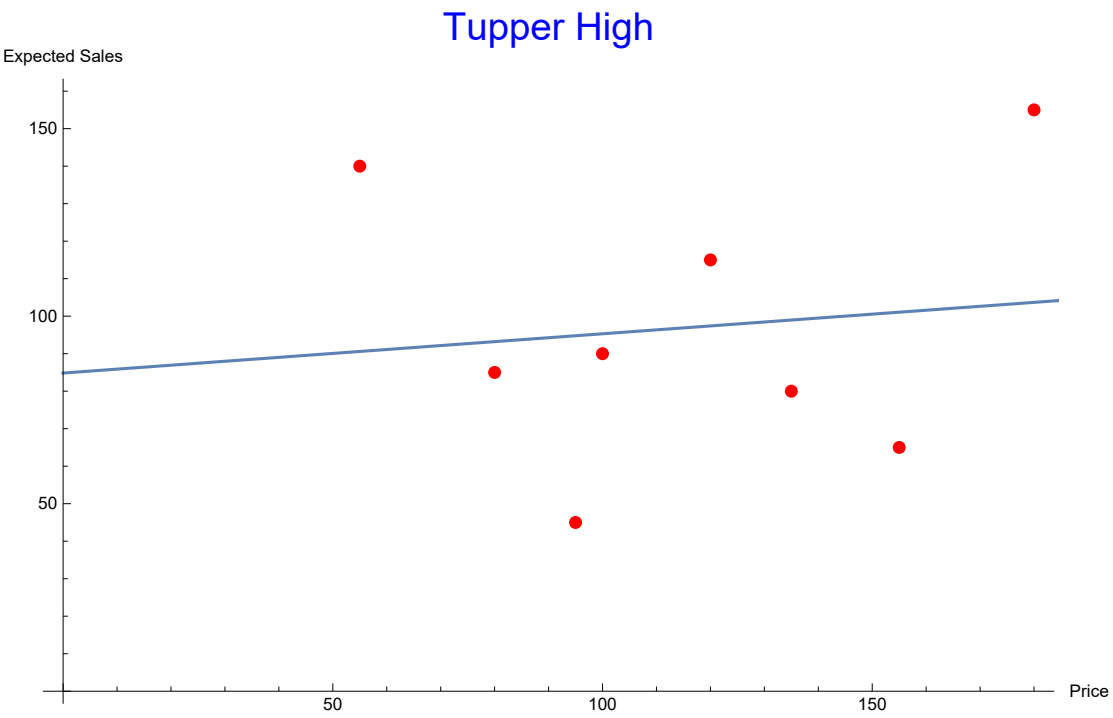
In[ ]:=
```
l1 = Fit[list1, {1, x}, x]
```

Out[ ]= $84.8344 + 0.104701\,x$

In[ ]:=
```
p1 = Plot[l1, {x, 0, 200}];
```

In[ ]:=
```
Show[ lp1, p1 ]
```

Out[ ]=



Expected Sales

```
In[ ]:= salesr = Reverse[sales]
Out[ ]= {155, 65, 80, 115, 90, 45, 85, 140}

In[ ]:= salesa = Accumulate[salesr]
Out[ ]= {155, 220, 300, 415, 505, 550, 635, 775}

In[ ]:= sales2 = Reverse[salesa]
Out[ ]= {775, 635, 550, 505, 415, 300, 220, 155}

In[ ]:= list2 = Transpose[{price, sales2}]
Out[ ]= {{55, 775}, {80, 635}, {95, 550}, {100, 505}, {120, 415}, {135, 300}, {155, 220}, {180, 155}}

In[ ]:= Text[Grid[Prepend[list2, {"price", "expected sales"}],
    Alignment → Center, Dividers → {2 → True, 2 → True}, Spacings → {1, 1}]]
```

Out[ ]=

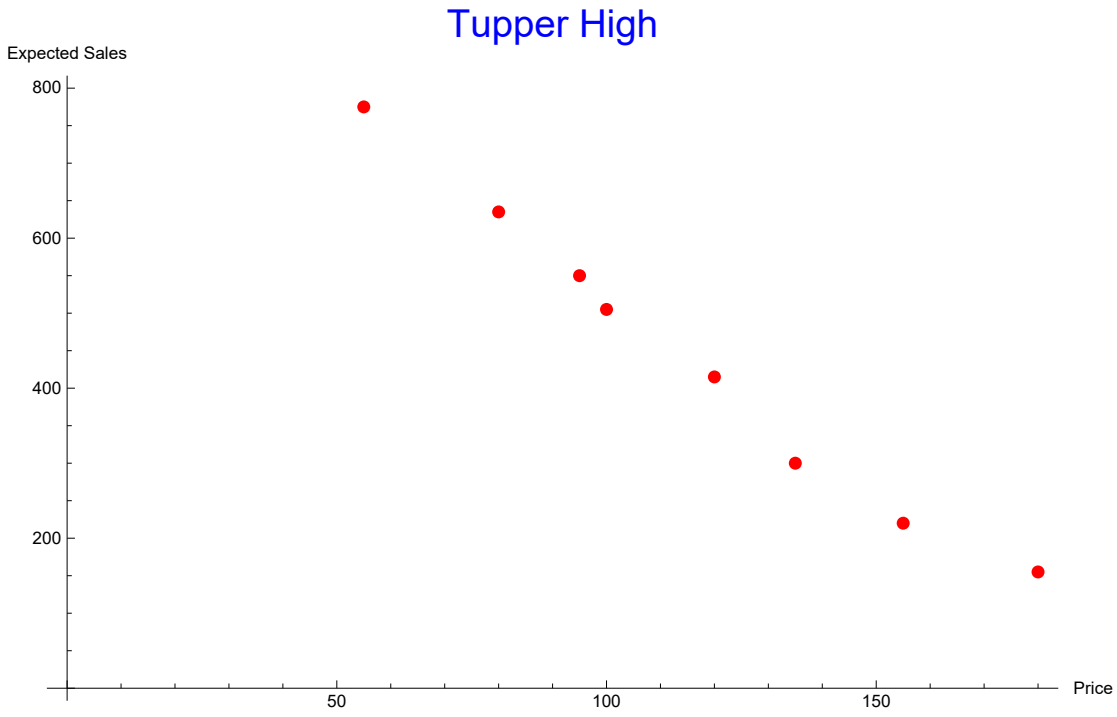
price	expected sales
55	775
80	635
95	550
100	505
120	415
135	300
155	220
180	155

A List Plot

```
In[ ]:= A List Plot
Out[ ]= A List Plot
```

In[ ]:=
```
lp2 = ListPlot[list2, AxesLabel → {"Price", "Expected Sales"},
  ImageSize → Large, PlotStyle → {Red, Point},
  AxesOrigin → {0, 0}, PlotLabel → Style["Tupper High", 20, Blue]]
```

Out[ ]=



Curve of Best Fit

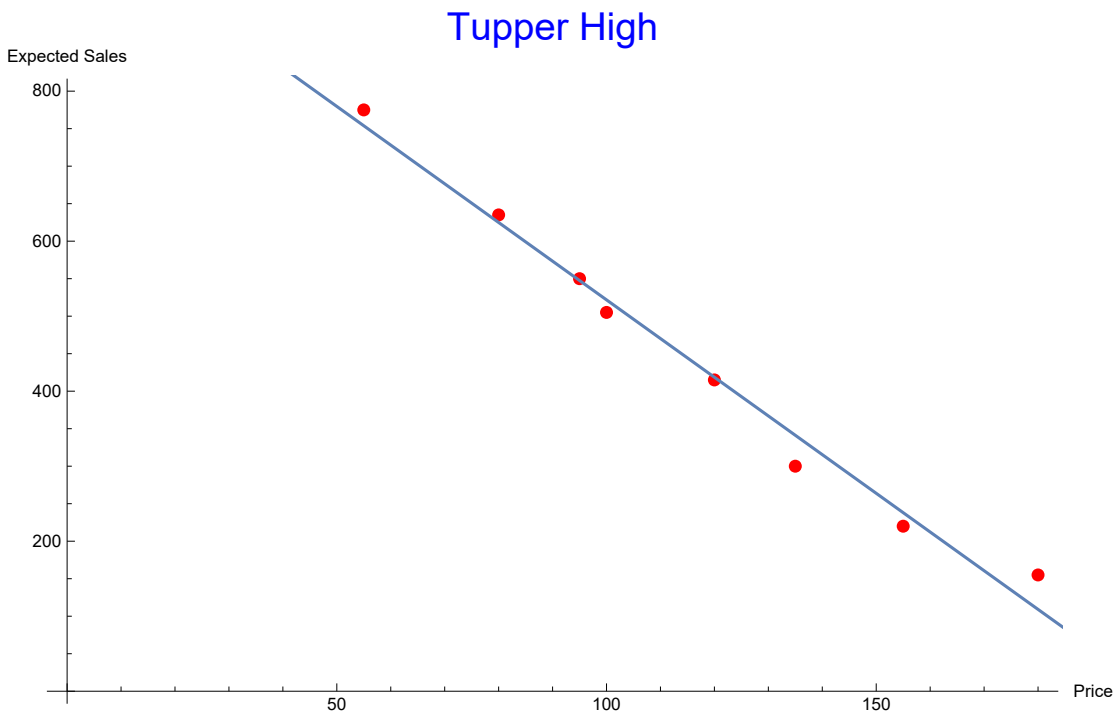
In[ ]:=
```
l2 = Fit[list2, {1, x}, x]
```

Out[ ]=
$$1037.56 - 5.15812\,x$$

In[ ]:=
```
p2 = Plot[l2, {x, 0, 200}];
```

In[ ]:=
```
Show[lp2, p2]
```

Out[ ]=



Revenue

In[ ]:=
```
revenue = price * sales2
```

Out[ ]=
```
{42 625, 50 800, 52 250, 50 500, 49 800, 40 500, 34 100, 27 900}
```

In[ ]:=
```
list3 = Transpose[{price, revenue}]
```

Out[ ]=
```
{{55, 42 625}, {80, 50 800}, {95, 52 250}, {100, 50 500},
 {120, 49 800}, {135, 40 500}, {155, 34 100}, {180, 27 900}}
```

In[ ]:=
```
Text[Grid[Prepend[list3, {"price", "revenue"}],
  Alignment → Center, Dividers → {2 → True, 2 → True}, Spacings → {1, 1}]]
```

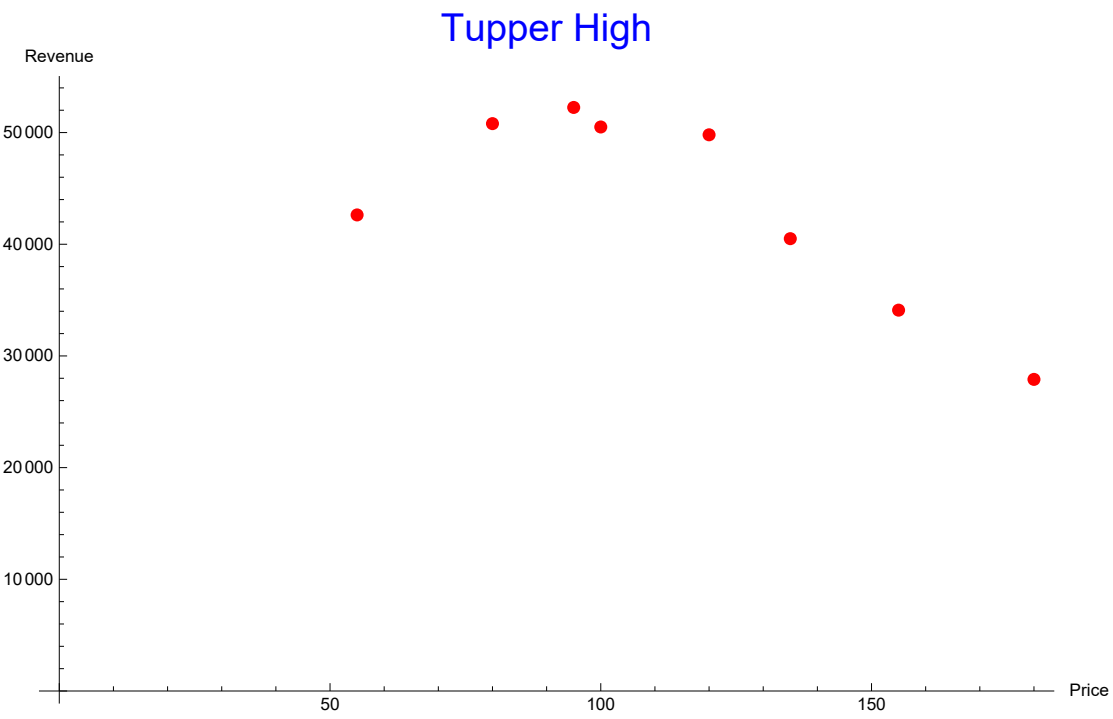
Out[ ]=

price	revenue
55	42 625
80	50 800
95	52 250
100	50 500
120	49 800
135	40 500
155	34 100
180	27 900

A List Plot

```
In[ ]:= lp3 = ListPlot[list3, AxesLabel → {"Price", "Revenue"},
          ImageSize → Large, PlotStyle → {Red, Point},
          AxesOrigin → {0, 0}, PlotLabel → Style["Tupper High", 20, Blue]]
```

Out[ ]=



Curve of Best Fit

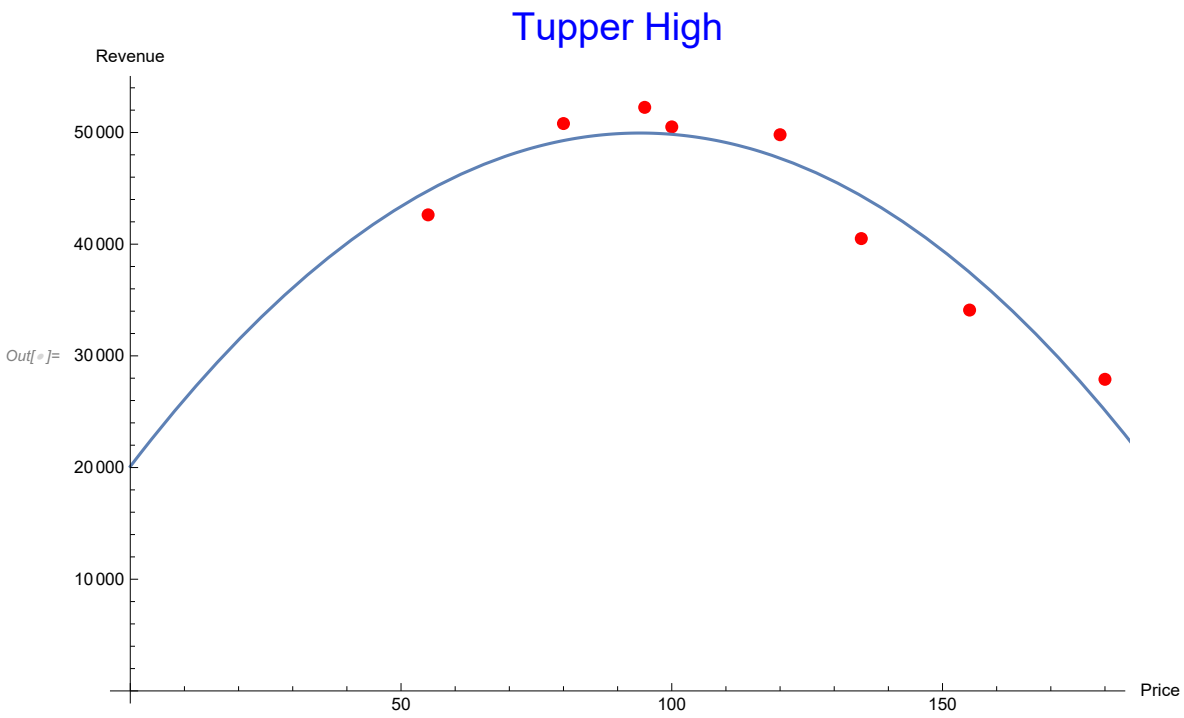
```
In[ ]:= l3 = Fit[list3, {1, x, x^2}, x]
```

Out[ ]= $20\,096.9 + 634.213\,x - 3.36831\,x^2$

```
In[ ]:= p3 = Plot[l3, {x, 0, 200}];
```

In[ ]:= **Show[lp3, p3]**

Out[ ]=



In[ ]:= **max = Maximize[l3, x]**

Out[ ]= {49 950.6, {x → 94.1441}}

Conclusion

I would set the price at $95. Despite the line of best fit saying that the vertex is at about $94.14, the revenue at that price is a little less than the estimated revenue of $95. $95 is also a good price because it is at a value that won't create much change when someone is buying the ticket.

There were some people who didn't respond to the survey but enough of school responded to represent what the majority of the people responded. It would also be safer to assume that they would want to spend less money on the ticket because they might have not cared enough to do the survey.