Crystals

Axis of symmetry   D
Make a triangle, square, and hexagon with a small hole in the centre.
These are placed on a drawing pin on a overhead projector or large
versions on the white board and turned to show 3, 4, and 6 fold
symmetry

Mirror planes and axes   A P _F_ 20 min
Students are given sheets with the letters of the alphabet in capitals.
For each letter they draw on lines to show the mirror planes and give the
axis of symmetry, e.g. twofold, fourfold etc.

Symmetry rules   D 3 min
This activity is to show how the symmetry rules mean that existence of
one crystal face determines the presence of a set of other faces.
Students look down a   kaleidoscope at a single bold line or a pencil (= one
face) on white paper.

Symmetry of the cube   A P and then D 10 min
Students are given wooden cubes and told to work out the position and
number of all the axes of symmetry and all the mirror planes. A large
cardboard cube is used by the teacher to demonstrate the symmetry of
the cube.

The relationship between unit cells and crystal faces   D
Buy some planed wood with a square section of about 2cm. Cut it into
many cubes using a circular saw with a fine blade or band saw. The cubes
can be stacked and may be glued to give a cube, a rectangle, an
octahedron, and a pyritohedron. It is also possible to cut and use
tetragonal and orthorhombic shapes to show the relation of the unit cells
to the crystal faces.
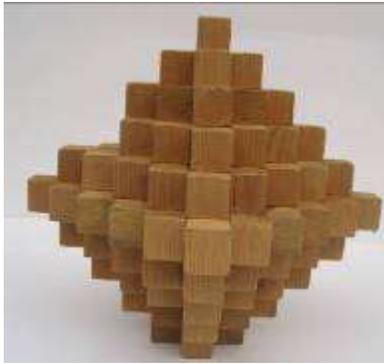
Law of constancy of angles   *A P 5 min*
Students are given several "cuboids" of pyrite and a goniometer. For each they measure the length of the edges and the angles. The angle is always 90° but the lengths vary. Repeat with small quartz crystals or diagrams of cross sections of them with varying width of faces.

Identifying crystal class 1   *A P 1 min per sample*
Student work out the crystal class of a variety of objects, match box, pencil, Toblerone bar etc. or hand made simple wooded shapes.

Identifying crystal class 2   *A P 1 min per sample*
Students examine wooden models of crystal forms and work out their class.

Identifying crystal class 3   *A P 1 min per sample*
Students examine real crystals and work out their class.

Unit cells 1   *D*
Use a molecular model of halite to show a unit cell.

Unit cells 2   *A I F 5m*
Wall paper or wrapping paper with coloured dots on is used to represent the atoms in a mineral. Students have to work out the repeat pattern which is equivalent to the unit cell of a mineral.

Unit cells and crystal faces 1   *D*
Picture of stacked cans in a supermarket

Unit cells and crystal faces 2   *Pa I 15 m*
Students work out the angle of a face using graph paper. On the paper each square represents one unit cell. Students draw faces in which the unit cells go up one and along one, up one and along two, and up one and along three and then measure or calculate the angle. Also try using rectangular unit cells.