

Relations and Functions

CBSE Class 11 Maths · Knowledge organiser

KEY DEFINITIONS

Cartesian product

$A \times B$: all ordered pairs (a, b) with a in A and b in B .

Relation

Any subset of $A \times B$.

Function

A relation in which every element of A has exactly one image in B .

KEY FORMULAS

Product $n(A \times B) = n(A) n(B)$;
relations $A \rightarrow B : 2^{n(A)n(B)}$

Function: each element of the domain has exactly one image; domain: denominators $\neq 0$, $\sqrt{\quad}$ of ≥ 0

$|x| \geq 0$; $\operatorname{sgn} x \in \{-1, 0, 1\}$; $[x]$ = greatest integer $\leq x$ ($[-2.5] = -3$)

YOU SHOULD BE ABLE TO...

- Work with ordered pairs and Cartesian products and recognise a function among relations.
- Find domains and ranges of standard real functions and combine functions.
- Analyse modulus, signum, greatest integer and rational functions fully, with their graphs in mind.
- Reason about ranges of less obvious functions and about products of sets.

WORKED EXAMPLE

Find the domain of $f(x) = \frac{x}{x^2 - 9}$.

$x^2 - 9 \neq 0$: domain $\mathbb{R} - \{-3, 3\}$.

COMMON MISTAKES

- ✗ Calling a relation a function when some element of the domain has two images, or none.
- ✗ $[-2.5] = -2$: the greatest integer function goes down, to -3 .
- ✗ Cancelling $x - 2$ in $\frac{x^2 - 4}{x - 2}$ and forgetting that 2 is still not in the domain.
- ✗ Mixing up codomain and range.