

**University of Guelph
Numeracy Project**

Measures of Central Tendency: Examples



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Measures of Central Tendency: Examples

Measures of Central Tendency

Measures of Central Tendency

- ▶ Consider the following distribution:

1, 1, 1, 2, 3, 4, 5, 5, 6, 6, 6, 6, 7

Mean: 4.08; Median: 5; Mode: 6

Mode

Mode

- ▶ Consider the following distribution:

1, 3, 5, 7, 11, 11, 13, 16, 17, 17

This is bi-modal, with modes of 11 and 17.

- ▶ Consider the following distribution:

2, 2, 2, 7, 8, 12, 15, 17, 17, 17, 19, 20, 23, 23, 23

This is multi-modal, with modes of 2, 17, and 23.

- ▶ If we measured the class level of all the undergraduate students in the university and coded them as 1= first year, 2= second year, 3= third year, 4= fourth year, 5 = victory lap, we could easily determine the most common class level, and the mode would be more useful to know than the median or the mean.

Median

Median

► Finding the median with:

- *an odd-numbered sample
- *interval or ratio data

We want to find the median of the following grades that students obtained on a recent calculus midterm:

15 46 23 47 35 78 46 89 24 76 35 89 49 60 46 89 50 57 95 99 78

The first step is to order the scores:

15 23 24 35 35 46 46 46 47 49 50 57 60 76 78 78 89 89 89 95 99

There are 21 test results ($n = 21$). The median is 50.

► Finding the median with:

- *an even-numbered sample
- *interval or ratio data

We recorded the IQ scores of new prison inmates during the winter season.

We obtained the following data:

123 78 144 74 52 78 65 98 155 162 85 82 69 125 93 53 172 61 72 98

The first step is to order the data:

52 53 61 65 69 72 74 78 78 82 85 93 98 98 123 125 144 155 162 172

We recorded the IQ score for 20 inmates ($n = 20$). Because this is an even number, we must find the two middle values in this distribution.

The two middle values are 85 and 93.

Next, we must find the mean of these two values:

$$\bar{X} = \frac{\Sigma X}{n}$$

$$\bar{X} = \frac{85 + 93}{2}$$

$$\bar{X} = \frac{178}{2}$$

$$\bar{X} = 89$$

Therefore, the median IQ score of new prison inmates during the winter season was 89.

► Finding the median with:

*an odd-numbered sample

*ordinal data

For example, we want to find the median of the following grades that students obtained on a recent chemistry midterm.

The following are the grades that were obtained on the test:

ABCDFABCDBCFCDCACFBAFCBACDFBACBACCBFACDB

We need to arrange the data in order to determine the median:

AAAAAAAAABBBBBBBBBBCCCCCCCCCCCCDDDDDDFFFFF

There are 41 test results (n=41). The median is C.

► Finding the median with:

*an even-numbered sample

*ordinal data

We want to determine the median placement of athletes on the swim team at a recent meet.

The following are the places the athletes came in:

15274563573451426486475562341523748617456734512426347565

The first step is to order the placings:

11112222223333334444444444445555555555566666666777777788

There are 56 competitors ($n=56$). The two middle placings are 4th and 5th. Because 5th place is a lower placement than 4th place, the median is 5.

Mean

Mean

- ▶ The registrar averages the top six grades of an entering undergraduate, which were as follows:

75 82 91 82 77 79

To calculate the mean, we sum the scores and then divide by the total number of scores:

$$\bar{X} = \frac{\Sigma X}{n}$$

$$\bar{X} = \frac{75+82+91+82+77+79}{6}$$

$$\bar{X} = \frac{486}{6}$$

$$\bar{X} = 81$$

Therefore, the entering undergraduate has a mean average of 81%.