# UW Math Circle

1. You have a cube. You can move it around however you like, but you must place it back so it fits exactly where it started. How many different ways can you put it back?

2. If you are also allowed to reflect the vertices of the cube over internal axes (like switching the front and back face of the cube), how many different ways can you move the cube?

3. The number you got in part (a) should be the same as the total number of permutations of $1, 2, 3, ..., n$ for some $n$. What is that $n$? Can you find exactly $n$ things that get permuted during the movements of the cube?