Activity: Orders of Permutations

The *order* of an element g in a group G is the least natural number n such that $g^n = e$, if such a number exists (otherwise we say the order of g is infinite).

1. Find the orders of the elements of S_5 below:

$\alpha = (12)$ $\alpha = (123)$ $\alpha = (1234)$ $\alpha = (12345)$

2. Find an element of S_5 that has an order different from those found above.

3. Let α be an element of S_5. What is α^{120}?

4. Is there an element in S_5 that has order 120?

5. What is the largest order of any element in S_5?