Class 11 Maths Chapter 2: Relations and Functions - Notes, Important Questions and MCQs (2026-27)

Free PDF notes from Nextoper.in | Session 2026-27 | Read online:
https://nextoper.in/class-11-maths-chapter-2-pdf-notes/

Class 11 Maths Chapter 2, Relations and Functions, introduces how elements of two sets can be paired and how functions – a special kind of relation – describe dependence between quantities.

These notes cover ordered pairs and Cartesian products, relations, domain, codomain and range, functions, standard real functions and their graphs, and the algebra of real functions.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- Domain and Range of Standard Functions
- Important Definitions and Terms
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

Want notes for every chapter? Explore the full Class 11 Maths notes on Nextoper, arranged book-wise and chapter-wise.

Chapter Overview

Many situations link one quantity to another: a student to a roll number, a number to its square. Mathematics captures such links using ordered pairs and the Cartesian product of sets.

A relation is any subset of a Cartesian product. A function is a relation in which every element of the first set has exactly one image in the second.

Important Topics and Concepts

Cartesian Product of Sets

- An ordered pair (a, b) has a definite order; (a, b) = (c, d) ⇔ a = c and b = d.
- $A \times B = \{(a, b) : a \in A, b \in B\}$. If A or B is empty, $A \times B = \varnothing$.
- If n(A) = p and n(B) = q, then $n(A \times B) = pq$.

- $A \times A \times A = \{(a, b, c) : a, b, c \in A\}$ – ordered triplets.
- Example: $A = \{1, 2\}$, $B = \{x, y\}$: $A \times B = \{(1,x), (1,y), (2,x), (2,y)\}$.

Relations

- A relation R from A to B is a subset of $A \times B$, often described by a rule linking x and y.
- If $(x, y) \in R$, y is the image of x and x is the pre-image of y.
- Domain: set of first elements; range: set of second elements; codomain: the whole set B (range $\subset$ codomain).
- Number of relations from A to B = 2^{pq} (number of subsets of $A \times B$).
- Representation: roster form, set-builder form, or arrow diagram.

Functions

- A relation f from A to B is a function if every element of A has one and only one image in B. Written $f : A \to B$.
- A is the domain; B the codomain; the set of images is the range.
- A real function has domain and range as subsets of R.
- Example: $f(x) = x^2 + 1$, $x \in R$: $f(2) = 5$; range = $[1, \infty)$.

Standard Real Functions

- Identity function: $f(x) = x$; domain and range R; graph is the line $y = x$.
- Constant function: $f(x) = c$; range $\{c\}$; graph is a horizontal line.
- Polynomial function: $f(x) = a_0 + a_1x + \ldots + a_nx^n$ with n a non-negative integer.
- Rational function: $f(x)/g(x)$ with $g(x) \neq 0$.
- Modulus function: $f(x) = |x| = x$ if $x \geq 0$ and $-x$ if $x < 0$; range $[0, \infty)$; V-shaped graph.
- Signum function: $f(x) = |x|/x$ for $x \neq 0$, and 0 for $x = 0$; range $\{-1, 0, 1\}$.
- Greatest integer function: $f(x) = [x]$, the greatest integer $\leq x$; e.g. $[2.7] = 2$, $[-1.2] = -2$; range Z; step graph.

Algebra of Real Functions

- For $f, g : X \to R$: $(f + g)(x) = f(x) + g(x)$; $(f - g)(x) = f(x) - g(x)$.
- $(\alpha f)(x) = \alpha f(x)$ for real α.
- $(fg)(x) = f(x) \cdot g(x)$.
- $(f/g)(x) = f(x)/g(x)$, provided $g(x) \neq 0$.
- Example: $f(x) = x^2$, $g(x) = 2x + 1$: $(f + g)(x) = x^2 + 2x + 1$; $(fg)(x) = 2x^3 + x^2$.

Domain and Range of Standard Functions

Function	Rule	Domain	Range
Identity	$f(x) = x$	R	R
Constant	$f(x) = c$	R	$\{c\}$
Square	$f(x) = x^2$	R	$[0, \infty)$
Cube	$f(x) = x^3$	R	R
Modulus	$f(x) = \|x\|$	R	$[0, \infty)$
Signum	$\|x\|/x$, 0 at 0	R	$\{-1, 0, 1\}$
Greatest integer	$f(x) = [x]$	R	Z

Function	Rule	Domain	Range
Reciprocal	f(x) = 1/x	R − {0}	R − {0}

Important Definitions and Terms

Term	Meaning
Ordered pair	Pair of elements in a definite order.
Cartesian product	Set of all ordered pairs (a, b), a ∈ A, b ∈ B.
Relation	A subset of A × B.
Domain	Set of first elements of a relation.
Range	Set of images.
Codomain	The set B in a relation from A to B.
Function	Relation where each element of the domain has exactly one image.
Real function	Function whose domain and range are subsets of R.
Modulus function	f(x) = |x|.
Greatest integer function	f(x) = [x], greatest integer not exceeding x.

Short Answer Questions

Q1. If (x + 1, y − 2) = (3, 1), find x and y.

x + 1 = 3 gives x = 2; y − 2 = 1 gives y = 3.

Q2. If n(A) = 3 and n(B) = 2, find n(A × B).

n(A × B) = 3 × 2 = 6.

Q3. How many relations are possible from A to B if n(A) = 2, n(B) = 2?

2^(2×2) = 16.

Q4. Is {(1,2), (1,3), (2,4)} a function from {1,2} to {2,3,4}?

No, because 1 has two images, 2 and 3.

Q5. Find the domain of f(x) = 1/(x − 3).

R − {3}, since the denominator cannot be zero.

Q6. Find [−3.5] and [4.9].

[−3.5] = −4 and [4.9] = 4.

Q7. Find the range of f(x) = |x − 1|.

[0, ∞), as modulus is never negative.

Q8. If f(x) = x^2 and g(x) = x + 1, find (f − g)(2).

f(2) − g(2) = 4 − 3 = 1.

Long Answer Questions

Q1. Let A = {1, 2, 3, 4, 6}. Define R on A by R = {(a, b) : b is exactly divisible by a, a ≠ b}. Find R, its domain and range.

Pairs where a divides b and a ≠ b: (1,2), (1,3), (1,4), (1,6), (2,4), (2,6), (3,6).

Domain = {1, 2, 3}.

Range = {2, 3, 4, 6}.

Q2. Find the domain and range of f(x) = √(9 − x²).

For real values, 9 − x² ≥ 0, so −3 ≤ x ≤ 3. Domain = [−3, 3].

The expression under the root takes values from 0 to 9, so f(x) takes values from 0 to 3.

Range = [0, 3].

Q3. Define the signum function and state its domain and range.

f(x) = 1 if x > 0, 0 if x = 0, and −1 if x < 0; equivalently |x|/x for x ≠ 0.

Domain = R.

Range = {−1, 0, 1}; its graph has two horizontal rays and a point at the origin.

MCQs with Answers

1. If n(A)=4, n(B)=3, n(A×B)=(a) 7 (b) 12 (c) 64 (d) 81Answer: (b) 12

2. A relation is a subset of:(a) A (b) B (c) A × B (d) A ∪ BAnswer: (c) A × B

3. Range of f(x) = x² is:(a) R (b) [0, ∞) (c) (0, ∞) (d) ZAnswer: (b) [0, ∞)

4. [−2.3] =(a) −2 (b) −3 (c) 2 (d) 3Answer: (b) −3

5. Range of signum function:(a) {0,1} (b) {−1,1} (c) {−1,0,1} (d) RAnswer: (c) {−1,0,1}

6. Domain of f(x) = 1/x:(a) R (b) R − {0} (c) (0, ∞) (d) ZAnswer: (b) R − {0}

7. If A × B = ∅ then:(a) A = ∅ or B = ∅ (b) A = B (c) A ⊂ B (d) A = UAnswer: (a) A = ∅ or B = ∅

8. f(x) = |x| at x = −5:(a) −5 (b) 5 (c) 0 (d) 25Answer: (b) 5

9. Number of relations from A to B with n(A)=1, n(B)=3:(a) 3 (b) 6 (c) 8 (d) 9Answer: (c) 8

10. Graph of identity function is:(a) y = 0 (b) y = x (c) y = 1 (d) y = |x|Answer: (b) y = x

Quick Revision Points

- (a, b) = (c, d) ⇔ a = c, b = d.
- n(A × B) = pq.
- Relation ⊂ A × B; number of relations = 2^(pq).
- Domain, codomain, range (range ⊂ codomain).
- Function – unique image for each element.
- Identity, constant, polynomial, rational functions.
- Modulus – range [0, ∞).
- Signum – range {−1, 0, 1}.

- Greatest integer [x] – range Z.
- f ± g, αf, fg, f/g (g ≠ 0).

Chapter Summary

The Cartesian product A × B is the set of ordered pairs from A and B, with n(A × B) = pq. Relations are subsets of the Cartesian product, with domain, codomain and range. A function is a relation in which each element of the domain has a unique image.

Standard real functions – identity, constant, polynomial, rational, modulus, signum and greatest integer – have distinctive domains, ranges and graphs. Real functions can be added, subtracted, multiplied and divided pointwise.

Exam Tips and PYQ Pattern

- Always check “one image for each element” to test if a relation is a function.
- For domain questions, exclude values that make denominators zero or square roots negative.
- Remember [x] for negative numbers rounds down, e.g. [−1.2] = −2.
- Sketch graphs of modulus, signum and greatest integer functions.
- Use arrow diagrams for small relation problems.
- Practise number-of-relations questions using 2^(pq).

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 11 Mathematics textbook, prescribed in the CBSE 2026-27 syllabus.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What is the difference between a relation and a function?

Every function is a relation, but a relation is a function only if each element of the domain has exactly one image.

What is the greatest integer function?

f(x) = [x], the greatest integer less than or equal to x.

How many relations are possible from A to B?

2^(pq), where p = n(A) and q = n(B).

Conclusion

Relations and Functions builds the base for calculus. Practise domain-range problems and graphs, revise the standard functions table and download the free PDF.

More Notes: Class 11 Maths Chapter 1: Sets notes | Class 11 Maths Chapter 3: Trigonometric Functions notes | All Class 11 Maths notes

Freshness Note: These notes follow the NCERT Class 11 Maths textbook, Mathematics (Class XI) (NCERT reprint 2026-27, rationalised syllabus), and the CBSE syllabus for the 2026-27 session. Last checked on 28 November 2026.