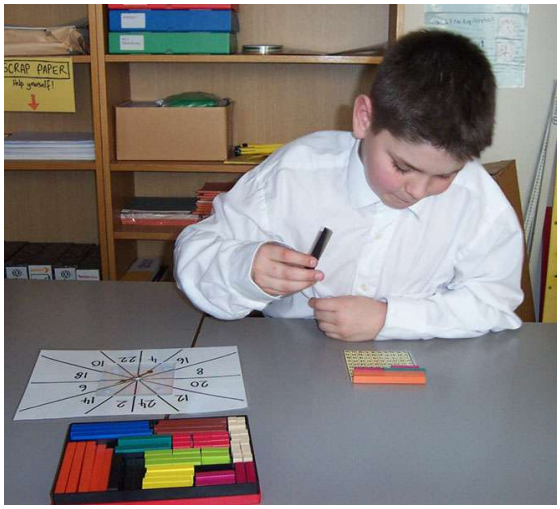
More to a game than meets the eye

Some games offer some sophisticated thinking if carefully developed. Carla Finesilver describes how a simple spinning game showed potential in breaking down and combining numbers, and being systematic. All within a convivial atmosphere, in small group and whole class of special needs pupils.

"Are we going to play the Spinner Game today?" asks Perry. Daisy is already heading hopefully for the shelf where the boxes of Cuisenaire Rods live. "OK", I agree. "Which table do you want to practice?" We settle on the four times table, and set up the equipment needed: a box of Cuisenaire Rods, a pair of hundred-grids (where each of the squares is 1 cm), and a plastic spinner Blu-Tacked onto one of my laminated spinner sheets. They argue a little over who should start, then decide to use the spinner with the person who gets the highest number starting.

How the Spinner Game came into being

I began to use the Spinner Game soon after I started teaching at The Moat School, a specialist school for secondary pupils with dyslexia and other related SpLD. Dyslexics typically have great difficulty remembering maths facts, such as the times tables, and the pupils I was teaching that year were no exception. I was teaching them strategies for quick calculation of table facts they could not remember, but they still needed to



practice these calculations. I made a spinner sheet, numbered from 1 to 12, with the idea that they would play a game where each player took it in turns to spin, and then would multiply by the number of whichever table we were practicing that day. For example, I had shown Perry and Daisy that to multiply a number by four, they could double the number then double it again. When Daisy spun a six, she would double six

to get twelve, then double twelve to get twenty-four. Another advantage of having the pupils generate their own questions was that there was no need for all the players to be practicing the same calculations; one player could practice multiplying the number on the spinner by four while another player practiced multiplying his numbers by five, for example.

My game needed a method for scoring. Many of my pupils had weak numeracy skills and found it difficult to imagine the size of different numbers when written down, so I needed a

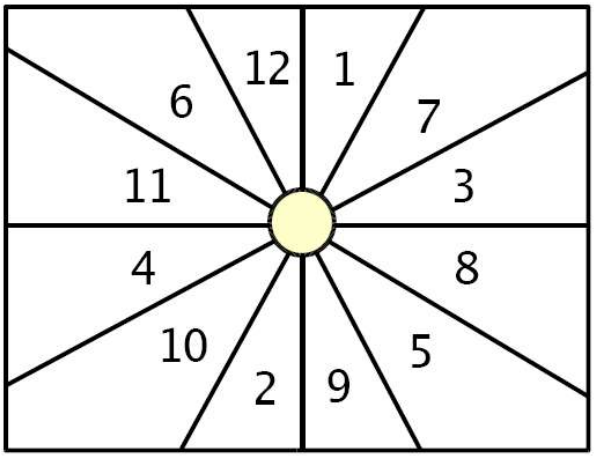


Figure 1 A simple spinner sheet numbered from 1 –12

visual way of displaying how many points they had won. Children love the look and feel of Cuisenaire Rods, so I decided that they should win a rod of the size corresponding to the calculation they had just done; if they spun a six, and did the calculation correctly, they would win a 'six' rod. Each player would have a hundred-grid, and the winner would be the first person to cover every square on the grid with rods, i.e. to score 100 points. The advantages to this were, apart from the fact that they could see their score physically growing as they did more questions, the amount of points they got in one turn would be to some extent proportional to the difficulty of the calculation, so for example, doing 4 x 8 would win them more points than doing 4 x 3. (Of course, they soon realised that to spin a ten was very lucky!). With teaching games, I always prefer to have some element of chance involved, as the pupil who loses can reassure themselves that they were unlucky that time, and so not become demoralised.

Now, when trying to cover all the squares on a hundred-grid with a random selection of Cuisenaire Rods, there comes a point when there are odd squares here and there left uncovered, but the rod that the player has just won is too big to fit in any of these gaps. At this point, it generally occurs to the pupils that they could take their eight points (for example) in the form of two 3-rods and a 2-rod,

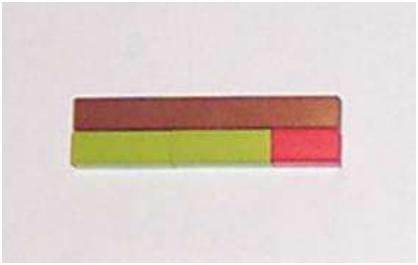


Figure 2 One 8 rod is equivalent to two 3 rods and a 2 rods

thus reinforcing the idea of it being possible to break up a number into different combinations of smaller numbers.

Extending the game

My next thought was to make a set of spinners numbered with the 'answers' to the times tables, as this would be a way to link multiplication and division. For example, if a pupil had been practicing multiplying numbers by four, I would replace the basic 1-12 spinner sheet with one numbered 4, 8, 12, ...48. When they spun a 24, I could phrase it first as 'Four times what makes twenty- four?' then 'How many fours go into twenty- four?' then eventually, 'What is twenty- four divided by four?' and so on. The game was very popular among the children, and as they became older and learned more advanced mathematics, I made spinner sheets

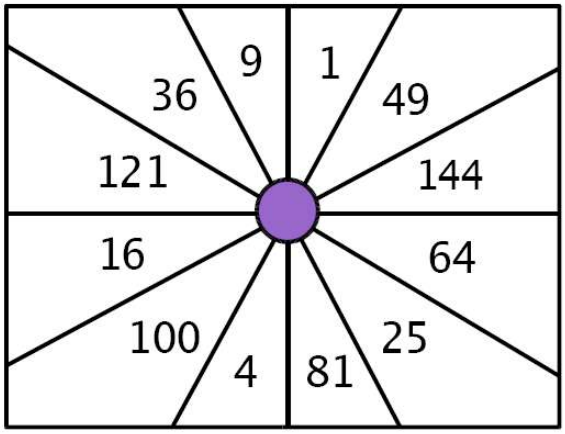


Figure 3 A spinner sheet for square numbers

numbered with the square numbers, and finally the first twelve cube numbers, so they could in fact end up asking each other 'What is the cube root of 343?'

I also began to introduce the Spinner Game to lower ability pupils, who perhaps had not yet encountered multiplication, as a way to practise their number bonds to ten. We would use a spinner sheet numbered from 1 to 10, and if, for example, they spun a three, I would ask something like 'Three and what make up ten?' Another option might be to use it to practice addition or subtraction, for example asking the child to

add to whichever number they spun.

Further variations

One of my pupils, David, did not like there to be any gaps on his grid, which gave me the idea of putting an increased emphasis on the partitioning of numbers into smaller components. Once pupils are familiar with the basic working of the game, I insist that they fill up each row of the grid before starting to fill the next. Thus, if there are two squares left on their current row, and they win seven points, they cannot take a 7-rod, but must take a 2-rod to fill the gap, and then work out that they should also take a 5-rod to make up their seven points (see Fig.2). This reinforces not only the act of breaking up larger numbers into smaller ones, but also addition facts and strategies.

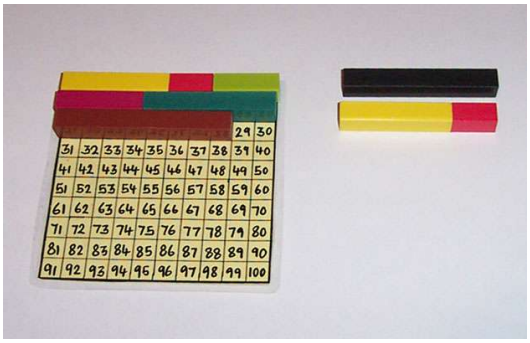


Figure 4 The player is effectively performing 28 + 7

Another pupil, Sam, had very strong opinions on different colours, and would only take rods of the colours he liked. He did not like orange, so when he spun a ten, would have to work out how to make that ten using rods that he liked, which were usually the 6-rod (dark green) and the 4-rod (dark pink). He would also willingly do many extra calculations in order to pick rods which would colour his grid symmetrically, or in a repeating pattern.

Meanwhile...

Back in my lesson, the situation is tense. After a series of high scores, Perry has been leading for most of the game, but he answered the last question wrong, and scored only one point on his previous turn, and Daisy is closing in fast. She spins a twelve, and is

momentarily concerned that this will be too difficult for her, before remembering that all she has to do is multiply by ten, multiply by two, and then put the answers together. She does a little victory dance as the bell goes, while Perry remarks that he will beat her tomorrow, if I let them play again.

Summary

Teaching Aims:

Practice of mental arithmetic strategies

Reinforcement of table facts

Breaking down and combining numbers

Advantages as a method:

Works with whole class practice, in groups of two or three

Variation used can be tailored exactly to suit a particular individual

Pupils generate their own questions

Pupils can check each other's answers with a calculator

Element of chance involved in winning, as well as skill

It's fun!