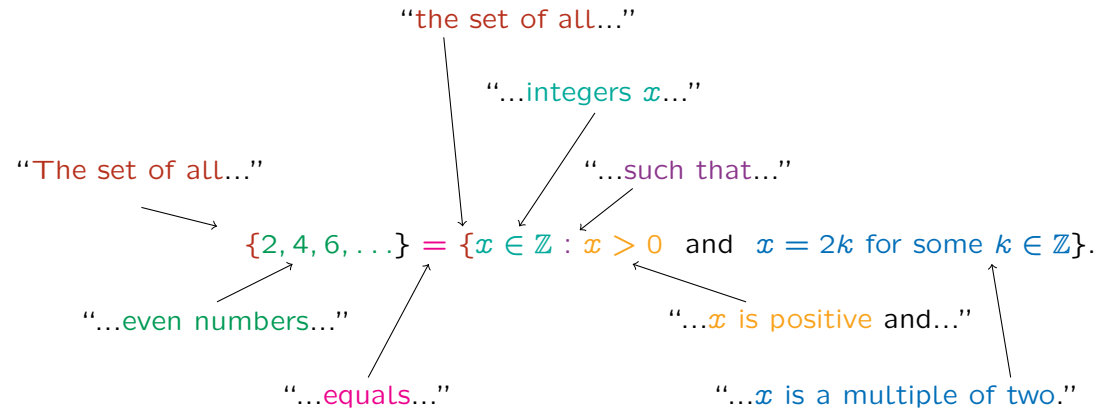# Set-Builder Notation

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Set-builder notation is used in mathematics to express a set by describing the condition(s) something must meet in order to be an element of that set. Here's an example:

"the set of all..."

"...integers x..."

"The set of all..."   "...such that..."

$$\{2, 4, 6, \ldots\} = \{x \in \mathbb{Z} : x > 0 \ \text{ and } \ x = 2k \text{ for some } k \in \mathbb{Z}\}.$$

"...even numbers..."   "...x is positive and..."

"...equals..."   "...x is a multiple of two."

The set on the left is defined informally, via a pattern. The set on the right is defined more formally, via set-builder notation. Stating where the elements in your set come from (such as in the "$x \in \mathbb{Z}$" portion from the example above) is not necessary. Here's an example of that:

$$\{1, 3, 9, 27, \ldots\} = \{3^n : n \in \mathbb{Z} \text{ and } n \geq 0\}.$$