

Problem Solving – Your Own Way!

SANDEEP DIWAKAR

For some time now, I have had many opportunities to work with teachers and children at both primary and middle school levels. I developed a habit of asking some puzzles or questions related to daily life during our mathematics sessions to make them more enjoyable. When someone came up with a solution, I would always try to understand the process and the thinking behind their processes.

Here is one such question –

“There are some rabbits and chickens in a room. Somebody asked the watchman about the number of chickens and the rabbits. The watchman said that he does not know how many rabbits and chickens there are, but he does know that there are 100 heads and 250 legs in total. Can you find out how many rabbits and how many chickens are in that room?”¹

Whenever this question was posed, whether to adults, middle school children, or teachers, the majority would guess and solve it using the “trial and error method.” They would estimate, for example, that there are 20 chickens and 80 rabbits, giving a total of 100 heads. Then this would give 240 legs, so their estimate needed to be corrected. They would then change the number of rabbits and chickens and again calculate the number of legs and try to get 100 heads and 250 legs.

When challenged with whether there could be more than one way to solve this question, some adults, middle school children, and teachers familiar with algebra would quickly formulate equations to solve the question i.e., $x + y = 100$ and $2x + 4y = 250$ (where x is the number of chickens and y is the number of rabbits).

¹ I read or heard this question somewhere a long time ago.

Keywords: Problem-solving, reasoning, individuals

They would then simplify these equations using methods such as substitution, elimination, or cross multiplication, reducing them to an equation with only one variable. For instance, assuming that the number of rabbits is x , therefore the number of chickens would be $100 - x$. This leads to the equation $4x + 2(100 - x) = 250$, which helps in finding the value of x and calculating the number of rabbits and chickens.

Working with more than 50 groups on this question, I observed that almost all of them resorted to either trial and error or algebraic equations for a solution. Middle school mathematics teachers or those familiar with algebra immediately chose the more formal approach. In contrast, primary teachers and adults who avoid algebra, predominantly used the trial and error method.

When asked about the appropriate level of children who should be asked this question, all mathematics teachers in one voice agreed that this was a difficult question and that unless the children knew algebra, this question should not be asked. They suggested that this question would be fine for children in grade 6 or higher.

This question was also presented to some groups of children at the primary level. Many children could not solve it, saying that this question was different as it did not ask them to add, subtract, multiply or divide directly. Some children tried

to solve it by drawing pictures in different ways but then stopped saying that the question was difficult.

In the course of this work, I found two or three children whose answers were correct and methods unique. When I asked one of them about his approach, he explained in his own language – “Look sir, in this question, there are rabbits and chickens. Rabbits have four legs and chickens have only two legs. Since the total number of heads is 100, I know there are 100 animals. Let’s first give two legs to each, which will take up 200 out of the 250 legs and we will have 50 legs left. Now you cannot give one leg to any animal as no animal has three legs. So you have to give feet in pairs of two. We have 50 legs left, now if we give two legs to each, we will be able to give 50 legs to 25 animals only. In this way, the 25 animals that will get these legs will have four legs, so that these 25 must be rabbits and the remaining 75 animals will be chickens”.

Of course, adults, middle school children, and teachers follow the methods given in textbooks to solve this question, but primary-level children have a lot of fun and use their own methods. Examining these methods, and observing how they try to solve the problem in their own way, their method also has mathematical reasoning and a logical approach to problem-solving.



SANDEEP DIWAKAR has been working as a mathematics resource person at Azim Premji Foundation, Bhopal, M.P. since 2012. He has experience teaching mathematics at higher secondary schools and worked in Rajya Shiksha Kendra (SCERT) Bhopal for 15 years as a lecturer. Sandeep has been associated with the development of SCE, textbooks, training modules and teaching learning material for teacher educators, teachers and children. His articles have been published in Shaikshik Palash, Prathmik Shikshak, Shaikshik Sandarbh, etc. Sandeep may be contacted at sandeep.diwakar@azimpremijifoundation.org