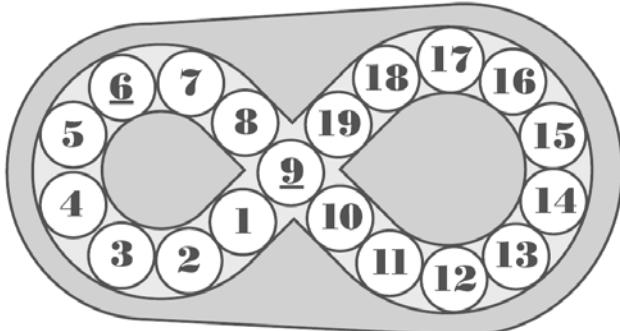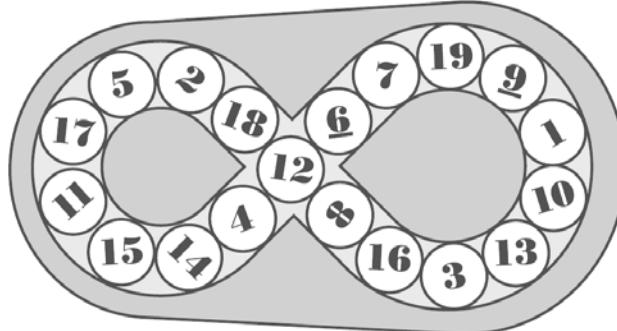```
> with(GroupTheory):
> G:=PermutationGroup([[1,2,3]],[[1,2],[3,4]]);
```
$$G := \langle (1,2,3), (1,2)(3,4) \rangle \qquad (1)$$

```
> GroupOrder(G);
```
$$12 \qquad (2)$$

```
> Elements(G);
```
$$\{(\ ), (1,2,3), (1,2,4), (1,3,2), (1,3,4), (1,4,2), (1,4,3), (2,3,4), (2,4,3), (1,2)(3, \qquad (3)$$
$$4), (1,3)(2,4), (1,4)(2,3)\}$$

```
> gens:=Generators(G);
```
$$gens := [(1,2,3), (1,2)(3,4)] \qquad (4)$$

```
> a:=gens[1]; b:=gens[2];
```
$$a := (1,2,3)$$
$$b := (1,2)(3,4) \qquad (5)$$

```
> a.b;
```
$$(2,4,3) \qquad (6)$$

```
> mult:=(a,b)->b.a;
```
$$mult := (a,b) \mapsto b \cdot a \qquad (7)$$

```
> mult(a,b);
```
$$(1,3,4) \qquad (8)$$

```
> mult(b,a);
```
$$(2,4,3) \qquad (9)$$



Puzzle: Original Position          Puzzle: Altered Position

```
> G:=PermutationGroup([[1,2,3,4,5,6,7,8,9]],[[9,10,11,12,13,14,15,
  16,17,18,19]]);
```
$$G := \langle (1,2,3,4,5,6,7,8,9), (9,10,11,12,13,14,15,16,17,18,19) \rangle \qquad (10)$$

```
> GroupOrder(G);
```
$$60822550204416000 \qquad (11)$$

```
> factorial(19);
```
$$121645100408832000 \qquad (12)$$

```
> %/2;
```
$$60822550204416000 \qquad (13)$$

```
> IsAbelian(G);
```
$$false \qquad (14)$$

```
> IsCyclic(G);
```
$$false \qquad (15)$$