LOGICS AND ORIGINALS IN MATHEMATICS

Abstract

Ideas have emerged through the Interplay of rigorous Logical analysis and Creative thinking, we demonstrate originality by understanding logical thinking that stems from the Principal ideas associated with the symbiotic nature of Logic and Originality in the advancement of Mathematics like Income and Expensive, Percentage calculating, Fore castings and Planning to identify the problems, Understand the context, Formulating equation or Models solving equations. The logical reasoning involves the systematic applications of mathematical structure, formal logics dealing with contra positive contradiction to planning financial aspects, investments and savings. It also helps to enhance critical thinking by problem-solving approach with the use of technological tools to enhance Mathematical Exploration.

Keywords: *Mathematics Creativity, Mathematical Reasoning, Logic and Creativity Problem-solving, Logical Foundation.*

Author

Prof. Ayesha Siddiqa
Assistant Professor
Department of Mathematics
Abbas Khan College for women
Bengaluru, India.
E-mail: ayeshasiddiqa53@gmail.com

I. INTRODUCTION

Logic serves as the foundational framework for reasoning and it involves the study of valid reasoning, to develop original ideas, proofs, ensuring the validity and coherence of mathematical contributions. It both logic and originality are crucial for developing and expanding mathematical theories. It promotes flexibility in thinking and encourages exploring alternatives methods. it verify the solutions to ensure they make sense in the given context. Apply mathematical techniques to solve the formulated equations. Continuously improve mathematical and problem- solving skills. Logical reasoning starts by accepting these as foundational truths.

Mathematical reasoning often involves structures like sets, groups and fields .plan for long-term financial goals, consider factors like inflation and interest rates, use basic arithmetic to project future expenses based on historical spending patterns. Make informed decisions about investments using rate of return calculations. Apply mathematical concepts, like compound interest, to assess savings growth over time.

Algebra helps in expressing relationships between variables, calculus deals with rates of change and accumulation and statistics involves analyzing data to make informed decisions.

Objectives

1. Problem – solving
2. It provides a frame work for logical reasoning.
3. Enhance critical thinking.
4. Budgeting to measuring ingredients in cooking
5. Understanding quantitative aspects of various situations.

In daily life, mathematics plays a crucial role in problem-solving by providing a systematic approach to analyze and address various situations. Here is a detailed explanation of how mathematics is used in problem-solving.

1. Identifying the Problem

- Recognize the issue or challenge you are facing.
- Clearly define the problem to understand what needs to be solved.

2. Understanding the Context

- Consider the context of the problem and gather relevant information.
- Determine what data or quantities are involved.

3. Formulating Equation or Models

- Express the relationships between different variables using mathematical equations or Models. Translate the real world problem into a mathematical representation.

4. Solving Equations

- Apply mathematical techniques to solve the formulated equations.
- Use Algebra, Calculus or other mathematical methods depending on the natural of the Problem.

5. Interpreting Results
- Analyze the solutions obtained from mathematical calculations.
- Relate the mathematical results to the real world context.

6. Decision Making
- Make Decision or draw conclusions based on the mathematical analysis.
- Consider the implications of the result and how they impact the problem.

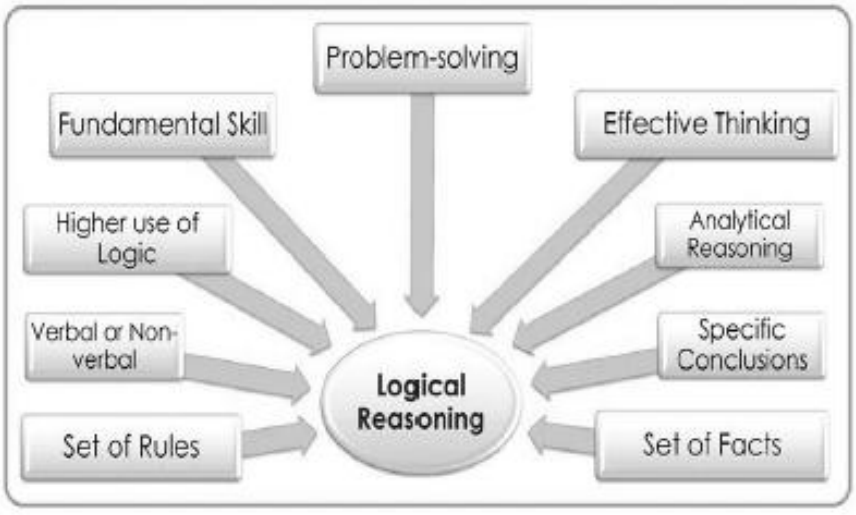
7. Verification and Iteration
- Verify the solutions to ensure they make sense in the given content.
- Iterate and refine the solution if necessary, adjusting variables or assumptions.

8. Applications of Results
- Implement the solutions in practical terms.
- Use the mathematical insights to address the original problems effectively

9. Reflecting on the Process
- Reflect on the problem – solving process
- Consider what worked well & if there are alternative approaches

10. Continuous Learning.
- Applying lessons learned to future problem solving scenarios
- Continuously improve mathematical and problem solving
  https://www.wtamu.edu, accessed on 5th Jan 2024
  https://insertmedia.bing.office.net/, accessed on 6th Jan 2024

II. MATHEMATICS USED IN LOGICAL REASONING



Logical reasoning in mathematics involves the systematic applications of principles to derive valid conclusions, here is the detailed explanation.

1. Axioms and Definitions.
- Logical reasoning starts by accepting these as foundational truths.

2. **Logical Connectives.**
   - Logical reasoning employs connectives like AND, OR, NOT.
   - For example, "If A is true and B is true, then C is true".

3. **Deductive Reasoning.**
   - Derives specific conclusions from general principles.
   - Moves from General to the specific, ensuring each step is logically valid.

4. **Proofs.**
   - Central to logical reasoning, proofs establishing the truth of mathematical statements
   - Constructed using a series of logically connected steps, starting from axioms and building upon prior theorems.

5. **Mathematical Structures.**
   - Mathematical reasoning often involves structures like Sets, Groups and Fields.
   - Logical reasoning ensures consistency within these structures.

6. **Formal Logics.**
   - Symbolic representation, such as using propositional logic or predicate logics helps formalize mathematical reasoning.
   - Enables the expressions of complex arguments in a concise and unambiguous manner.

7. **Contra Positive and Contradiction**.
   - Techniques like proofs by contra positive and proof by contradiction are common.
   - Contra positive: If not Q implies not P, then P implies Q.
   - Contradiction: Assumes the negation of what need to be proven and derives a contradiction.

Logical reasoning in mathematics involves building a structured argument, starting from foundational axioms and definitions using deductive reasoning to establish the truth of mathematical statements.

https://en.m.wikipedia.org/wiki/logical_reasoning, accessed on 12 Jan 2024

III. MATHEMATICS USE IN FINANCIAL PLANNING IN ALL ASPECTS

1. **Income and Expenses.**
   - Use addition and subtraction to calculate total income and expenses.
   - Create a budget by allocating specific amounts to various categories such as groceries, utilities and Entertainment.

2. **Percentage Calculating**
   - Calculating the percentage of income allocated to different expense categories.
   - Determine the proportion of the budget allocated to savings or discretionary spending.

3. **Forecasting and Planning.**
   - Plan for long-term financial goals, considering factors like inflation and interest rates.
   - Use basic arithmetic to project future expenses based on historical spending patterns.

4. **Investments and Savings.**
   - Make informed decisions about investments using rate of return calculations.
   - Ply mathematical concepts, like compound interest, to assess savings growth over time.

5. **Measuring Ingredients can be done Through Mathematics like Conversion of Units.**
   - Scaling recipe.
   - Fraction and decimals operations.
   - Cost per serving.
   - Portion control.
   - Recipe adjustments.

In both cooking and budgeting mathematics plays a crucial role in ensuring accuracy, efficiency and optimal resource utilization. Whether managing finances or preparing meals, mathematical concepts contribute to informed decision making and effective planning.

To Enhance Critical Thinking in Mathematics, Considering these Strategies:

- **Problem-Solving Approach:** Encourage students to solve problems rather than memorize formulas. Focus on understanding the underlying concepts and applying them to various situations.
- **Multiple Solution Paths:** Emphasize that there can be different ways to approach solve a problem. This promotes Flexibility in thinking encourages students to explore alternatives methods.
- **Puzzles and Challenges:** Incorporate puzzles and challenging problems that require Creative thinking and problem-solving, this can make Learning more engaging and stimulate critical thinking.

- **Multiple Solution Paths:** Emphasize that there can be different ways to approach solve a problem. This promotes Flexibility in thinking encourages students to explore alternatives methods.
- **Collaborative Learning:** Group activities and discussions can stimulate critical thinking. Students can learn from Each other's. Perspectives analyze different approaches and develop a deeper Understanding.
- **Use Technology Wisely:** Utilize technology tools to enhance mathematics exploration. Interactive Simulations, graphing software and provide students with hands on experiences and Opportunities for critical thinking. It is process that involves creating a supportive learning Environment by applying these strategies**.**

https://freepngimg.com/png/32329-technology

IV. MATHEMATIC IN UNDERSTANDING QUANTITATIVE ASPECTS OF VARIOUS SITUATION

To understand the quantitative aspects of various situations in mathematics, it's crucial to grasp fundamental concepts like algebra, calculus and statistics. Algebra helps in expressing Relationships between variables, calculus deals with rates of change and accumulation and Statistics involves analyzing data to make informed decisions.

For Specific Situations

1. **Algebraic Situation:** use algebra to model real-world problems with equation and Inequalities. Solve for unknowns to understand the qualities.
2. **Financial Mathematics:** apply mathematical concepts to financial situations, such as Annuities, interest and investment strategies.
3. **Statistics and Probability:** analyze data using statistical methods to draw conclusions. Probability theory helps in understanding uncertainties and making predictions.
4. **Calculus in Change:** derivatives represent rates of change, while integrals help accumulate qualities over intervals.

By mastering these aspects, you will be equipped to approach a wide range of Quantitative problem in various contexts. https://www.investopedia.com ,accessed on 15th Jan 2024

Reference

https://freepngimg.com/png/32329-technology