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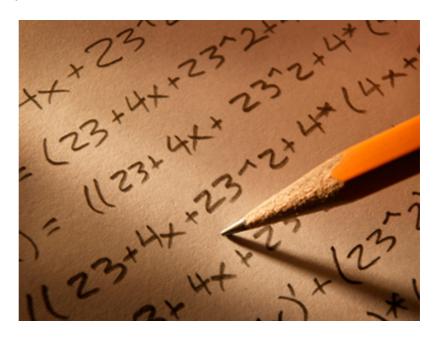**GCSE**
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What are BODMAS, BIDMAS and PEMDAS?

You could be forgiven for thinking that BODMAS, BIDMAS and PEMDAS are swear words! In fact, they are mnemonics for remembering the order of operations in mathematics. BODMAS stands for Brackets, Orders, Division, Multiplication, Addition and Subtraction

You could be forgiven for thinking that BODMAS, BIDMAS and PEMDAS are all swear words, particularly when you consider they conspire to produce so much hassle for parents! So, what exactly are BODMAS, BIDMAS and PEMDAS? The words are in fact mnemonics for remembering the order of operations in mathematics and, if that sounds like gobbledegook to you, we hope to be able to throw some light on the matter in this article.

Why are they called BODMAS, BIDMAS and, PEMDAS?

Let's start with the meaning of a mnemonic. Rationally, it is something simple that helps you remember something more complicated. It is fairly easy to remember the phrase *Richard Of York Gave Battle In Vain*. The first letters of each word coincide with the first letters of the colours of the rainbow - Red, Orange, Yellow, Green, Blue, Indigo, Violet. It's easier to remember the complete sentence than it is to remember 7 different colours, and the idea is that remembering the sentence jogs your memory about the order of the colours. That's a mnemonic. The letters in BODMAS, BIDMAS and, PEMDAS all stand for words.

What do the letters in BODMAS, BIDMAS and, PEMDAS stand for?

In the case of the mathematical mnemonics (BODMAS, BIDMAS and, PEMDAS) currently under discussion, we have 3 of them that mean exactly the same thing, and they all serve exactly the same purpose. Here's what the letters stand for:

- Brackets
- Orders
- Division
- Multiplication
- Addition
- Subtraction

- Brackets
- Indices
- Division
- Multiplication
- Addition
- Subtraction

- Parenthesis
- Exponents
- Multiplication
- Division
- Addition
- Subtraction

The third *series* above is the one most often used in the USA whilst UK schools almost always adopt series 1 or series 2 above. When your child first confronts you with one of these you will do well to remember which one it is because different schools use different ones. By sticking to the same one that your school uses you will at least avoid one level of complication.

What are orders and indices?

Brackets, Division, Multiplication, Addition and Subtraction are all words with which we are familiar but what of the second element of the mnemonics – Orders/Indices? These are the "half size numbers" that often occur in mathematical expressions. In the following example the 2 is an index (singular of the plural *indices*): $3^2 = 1 + 2 + 3 + 3$

What are mathematical operations?

A mathematical *Operation* can be thought of as one of the symbols that *make something happen* in maths. A multiplication sign (x) means that two numbers need multiplying together whilst an addition sign (+) means that two numbers need adding together. These are *Operations*.

What is the correct order of operations in maths?

The whole point of BIDMAS and BODMAS is to help you remember which operations to do in which order. Unfortunately, mathematics dictate that this is not the order from left to right as you might expect: Let's look at a typical example and see if you get the correct answer:

2 + 3 x 4

Did you conclude that the answer is 20? If so, then you did the calculation from left to right and said that *2 plus 3 equals 5* and that is then *multiplied by 4 to give 20*. Unfortunately, in mathematical terms it is wrong!

If you look at the rules of BIDMAS/BODMAS you will see that multiplication comes before addition (the two operations we are dealing with) and therefore you should have dealt with the Multiplication **BEFORE** you dealt with the Addition. Therefore, the correct logic is *3 multiplied by 4 equals 12* and that is then *added to the 2 to give 14*. 14 is the correct answer.

I have lost count of the number of times that I have had a parent on the 'phone who has said, "You have just got to be wrong. Look, I have done it on my calculator and tapped in 2 + 3 x 4 and it always, but always, gives me the answer of 20".

Throughout the many thousands of questions on the Education Quizzes site, this issue of the Order of Operations is the one that most often generates a query to our teachers - and when parents seem to have calculators on their side there is little wonder why!

Does the 11-Plus exam use BODMAS or BIDMAS?

Now, this might take some believing but in an 11-Plus exam the wrong answer is often marked as correct whilst the correct answer is marked down! This is because some authorities believe that children up to the age of 11 should have no knowledge of the Order of Operations as defined by BIDMAS/BODMAS and therefore they expect the students to erroneously do the calculation from left to right.

To avoid the possibility of an 11-Plus candidate being marked down for getting the right answer (!) it is imperative that you check with your school whether or not the rules of Order of Operations should be applied in mathematical questions.

What are the rules of BODMAS or BIDMAS?

To see how BIDMAS (or BODMAS) rules are applied in more complex scenarios we need to analyse a mathematical expression that contains all the various elements. If you are ready, then let us begin!

2 x 20 ÷ 2 + (3+4) x 3^2 – 6 + 15

Step 1

Deal with the Brackets to get:

2 x 20 ÷ 2 + 7 x 3^2 – 6 + 15

Step 2

Deal with the Indices (if you are thinking BIDMAS) or the Order (if you are thinking BODMAS) to get:

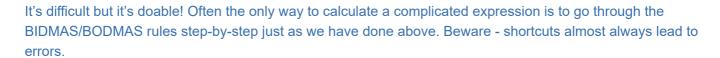2 x 20 ÷ 2 + 7 x 9 – 6 + 15

Step 3

Division and Multiplication rank equally so deal with these together from left to right to get:

20 + 63 – 6 + 15

Step 4

Addition and Subtraction rank equally so deal with these together from left to right to get:

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It's difficult but it's doable! Often the only way to calculate a complicated expression is to go through the BIDMAS/BODMAS rules step-by-step just as we have done above. Beware - shortcuts almost always lead to errors.

I hope this article has helped you to get to grips with what BODMAS, BIDMAS and PEMDAS are. For a more in-depth look at the Order of Operations, along with some interesting examples, you might like to try the Wiki article at: Order of Operations but don't expect to escape without a headache!

For a little lighter practise, try the two quizzes on the Education Quizzes site at:

- KS3 Maths - Level 3-4 Algebra - BODMAS Otherwise Known as BIDMAS
- GCSE Maths – BIDMAS (F)

So that's BODMAS, BIDMAS and PEMDAS explained – is there anything else you'd like to know? Look through our Knowledge Bank if you have questions about education. We've got loads of articles packed full of information, tips and advice for parents. It's a valuable weapon in any parent's armoury!

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