

Survival Mathematics!

A daily record of classes with the 4th and 5th standard students of the village primary school, Varadenahalli, with two senior students and a teacher from CFL.



The topics covered were: length, weight, money and time. Each session lasted an hour and 15 minutes approximately, and we spent ten sessions to cover the topics. On many days, we would play games with them such as Kho-kho, or simply allow them the time to turn cartwheels and somersaults! But ten sessions were sufficient to complete what we set out to do.

Day one

We had twelve 4th and 5th graders come. As a warm-up exercise, we painted leaves with colours and pressed them on paper to form lovely designs. Then the children arranged themselves in height order. They collected straight twigs and sticks and arranged these in order of length in two groups, after which one group inserted their sticks into the other group's arrangement.

We ended the session with 'dog and bone' and measured how many tiles' distance each side had to keep from the bone.

Day two

We split them into two groups and conducted the same activity with both.

Using handspans, we measured several objects around – tiles, books, pillars. They reported lengths to the nearest quarter of a handspan. They saw that small hands and larger hands gave different values for a particular length, but a scale is fixed and therefore better.

The word centimeter was introduced and all measured various small objects to the nearest 0.1 cm. Then a metre ruler was brought and they saw it had 100 cm. We used it to measure pillars, doors, etc. When the metre ruler was needed by the other group, we used measured objects of known length to estimate the height of a pillar.

The children showed roughly a cm on their fingers and a meter with their arms.

We then measured circumferences of several cans, tins and round objects using string and rulers. We were in a circular room with several pillars at regular intervals, so the more able students could estimate it's perimeter by measuring one distance from pillar to pillar and multiplying appropriately.

We had cartwheels in between and ended with 'dog and bone'.

Day three

We split them into two groups of six each. One group went off to do long jumps and measure their jumps using a metre scale. The teacher demonstrated how to do a long jump and the beginning and end marks for the jump. Each of the children tried it a few times, and then did it properly twice with measurement. These were all 1.5 to 2.5 m but most of them used cm as their unit.

Meanwhile the other group worked on another thing. I had measured several objects around the hall (board, door, painting, trunk, chalk, book...) and written only the measurement in cm on the board (ranging from 4cm to 270 cm). They copied these numbers down and then I showed them the objects one by one. They had to guess each one's length from the numbers in their books. Working together with much noise and excitement they got all the values. They wrote the name of each object in English and in Kannada beside its measurement. By the time the chalk was shown it was less than 4cm! They understood why.

The last object I actually forgot, and since they knew the number they looked around the room measuring things looking for some object 14.5 cm long – it was the duster. (In the second group I pretended to forget it since it had worked so well in the first!)

Next I picked up various other lengths around the room (hem of my kurta, edge of pencil box etc.) and each had to guess its length as closely as possible. This being an oral group exercise it was noisy and exciting with all guesses quite intelligent. They checked the values themselves using rulers. When values are longer than 15cm, they have to write '15+15+12 = 42cm' for example. One was a circumference of a 'tenicoit' ring which they checked using string and ruler.

Day four

I was busy and a group of four senior students took over. They had the children review by drawing straight lines of specified length using rulers. This went up to 1 decimal place (1mm). Then the place value cubes and sticks were used to write numbers and say the numbers in Kannada and English (eg $100+30+6 = 136$).

Day five



We began weights today. We had collected a floor scale, a kitchen balance (wts upto 5 kgs), two small pan scales (upto 500gms and 1kg), a small weighing balance with needle (upto 200 gms) and a hanging spring balance. These were all arrayed in a line. The children recognized them as measuring weights. We asked, but none of them could give any guess of their own weight. So we asked them if they could weigh themselves using each of the scales in turn. They were clear that either the size or the pans or the range of weight would prevent them being able to weigh themselves on any but the floor scale and hanging scale.



One of them saw the calibration knob on the pan scale and asked what it was. We then demonstrated the importance of starting from zero on all scales.

Then we asked them to line up in weight order – to weight themselves on the floor scale. It turned that because they are all uniformly thin, this resulted in a height order arrangement (confirmed by subsequent weighing)! So we (the senior students and I) showed how amongst us, height and weight were not correlated!

Then they collected various items from around the hall (twigs, stones, shoes, pencil box, spoons, cups, books) and weighed these using appropriate scales (so first estimate and decide whether the range of a particular scale will allow the weighing).



Day six

We divided them into three groups and spent 20 mins to half an hour on each of three activities in rotation.

Group 1: we had written some weights on the board in gms, and arrayed objects in front of them. They had to match objects with weights. As just vision was no guide, and neither was just weighing in hand, they had to gauge by first finding the heaviest and the lightest, and matching those weights. The rest fell into place. When all weights were known, some combinations were shown eg. spoon in cup, onion in spoon, pen in bowl, and they had to calculate combined weights (addition)

Group 2: they practiced reading of weights using different scales – the skill was actually dividing a number line appropriately (calibration?).

Group 3: subtraction to guess weights. Find the weight of a container (cup or bag) and then the combined weight (eg bag plus dal or cup plus water). Subtract for the weight of the liquid or dal.

Days seven and eight

Today we progressed to Money. We showed them money in the following denominations: 50p, 1Re, 2Rs, 5Rs, 10Rs, 20Rs, 50Rs – and asked them how many of one would go into the other (mental calculations only). Some of them eventually managed to do hard ones like ‘how many Rs. 1.50 in Rs. 30?’

Then we priced some vegetables (potatoes, onions, tomatoes, peppers and limes) per piece, and asked them to choose a combination of vegetables to make some imaginary dish (that part was fun!). They played in small groups, two children as shop owners and two as customers, and simple paper money was made by them and used for the transactions.

We also gave them simple word problems (orally) like “If this cloth costs Rs. 75 per metre, and I want to stitch a shirt so I need 2 metres, how much will it cost to buy the cloth?” Soon they were deciding how many metres they would need based on what they wanted stitched, and how expensive the cloth would be, and thus making and solving their own problems!

In between all these activities, they also practiced English numbers and played handball and other games.

Day nine

We moved on to Time. First we showed them a clock and made sure they knew the hands and could tell some basic times like 1:00, 2:00, etc. Then we moved the minute hand five minutes at a time and taught them those divisions (5, 10, 15, 20, etc). We showed them random times like ‘1:25, 2:15, 3:40’ for them to read. We made them draw clock faces and show given times.

We played a game where they had clock faces on cards showing times, and we had the same times written down on cards, and they had to match the two.

This game is a good way to drill clock reading.

Days ten and eleven

We asked the children questions to do with time such as “if the train takes $2\frac{1}{2}$ hours to go from one station to the next, and it starts at 9 in the morning, when will it reach? What about if it leaves at 9:30? Or 11:15?” etc.

We soon saw that they had most trouble with such questions when the answer required ‘carrying over’ minutes into the next hour. That is, if the train left at 9:40, they were not able to get the answer 12:10. We wondered whether this is just too difficult for their age group. So we abandoned such questions and in the next session, in addition to practicing the previous skills, we asked more simple questions like – if I combed my hair from 8 to 8:10, how long did I comb my hair?

In the next session we continued this activity, and then divided the children into two groups. Each group made a timetable for the day, beginning from waking up and going through whatever activities they wanted to include. The group decided how long the activity would take, and therefore what time it would finish, and in this way went through a whole day. Then the groups exchanged places, and reversed the process. They had to read the timetable to calculate how much time each activity would take.

Conclusion

The sessions were fun for the children and teachers, and everyone learned something. We especially learned that we can fill in some of the gaps in basic mathematical understanding by doing various hands-on, small group activities that are easy to set up and carry out.

