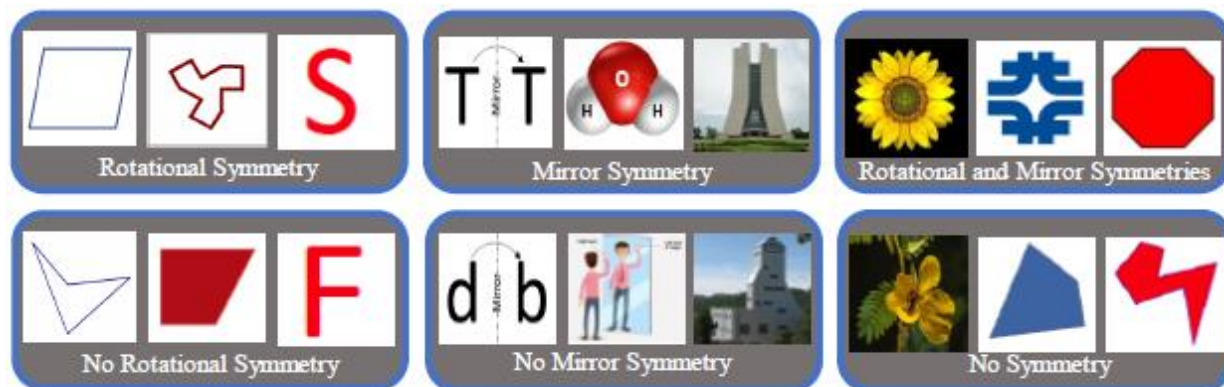


What is symmetry?



An object exhibits symmetry if its appearance does not change after a transformation, such as rotation or reflection. **Rotation** is a transformation that turns a figure around a fixed point or line. A shape has rotational symmetry if after you rotate it **less than one full turn**, it looks exactly the same as the original shape. **Reflection** is a transformation that flips a figure across a line. Mirror reflection reverses the left side onto the right side and vice versa. If an object and its mirror reflection look exactly the same, then that object has reflectional or mirror symmetry.

In physics, symmetry has a slightly different meaning; physicists look for symmetries in nature's laws that govern the universe. Physical law is an observable rule that describes a natural phenomenon. Symmetry exists when a change can be applied without changing the laws of physics. For example, physical laws are symmetric with respect to space; no matter where you move an object, it will still follow the same law of gravity. Fermilab scientists use symmetry to understand the properties of matter and forces.



Materials: Geometric figures (equilateral triangle, square, trapezoid, right triangle, hexagon, rhombus, circle, oval); a mirror

Activity: Examine each geometric figure for rotational and mirror symmetry. Organize them into three groups based on how many types of symmetry they have: one, two or none.

Questions to ask: What does it mean for an object to have a shape symmetry? What properties should an object have to exhibit a rotational symmetry? Do all objects exhibit mirror symmetry? What symmetries did you find in an equilateral triangle? What symmetries does a square have? Can a figure have both rotational and mirror symmetries? Can a figure have mirror symmetry but no rotational symmetry?

Useful links:

https://ed.fnal.gov/lsc_exhibits/list.html

<https://www.liveworksheets.com/id/sy41095yl>