Important Questions for Class 11 Maths Chapter 4: Class 11 Maths Chapter 4 Principle of Mathematical Induction is a foundational topic in higher mathematics that strengthens students logical thinking and proof skills.

Important questions in this chapter focus on applying the principle of mathematical induction to prove statements about sequences, inequalities, divisibility and identities. These questions help students practice structuring mathematical proofs step-by-step, making sure to establish a base case and then proving that if the statement holds for one integer, it also holds for the next. Mastery of this chapter is important, as it sets the stage for more advanced proof techniques used in calculus, algebra and beyond.

Practicing important questions from Chapter 4 helps students gain confidence in their reasoning skills and prepares them for a range of mathematical problems in competitive exams and further studies.

Important Questions for Class 11 Maths Chapter 4 Overview

Important Questions for Class 11 Maths Chapter 4 Principle of Mathematical Induction are prepared by subject experts at Physics Wallah to provide a thorough overview of this crucial topic. These questions are created to deepen students understanding of mathematical induction, a method widely used in higher mathematics to establish the validity of statements or formulas across integers.

Practicing these important questions helps students gain confidence, develop logical reasoning and build a strong foundation for advanced topics in mathematics.

Important Questions for Class 11 Maths Chapter 4 PDF

Important Questions for Class 11 Maths Chapter 4 PDF has key questions on the Principle of Mathematical Induction.

You'll find problems on topics like proving sequences, inequalities and divisibility. These questions are useful for exams and improving your understanding of Chapter 4. You can download the PDF from the link below to start practicing.

Important Questions for Class 11 Maths Chapter 4 PDF

Important Questions for Class 11 Maths Chapter 4 Principles of Mathematical Induction

Below is the Important Questions for Class 11 Maths Chapter 4 Principles of Mathematical Induction-

Question 1:

Prove that $2^n > n$ for all positive integers n by the Principle of Mathematical Induction

Solution:

Assume that P(n): $2^n > n$

If n =1, $2^1>1$. Hence P(1) is true

Let us assume that P(k) is true for any positive integer k,

It means that, i.e.,

$2^k > k$ …(1)

We shall now prove that P(k +1) is true whenever P(k) is true.

Now, multiplying both sides of the equation (1) by 2, we get

$2. 2^k > 2k$

Now by using the property,

i.e., $2^{k+1}> 2k = k + k > k + 1$

Hence, P(k + 1) is true when P(k) is true.

Therefore, P(n) is true for every positive integer n is proved using the principle of mathematical induction.

Question 2:

Prove that $1 + 3 + 5 + … + (2n – 1) = n^2$ using the principle of mathematical induction.

Solution:

Given Statement: $1 + 3 + 5 + … + (2n – 1) = n^2$

Assume that P(n) : $1 + 3 + 5 +…+ (2n – 1) = n^2$, for $n \in N$

Note that P(1) is true, since

P(1) : $1 = 1^2$

Let P(k) is true for some $k \in N$,

It means that,

$P(k) : 1 + 3 + 5 + \ldots + (2k - 1) = k^2$

To prove that P(k + 1) is true, we have

$1 + 3 + 5 + \ldots + (2k - 1) + (2k + 1)$

$= k^2 + (2k + 1)$

$= k^2 + 2k + 1$

By using the formula, the above form can be written as:

$= (k + 1)^2$

Hence, P(k + 1) is true, whenever P(k) is true.

Therefore, P(n) is true for all $n \in N$ is proved by the principle of mathematical induction.

Question 3:

Show that $1 \times 1! + 2 \times 2! + 3 \times 3! + \ldots + n \times n! = (n + 1)! - 1$ for all natural numbers n by the Principle of Mathematical Induction.

Solution:

Assume that P(n) be the given statement, that is

$P(n) : 1 \times 1! + 2 \times 2! + 3 \times 3! + \ldots + n \times n! = (n + 1)! - 1$ for all natural numbers n.

It is noted that P (1) is true, since

$P (1) : 1 \times 1! = 1 = 2 - 1 = 2! - 1.$

Let P(n) is true for some natural number k,

It means that

$P(k) : 1 \times 1! + 2 \times 2! + 3 \times 3! + \ldots + k \times k! = (k + 1)! - 1$

Inorder to prove P (k + 1) is true, we have

$P (k + 1) : 1 \times 1! + 2 \times 2! + 3 \times 3! + \ldots + k \times k! + (k + 1) \times (k + 1)!$

$= (k + 1)! - 1 + (k + 1)! \times (k + 1)$

Now, simplify the above form, we get

= (k + 1 + 1) (k + 1)! – 1 = (k + 2) (k + 1)! – 1 = ((k + 2)! – 1

Therefore, P (k + 1) is true, whenever P (k) is true.

Hence, P(n) is true for all natural number n is proved using the Principle of Mathematical Induction.

Benefits of Solving Important Questions for Class 11 Maths Chapter 4 Principles of Mathematical Induction

Here are the benefits of solving Important Questions for Class 11 Maths Chapter 4 Principles of Mathematical Induction:

Strengthens Understanding: Helps you grasp the steps of mathematical induction, including base case and inductive step.

Builds Logical Reasoning: Enhances logical thinking skills, useful for solving complex problems in math.

Exam Preparation: Familiarizes you with question types, making you better prepared for exams.

Boosts Confidence: Increases confidence in tackling proof-based questions.

Improves Accuracy and Speed: Practicing regularly improves precision and problem-solving speed.

Foundation for Advanced Math: Provides a strong base for future math topics and competitive exams.