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Advice for Parents, from Professor Jo Boaler

Do you remember how excited your children were about maths* when they were young? How they were excited by patterns in nature? How they rearranged a set of objects and found, with delight, that they had the same number? Before children start school they often talk about maths with curiosity and wonder, but soon after they start school many children decide that maths is confusing and scary and they are not a "math person". This is because maths in many schools is all about procedures, memorization and deciding which children can and which cannot. Maths has become a performance subject and students of all ages are more likely to tell you that maths is all about answering questions correctly than tell you about the beauty of the subject or the way it piques their interest.

Given the performance and test-driven culture of our schools, with over-packed curriculum and stressed out students, what can parents do to transform maths for their children? Here are some steps to take:

1. Encourage children to play maths puzzles and games. Award winning mathematician, Sarah Flannery reported that her maths achievement and enthusiasm came not from school but from the puzzles she was given to solve at home. Puzzles and games – anything with a dice really – will help kids enjoy maths, and develop number sense, which is critically important.

2. Always be encouraging and never tell kids they are wrong when they are working on maths problems. Instead find the logic in their thinking – there is always some logic to what they say. For example if your child multiplies 3 by 4 and gets 7, say – Oh I see what you are thinking, you are using what you know about addition to add 3 and 4, when we multiply we have 4 groups of 3...

3. Never associate maths with speed. It is not important to work quickly, and we now know that forcing kids to work quickly on maths is the best way to start maths anxiety for children, especially girls. Don't use flashcards or other speed drills. Instead use visual activities such as Math Cards, How Close to 100, Snap It, Tic-Tac-Toe Sums, Tic-Tac-Toe Products and more.

4. Never share with your children the idea that you were bad at maths at school or you dislike it – especially if you are a mother. Researchers found that as soon as mothers shared that idea with their daughters, their daughter's achievement went down.

5. Encourage number sense. What separates high and low achievers is number sense – having an idea of the size of numbers and being able to separate and combine numbers flexibly. For example, when working out 29 + 56, if you take one from the 56 and make it 30 + 55, it is much easier to work out. The flexibility to work with numbers in this way is what is called number sense and it is very important.

6. Perhaps most important of all – encourage a "growth mindset" let students know that they have unlimited maths potential and that being good at maths is all about working hard. When children have a growth mindset, they do well with challenges and do better in school overall. When children have a fixed mindset and they encounter difficult work, they often conclude that they are not "a math person". One way in which parents encourage a fixed mindset is by telling their children they are "smart" when they do something well. That seems like a nice thing to do, but it sets children up for difficulties later, as when kids fail at something they will inevitably conclude that they aren't smart after all. Instead use growth praise such as "it is great that you have learned that", "I really like your thinking about that". When they tell you something is hard for them, or they have made a mistake, tell them: "That's wonderful, your brain is growing!"

** I use maths, rather than math, partly because I am from the UK and we say maths there and partly because maths is short for mathematicS, it is a plural noun. Mathematics was chosen to be plural to reflect all the many parts of mathematics - drawing, modeling, asking questions, communicating, etc. Math sounds more singular and narrow (Do the math, usually means do a calculation!), and I prefer to keep the idea that maths is a multidimensional and varied set of mathematical forms and ideas.*

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