

4.1: Set Notation

Learning Outcomes

1. Read set notation.
2. Describe sets using set notation.

A set is just a collection of items and there are different ways of representing a set. We want to be able to both read the various ways and be able to write down the representation ourselves in order to best display the set. We have already seen how to represent a set on a number line, but that can be cumbersome, especially if we want to just use a keyboard. Imagine how difficult it would be to text a friend about a cool set if the only way to do this was with a number line. Fortunately, mathematicians have agreed on notation to describe a set.

Example 4.1.1

If we just have a few items to list, we enclose them in curly brackets "{" and "}" and separate the items with commas. For example,

$$\{\text{Miguel, Kristin, Leo, Shanice}\}$$

means the set the contains these four names.

Example 4.1.2

If we just have a long collection of numbers that have a clear pattern, we use the "..." notation to mean "start here, keep going, and end there". For example,

$$\{3, 6, 9, 12, \dots, 90\}$$

This set contains more than just the five numbers that are shown. It is clear that the numbers are separated by three each. After the 12, even though it is not explicitly shown, is a 15 which is part of this set. It also contains 18, 21 and keeps going including all the multiples of 3 until it gets to its largest number 90.

Example 4.1.3

If we just have a collection of numbers that have a clear pattern, but never ends, we use the "..." without a number at the end. For example,

$$\left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots \right\}$$

This set contains an infinite number of fractions, since there is no number followed by the "...".

Example 4.1.4

Sometimes we have a set that it best described by stating a rule. For example, if you want to describe the set of all people who are over 18 years old but not 30 years old, you announce the conditions by putting them to the left of a vertical line segment. We read the line segment as "such that".

$$\{x \mid x > 18 \text{ and } x \neq 30\}$$

This can be read as "the set of all numbers x such that x is greater than 18 and x is not equal to 30".

Exercise

Describe using set notation the collection of all positive even whole numbers that are not equal to 20 or 50.

- [Set-Builder Notation](#)

- <https://youtu.be/VGphtczN0-c>

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