**NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.3:** NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.3 focus on the concept of functions and their various types. This exercise introduces key functions such as identity functions, constant functions, polynomial functions, rational functions, modulus functions, signum functions, and greatest integer functions.

These solutions help students understand how to perform these operations effectively, providing a deeper understanding of the behavior of different types of functions and their graphs. By solving this exercise, students gain the necessary skills to handle more complex mathematical problems related to functions and are better prepared for exams.

# NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.3 Overview

NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.3 focuses on deepening the understanding of functions and their operations. The exercise covers various types of functions, including identity functions, constant functions, polynomial functions, rational functions, modulus functions, signum functions, and greatest integer functions.

It also introduces the algebra of real functions, which includes performing operations such as addition, subtraction, multiplication, and division of two real functions. By solving this exercise, students learn to manipulate different types of functions and gain a better understanding of their properties and graphical representations. This practice helps build a strong foundation for more advanced mathematical concepts and problem-solving, making it an essential part of mastering the topic of functions in Class 11.

# Class 11 Maths Chapter 2 Exercise 2.3 Questions and Answers PDF

Class 11 Maths Chapter 2 Exercise 2.3 Questions and Answers PDF provides detailed solutions to the problems related to various types of functions and their operations. The PDF provide step-by-step solutions, helping students understand the methods used to solve these problems and improve their grasp of the topic. For easy access, the link to download the PDF is available below.

**Class 11 Maths Chapter 2 Exercise 2.3 Questions and Answers PDF**

# NCERT Solutions for Class 11 Maths Chapter 2 Relations And Functions Exercise 2.3

Below is the NCERT Solutions for Class 11 Maths Chapter 2 Relations And Functions Exercise 2.3:

**1. Which of the following relations are functions? Give reasons. If it is a function, determine its domain and range.**

**(i) {(2, 1), (5, 1), (8, 1), (11, 1), (14, 1), (17, 1)}**

**(ii) {(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6), (14, 7)}**

**(iii) {(1, 3), (1, 5), (2, 5)}**

**Solution:**

(i) {(2, 1), (5, 1), (8, 1), (11, 1), (14, 1), (17, 1)}

As 2, 5, 8, 11, 14, and 17 are the elements of the domain of the given relation having their unique images, this relation can be called a function.

Here, domain = {2, 5, 8, 11, 14, 17} and range = {1}

(ii) {(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6), (14, 7)}

As 2, 4, 6, 8, 10, 12, and 14 are the elements of the domain of the given relation having their unique images, this relation can be called a function.

Here, domain = {2, 4, 6, 8, 10, 12, 14} and range = {1, 2, 3, 4, 5, 6, 7}

(iii) {(1, 3), (1, 5), (2, 5)}

It's seen that the same first element, i.e., 1, corresponds to two different images, i.e., 3 and 5; this relation cannot be called a function.

**2. Find the domain and range of the following real function.**

**(i) $f(x) = -|x|$ (ii) $f(x) = \sqrt{(9 - x^2)}$**

**Solution:**

(i) Given,

$f(x) = -|x|$, $x \in R$

We know that

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

$$\therefore f(x) = -|x| = \begin{cases} -x, & x \geq 0 \\ x, & x < 0 \end{cases}$$

As $f(x)$ is defined for $x \in$ R, the domain of $f$ is R.

It is also seen that the range of $f(x) = -|x|$ is all real numbers except positive real numbers.

Therefore, the range of $f$ is given by $(-\infty, 0]$.

(ii) $f(x) = \sqrt{(9 - x^2)}$

As $\sqrt{(9 - x^2)}$ is defined for all real numbers that are greater than or equal to –3 and less than or equal to 3, for $9 - x^2 \geq 0$

So, the domain of $f(x)$ is $\{x: -3 \leq x \leq 3\}$ or $[-3, 3]$

Now,

For any value of $x$ in the range [–3, 3], the value of $f(x)$ will lie between 0 and 3.

Therefore, the range of $f(x)$ is $\{x: 0 \leq x \leq 3\}$ or $[0, 3]$

**3. A function *f* is defined by *f*(*x*) = 2*x* – 5. Write down the values of**

**(i) *f*(0), (ii) *f*(7), (iii) *f*(–3)**

**Solution:**

Given,

Function, $f(x) = 2x - 5$

Therefore,

(i) $f(0) = 2 \times 0 - 5 = 0 - 5 = -5$

(ii) $f(7) = 2 \times 7 - 5 = 14 - 5 = 9$

(iii) $f(-3) = 2 \times (-3) - 5 = -6 - 5 = -11$

**4. The function '*t*', which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by** $t(C) = \frac{9C}{5} + 32$ **.**

**Find (i) *t* (0) (ii) *t* (28) (iii) *t* (–10) (iv) The value of C, when *t*(C) = 212**

**Solution:**

Given function, $t(C)=\frac{9C}{5}+32$

So,

(i) $t(0)=\frac{9\times 0}{5}+32=0+32=32$

(ii) $t(28)=\frac{9\times 28}{5}+32=\frac{252+160}{5}=\frac{412}{5}$

(iii) $t(-10)=\frac{9\times(-10)}{5}+32=9\times(-2)+32=-18+32=14$

(iv) Given that, $t(C)=212$

$\therefore 212=\frac{9C}{5}+32$

$\Rightarrow \frac{9C}{5}=212-32$

$\Rightarrow \frac{9C}{5}=180$

$\Rightarrow 9C=180\times 5$

$\Rightarrow C=\frac{180\times 5}{9}=100$

Therefore, the value of $t$ when $t(C)=212$, is 100.

**5. Find the range of each of the following functions.**

**(i) *f*(*x*) = 2 – 3*x*, *x* ∈ R, *x* > 0**

**(ii) *f*(*x*) = $x^2$ + 2, *x* is a real number.**

**(iii) *f*(*x*) = *x*, *x* is a real number.**

**Solution:**

(i) Given,

f(x) = 2 – 3*x*, *x* ∈ R, *x* > 0

Here the values of f(x) for various values of real numbers x > 0 can be given as

| x | 0.01 | 0.1 | 0.9 | 1 | 2 | 2.5 | 4 | 5 | ... |
|---|---|---|---|---|---|---|---|---|---|
| f(x) | 1.97 | 1.7 | -0.7 | -1 | -4 | -5.5 | -10 | -13 | ... |

It can be observed that the range of f is the set of all real numbers less than 2.
Range of f = $(-\infty, 2)$

We have,

$x > 0$

So,

$3x > 0$

$-3x < 0$ [Multiplying by -1 on both sides, the inequality sign changes.]

$2 - 3x < 2$

Therefore, the value of $2 - 3x$ is less than 2.

Hence, Range = $(-\infty, 2)$

(ii) Given,

$f(x) = x^2 + 2$, $x$ is a real number

Here the values of f(x) for various values of real numbers x can be given as

| x | 0 | ±0.3 | ±0.8 | ±1 | ±2 | ±3 | ... |
|---|---|---|---|---|---|---|---|
| f(x) | 2 | 2.09 | 2.64 | 3 | 6 | 11 | ... |

It can be oberserved that the range of f is the set of all real numbers greater than 2.
Range of f = $[2, \infty)$

We know that

$x^2 \geq 0$

So,

$x^2 + 2 \geq 2$ [Adding 2 on both sides]

Therefore, the value of $x^2 + 2$ is always greater or equal to 2, for x is a real number.

Hence, Range = $[2, \infty)$

(iii) Given,

$f(x) = x$, $x$ is a real number

Clearly, the range of $f$ is the set of all real numbers.

Thus,

Range of $f$ = R

# Benefits of Solving NCERT Solutions for Class 11 Maths Chapter 2 Exercise 2.3

- **Deep Understanding of Functions**: This exercise helps students understand various types of functions like identity, constant, polynomial, rational, modulus, signum, and greatest integer functions. Gaining a clear understanding of these functions is essential for solving more complex problems in mathematics.
- **Mastering Operations on Functions**: The exercise teaches students how to perform algebraic operations on functions, including addition, subtraction, multiplication, division, and scalar multiplication. Mastery of these operations is crucial for solving advanced problems in mathematics and related fields.
- **Improved Problem-Solving Skills**: By practicing the problems, students develop their problem-solving abilities, learning to manipulate and analyze functions effectively. This boosts their confidence in handling similar questions in exams.
- **Conceptual Clarity**: The step-by-step solutions provided in the NCERT book help students break down complex problems, allowing them to grasp difficult concepts with ease. This clarity is important for building a strong mathematical foundation.
- **Preparation for Future Topics**: Understanding functions and their operations is fundamental for calculus and higher-level mathematics. This exercise lays the groundwork for future chapters and topics, making it easier for students to tackle advanced concepts.
- **Better Exam Performance**: Regular practice of these exercises helps students become familiar with different question types and improves their speed and accuracy in exams. This contributes to better performance in board exams and competitive exams.