

Mixed Up Socks

<http://nrich.maths.org/166>

Start with three pairs of socks. Now mix them up so that no mismatched pair is the same as another mismatched pair.



Now try it with four pairs of socks. Is there more than one way to do it?

You Will Need:

- 8 counters, 2 each of 4 colours
- Or 8 socks, 8 pencils or 8 cards, 2 each of 4 colours

Teachers' Notes

Why do this problem?

Very young children can work on [this problem](#), as all that is needed is an awareness of same and different, and the idea of making groups of two. The problem also fits in with activities about pairs and counting by twos.

Possible approach

You could make up a simple story context in which to introduce one pair of socks, then a second pair, and then mix them up. It would be a good idea to illustrate it with two or three pairs of real socks.

When the children have seen how two pairs can be mixed, set the problem of mixing up three pairs of socks. They could then use these paper socks to work with either singly or in pairs. They will also need coloured pencils and paper to record their results.

Once the task has been achieved, recorded and discussed, introduce a fourth pair of socks and challenge the children to mix them up. Stress the requirement that no two pairs can use the same combination of socks, as this is an easy mistake to make when using eight socks. For example, making a pair with a blue and red sock means that the other red and blue socks cannot be used together.

Ask the children to display and compare their solutions. In this way, learners get a chance to question others' solutions and there is a purpose to explaining what has been done. You could then invite a few children to draw attention to someone else's solution for a particular reason. It may be that it is recorded very systematically, for example, or that their way of finding an answer seemed particularly efficient or understandable. You may also wish to discuss the number of different solutions the children found.

Key questions

Are all the pairs you have made different?

I wonder how you can tell if you have found all the different ways of doing it?

Possible extension

Try it with five and six pairs. Children could explore to see whether there is a pattern to the number of possible solutions.

For an extra challenge, try the problem using gloves instead of socks. This adds the complication of there being a left and right glove. How does this affect the total number of possible solutions?

Possible support

Suggest that learners use paper socks starting with just two pairs. Those with difficulties in recording could paste the different pairs of socks onto a sheet of paper.