NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.1: NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.1 provide step-by-step solutions to help students understand the concepts of Relations and Functions. This exercise focuses on different types of relations and functions, including domain, codomain, and range.

By practicing the problems in this exercise, students can develop a clearer understanding of how relations work and how to represent them effectively. These solutions provide a solid foundation for further study in higher mathematics.

NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.1 Overview

NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.1 focuses on the concept of Relations and Functions, which is an essential topic in set theory and functions. This exercise introduces students to various types of relations, including the domain, codomain, and range of a function. It helps in understanding how elements from one set are related to elements of another set, which is fundamental in mathematics.

Key Topics Covered in Exercise 2.1:

- **Relation**: A relation is a set of ordered pairs, where each element from one set is related to an element of another set. The exercise provides problems that require students to identify and represent relations between sets.
- **Domain**: The set of all possible input values (first elements of the ordered pairs) in a relation.
- **Codomain**: The set of all possible output values (second elements of the ordered pairs) that could result from applying the relation.
- **Range**: The set of actual output values (second elements) that are used in a relation.

Class 11 Maths Chapter 2 Exercise 2.1 Questions and Answers PDF

The Class 11 Maths Chapter 2 Exercise 2.1 Questions and Answers PDF provides detailed solutions to all the problems in Exercise 2.1, helping students understand the fundamental concepts of Relations and Functions. This PDF provide step-by-step explanations for each question, making it easier for students to grasp the topic and prepare effectively for exams. The PDF link is available below for easy access.

Class 11 Maths Chapter 2 Exercise 2.1 Questions and Answers PDF

NCERT Solutions for Class 11 Maths Chapter 2 Relations And Functions Exercise 2.1

Below is the NCERT Solutions for Class 11 Maths Chapter 2 Relations And Functions Exercise 2.1:

1. If $\left(\frac{x}{3}+1, y-\frac{2}{3}\right)=\left(\frac{5}{3}, \frac{1}{3}\right)$ **, find the values of *x* and *y*.**

Solution:

Given,

$\left(\frac{x}{3}+1, y-\frac{2}{3}\right)=\left(\frac{5}{3}, \frac{1}{3}\right)$

As the ordered pairs are equal, the corresponding elements should also be equal.

Thus,

x/3 + 1 = 5/3 and y – 2/3 = 1/3

Solving, we get

x + 3 = 5 and 3y – 2 = 1 [Taking L.C.M and adding]

x = 2 and 3y = 3

Therefore,

x = 2 and y = 1

2. If set A has 3 elements and set B = {3, 4, 5}, then find the number of elements in (A × B).

Solution:

Given, set A has 3 elements, and the elements of set B are {3, 4, and 5}.

So, the number of elements in set B = 3

Then, the number of elements in (A × B) = (Number of elements in A) × (Number of elements in B)

= 3 × 3 = 9

Therefore, the number of elements in (A × B) will be 9.

3. If G = {7, 8} and H = {5, 4, 2}, find G × H and H × G.

Solution:

Given, G = {7, 8} and H = {5, 4, 2}

We know that

The Cartesian product of two non-empty sets, P and Q, is given as

P × Q = {(p, q): $p \in$ P, $q \in$ Q}

So,

G × H = {(7, 5), (7, 4), (7, 2), (8, 5), (8, 4), (8, 2)}

H × G = {(5, 7), (5, 8), (4, 7), (4, 8), (2, 7), (2, 8)}

4. State whether each of the following statements is true or false. If the statement is false, rewrite the given statement correctly.

(i) If P = {*m*, *n*} and Q = {*n*, *m*}, then P × Q = {(*m*, *n*), (*n*, *m*)}.

(ii) If A and B are non-empty sets, then A × B is a non-empty set of ordered pairs (*x*, *y*) such that $x \in$ A and $y \in$ B.

(iii) If A = {1, 2}, B = {3, 4}, then A × (B ∩ Φ) = Φ.

Solution:

(i) The statement is False. The correct statement is

If P = {m, n} and Q = {n, m}, then

P × Q = {(m, m), (m, n), (n, m), (n, n)}

(ii) True

(iii) True

5. If A = {–1, 1}, find A × A × A.

Solution:

The A × A × A for a non-empty set A is given by

$A \times A \times A = \{(a, b, c): a, b, c \in A\}$

Here, it is given $A = \{-1, 1\}$

So,

$A \times A \times A = \{(-1, -1, -1), (-1, -1, 1), (-1, 1, -1), (-1, 1, 1), (1, -1, -1), (1, -1, 1), (1, 1, -1), (1, 1, 1)\}$

6. If $A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$. Find A and B.

Solution:

Given,

$A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$

We know that the Cartesian product of two non-empty sets, P and Q, is given by

$P \times Q = \{(p, q): p \in P, q \in Q\}$

Hence, A is the set of all first elements, and B is the set of all second elements.

Therefore, $A = \{a, b\}$ and $B = \{x, y\}$

7. Let A = {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} and D = {5, 6, 7, 8}. Verify that

(i) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

(ii) $A \times C$ is a subset of $B \times D$

Solution:

Given,

$A = \{1, 2\}$, $B = \{1, 2, 3, 4\}$, $C = \{5, 6\}$ and $D = \{5, 6, 7, 8\}$

(i) To verify: $A \times (B \cap C) = (A \times B) \cap (A \times C)$

Now, $B \cap C = \{1, 2, 3, 4\} \cap \{5, 6\} = \Phi$

Thus,

L.H.S. $= A \times (B \cap C) = A \times \Phi = \Phi$

Next,

$A \times B = \{(1, 1), (1, 2), (1, 3), (1, 4), (2, 1), (2, 2), (2, 3), (2, 4)\}$

A × C = {(1, 5), (1, 6), (2, 5), (2, 6)}

Thus,

R.H.S. = (A × B) ∩ (A × C) = Φ

Therefore, L.H.S. = R.H.S.

Hence, verified

(ii) To verify: A × C is a subset of B × D

First,

A × C = {(1, 5), (1, 6), (2, 5), (2, 6)}

And,

B × D = {(1, 5), (1, 6), (1, 7), (1, 8), (2, 5), (2, 6), (2, 7), (2, 8), (3, 5), (3, 6), (3, 7), (3, 8), (4, 5), (4, 6), (4, 7), (4, 8)}

Now, it's clearly seen that all the elements of set A × C are the elements of set B × D.

Thus, A × C is a subset of B × D.

Hence, verified

8. Let A = {1, 2} and B = {3, 4}. Write A × B. How many subsets will A × B have? List them.

Solution:

Given,

A = {1, 2} and B = {3, 4}

So,

A × B = {(1, 3), (1, 4), (2, 3), (2, 4)}

Number of elements in A × B is n(A × B) = 4

We know that

If C is a set with n(C) = m, then n[P(C)] = 2^m.

Thus, the set A × B has 2^4 = 16 subsets

And these subsets are as below:

Φ, {(1, 3)}, {(1, 4)}, {(2, 3)}, {(2, 4)}, {(1, 3), (1, 4)}, {(1, 3), (2, 3)}, {(1, 3), (2, 4)}, {(1, 4), (2, 3)}, {(1, 4), (2, 4)}, {(2, 3), (2, 4)}, {(1, 3), (1, 4), (2, 3)}, {(1, 3), (1, 4), (2, 4)}, {(1, 3), (2, 3), (2, 4)}, {(1, 4), (2, 3), (2, 4)}, {(1, 3), (1, 4), (2, 3), (2, 4)}

9. Let A and B be two sets such that *n*(A) = 3 and *n* (B) = 2. If (*x*, 1), (*y*, 2), (*z*, 1) are in A × B, find A and B, where *x*, *y* and *z* are distinct elements.

Solution:

Given,

$n(A) = 3$ and $n(B) = 2$; and $(x, 1)$, $(y, 2)$, $(z, 1)$ are in A × B.

We know that

A = Set of first elements of the ordered pair elements of A × B

B = Set of second elements of the ordered pair elements of A × B.

So, clearly, *x*, *y*, and *z* are the elements of A; and

1 and 2 are the elements of B.

As $n(A) = 3$ and $n(B) = 2$, it is clear that set A = {*x*, *y*, *z*} and set B = {1, 2}.

10. The Cartesian product A × A has 9 elements, among which are found (–1, 0) and (0, 1). Find the set A and the remaining elements of A × A.

Solution:

We know that

If $n(A) = p$ and $n(B) = q$, then $n(A \times B) = pq$.

Also, $n(A \times A) = n(A) \times n(A)$

Given,

$n(A \times A) = 9$

So, $n(A) \times n(A) = 9$

Thus, $n(A) = 3$

Also, given that the ordered pairs (–1, 0) and (0, 1) are two of the nine elements of A × A.

And, we know in $A \times A = \{(a, a): a \in A\}$.

Thus, –1, 0, and 1 have to be the elements of A.

As $n(A) = 3$, clearly A = {–1, 0, 1}

Hence, the remaining elements of set A × A are as follows:

(–1, –1), (–1, 1), (0, –1), (0, 0), (1, –1), (1, 0), and (1, 1)

Benefits of Solving NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.1

- **Clear Understanding of Concepts:** The exercise focuses on Relations and Functions, and solving these problems helps students develop a deep understanding of important mathematical concepts like domain, codomain, and range.
- **Improved Problem-Solving Skills**: By practicing the problems, students learn how to apply theoretical knowledge to practical problems, enhancing their problem-solving abilities.
- **Stronger Foundation**: This exercise builds a solid foundation for advanced topics in mathematics, especially those related to functions, which are crucial for further studies in calculus, algebra, and other branches of mathematics.
- **Boosts Exam Preparation**: Regularly solving exercises from NCERT helps students familiarize themselves with the types of questions commonly asked in exams, improving accuracy and speed during the actual exam.
- **Step-by-Step Solutions**: The NCERT solutions provide detailed, step-by-step explanations, making it easier for students to understand how to approach each problem and ensuring they don't miss any important steps.
- **Enhances Confidence**: As students solve more problems correctly, their confidence in tackling related topics grows, which positively impacts their overall learning and performance in mathematics.