THE SANDWICH GAME

This game for two players is about reasoning from one component fact – a fact that is either known or given – to another related fact. Players must first be familiar with Cuisenaire rods and should spend some time making, exploring and reading the 'Stories' of all the numbers up to 10 (see 'Teaching Points' below). For more details see my print book *The Dyscalculia Toolkit* (Sage) and my ebook *Exploring Numbers Through Cuisenaire Rods* (Apple Books).

EQUIPMENT NEEDED TO PLAY THE GAME

Two ordinary 6-sided dice. Cuisenaire rods.

RULES

Players take turns to throw both the dice. On your turn, announce the total of the dice throw and construct a Cuisenaire rod 'sandwich' to match: between two rods that each match the dice total, align two shorter rods that add up to the same length. Make a second row of two rods below the first that is a single step of logic away from the components dictated by the dice. You might like to imagine slicing a cube off one of the rods in order to attach it to the other rod.

For example, if I throw 5 and 4 with the dice, I must announce the total to be 9 before taking a purple and a yellow rod and placing them end to end, sandwiched between two blue rods. I must now create a second row of rods of the same total length, with one rod measuring one unit shorter and the other rod one unit longer than the rods that were matched to the dice. In this example, the new sandwich filling will be a light-green plus a dark green rod, i.e. 3 + 6. (In this particular example, had I lengthened the purple rod instead of shortening it, the newly created row would have the same pair of rods as the previous row, so could only score 1 point.)

The maximum size of a sandwich is 10, so if your dice throw is greater than 10, try again.

The game ends after 8 turns each. Discard any duplicate rows within a sandwich (e.g. if both rows in a 9 are yellow and purple, discard one row). This means that a throw of 2 or 3 can only score 1 point. Discard any duplicate sandwiches (e.g. if you made two 7 sandwiches both comprised of one layer of yellow + red and one layer of dark-green + white rods, only one sandwich can count). Score 1 point for every valid filling row: this should mean 2 points scored for every (non-duplicate) sandwich representing the numbers 4 – 10 and 1 point for every sandwich representing 2 or 3.

THE SANDWICH GAME

A throw of 5 and 4 results in the rods sandwich shown above. On this occasion, there is only one way to create a valid second row that scores a second point. However, in the example below, a throw of 2 and 5 must start with a row of red and yellow rods sandwiched between black rods, followed by a choice in the second row of: either a purple and light green rod (4 + 3) or a dark green and white rod (6 + 1).

or

TEACHING POINTS

Teaching pupils to reason about the components of numbers is a really important stage of their learning and is covered very thoroughly in my print books and my ebooks.

Here, I will briefly mention only two approaches:

    (1) movement between groups of **discrete objects**, and

    (2) the 'Story of . . ." a number, modelled with **Cuisenaire rods**.

The Sandwich Game provides practice in the logical reasoning technique. The aim is that, after enough work with concrete materials and plenty of discussion and talk, any component facts can be derived mentally by logic and reasoning and not by counting in ones.

Discrete objects

In an activity that focuses on movement between groups, the child makes a doubles pattern, for any even number, out of nuggets (those tactile and attractive glass flat-bottomed stones sold as table decoration or flower arranging accessories). For example, for the number 8, 8 nuggets are arrange as two groups of 4, each group forming the familiar square dice or domino pattern for 4.

After separating the two groups of four, very slowly move one item from one group to the other and have the child put into words what is happening to each group: as one group becomes bigger by one, the other group automatically becomes smaller by one, i.e. by the same amount. In other words, finding that 5 and 3 makes 8 is not a new or unrelated fact. We can deduce that 5 + 3 = 8 because we already know that 4 + 4 = 8.

See also my game 'Regroup' in *The Dyscalculia Resource Book* (Sage, 2011).

Continuous materials

In an activity that focuses on the 'Story' of a number, pupils build up successive layers of a 'sandwich' between two Cuisenaire rods. So, knowing that the key fact about 8 is that 8 is built from two 4s, children begin by sandwiching two purple (4) rods, end to end, between two brown (8) rods.

The next step is to take a rod that is one size bigger, or smaller, than one of the purple (4) rods, and use it to start a new row in the sandwich. We must now reason about what component is needed to complete this new row. The reasoning goes something like this: "Because this new rod is one bigger than the 4, I now need a rod that is one smaller than the other 4 to fill the gap exactly." And so on.

or
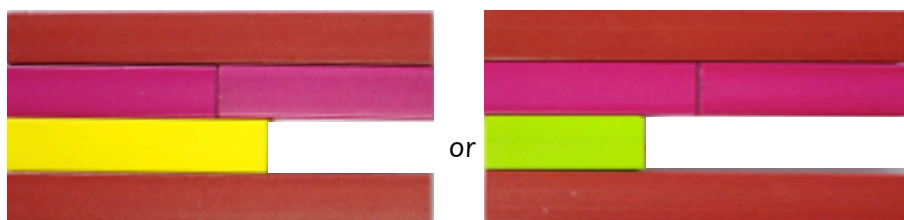
*Start building the Story of a number from its **key fact**.*

The Story of a number shows all the ways to build it from two components.

© Ronit Bird