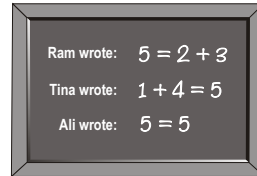


Maths: Class: III Number sense, related concepts and basic number competency

Question

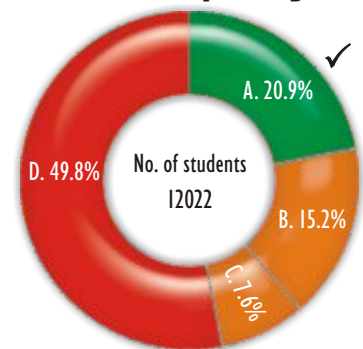
3 children wrote 3 different number sentences on the board.

Which of the sentences are correct?



Options

- ✓ **A** All three sentences are correct.
- B** Only Tina and Ali's sentences are correct.
- C** Only Ali's sentence is correct.
- D** Only Tina's sentence is correct.



Only 20.9% answered correctly

Why was the question asked?

The question was asked to test whether students are able to understand the meaning and significance of the “=” sign – Do they understand just the traditional meaning of 'announcing a result' or do they understand its actual 'relational' meaning of saying that two expressions have the same numerical value? Research shows that a proper understanding of the “equal to” sign is important as students move to higher classes and learn algebra.

What did students answer?

Only 21% of the students, at the most, are able to actually understand the meaning of the “=” sign and see that all the three equations given in the question are correct.

Possible reason for choosing B: Students choosing this option probably feel that “ $5=2+3$ ” is not a correct number sentence, because they are used to seeing the expression on the left side and its answer on the right side. As the order is reversed in this case, they conclude that the number sentence cannot be “correct”.

Possible reason for choosing C: Very few students chose this option- so it appears that they might just have guessed. Another possibility is that they may have seen the same number on both sides of the “=” sign, and eliminated the other two equations as incorrect by seeing different numbers on either side of the “=” sign.

Possible reason for choosing D: Almost 50% of students have chosen D which seems to confirm the view that students are going by the 'correct representation' of an equation rather than actually understanding what an equation (or “=” sign) means.

Learnings

The “=” sign is treated by most students as something giving a result rather than as a sign to indicate that the expressions to its left and right are the same. There are other questions like $5 + 3 = \underline{\quad} + 4$ in similar tests. The response data on these questions show that many students answered 8, and some answered 3. Both the above answers indicate students' inadequate understanding of the “=” sign. Research shows that students having problems with understanding the “=” sign also have problems with understanding algebraic expressions and solving algebraic equations, in later classes. Therefore developing an understanding of the “=” sign and working with numerical equations is very important from the beginning itself.

How do we handle this?

Problem - Exposure to just the traditional meaning of the sign: Generally, students get exposure to the “=” sign only through the equations like $2 + 3 = 5$. No other forms are really introduced to them, in the initial stages. And by the time they are introduced to other forms of usage of the “=” sign, they might have already internalised just the traditional meaning of it deeply. Hence, it becomes difficult for them to appreciate other meanings of the “=” sign.

Possible solution: A good thing would be to start doing balancing activities with numbers - activities demonstrating equations of all types like $5 = 5$, $3 + 4 = 7$, $3 + 4 = 2 + 5$; demonstrating the equality and asking students to find the missing number to equate/balance.

Based on this intuitive understanding of equality, students can be introduced to equating numerical expressions using the “=” sign. This would help students relate the sign to its actual meaning rather than only to its traditional meaning.

Useful resource

Website: http://psych.wisc.edu/alibali/files/Knuth_Stephens_McNeil_Alibaldi_JRME_2006.pdf

This is a research paper describing the types of mistakes that children tend to make in understanding of the “=” sign and how it gets reflected in the understanding of algebraic expressions too.

Books: John A. Van de Walle, Elementary and Middle School Mathematics: Teaching Developmentally, 4th ed. (New York: Addison Wesley Longman, 2001), pp. 396-399.

These pages in the book describe a few balancing activities to learn number sentences and the meaning of the “=” sign.