

# 9.2 Mean

**ESSENTIAL QUESTION:**

How can you find the mean of a set of numbers?

35, 56, 41, 59, 37, 48, 53, 23

1. Add the numbers.

2. Divide the sum of the numbers by how many numbers you added.

$$\begin{array}{r}
 35 \\
 56 \\
 41 \\
 + 59 \\
 \hline
 191 \\
 \end{array}
 \quad
 \begin{array}{r}
 37 \\
 48 \\
 53 \\
 + 23 \\
 \hline
 161 \\
 \end{array}
 \quad
 \begin{array}{r}
 191 \\
 + 161 \\
 \hline
 352 \\
 \end{array}$$

$$\begin{array}{r}
 44 \\
 8 \overline{) 352} \\
 \underline{32} \phantom{0} \\
 32 \\
 \underline{32} \\
 0
 \end{array}$$

Mean = 44

Mean -> The sum of the numbers divided by the number of values that were added (average).

outlier -> A number that is much higher or lower than the rest of the numbers.

**EXAMPLE 1 -> Finding the Mean**

The table shows the number of text messages sent by a group of friends over 1 week. What is the mean number of messages sent?

$$\begin{array}{r}
 120 \\
 95 \\
 101 \\
 125 \\
 82 \\
 108 \\
 + 90 \\
 \hline
 721
 \end{array}
 \quad
 \begin{array}{r}
 103 \\
 7 \overline{) 721} \\
 \underline{70} \phantom{0} \\
 21 \\
 \underline{21} \\
 0
 \end{array}$$

The mean number of text messages sent is 103.

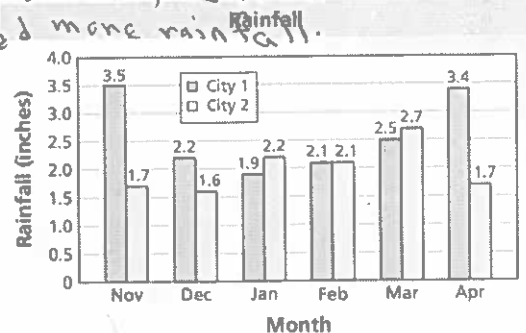
**Text Messages Sent**

- Mark: 120
- Laura: 95
- Stacy: 101
- Josh: 125
- Kevin: 82
- Maria: 108
- Manny: 90

**EXAMPLE 2 -> Comparing Mean**

The double bar graph shows the monthly rainfall amounts for two cities over a 6-month period. Compare the mean monthly rainfall.

The average rainfall for City 1 is 2.6 inches and for City 2 it is 2 inches. City 1 averaged more rainfall.

$$\begin{array}{r}
 \text{City 1} \\
 3.5 \\
 2.2 \\
 1.9 \\
 2.1 \\
 2.5 \\
 + 2.4 \\
 \hline
 15.6 \\
 \end{array}
 \quad
 \begin{array}{r}
 2.6 \\
 6 \overline{) 15.6} \\
 \underline{12} \phantom{0} \\
 36 \\
 \underline{36} \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 \text{City 2} \\
 1.7 \\
 1.6 \\
 2.2 \\
 2.1 \\
 2.1 \\
 + 1.7 \\
 \hline
 12
 \end{array}
 \quad
 \begin{array}{r}
 2 \\
 2 \overline{) 12} \\
 \underline{12} \\
 0
 \end{array}$$


**ON YOUR OWN**

Find the mean of the data.

1. 49, 62, 52, 54, 61, 70, 55, 53

Handwritten calculations for problem 1:

Vertical list of numbers: 49, 62, 52, 54, 61, 70, 55, 53. Below them is a horizontal line and the sum 456.

Division:  $8 \overline{) 456}$ . The quotient is 57. The steps shown are:  $8 \times 50 = 400$ ,  $456 - 400 = 56$ ,  $8 \times 7 = 56$ ,  $56 - 56 = 0$ . The final result is Mean = 57.

2. 7.2, 8.5, 7.0, 8.1, 6.7

Handwritten calculations for problem 2:

Vertical list of numbers: 7.2, 8.5, 7.0, 8.1, 6.7. Below them is a horizontal line and the sum 37.5.

Division:  $5 \overline{) 37.5}$ . The quotient is 7.5. The steps shown are:  $5 \times 7 = 35$ ,  $37.5 - 35 = 2.5$ ,  $5 \times 0.5 = 2.5$ ,  $2.5 - 2.5 = 0$ . The final result is Mean = 7.5.

**EXAMPLE 3 -> Finding the Mean With and Without an Outlier**

The table shows the heights of several Shetland ponies.

**Shetland Pony Heights (inches)**

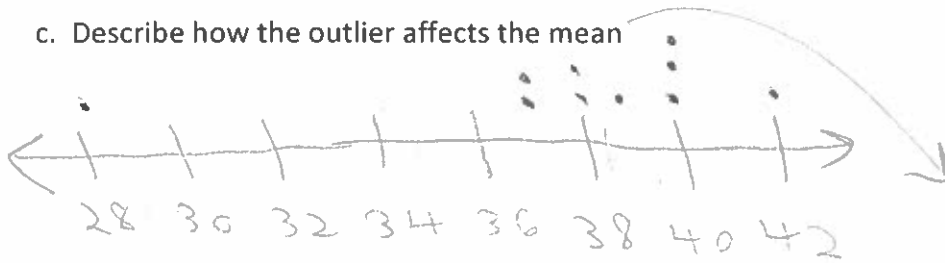
40	37	39	40	42
38	38	37	28	40

a. Identify the outlier.

Handwritten: 28 is the outlier.

b. Find the mean with and without the outlier.

c. Describe how the outlier affects the mean



Mean without outlier

Handwritten calculations for the mean without the outlier:

Vertical list of numbers: 40, 37, 39, 40, 42, 38, 38, 37. Below them is a horizontal line and the sum 351.

Division:  $9 \overline{) 351}$ . The quotient is 39. The steps shown are:  $9 \times 30 = 270$ ,  $351 - 270 = 81$ ,  $9 \times 9 = 81$ ,  $81 - 81 = 0$ . The final result is Mean = 39.

Handwritten calculations for the mean with the outlier:

Vertical list of numbers: 40, 37, 39, 40, 42, 38, 38, 37, 28, 40. Below them is a horizontal line and the sum 379.

Handwritten calculations for the mean with the outlier:

Division:  $10 \overline{) 379.0}$ . The quotient is 37.9. The steps shown are:  $10 \times 30 = 300$ ,  $379.0 - 300 = 79.0$ ,  $10 \times 7 = 70$ ,  $79.0 - 70 = 9.0$ . The final result is Mean = 37.9.

The mean with the outlier is less than all but 3 of the heights.

The mean without the outlier is about in the middle of the heights. This better

represents the heights.