

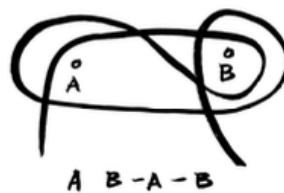


PICTURE HANGING PUZZLE

The picture hanging puzzle asks how to hang a picture over some hooks so that if any one of the n hooks comes out, the picture will fall to the ground.

This puzzle is featured in Matt Parker's book *Things to Make and Do in the Fourth Dimension* and this solution sheet features excerpts from that book.

The solution for $n=2$ is shown below.



In the solution 'A B -A -B' a letter represents the string passing over that hook in a clockwise direction. And a negative letter represents the string passing over that hook in an anti-clockwise direction.

Using the solution for $n-1$ hooks we can generate the solution for n hooks using an algorithm. The algorithm (as featured in *Things to Make and Do in the Fourth Dimension*) is below.

Hanging a Picture on n Hooks

- Step 1: List how to hang a picture on $n - 1$ hooks.
- Step 2: Write the new direction, around the new hook.
- Step 3: List how to hang a picture on $n - 1$ hooks in the reverse order and swap signs.
- Step 4: Write the negative new direction, around the new hook.

Applying this algorithm to the $n=2$ solution yields the $n=3$ solution, shown below.

