Why Children Fear Division

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Five years ago, I was presenting a paper on the Mathematics Laboratory in my school. In the discussion after the presentation, I was asked: 'We start with one digit in all other arithmetic operations but in division, why do we start from the higher place value?'

My answer was, 'If your understanding of the place value is good, it is not necessary to start the operations from the ones digit It could be the other way around. Similarly, in division also, you can start dividing in either way.'

That question is still there in a corner of my mind. The rule that we follow while doing the four basic arithmetic operations is there in order to set an algorithm. But these rules are not hard and fast.

Division is one of the hardest parts of all the arithmetic operations and children fear it because it involves a lot of rules, especially long division which is the toughest for primary children. In schools, when we start division as a set of rules/ algorithms to be followed, we fail to inculcate the real meaning of division. The rules of division are a process but understanding the concept needs reasoning and focused inferential work.

Understanding the concept

I cannot find a better example than the one given by Daniel Willingham, a cognitive scientist and writer, who says that almost 25% of the sixth graders in America think the symbol = means *put the answer here* (ACT, American Educator) They do not understand that the = sign means *equality* or *mathematical equivalence*.

What is needed in the classroom? In its position paper on mathematics, the NCF (2005) recommends a curriculum that is ambitious and coherent and says that learning mathematics is every child's right. For this, it prescribes that school mathematics should be activity-oriented.

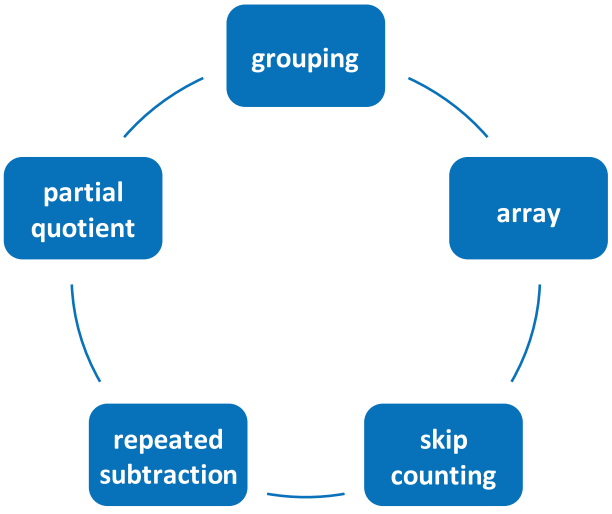
So, to bring forth the idea of the 'mathematics' in division and to make every child of my class learn it, I have attempted an activity-oriented approach in my division classes. I ensure that all my students can learn to do division easily. These ideas are presented here in this article.

Why is division difficult for children?

The problem is not with the children, but in the way, it is taught. Here are some questions to think over and ask whether we are addressing these questions in our classroom teaching.

1. What is division?
2. Where it is used in real life?
3. Is there any situation in our real lives where we divide a four or five-digit number by a three-digit number? (multi-digit computation)
4. And if there is such a situation, how many can do it without a calculator?

I would like to refer to an important point here. Children are able to deal with basic arithmetic, including division and fractions in their everyday life before they formally learn these concepts in school. *(Parmar, 2003; Mix et al., 1999)*. According to an NCTM (National Council of Teachers of Mathematics) publication, when students understand, they develop their own procedure to solve a problem. There are a number of ways to make the teaching-learning of division more meaningful. These have been tried in my school with the children of class IV. Our school is a girls' primary school where most of the students come from families living below the poverty line.



Some methods

Array

Since they have already learnt to divide using grouping in class III, I asked them to divide using array. It is done using counters for making arrays (rows). Children make all the possible arrays for a given number and write down the division facts for them. When children do more and more arrays, they become familiar with the concept of the factors of a number. In the traditional method, everything depends on multiplication tables, even in learning factors. With arrays, children understand the concept and know that 16 cannot be arranged as three in a row because three in a row would mean get five rows of three and a one (15 +1). All this happens in a very short period of time, proving that good understanding develops good number sense.

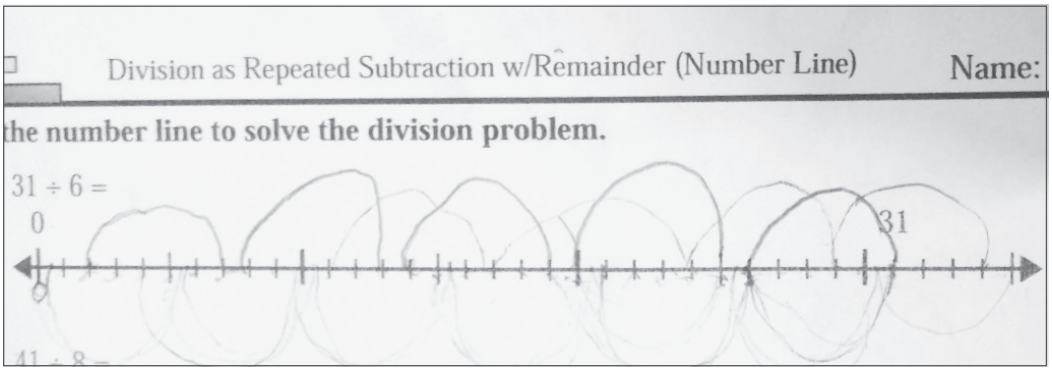
Ganitmala

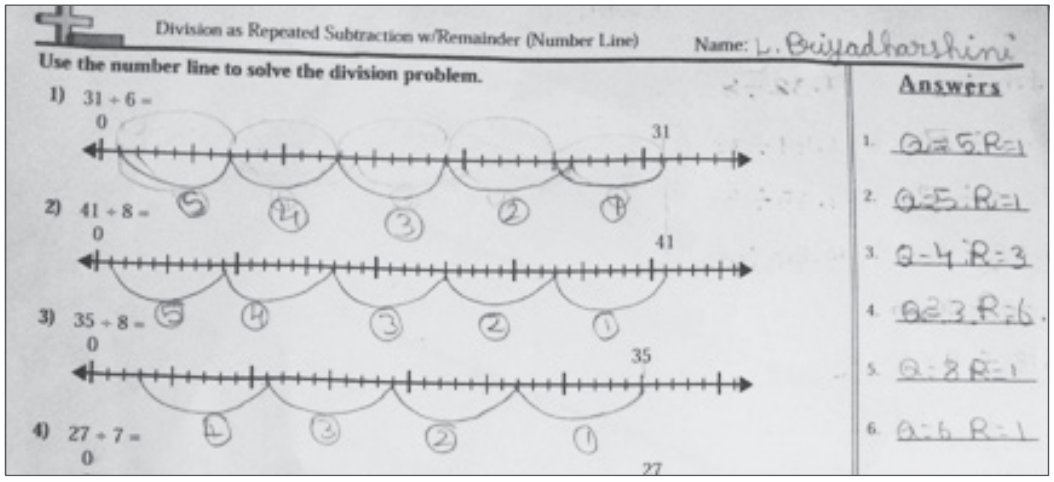
The number line division is a nightmare because it is an abstraction which is never used in real life, except to develop number sense in maths.

This illustration shows that students cannot understand where to start from and they do not know that the continuity should not break in the middle. *Ganitmala* is a very good representation of number lines. It reduces the level of abstraction. When students use *ganitmala* they develop a good understanding of the number line and make fewer errors.

Partial quotient method

In my experience, the students will learn any concept, whether it be addition, subtraction, multiplication or division, with ease through handling money. I use pretend money for this. The class is divided into five groups and given names of shapes: Cube, Cuboid, Cylinder, Cone and Sphere.





The first sum is to share 132 between two. To do this sum, they draw two stick figures and write down the share of each against them. It has been found that children use self-invented procedures to solve problems. So, the maths problems solved in class should simulate real-life situations that the children can relate to *(Verschaffel et al., 2006)*.

They first divided the one hundred into two fifties. Then they took thirty and divided in into two fifteens and finally the two into two ones. They counted the share each one got, the quotient, and found that there was no remainder.

An important aspect of mathematics is recording, without which the learning is incomplete. Doing

the activity teaches the concept and *recording* it is the way of learning the procedure. Concept and process should go together to connect and make understanding easier. Children bring out the answer by themselves, but teachers should watch out for disputes and ensure the equal participation of all the children in the activity.

Some common mistakes

Children can make mistakes in subtraction, which is an important part of division. For example, in subtracting 80 from 125, the remainder must be less than 100. However, children sometimes do not understand this, and the problem is with not understanding the concept of subtraction. Without addressing that, all efforts to teach her division will go in vain. The first step is teaching subtraction.

Children also make careless mistakes while doing their work, such as leaving out parts of the number to be divided. The teacher has to be alert to these mistakes and be ready to explain the basic concepts behind these.

Every child can learn division

I would like to share my best moment while teaching division. One of my students was given a division sum by her tuition master. She did it using a method taught in class, but her tuition master did not understand that and struck it out, saying that she was wrong and he did it in the long division method. She explained it to him and pointed out, 'We both got the same answer'. He accepted it and appreciated her. Now the same student is the class topper of International Math Olympiad (IMO) exam and has been selected for the second round of the IMO exam, 2020.

Whether it is learning division in a narrow sense or learning mathematics in a broader sense, there are many factors that affect the learning of children. Teachers and their pedagogical knowledge, use of inappropriate methods and lack of understanding, classroom settings and other factors affect the learning of a child.

There is a belief that maths is generally difficult for children and in particular, for girls. This is just gender bias. Ernest's 1976 study focuses on gender differences in elementary school children and the attitudes of their teachers. This study concludes that the idea that males are superior to females in mathematics is clearly a misconception and that the lack of women as professional mathematicians is likely more due to cultural influences than a lack of ability.

So, I took this opportunity of working as a teacher in a girls' school to prove that learning mathematics is everyone's right and every child can do it. Providing opportunities for girls from deprived communities to excel in mathematics is an important social change ahead of us. I am working towards it.

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