Fundamental Mathematics
Elementary Geometry

Symmetry

Symmetry of a figure F is a particular characteristic of that figure.
It means that there is an isometry I of the plane that leaves the figure globally invariant, that is, such that I(F) = F.

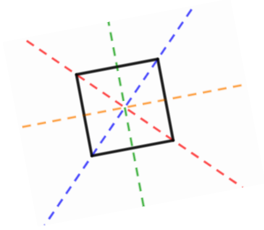
To speak of symmetry is to speak of symmetry of a figure.
Analysing the symmetry of a figure leads to investigate if there are isometries (different from the identity) that leave it globally invariant.

There is a symmetry for each of the four types of isometries: translational symmetry, rotational symmetry, reflectional symmetry, glide reflexional symmetry.

Reflectional Symmetry

There is, at least, a reflection that leaves the figure globally invariant.
The figure admits, at least, one line (or axis) of symmetry.

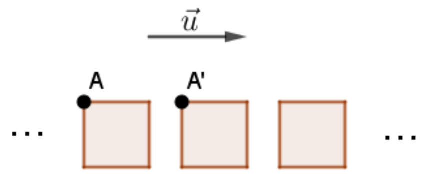
This square has four reflectional symmetries associated to the four lines of symmetry signed (green, blue, orange, red).



Translational Symmetry

There is, at least, a translation that leaves the figure globally invariant.
It is only possible if the figure is infinite.

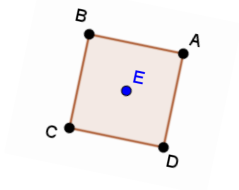
This infinite figure admits, for example, a translational symmetry associated to vector $\vec{u}$.



Rotational Symmetry

There is, at least, one rotation with an amplitude greater than 0º and less than 360º that leaves the figure globally invariant.
Only in this case, a rotational symmetry associated with an angle of 360º is also allowed.

This square has four rotational symmetries centred in E and associated to positive amplitudes.
For example, 90º (B: image of A…), 180º (C: image of A…), 270º (D: image of A…), 360º (A: image of A…).



Glide Reflectional Symmetry

There is, at least, a glide reflection that leaves the figure globally invariant.
It is only possible if the figure is infinite.

This infinite figure admits a glide reflectional symmetry associated to both the line s and vector $\vec{u}$.