Equivalent arrangements

*G* is a group of permutations.

Two arrangements *A* and *B* for which there is some  for which .

Elements Fixed by 

*G* is a group of permutations on a set *S*.

For , .

Burnside’s Theorem

If *G* is a finite group of permutations on a set *S*, then the number of orbits of *G* on *S* is

.

Group *G* Acts on a Set *S*

There is a homomorphism  from a group *G* to *sym(S)*, the group of all permutations on *S*.

Digraph

A directed graph: a finite set of points (called vertices) and a set of arrows (called arcs) connecting some of the points.

Cayley Digraph of a Group *G* with Generating Set *S*

Let *G* be a finite group and *S* a set of generators for *G*.

A directed graph  defined as follows:

1. Each element of *G* is a vertex of .
2. For each *x* and *y* in *G*, there is an arc from *x* to *y* only if  for some .

Hamiltonian Circuit

A sequence of arcs that traverses the diagraph in such a way that each vertex is visited exactly once before returning to the starting point.

Hamiltonian Path

A sequence of arcs that traverses the diagraph in such a way that each vertex is visited exactly once without returning to the starting point.

A Necessary Condition

 does not have a Hamiltonian circuit when *m* and *n* are relatively prime and greater than 1.

A Sufficient Condition

 has a Hamiltonian circuit when *n* divides *m*.

Abelian Groups Have Hamiltonian Paths

Let *G* be a finite Abelian group, and let *S* be any (nonempty) generating set for *G*. Then  has a Hamiltonian path.