

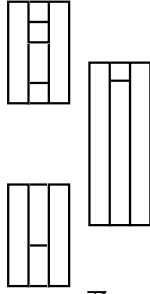
APPENDIX 2

Cuisenaire rods

Making sandwiches

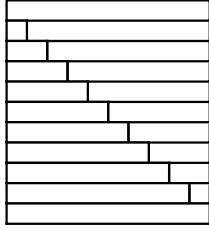
Sandwich two rods of the same colour with a 'filling' of any two rods that fit exactly. Can you make a different filling for the same sandwich? What if you were allowed more than two rods for the filling?

Look at the 5-sandwich and say some of the different ways of making 5. Will it be the same if the sandwich is turned upside down? How many ways can you make a 6-sandwich or a 7-sandwich, etc. Can you cover the rods and still say what numbers build up to 6 or 7, etc?



Make a wall and find number bonds to 10

Start with a staircase. Find the rod to fit on top of each step to make 10. Practise lots of questions, first looking at the wall, and later just 'seeing' it in your head: What and two makes ten? Ten is five and what? What more must we add to seven to get ten? Ten minus eight is . . . ? etc.



Number lines

Put 5 orange rods side by side. Throw lottery dice or pick random numbers below 50. Where on the orange number line will you find this number? (Lay out the number in rods, on top, if necessary.) How far is it from the next round number? What is that round number called?

Make and read equations

a) Take any two rods and put them end to end. Find the rod that is the same length. For this example put a red and a light green next to a yellow rod (like an open sandwich). Read the equation in four different ways, pointing at the relevant rods as you speak:

$$\text{e.g. } 2 + 3 = 5, \quad 3 + 2 = 5, \quad 5 - 3 = 2, \quad 5 - 2 = 3.$$

When you read '+' you can say 'and', 'add', 'plus'. When you read '-' you can say 'minus', 'take away', 'subtract'. When you read '=' you can say 'equals', 'is', 'is the same as'. Try using a variety of these words - don't always stick to the same ones. Sometimes start with the answer: $5=3+2$, $5=2+3$.

b) Put some rods into a bag, take out two rods without looking, then make and read an equation for them. Now shut your eyes, visualise the rods in your mind and say the four equations again.

Some things you can do with your Cuisenaire rods

Play around with them

The rods can only be used to help mathematical thinking when the relationship between the sizes and colours are very well known. The best way to become really familiar with them is to spend plenty of time playing around with them. Flat patterns are best. Do not allow younger siblings to join in - Cuisenaire rods are not toys.

Name the Colours

The convention is to use these names: white, red, light green, purple, yellow, dark green, black, brown, blue, orange.

Put them back in the box

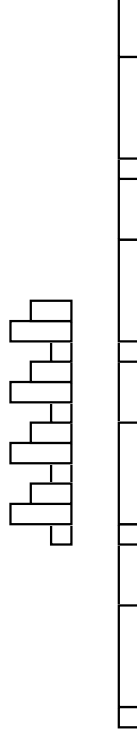
Putting the rods back gives an opportunity to match colours and sizes and to talk/think about different sizes and what fits.

Build flat designs

Use the rods flat on the table to make colourful pictures (a house, a car, etc) or designs (abstract patterns). Talk about the designs: What did you make? What rods did you use? etc.

Make sequences and play 'Hide the Rod'

Pick three rods at random and put them side by side. Repeat this pattern three more times until you have a sequence. While one player looks away, the other takes one rod out of the sequence and closes up the gap. The other player works out which colour is missing. Later try sequences of four or more repeated rods.



Matching designs

Take a **small** handful of rods and put them in a heap on the table. The second player must find the same number and colours to put in a heap of their own. The first player arranges the rods in a pattern or design while the other looks away. The second player looks at it and copies the pattern.

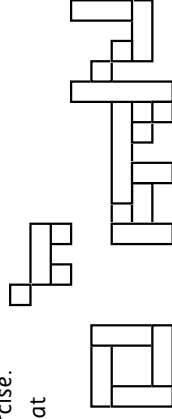
Copying designs onto paper

Make a simple pattern on squared paper. (The rods are in units of one cm, so find squares of 1 cm if possible). Using coloured pencils in Cuisenaire colours, copy the design and colour it.

Match designs from a picture

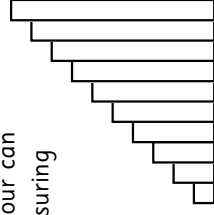
At another session, try to reproduce the designs made in the exercise above, from the coloured picture. Alternatively, draw some new designs on paper for this exercise.

As you and your child get better at this, you can make the designs more and more complicated.



Build a staircase

A staircase is built from one of each colour of rod, arranged in order of size, flat on the table. With practice, a staircase can be built in less than 30 seconds. Count the steps, and associated each colour with its number. The number for each colour can be found either by counting the steps or by measuring how many ones (white) fit into the same length.



See the staircase in your mind

Make a staircase then cover it with a sheet of paper. Say the colours in order. Name a colour for the other player to say the number, and vice versa. Throw a die, then see who can be first to pick out of the box the right rod to match the number. Pick a rod at random and ask the other player to say the number and colour of the next size bigger (or smaller).

Play 'Hide the Rod' from the staircase

Players take turns to hide one of the rods out of a staircase closing the gap afterwards. The other player must say both the colour and the number of the missing rod.

Race to build a staircase with 10-sided dice

Two players take turns to throw a 1-10 die and take a rod to match the throw. Put the rod down in roughly the place it will be in your final staircase, leaving spaces for the rods still to come. Who can complete their staircase first?

Measuring the rods

Every rod can be measured in white rods. How many white rods? Can every rod be measured in red rods? Why not? Talk about odds and evens. Find which rods can be measured exactly in light greens, or yellow.

Estimating and measuring with rods

First guess and then measure how many orange rods will fit into the length of a ruler, that book, your shoe, a box, etc. Note that an orange rod is 10 cm long, so after you find that something is, say, a little longer than 2 orange rods, you can also say it is just more than 20 cm.

Estimating and measuring bigger numbers with rods

Take a handful of mixed rods and put them end to end in a 'train'. Estimate roughly how long the train is by saying how many orange rods you think will fit into the length, therefore how many centimetres long the train is. Measure in orange rods first, then with a metre rule.

Finding doubles

Which rods can be measured exactly by two other identical rods? So, double two is . . . , double five is . . . , half of eight is . . . , etc.

Doubles up to 20

Find, say, double 7: Put two black rods end to end, then measure against an orange. How much more than one orange rod is it? So, how much is double 7? What is half 14? Repeat for the other numbers.