1. Set notation

Roster notation. $\{N, S, E, W\}$ $\{1, 2, \ldots, 99, 100\}$

Membership. $5 \in \{1, 2, \ldots, 99, 100\}$,
or "5 is an element of the set $\{1, 2, \ldots, 99, 100\}$"

Special sets. Set $\mathbb{Z} = \{\ldots, -2, -1, 0, 1, 2, 3, \ldots\}$ of *integers*
Set $\mathbb{N} = \{0, 1, 2, 3, \ldots\}$ of *natural numbers*, *empty set* $\emptyset = \{\}$

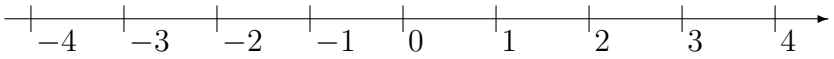
Set-builder notation. $\{n \in \mathbb{N} \mid 2 < n\} = \{3, 4, 5, \ldots\}$

$\{x \in X \mid P(x)\}$ means "the set of elements x in X with property $P(x)$"

Mixed notation. $\{n^2 \mid n \in \mathbb{N}\} = \{0, 1, 4, 9, \ldots\}$

Special sets. Set $\mathbb{Q} = \{\frac{m}{n} \mid m, n \in \mathbb{Z},\ n \neq 0\}$ of *rational numbers*

Set $\mathbb{R}$ of *real numbers*



Cardinality. $|\{N, S, E, W\}| = 4$, $|\{N, N, S, N, S, E, E, E, W\}| = 4$
$|\{1, \{2, 3\}\}| = 2$

Cardinality or *size* or *order* $|X|$ of a set X
is the number of elements of X.

Note $|\emptyset| = 0$, and $\mathbb{N}$ is the set of cardinalities of finite sets.

Ordered pairs. The single ("vector") equation $(a, b) = (a', b')$
means two separate ("scalar") equations $a = a'$ and $b = b'$.

Cartesian product. Also called the **direct product**,
$A \times B = \{(a, b) \mid a \in A \text{ and } b \in B\}$