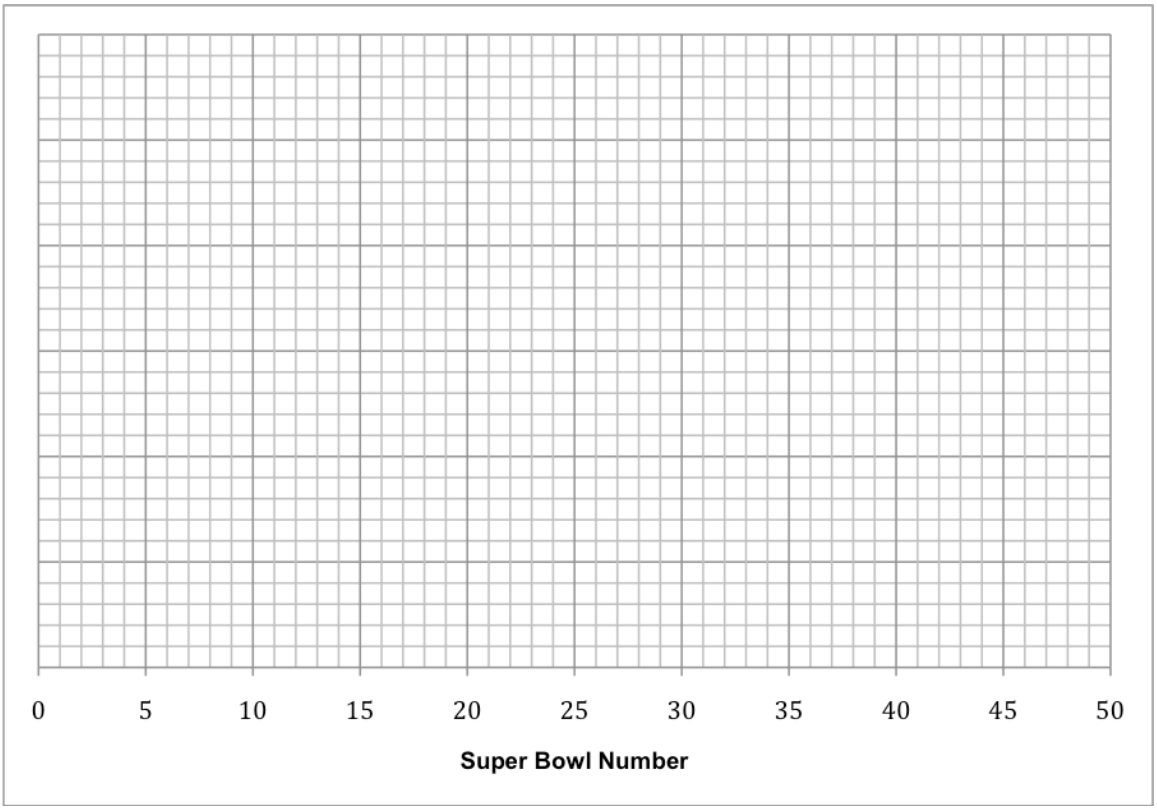
Bowl number	Cost of 30-second ad
1	$40,000
2	$54,000
3	$67,500
4	$78,200
5	$72,000
6	$86,000
7	$103,500
8	$107,000
9	$110,000
10	$125,000
11	$162,000
12	$185,000
13	$222,000
14	$275,000
15	$324,300
16	$345,000
17	$400,000
18	$450,000
19	$500,000
20	$550,000
21	$575,000
22	$600,000
23	$675,000
24	$700,000
25	$800,000
26	$800,000
27	$850,000
28	$900,000
29	$1,000,000
30	$1,100,000
31	$1,200,000
32	$1,300,000
33	$1,600,000
34	$2,100,000
35	$2,050,000
36	$1,900,000
37	$2,100,000
38	$2,250,000
39	$2,400,000
40	$2,500,000
41	$2,600,000
42	$2,700,000
43	$3,000,000
44	$2,800,000
45	$3,000,000
46	$3,500,000

Super Bowl commercial: So expensive!

Experts are predicting that 78% of the people in the U.S. plan to watch the Super Bowl this year. With all those people watching, the value of commercial time is very expensive. The table to the left shows the cost of a 30-second Super Bowl ad each year since 1967. Create a scatter plot of the data on the grid below. When creating a scatter plot you do not connect the data points with lines as you might do with a line graph. Make sure to be careful setting up the scale for the y-axis.



1. How has the cost of a 30-second Super Bowl commercial grown over time? Describe this in detail. Has it increased or decreased? Has it grown at a constant rate of change?

2. Try to draw a smooth curve that models the cost of an ad over time. It should go through many of the data points, but may not go through all of the data points. It should be a good model of how the cost is growing over time and be usable to make future predictions.

You should have noticed that the cost of a Super Bowl ad has not grown linearly. The cost may have grown somewhat ***exponentially***. This means that we can multiply by the same value year after year to find the cost of the following year's ad. To determine whether this is true, simply divide an ad cost by the cost from the year before.

For example, I will divide Super Bowl 41's ad cost by Super Bowl 40's cost:

$2,600,000/$2,500,000 = 1.04

This means that I should be able to multiply $2,500,000 by 1.04 and get $2,600,000.

Go ahead and try that out.

3. As a group or as a class, try to find the quotient between each year of Super Bowl ads. Write these quotients to the right of the table on the first page. You should put the values to the right and between the two years that you computed with. These values represent the number that we multiply by to get to the following year's cost of a Super Bowl ad.

4. What does the typical quotient look like? Can you find an average?

This average value can represent a rough estimate of what we multiply by to get future ad costs. When we multiply by this value over and over again to find the next ad cost we refer to it as the ***growth factor***. If you found that the typical quotient is 1.12, which means that typically the Super Bowl cost increases by 12% per year and that our average growth factor is roughly 1.12.

5. What has your class determined as the typical **quotient/growth factor**? In real life situation between two factors that seem to be changing exponentially you might not have a consistent growth factor. But, we can use a rough estimate of the growth factor as a model.

6. Use your typical growth factor to find the potential cost of a 30-second ad during the next three Super Bowls. For example, if your typical growth factor is 1.12, then multiply the last Super Bowl cost by 1.12 to find the potential cost of an ad during Super Bowl 47. Repeat this process until you have potential ad costs for Super Bowls 48 and 49.

7. Graph your potential Super Bowl ad costs for these three Super Bowls on your graph. Do they seem to fit in with the trend?

Actually, we could find a more accurate average growth factor by using just the initial and final values of this exponential growth relationship. (You could use any two values of an exponential growth situation.) a. Decide how many growth intervals have occurred between the two values and let that = n. In our example there have been 45 intervals between the 1st year of a Super Bowl game and the 46th year of the Super Bowl. b. Divide the final value ($3,500,000) by the original value ($40,000) to find out, in total, how much the initial value has been increased. c. Do the math and see what a better average growth factor calculation might have been.

8. Does it seem realistic that a cost of a Super Bowl ad will continue to grow at this rate? Explain.

Extension: Can you find an exponential equation that gives the cost for a Super Bowl ad for any number Super Bowl?

According to your model, can you predict when a 30-second Super Bowl ad will cost one billion dollars?

Did you know that you could use a graphing calculator or Microsoft Excel to create a scatter plot of the data and to find an exponential equation that models the data?

Source: http//adage.com/images/random/0109/sb-historical-cosofads012709.pdf