Math Teacher Notes

Unit One: Math Lesson 2

Students should understand that convenience sampling and voluntary response sampling will not yield good data from which to draw conclusions about a population, because the data set will not fairly represent the make-up of the entire population. It is important to reinforce the concept of "randomness" (determined by chance) in the selecting of sample data. While this lesson deals only with the selection of a simple random sample, other good sampling methods would be stratified, systematic and multi-level cluster sampling. Each of these includes an element of random selection. *See Data-Driven Mathematics (DDM) – Exploring Projects: Lesson 7, "Sampling in the Real World," pp. 43-50 TE.*

Unit Two: Math Lesson 3--Dot Plots, pg. 46

Draw a long horizontal line on the white board, labeling the horizontal axis with evenly spaced numbers from 1 to 9. Students place small Post-It™ notes on top of the numbers corresponding to the responses in their samples. For example, if a student had three people respond with an answer of 7, she would place three Post-It™ notes, one above the other, over the number 7 on the line. The next student continues by placing his Post-It™ notes above the ones already placed on the board. (Optional: students may wish to use different colors for male and female responses.) Once all the students have placed their Post-It™ notes on the board, discuss the following questions:

i. What is the shape of the distribution of the data? (i.e. mound shaped; it has two peaks; it looks symmetrical; it's pushed more to one side, etc.)

ii. What is the range of the data? (distance from highest response to lowest response)

iii. What seems to be the most common response? (this is another way of trying to determine what the center of the distribution is, and it should lead to a discussion of what is meant by "center").

iv. At this point it would be good to introduce the use of the calculator for graphical data display. Have each student go to STAT, 1:Edit, and enter all the data into L1. Arrow down after each data entry. Then go to Stat Plot (2nd Y=). Enter Plot 1 and turn ON. Arrow down to Type: arrow right to histogram and press ENTER. For Xlist, enter the number of the list in which the data are stored – for example, (L1). Then press ZOOM 9 to see the histogram. Note the similarities and/or differences between the dot plot on the board and the histogram on the screen. Press TRACE to see the actual number of data entries in each column.

Sample Dot Plot:

						x		
						x	x	
					x	x	x	
		x		x	x	x	x	x
x		x	x	x	x	x	x	x
1	2	3	4	5	6	7	8	9

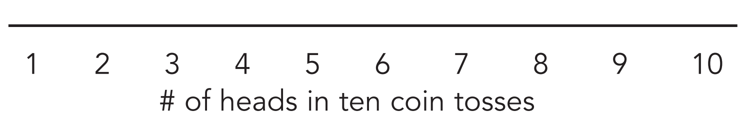
Unit Two: Math Lesson 3--Measures of Center, pp. 46-48

- Students may ask about the other entries on the screen. The symbol Σx represents the sum of all the data entries in the list. Notice that n indicates how many data entries the list contains. You may wish to have students show that $\Sigma x \div n$ is the same as "x bar" shown on the calculator.
- Students will respond that Mrs. Short's class did better because her students had the higher mean. Now look at different measures of center.
- It is important for students to experiment with changing values in a data set to see that the mean is heavily influenced by extreme data values, but the median is resistant to values that are at the ends of the data set (either low or high).

Unit Two: Math Lesson 4--Activity, p. 56

Distributions and Variability

*Plot data for the two exercises as follows:



a) The distribution for the rolls of the die should appear more uniform (flatter across the top), and the coin toss distribution should tend to mound in the middle over the number 5. The first distribution is described as a uniform distribution, while the second we call mound-shaped. It should appear somewhat symmetric. The distributions are different because each of the faces of the die has an equal chance of appearing, so overall we would expect about the same number of 1's, 2's, 3's, etc. Since the chance of getting a head on any given toss is $^1/_2$, we would expect somewhere around 5 heads in 10 tosses, so it would be more likely that we get 4, 5, or 6 heads in 10 tosses than, say, only 1 head in 10 tosses.

b) Students intuitively understand that variation occurs in our natural world. They would not be concerned about getting 7 heads in 10 tosses, or even 8 heads, if that did not happen all the time. They might think that 10 heads in 10 tosses is unusual and begin to suspect that the coin may not be a fair coin (i.e. that the true chance of getting a head was not, in fact, $^1/_2$) if this outcome occurred frequently.

c) Students should recognize that the center of the die-rolling distribution should be between 3 and 4, while the coin toss distribution would center around 5. The range of each distribution will depend on the actual data the students generate.

The more data we collect, the more our distributions will look like the theoretical probability distributions. Since collecting more data is time-consuming, we can quickly generate much larger data sets by running simulations on the calculator.

The following practice problems were reprinted with permission from *Foundations for Algebra: Year 1*,

Unit 2: Math lesson 1--Practice problems 3-5, pp. 24-25
Unit 3: Practice problems 1-5, pp. 37-39
