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EFFECTIVE WAYS TO FOSTER LOGICAL THINKING ABILITIES OF STUDENTS IN MATH CLASSES

Samandarov Toji Normurodovich
The Mathematics Teacher of the University of Business and Science LLC
tojiddinsamandarov@gmail.com

Abstract:
Current article highlights the effective teaching strategies for fostering logical thinking abilities of students in math classes.

Keywords: Logical thinking, mathematics, teaching strategies, logical reasoning, arithmetic, algebra, calculus, geometry, statistics, Problem-solving.

Before starting to analyze the ways of teaching logical thinking skills, it would be better to become well versed about the logical reasoning itself. That's an interesting perspective. It is true that logical reasoning plays a crucial role in a child's cognitive development and their ability to understand and interpret the world around them. Logical reasoning allows children to make sense of information, draw conclusions, solve problems, and make predictions based on evidence and facts.

As it is mentioned, children have a natural inclination to learn and explore their environment. Through their interactions and experiences, they acquire knowledge and gradually develop their reasoning abilities. This process of reasoning can be nurtured and enhanced through various activities and educational opportunities. Educators and parents can provide children with opportunities to engage in activities that promote logical reasoning, such as puzzles, games, and critical thinking exercises. Encouraging children to ask questions, make predictions, and explain their thought processes can also foster their logical reasoning skills.

It is important to note that each child may develop logical reasoning abilities at their own pace and in their unique way. Some children may show early signs of logical thinking, while others may require more time and support. It is crucial to provide a supportive and stimulating environment that allows children to explore, experiment, and make connections between different concepts.

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Overall, fostering logical reasoning in children can have long-lasting benefits, as it equips them with essential thinking skills that can be applied to various aspects of their lives, including problem-solving, decision-making, and understanding complex ideas.

Mathematics is often considered a discipline that heavily relies on logical reasoning. It involves the study of patterns, relationships, and structures, and the ability to reason logically is essential for understanding and applying mathematical concepts effectively.

Logical reasoning is particularly important in math because it allows students to make connections between different mathematical ideas and apply them to solve problems. By understanding the underlying logic and principles, students can see the coherence and interrelationships within the subject, which helps them develop a deeper understanding of mathematical concepts.

When students engage in math education that emphasizes understanding and problem-solving rather than rote memorization, they are encouraged to think critically and apply logical reasoning to analyze and solve mathematical problems. This approach promotes a more meaningful and enduring understanding of mathematics.

Furthermore, as students' progress in their mathematical journey, they encounter more abstract concepts and symbolic representations. Logical reasoning helps them make sense of these abstract ideas by identifying patterns, making logical deductions, and drawing conclusions based on the given information.

By fostering logical reasoning skills in the context of mathematics, children not only develop their mathematical abilities but also enhance their broader cognitive skills. Logical reasoning can improve their analytical thinking, problem-solving abilities, and general ability to make logical connections in various domains of life.

Mathematics encompasses a wide range of areas and components, and logical reasoning is fundamental to each of them. As you mentioned, arithmetic, algebra, calculus, geometry, statistics, and other branches of mathematics all require different types of reasoning skills.

In arithmetic, for example, logical reasoning is necessary to understand numerical relationships, patterns, and operations. It involves making logical

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connections between numbers and applying rules and properties to solve problems.

Algebra, on the other hand, relies heavily on logical reasoning to manipulate symbols, equations, and variables. Students need to use logical thinking to identify patterns, make deductions, and solve equations systematically.

Calculus involves reasoning with limits, derivatives, and integrals. It requires logical thinking to understand and apply concepts such as rates of change, optimization, and the fundamental theorem of calculus.

Geometry deals with spatial relationships, shapes, and proofs. Logical reasoning is crucial in constructing and justifying geometric arguments, making deductions based on geometric properties, and solving geometric problems.

Statistics involves analyzing data, making inferences, and drawing conclusions. Logical reasoning is essential for interpreting and critically evaluating statistical information, designing experiments, and making sound decisions based on data.

In each of these areas and beyond, logical reasoning is a fundamental aspect of mathematics. It helps students develop problem-solving skills, think critically, and make connections between different mathematical concepts and techniques. By engaging in mathematical reasoning, students not only strengthen their mathematical abilities but also enhance their overall logical thinking skills. These skills can be applied beyond the realm of mathematics and are valuable in various academic disciplines and real-life situations.

In summary, logical reasoning is at the core of mathematics and is essential for understanding and solving mathematical problems in different areas. By exploring and studying various components of mathematics, children can develop and enhance their logical thinking abilities, which have broader applications in their education and everyday life.

If it is so how we can implement logical thinking skills in the process of teaching mathematics?

1 Concentrate on Understanding Core Concepts

While memorizing formulae and rules can help unravel many math problems, that does not mean that you have understood or gathered the core concept behind the problem.

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So, by focusing on understanding core concepts rather than relying solely on memorization, you enhance your mathematical skills, develop logical reasoning abilities, and build a solid foundation for further learning. It's important to take the time to grasp the underlying concepts and ensure a deeper understanding of math principles.

2 Choose Word Problems to Boost Logical Reasoning

While simplified problems can help you score well, trying to work on difficult word problems will help you understand the logic behind the exercise better.

Some students may have a harder time than others while working on math word problems. However, these are the problems that actually boost your logical reasoning abilities.

3. Relate Theory to Practice

In order to correlate theory with things and situations they encounter in actual problem-solving, your child needs mathematical thinking, creativity, and logical reasoning skills. For this, it is important to establish a connection between practice and theoretical knowledge to understand and work on problems better, for which logical reasoning is quintessential.

Correlating theory with practice will not only boost your child's logical reasoning skills but also make math learning more fun.

By establishing a connection between theory and practice, children develop a deeper understanding of mathematical concepts, enhance their logical reasoning abilities, and find joy in learning math. Engaging in real-world problem-solving scenarios nurtures their creativity, critical thinking, and analytical skills, making math learning a fun and rewarding experience.

Smart Problem- solving One of the biggest hurdles faced by children who memorize formulae or concepts is solving problems that are not straightforward or are slightly tricky. However, teaching children to always use logical reasoning while looking at a problem will give them a distinct advantage in this regard. Children who can think and reason logically will break down the problem into smaller parts and think in creative ways to arrive at a smart solution in a brief span of time.

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As a proof of our sentences, let`s see some example problems from task book for 7 grades:

1-problem: 8 digit numbers formed from the numbers 1, 2, 3, ..., 8 without repeating them

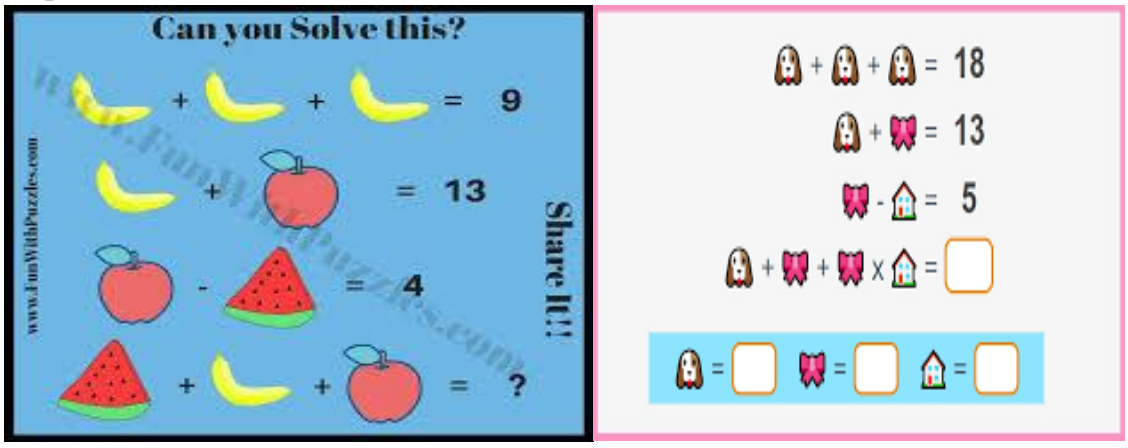
How many numbers 1 and 8 are next to each other?

The following cases are possible: 1 in the first place, 8 in the second place, ..., 1 in the seventh place, 8 in the eighth place, the number of such cases is 7.

In addition, 1 and 8s in the above 7 cases, changing their places, and 7 more (they are side by side

standing) we find the case. So, put 1 and 8 side by side in 14 ways possible 6 of the other remaining numbers to each of these methods! Place replacements are suitable. So the numbers 1 and 8 are next to each other the number of substitutions is $2 \cdot 7 \cdot 6! = 2 \cdot 7!$ is equal to.

2- problem:



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