= b + a for any two integers (commutativity of addition) . Groups for which the commutativity equation a ? b =
b ? a always holds are called abelian groups (in honor of Niels Henrik Abel) . The symmetry group described in the following section is an example of a group that is not abelian .
The identity element of a group G is often written as 1 or 1G , a notation inherited from the multiplicative identity . If a group is abelian , then one may choose to denote the group operation by + and the identity element by 0 ; in that case , the group is called an additive group . The identity element can also be written as id .
The set G is called the underlying set of the group (G , ?) . Often the group 's underlying set G is used as a short name for the group (G , ?) . Along the same lines , shorthand expressions such as " a subset of the group G " or " an element of group G " are used when what is actually meant is " a subset of the underlying set G of the group (G , ?) " or " an element of the underlying set G of the group (G , ?) " . Usually , it is clear from the context whether a symbol like G refers to a group or to an underlying set .

= = = Second example : a symmetry group = = =

Two figures in the plane are congruent if one can be changed into the other using a combination of rotations , reflections , and translations . Any figure is congruent to itself . However , some figures are congruent to themselves in more than one way , and these extra congruences are called symmetries . A square has eight symmetries . These are :
the identity operation leaving everything unchanged , denoted id ;
rotations of the square around its center by 90 ° clockwise , 180 ° clockwise , and 270 ° clockwise , denoted by r1 , r2 and r3 , respectively ;
reflections about the vertical and horizontal middle line (fh and fv) , or through the two diagonals (fd and fc) .
These symmetries are represented by functions . Each of these functions sends a point in the square to the corresponding point under the symmetry . For example , r1 sends a point to its rotation 90 ° clockwise around the square 's center , and fh sends a point to its reflection across the square 's vertical middle line . Composing two of these symmetry functions gives another symmetry function . These symmetries determine a group called the dihedral group of degree 4 and denoted D4 . The underlying set of the group is the above set of symmetry functions , and the group operation is function composition . Two symmetries are combined by composing them as functions , that is , applying the first one to the square , and the second one to the result of the first application . The result of performing first a and then b is written symbolically from right to left as
b ? a (" apply the symmetry b after performing the symmetry a ") .
The right @-@ to @-@ left notation is the same notation that is used for composition of functions .
The group table on the right lists the results of all such compositions possible . For example , rotating by 270 ° clockwise (r3) and then reflecting horizontally (fh) is the same as performing a reflection along the diagonal (fd) . Using the above symbols , highlighted in blue in the group table :