

UNDERSTANDING MEAN, MEDIAN, AND MODE

FINDING THE MEAN

An important concept that is used in calculating grades, in controlling the quality of products, and in many other situations is the “average” of a set of measurements. The average of a set of numbers is one of three measures that indicate where the “center” of the set is. The **mean** is one of those measures. The others are *median* and *mode*. We will discuss all three. The mean can be thought of as the arithmetic balance point in a set of measurements.

To find the mean of a set of n numbers: Add the numbers together and then divide by n .

EXAMPLE

A woman measures the heights of some shrubs in front of her house. They measure 33.4 inches, 35.2 inches, 42.5 inches, and 38.1 inches. What is the average height?

SOLUTION

Here $n = 4$, because there are four measurements. To find the mean, we add all the measurements and then divide that total by 4.

$$\begin{array}{r} \text{Add: } 33.4 \\ 35.2 \\ 42.5 \\ \underline{38.1} \\ 149.1 \end{array} \quad \begin{array}{r} \text{Divide by 4: } 4 \overline{)149.2} \\ \underline{12} \\ 29 \\ \underline{28} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

The average of the four heights is 37.3 inches.

FINDING THE MEDIAN

The **median** of a set of numbers is the “center” of a set when the numbers are arranged in order. The median can be thought of as the positional balance point in a set of measures.

To find the median of a set of n numbers: Arrange the numbers in order and then find the center of those numbers. The “center” is the number such that there are as many values greater than it as there are values less than it.

EXAMPLE

Find the median of 43, 39, 47, 26, and 28.

SOLUTION

Arrange the numbers in order.

$$26 \quad 28 \quad 39 \quad 43 \quad 47$$

The central number is 39, because there are 2 numbers on either side of it. So 39 is the median.

Finding the median involves more computation when we have an even number values.

EXAMPLE

A child cuts some string in the following lengths: 43.1 inches, 47.2 inches, 42 inches, and 48.5 inches. What is the median length?

SOLUTION

To find the median, we first write the numbers in order:

42 43.1 47.2 48.5

There is no “central number” because there are four numbers. To find the median in such a case, we must find the average of the two middle numbers here 43.1 and 47.2. We add them and divide their sum by 2.

$$\frac{43.1+47.2}{2} = \frac{90.3}{2} = 45.15$$

The 45.15 is the median length.

FINDING THE MODE

The **mode** is also relatively easy to find. It is the value that occurs most frequently in a set of numbers. A given set of numbers may have one mode, no mode, or many modes.

To find the mode of a set of n numbers: Determine which number in the set appears the most.

EXAMPLE

Find the mode of the following numbers:

1, 3, 2, 4, 5, 3, 7, 2, 3, 7, 3

SOLUTION

Because the number 3 occurs four times, and no other number occurs as many times, 3 is the mode of this set of numbers.

PRACTICE PROBLEMS

1. The lengths of the spans of the five longest steel arch bridges in the world are given in the following table.

New River Gorge	1699.58 feet
Bayonne	1625.4 feet
Sydney Harbour	1649.66 feet
Fremont	1254.9 feet
Port Mann	1199.95 feet

What are the mean and median lengths for these five steel arch bridges?

2. The last six Apollo missions had durations of $245\frac{1}{3}$ hours, 143, $215\frac{3}{4}$ hours, $295\frac{1}{4}$ hours, $266\frac{1}{3}$ hours, and $301\frac{1}{2}$ hours. What was the median duration of these six missions?

3. Organize the following data in a table, and determine the mean number of people per year who immigrated to the United States from France in the period 1931-1980. The number of people who immigrated from France to the United States during the period 1931-1940 was 12, 623. During 1941-1950, the number rose 26,186; during 1951-1960, the number increased 12, 312. From 1961-1970, the number dropped by 5884, from 1971-1980, the number dropped 20,168.

4. The following heights above and below sea level were recorded by a scientific team: 35 feet below, 46.3 feet above, 19 feet below, 25.17 feet above, 0.3 feet above, 135.4 feet below, 35 feet below, and 6.24 feet above. What is the median of these readings? What was the mean height recorded?

PRACTICE PROBLEM SOLUTIONS

1. mean: 1485.898 feet; median: 1625.4 feet

2. $255\frac{5}{6}$ hours

3. 3457 immigrants per year

4. median: 0.3 feet; mean: -18.30 feet