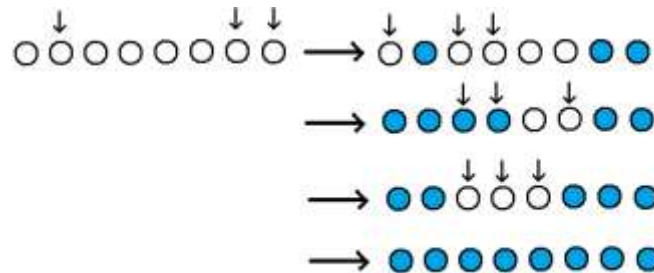# MORE WITHOUT WORDS
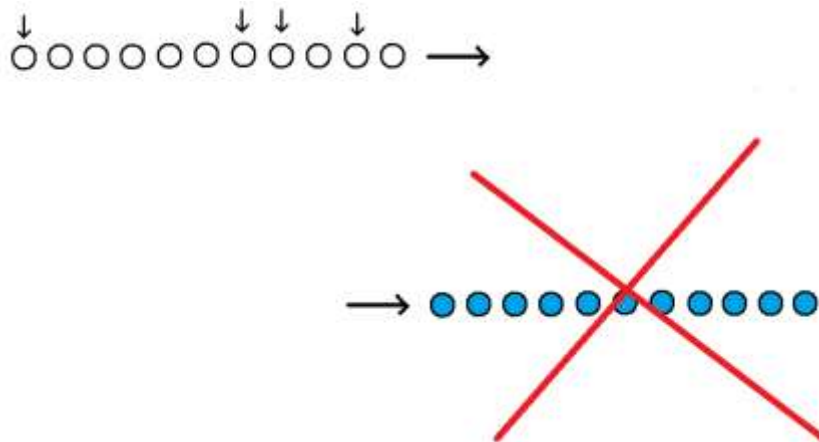*Mathematical Puzzles to Confound and Delight*

MWW 11: SOLUTION

Switching the colours of three dots at a time, it is possible to convert a row of 8 white dots into a row of 8 coloured dots.

It is not possible, however, to convert a row of 11 white dots into a row of 11 colored dots switching the colours of four dots at a time.

Reason: Each move of this game switches four colours and so as the game is played the total number of switches that have occurred is a multiple of four, an even number.

But for each dot to end up colored it must undergo an odd number of colour switches. With 11 dots each needing an odd number of colour switches, we need an odd number of colour switches in total. This is not going to happen!

> **RESEARCH:** Suppose there are N white dots in a row and one can switch the colour of any k of them at a time. What must be true about the numbers N and k for it to be possible to convert all to coloured dots?