TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION

Southern Nevada Regional Professional Development Program
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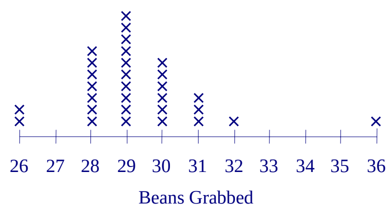
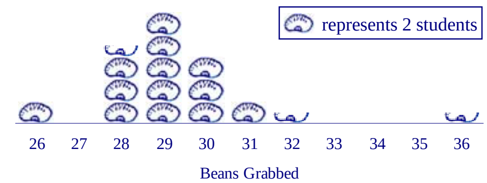
We continue our discussion from the October and November 2003 issues about ways to represent numerical data. So far, we've looked at two: the line plot and the pictograph. In this issue of *Take It to the MAT*, we'll look at them in more depth and address some of their drawbacks.

Beans Grabbed	Number of Students
26	2
27	0
28	7
29	10
30	6
31	2
32	1
33	0
34	0
35	0
36	1

As we saw last time, the line plot has some problems. While it's a good "build-as-you-go" graph and can be quickly made to see the distribution of the data, it's inefficient for large numbers of observations. Instead of creating the line plot shown for one class of 30 students, imagine doing a school of several hundred! Also, if we wanted to know how many students grabbed 29 beans, we would have to count the x's, perhaps a lot of them.



The pictograph is an alternative to the line plot, but would need to be constructed after the data is collected. If the data were organized in a *frequency table*, one could easily create a pictograph from it. The frequency table and pictograph that correspond to the line plot are shown at right.

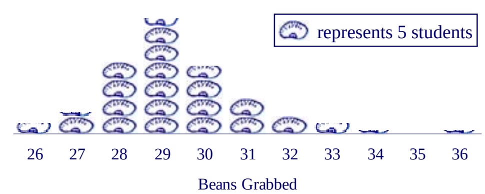


What if we had a large number of observations? Consider the second frequency table that contains one hundred observations. Making a pictograph with bean symbols that represent two students would be silly. There were thirty-two kids that grabbed 29 beans; it would require sixteen symbols to represent this. We're back to the same problem that we had with the line plot—having to do too much counting to read the graph.

Beans Grabbed	Number of Students
26	3
27	6
28	20
29	32
30	19
31	10
32	5
33	3
34	1
35	0
36	1

The solution is to change the scale, that is, make each symbol worth something larger than two—perhaps four, five, or ten. The question that remains is how to represent the fractions of beans. For instance, if four is to be the quantity represented by our symbol, should represent one-fourth or should ? If we use ten as our benchmark, one-tenth of a bean ( ) will be very small indeed. A pictograph where each bean represents five students is shown below.

Looking at the graph, how many kids grabbed 29 beans? Is it thirty-two or thirty-three? Determining what fraction of a bean is at the top of the 29 stack is difficult. What's needed is a little perspective.



If we have one hundred observations, one or two aren't as significant when compared to the whole as they would be with only 20 or 30 observations. The purpose of the graph, after all, is to display the distribution of the data in a clear, concise way. The graph clearly shows that more students grabbed 29 beans than any other number. The distribution is fairly symmetrical and there is still that one kid at 36 beans. If we really want the detail of knowing there are exactly thirty-two students who grabbed 29 beans, we can give that in a table. The graph gives us the big picture; the table gives us the details.

Next time, bar graphs.