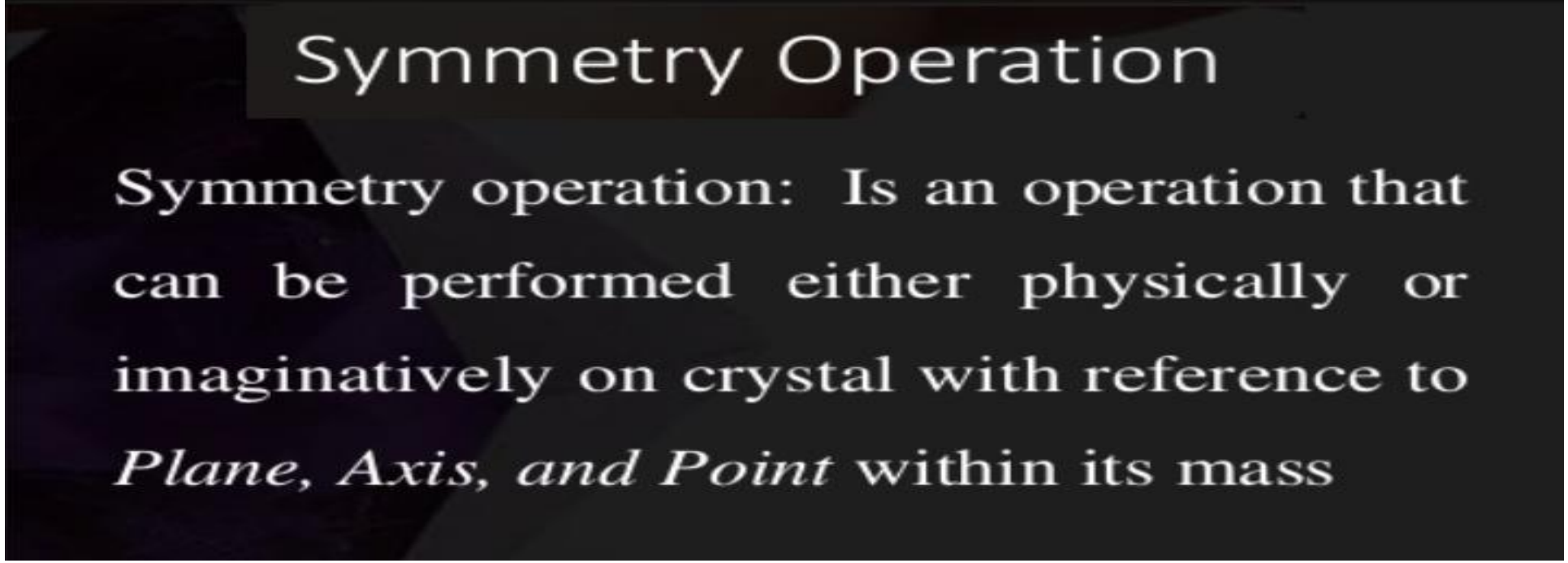
CRYSTAL SYMMETRY

Crystal Symmetry

It explains how similar atoms or group of atoms (**motif**) repeated symmetrically in space to produce ordered structure. In many crystals, regularity of arrangement of these plane faces occurs, and a careful study of such a crystal will reveal elements of symmetry.

Crystal Symmetry

It explains how similar atoms or group of atoms (**motif**) repeated symmetrically in space to produce ordered structure. In many crystals, regularity of arrangement of these plane faces occurs, and a careful study of such a crystal will reveal elements of symmetry.



Symmetry Element

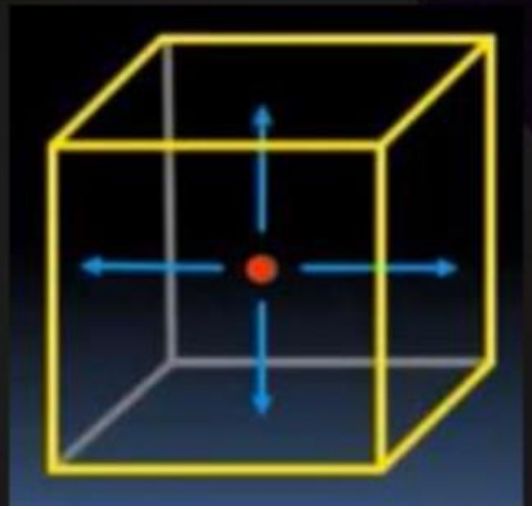
The location where the symmetry operation occurs such as rotation axis ,mirror plane, inversion centre or translational vector.

FUNDAMENTAL SYMMETRY ELEMENT

1. Centre of symmetry
2. Axis of symmetry
3. Plane of symmetry
4. Translational operation

Centre of Symmetry

It is an imaginary point in the crystal that any line drawn through it intersects the surface of the crystal at equal distance on either side



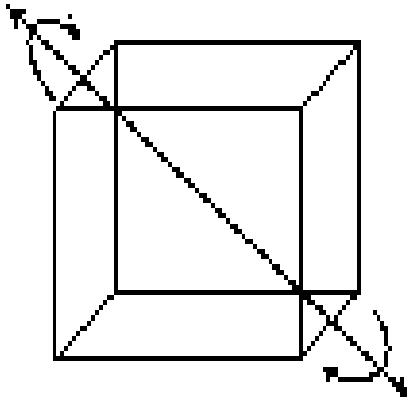
•If an object has only a center of symmetry, we say that it has a 1 fold axis.

Axis of Symmetry

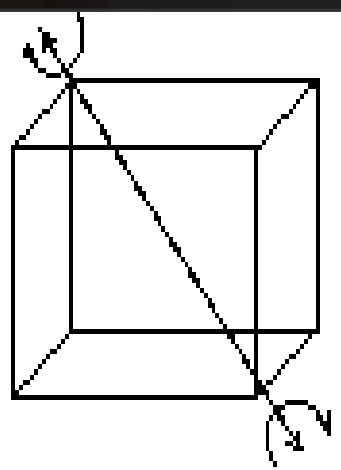
An axis of symmetry or axis of rotation is an imaginary line, passing through the crystal such that when the crystal is rotated about this line, it presents the same appearance more than once in one complete revolution i.e., in a rotation through 360°.

Four Axis of Symmetry

- On the rotation about the axis, if the same faces or same view occurs 2 times, the axis termed as **Diad** axis i.e. **$360^0/180^0$= 2 rotations**
- On the rotation about the axis, , if the same faces or same view occurs 3 times, the axis termed as **Triad** axis i.e. **$360^0/120^0$= 3 rotations**



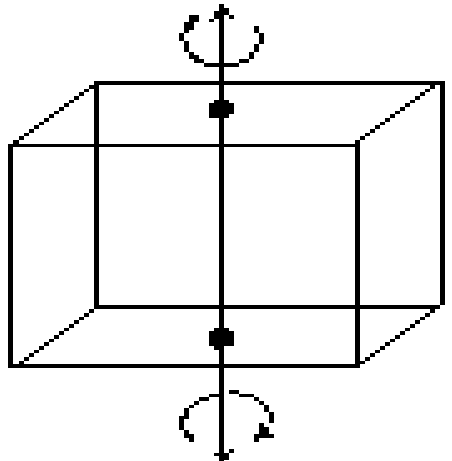
Axis of two fold symmetry



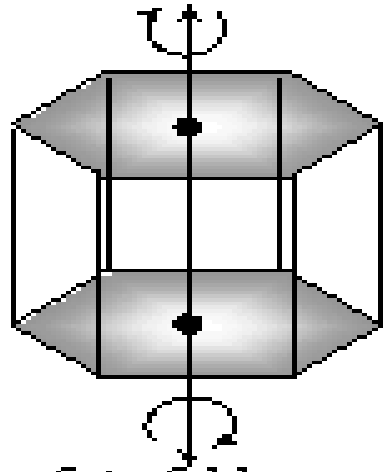
Axis of three f old symmetry

Four Axis of Symmetry

- On the rotation about the axis, if the same faces or same view occurs 4 times, the axis termed as **Tetrad** axis or **four fold axis.** i.e. **$360^0/90^0$= 4 rotations**
- On the rotation about the axis, , if the same faces or same view occurs 6 times, the axis termed as **Hexad** axis or **six fold axis.** i.e. **$360^0/60^0$= 6 rotations.**



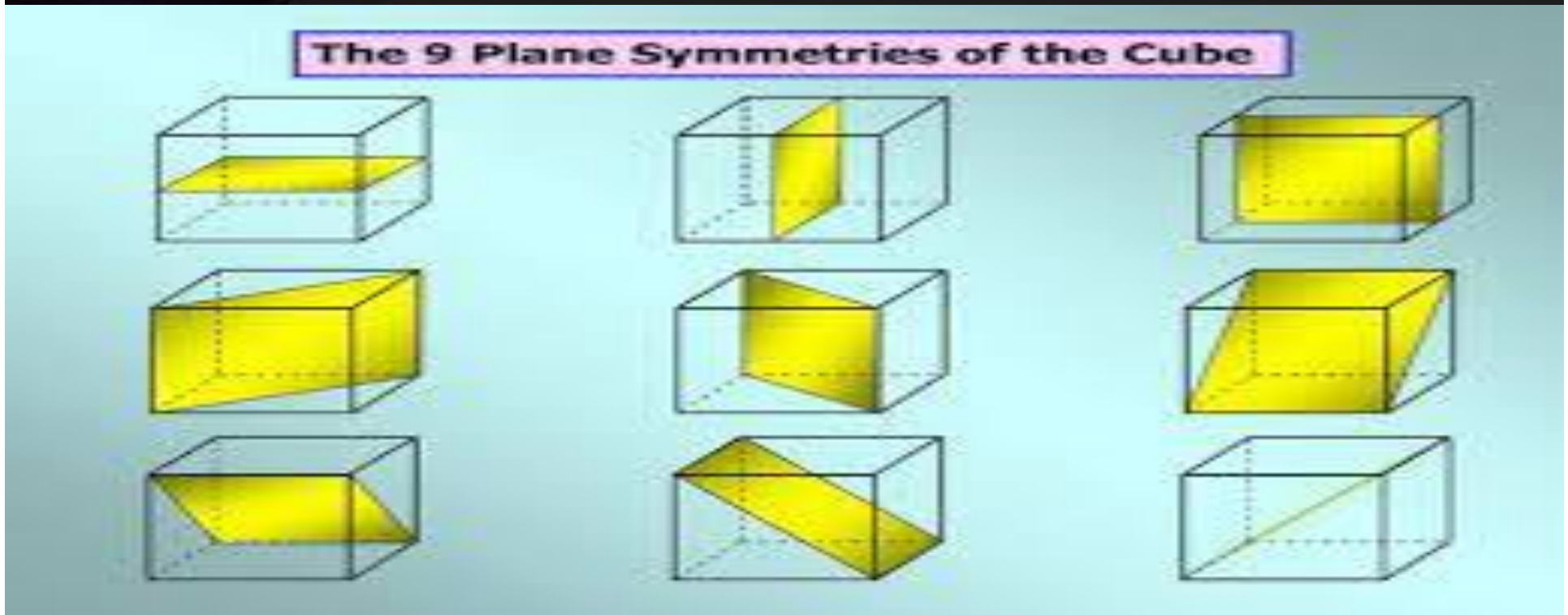
Axis of four fold symmetry



Axis of six fold symmetry

Plane of symmetry

It is an imaginary plane, which passes through the centre of a crystal can, divides it into two equal portions, which are exactly the mirror images of each other



Thank you