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TEACHING THE DIFFERENCE OF SQUARES USING INTERACTIVE METHODS

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Abstract

This article explores the effective teaching of the Difference of Squares formula using modern interactive methods. It highlights the role of didactic strategies like "Don't Get Lost," "Fill in the Blanks," "Step-by-step," and "Find the Match" in making mathematical concepts more accessible and engaging for students. Emphasis is placed on interdisciplinary connections and student-centered learning.

Introduction. As we know, the significance and usefulness of mathematics lie in the fact that its concepts, formulas, methods, and algorithms can be widely used not only in physics, chemistry, and biology but also in a number of other subjects, even in the study and interpretation of social and humanitarian sciences. Through interdisciplinary integration, it becomes necessary to interpret the mathematical concepts presented in these academic subjects in a unified and modern mathematical language. Naturally, in each subject, it is important to demonstrate to students how the mathematical concept applies within that specific subject.

If a modern mathematics teacher views the comprehension of general mathematical concepts and ideas as the main goal of a lesson, then they must strive to fully explain their essence to students. In order for students to understand the meaning of newly introduced concepts more deeply, analogies should be drawn using words that express similar ideas. The overall approach of mathematics teaching theory and methodology is defined by didactics. When selecting a method, theoretical information and related exercises should be considered in the context of the class's readiness, students' age, and the scope of the topic.

A teacher's methodological skill is, first and foremost, determined by their ability to inspire students to learn. The use of various techniques can help achieve this. For example, the following methods exist for teaching mathematics: traditional methods, problem-based learning, programmed instruction, and non-standard approaches. During lessons, it is always important to explain to students how problems they are solving can be applied in practice and in real life. As a result, students consciously understand and absorb knowledge from other disciplines:

- They understand mathematical topics and problems well and can analyze them;
- No matter how complex the proofs in the subject being studied are, they can comprehend them through their connection with the material world;
- Tangible heritage, wealth, and resources - all of these relate back to mathematical concepts;

- They are able to integrate interdisciplinary connections into mathematical ideas.

Demonstrating the use of mathematical concepts in other subjects is of great importance for the student. Naturally, the math teacher should base their teaching on modern educational methods. One of the easiest and most effective modern strategies in mathematics lessons is the "Don't Get Lost" method, which is especially suitable and simple for students who are not fond of the subject. This method ensures that all students are actively working at the same time during the lesson. The teacher assigns simple examples and problems to solve, monitors the process, and leaves the checking of the solutions to the students themselves — for instance, their classmates. In this way, they check each other and correct mistakes on the spot. This not only increases student engagement but also encourages them to think critically. Moreover, this method is very useful for members of math clubs.

Using the "Don't Get Lost" method leads to the following positive and active outcomes:

1. First, the effectiveness of the educational process increases, and the teacher discovers new pedagogical opportunities.
2. The teacher can fully monitor the students' problem-solving process in class and saves time in assessment.
3. It helps reveal individual student characteristics and fosters their creative curiosity.
4. During the lesson, the student becomes an active problem-solver, learner, and independent thinker, rather than just a copier.
5. Most importantly, the bond between teacher and student is strengthened, and students are encouraged to independently solve similar problems. The teacher gains the opportunity to directly observe the problem-solving process established through new pedagogical technologies.

In teaching mathematics, rote memorization and passive repetition are being replaced by methods that enhance the educational quality of lessons. All activities carried out with students - whether studying new topics, reinforcing acquired knowledge, asking questions, or having discussions - are directed toward encouraging students to search for convenient solutions, make rational substitutions, draw conclusions, and engage in proof.

Main Section. Square of a Sum and Square of a Difference

To reinforce the topic, we can use the "Fill in the Blanks" method as shown below.

Technology of the "Fill in the Blanks" method: Answers to the questions are found using short multiplication formulas related to the topic

1. $(\mathrm{a}+\mathrm{b})^2 = a^2 + 2ab + \cdots$
2. $(3+\mathrm{c})^2 = 9 + 6c + \cdots$
3. $(\mathrm{a}-\mathrm{b})^2 = a^2 - 2ab + \cdots$
4. $(2\mathrm{a}+\mathrm{c})^2 = 4a^2 + 4ac + \cdots$
5. $a^2 + 6a + \cdots = (\mathrm{a}+\cdots)^2$
6. $p^2 - 0.5py + \cdots = (\mathrm{p}-\cdots)^2$.

$a-b$ and $a+b$ based on the rule of polynomial multiplication

$(a-b)(a+b) = a^2 + ab - ab - b^2$

by simplifying the like terms on the right-hand side of the equation

$(a-b)(a+b) = a^2-b^2$

we obtain the expression :

$a^2-b^2 = (a-b)(a+b)$

this equality is called the difference of squares formula. This formula is convenient to use when calculating certain numerical expressions

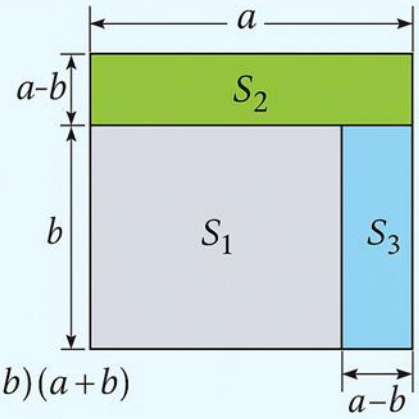
1-example $1012-912 = (101-91)\cdot(101+91) = 10\cdot 192 = 1920$

This expression can also be derived using a geometric shape.

$S = S_1 + S_2 + S_3 = S_2 = a^2$

$S_1 = b^2,\ S_2 = a(a-b),\ b(a-b)$

Then, using the $S - S_1 = S_3$ wht the corresponding values above, we write:



$a^2 - b^2 = a(a-b) + b(a-b) = (a-b)(a+b)$

If we factor out the common factor $(a-b)$, we get:

$a^2 - b^2 = (a-b)(a+b)$

If we factor out the common factor $(a-b)$, we get:

$a^2 - b^2 = (a-b)(a+b)$

2-example $n^2 - 36 = n^2 - 62 = (n-6)(n+6)$

3- example $36 - n^2 = 62 - n^2 = (6-n)(6+n)$

4- example $36n^2-4 = (6n)^2 - 2^2 = (6n-2)(6n+2)$

5- example $x^2 - 9y^2 = x^2 - (3y)^2 = (x-3y)(x+3y)$

6- example $16x^2 - 25y^2 = (4x)^2 - (5y)^2 = (4x-5y)(4x+5y)$

Now, to reinforce the new topic, we will use the “Step-by-step” and “Find the Match” methods.

Technology of the "Step-by-step" Method: In this method, students are divided into two groups and each group is given a pre-prepared "staircase" layout. The group whose members step through the staircase first is considered the winner (see Figure 1).

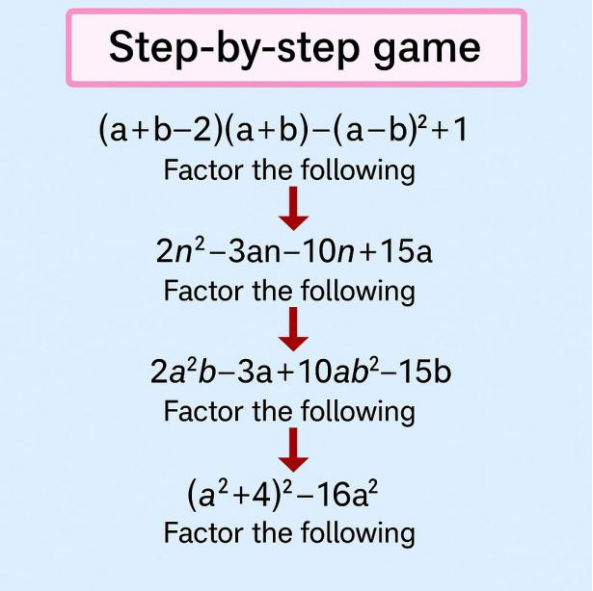


Figure 1. Step-by-step method

Technology of the "Find the Match" Method: In this game, although the answers are arranged in a mixed format, they can be found in the table. This provides students with an opportunity to recall the correct answers or find them through logical thinking. In many cases, comparing answers helps to both reinforce knowledge and strengthen understanding of previously covered concepts.

Table 1

1	$1-(8*a-3)^2$	A	$(a-4)^2*(a+4)^2$
2	$(a^2+16)^2-64*a^2$	B	$(a-2*b)*(2*ab+3)$
3	$1-(2*x-3)^2$	C	$(x-9)*(x+1)$
4	$2*a^2*b+3*a-4*a*b^2-6*b$	D	$8*(16-2*a)*(4*a-3)$
5	$16-(8*a-3)^2$	E	$4*(2-x)*(x-1)$
6	$(x-4)^2-25$	F	$(2*x+1)*(7-2*x)$

Answers to the 'Find the Match' method

1. D
2. A
3. E
4. B

5. F
6. C

Conclusion. It is necessary to once again remind students of the goal of the lesson and evaluate to what extent that goal has been achieved, together with the students. It is also important to answer their questions related to the topic, assess their level of understanding, and summarize the key moments of the lesson. Students who actively participated during the lesson should be acknowledged and evaluated.

Just like other methods, the methods used in today's lesson on the topic “Difference of Squares Formula” have their own advantages and limitations. However, these interactive methods play an important role in increasing students’ interest in mathematics and helping them gain a deeper understanding of the subject.

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