Binomial Products—Sales and Profits

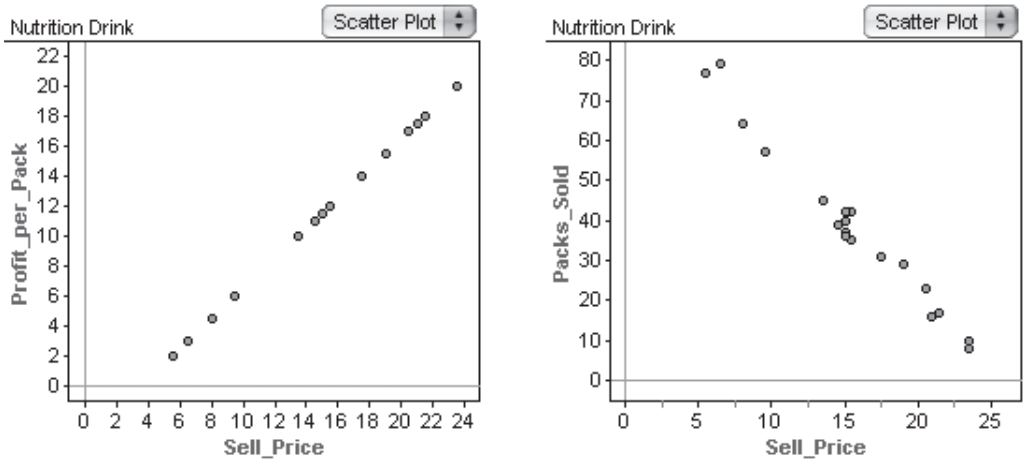
You have developed a great-tasting nutrition drink. You sell it in 12-packs to 20 retail markets in your area. Some of the discount stores resell the 12-packs at a low price so as to sell a large number of packs. Some health clubs sell drinks individually at a high price and sell only a few packs. You have decided to sell your own product at a local festival, but you need to choose a price.

Q1 Is it better to sell many drinks at a low price or a few at a high price? Explain your ideas.

Test your opinions by collecting data on last month's sales at each outlet.

INVESTIGATE

1. Open the Fathom document **Sales.ftm**. You will find a case table of the selling price per pack from each outlet, the profit they made on each pack, and the total sales for the previous month. You can start your research by looking for any patterns in these values. Create scatter plots for *Sell_Price* versus *Profit_per_Pack* and *Sell_Price* versus *Packs_Sold.*



2. Find the best line of fit modeling each of these graphs.

Q2 What model did you use for the first graph? What can you learn from its intercepts with the axes?

Q3 Give the model for the second graph and explain what the slope in this model tells you.

Q4 How would you calculate how much money Albert's Market made from this product last month?

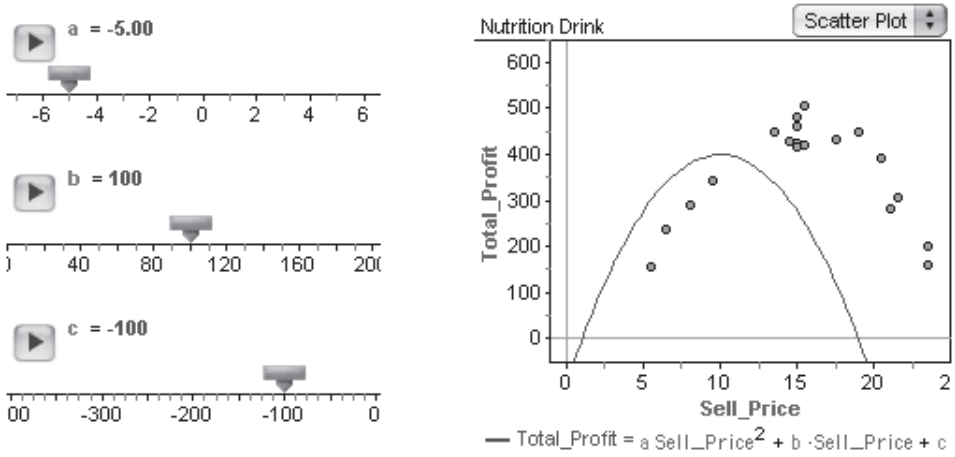
Nutrition Drink

	Outlet	Sell_Price	Profit_per_Pack	Packs_Sold
1	Albert's Market	13.5	10	45

3. What you want to know is which stores made the most money. Add a new attribute in the case table with a name like *Total_Profit* and enter a formula to calculate this value.

Q5 What formula did you use? Which outlet made the greatest profit?

4. Because the best price according to the model may not be one of the prices any outlet charged, you will want to look for a formula. Create a third graph to study how profit relates to the selling price. Use sliders to help you find a model to fit these data.



Q6 What model did you find to fit these data? According to that model, what price should you charge at the festival, and what profit will you receive?

Now that you have solved the problem one way, you wonder whether using algebra can give you a solution without using sliders. You decide to compare the three graphs.

Q7 What are the horizontal intercepts of the three models? Explain any patterns you see.

Q8 Multiply the right sides of your answers to Q2 and Q3. Explain any patterns you see.

Q9 How could you have found the model for *Sell_Price* as a function of *Total_Profit* without sliders? What solution would you have gotten?

EXPLORE MORE

1. You have decided to go into the vegetable-growing business. You plant carrots. When these carrots are young, they are very sweet, but they get less tasty as they continue to grow in size. Each day you leave them in the field, they increase in size. Create a case table for the collection Carrots (scroll down in the Fathom document **Sales.ftm**) and use what you have learned to find the best day to harvest your crop for the highest profit. The values given are based on previous years and are only good approximations of this year's crop. A function for *Profit* in terms of *Time* will help you find the best theoretical values.
2. Explore the Walleye data (also in **Sales.ftm**) to determine for the fishery the best age at which to sell fish to make the highest profit.