

Order of Operations

Question: How do you know that $2 + 3 \times 8$ does not equal 40?

Possible answers to the question are:

1. But it should equal 40. 2 add 3 is 5, and 5 times 8 is 40. We read in English left to right. This tells means you have to process math stuff also from left to right.
2. BEDMAS says to do multiplication before addition. So you have to multiply first: 3×8 is 24; 2 added to 24 is 26. The correct answer is 26.
3. If you start with 2 candies and someone gives you 3 bags with 8 candies in each bag, you then have 2 candies and 24 more candies. You have 26 candies in all, not 40 candies.
4. The answer depends on how you look at the expression. If you want, you can look at it as 2 add 3, and then multiply by 8.

Answer 1 is not correct. Mathematics expressions and equations do not have to be processed in left to right order. There are rules to be followed but left to right processing is not one of them.

Answer 4 involves a misconception. While you certainly can alter mathematical expressions, doing so does not depend on how you look at the expression. Mathematics cannot have this kind of flexibility. Mathematics won't work if the same expression has two or more different answers. There are rules of precedence, established at least as far back as the 1500s, called the "order of operations", that concern processing expressions.

Answers 2 and 3 are correct in some way. Answer 2 relies on authority (BEDMAS) without revealing any reasoning about why you should use BEDMAS or why it is supposed to work.

Answer 3 is conceptually based because it translates the expression into a story context as a way of explaining why 40 is not the answer.

The following links provide detail about the order of operations. That detail includes both a description of the order (hierarchy of operators) and the reasoning involved.

[Grade 6 Order of operations](#)

[The Truth about PEDMAS](#) (Ameis, MTMS)