

Module 6: Describing Variability of Quantities

TOPIC 1: THE STATISTICAL PROCESS

In this topic, students are introduced to the statistical problem-solving process: formulate questions, collect data, analyze data, and interpret the results. Students will use this process throughout their studies of statistics, increasing the complexity of each step of the process as they develop their statistical literacy. Students use bar graphs and circle graphs to analyze and interpret survey data, the final steps of the statistical process. As students learn about and analyze dot plots, stem-and-leaf plots, and histograms, they practice using the four steps of the statistical process.

Where have we been?

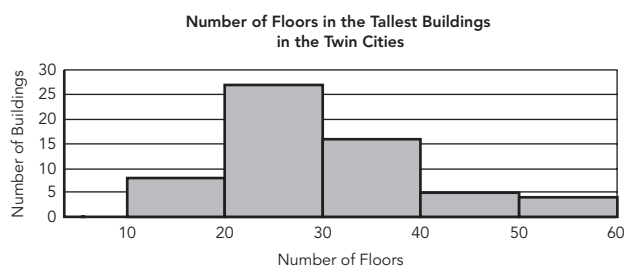
In grade 1, students were expected to collect, organize, and sort data with up to three categories. They also generate picture and bar-type graphs. In grade 2 and 3, they use frequency tables, dot plots, pictographs or bar graphs to represent data. In grades 4 and 5, students represent categorical data with bar graphs or frequency tables and numerical data, including data sets with fractions or decimals, with dot plots or stem-and-leaf plots.

Where are we going?

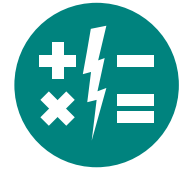
In the next course, students will use the data displays learned in this topic to compare data distributions. They will use statistical problem solving to investigate and draw inferences about populations. Then students will move into comparing bivariate sets of data, creating scatterplots, and using trend lines to make predictions.

Histograms

A histogram is a graphical way to display quantitative or numerical data using vertical bars. The width of a bar in a histogram represents an interval of data and is often referred to as a bin. The height of the bar indicates the frequency, or the number of data values included in any given bin. Bins are represented by intervals of data instead of showing individual data values.



Myth: Faster = smarter.



In most cases, speed has nothing to do with how smart you are. Why is that? Because it largely depends on how familiar you are with a topic. For example, a bike mechanic can look at a bike for about 8 seconds and tell you details about the bike that you probably didn't even notice (e.g., the front tire is on backwards). Is that person smart? Sure! Suppose, instead, you show the same bike mechanic a car. Will they be able to report the same amount of detail as they did for the bike? No!

It's easy to confuse *speed* with *understanding*. Speed is associated with the memorization of facts. Understanding, on the other hand, is a methodical, time-consuming process. Understanding is the result of asking lots of questions and seeing connections between different ideas. Many mathematicians who won the Fields Medal (i.e., the Nobel prize for mathematics) describe themselves as extremely slow thinkers. That's because mathematical thinking requires understanding over memorization.

#mathmythbusted

Talking Points

You can support your student's learning by approaching problems slowly. Students may observe a classmate learning things very quickly, and they can easily come to believe that mathematics is about getting the right answer as quickly as possible. When this doesn't happen for them, future encounters with math can raise anxiety, making problem solving more difficult, and reinforcing a student's view of himself or herself as "not good at math." Slowing down is not the ultimate cure for math difficulties. But it's a good first step for children who are struggling. You can reinforce the view that learning with understanding takes time, and that slow, deliberate work is the rule, not the exception.

Key Terms

categorical data

Categorical data are data for which each piece of data fits into exactly one of several different groups or categories. Categorical data are also called *qualitative data*.

quantitative data

Quantitative data are data for which each piece of data can be placed on a numerical scale. Quantitative data are also called *numerical data*.

frequency

Frequency is the number of times an item or number occurs in a data set.

mode

The mode is the value or values that occur most frequently in a data set.