

Class 11 Maths Chapter 14: Mathematical Reasoning

Having clarity in the concepts of **Class 11 Maths Chapter 14** is vital for scoring excellent marks in CBSE Term – II exams. The **Mathematical Reasoning NCERT** questions are often asked in different competitive exams also. Therefore, it is imperative to have a strong command of this topic. **NCERT Solutions for Class 11 Maths Chapter 14** includes all essential questions from the latest NCERT textbooks. The **Mathematical Reasoning NCERT** solutions are prepared by our highly experienced subject experts as per the updated term-wise CBSE Syllabus 2021-22. These solutions help build an in-depth and fundamental conceptual understanding of the subject quickly. You can refer to these NCERT Solutions during your exam preparations as they are easy to comprehend. We intend to clear all your doubts regarding Mathematical Reasoning and have answered a few frequently asked questions at the end.

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Introduction

Class 11 Maths Chapter 14 is an essential and interesting topic. As stated earlier, mathematical reasoning is an integral part of most competitive exams, and this chapter prepares students to apply logical reasoning to mathematical statements. Students learn about different concepts of mathematical reasoning, including mathematically acceptable statements, compound statements, contrapositive and converse of statements, connecting words/phrases and implications of phrases. Students also learn how to analyse and validate mathematical statements. Each topic covered in this chapter is fundamentally very easy. Still, applying the rules given in each topic can be a little daunting if they are not appropriately understood. Students must solve different **Mathematical Reasoning NCERT** problems regularly with the help of **NCERT Solutions For Class 11 Maths Chapter 14** to clarify their doubts and develop a deeper understanding of each topic.

Statements

A sentence becomes a statement when it is either true or false. If there is any ambiguity or confusion, then the sentence is not a statement.

- Sentences with variable times such as 'today', 'tomorrow' and 'yesterday' are not statements.
- Sentences with variable places such as 'here', 'there' and 'near' are not statements.

New Statements from Old

There are two techniques used to form new statements from old statements:

Negation of a statement

- It means contradicting a given statement. Simply put, we write the opposite of the given statement.
- Phrases like 'is not,' 'it is not the case,' 'it is false that' are used while forming negation of a statement.

Compound statements

- A new statement can be formed by compounding two or more old statements, also called component statements. The resultant statement is called the compound statement.
- Connecting words 'or', 'and' are used to connect component statements.

Special Words/Phrases

Connecting words 'and', 'or' are often used in compound statements. Each of these words plays a significant role in mathematical statements.

The word 'And'

- A compound statement that uses the word 'and' as the connecting word is true if all the component statements are true.
- A compound statement that uses the word 'and' as the connecting word is false if even one component statement is false.
- It is important to note that 'and' is not always used as the connecting word in statements.

The word 'Or'

- A compound statement that uses the word 'or' as the connecting word is true if either one component statement is true or all the component statements are true.
- A compound statement that uses the word 'or' as the connecting word is false if all the component statements are false.

Quantifiers

- Phrases like 'there exists', 'for every' 'for all' are called quantifiers.

- 'There exists' implies that the property being spoken of is satisfied by at least one element of the referred set.
- 'For all' or 'for every' imply the property being spoken of is satisfied by each element of the referred set.

Implications

Statements with 'if then', 'only if' and 'if and only if' have implications. Contrapositive and converse statements with 'if- then' are very common. Let us understand the difference between the two:

- **The contrapositive of a statement:** For a statement 'if P then Q', the contrapositive is 'if the negation of Q then the negation of P'.
- **The converse of a statement:** For a statement 'if P then Q', the converse is 'if Q then P'.

Validating Statements

The presence of connecting words, quantifiers and phrases with implications must be kept in mind while validating whether a statement is true or not. The rules followed can be summarised as follows:

- **Statement with 'and':** Statement 'P and Q' are true if statement P is true and statement Q is true.
- **Statement with 'or':** Statement 'P or Q' is true if only one of the statements is true.
- **Statement with 'if-then':** Statement 'if P then Q' is true if statement Q is true because statement P is true. The statement 'if P then Q' is also true if statement P is false because statement Q is false.

Solved Examples for CBSE Class 11 Maths Chapter 14

Problem 1: Which of the following sentences are statements?

- There are 50 days in a month.
- There are 30 days in a month.

Answer: a) There are 50 days in a month.

Explanation: The answer to the first sentence is always false irrespective of the month, and therefore it is a statement.

The second sentence is not a statement. It is unclear which month is referred to in this sentence since the number of days in some months is 30 while others are not 30.

Problem 2: What is the negation of the following statements?

- The number 3 is not greater than 2.
- New Delhi is the capital of India.

Answer: a) The number 3 is greater than 2.

b) New Delhi is not the capital of India.

Explanation: The first statement has 'not' in it. We will remove 'not' from it to form its negation. The second statement has no 'not' in it. We will add 'not' to it to form its negation.

Problem 3: Find the component statements of the compound statement: Number 2 is prime or it is even.

Answer: There are two component statements:

1) Number 2 is prime.

2) Number 2 is even.

Explanation: Each component is a statement in itself. There are two component statements in the given compound statement.

Problem 4: Identify the connecting word and find the component statements of the compound statement: Square root of a number is positive or negative.

Answer: The connecting word is 'or.'

There are two component statements:

1) Square root of a number is positive.

2) Square root of a number is negative.

Explanation: Each component statement is an independent statement with complete meaning. There are two component statements in the given compound statement, which uses 'or' as the connecting word.

Problem 5: Write the contrapositive of the following statement: If a number is not divisible by 2, it is not divisible by 4.

Answer: If a number is divisible by 4, it is divisible by 2.

Explanation: The contrapositive of a statement is formed by placing the negation of the second component statement before the negation of the first component statement.

Problem 6: Write the converse of the following statement: If a number is divisible by 15, it is divisible by 5.

Answer: If a number is divisible by 5, it is divisible by 15.

Explanation: Converse of a statement is formed by placing the second component statement before the first component statement.

FAQs

Write down the main topics of the NCERT Solutions for Class 11 Maths Chapter 14

Mathematical Reasoning.

Class 11 Maths Chapter 14 introduces students to various concepts of mathematical reasoning. Students learn to analyse whether a given sentence is a statement or not using mathematical reasoning. They also learn to form new statements from old ones using negation or compounding two or more statements. Students understand the importance of connecting words and quantifiers in compound statements and the implication of specific phrases in these statements. This chapter also lists some rules for validating statements.

What is the importance of Class 11 Maths Chapter 14 Mathematical Reasoning?

Class 11 Maths Chapter 14 is an integral part of the CBSE syllabus for class 11. This chapter aims at developing the power of reasoning in students. The ability to reason logically is crucial for success in exams and other aspects of life in general.

Where can I get the NCERT Solutions for Class 11 Maths Chapter 14?

MSVGo has error-free and step-by-step **NCERT Solutions For Class 11 Maths Chapter 14**.

Solutions to different types of questions of all critical topics are explained clearly. Students will find the chapter easy to understand as these solutions are structured to simplify the concepts of Class 11 Maths Chapter 14. Students should refer to these solutions to secure good marks in the CBSE Term-II exams during their exam preparations.

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43 All suggestions

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Topics Covered in this Chapter

1,459 words

43 more suggestions

Hide Assistant

Overall score **92**
See performance

Goals
Adjust goals

All suggestions

Correctness
5 alerts

Clarity
Very clear

Engagement
A bit bland

Delivery
Just right

Plagiarism