Concept 4: Cubes

A cube is a three dimensional geometric figure. It is either solid or hollow in nature. It has 6 equal sized square faces, with each face being perpendicular to all the adjacent faces.

Features of a cube:

Face	A cube has 6 equal sized square faces.
Edges	The line segment formed, where two faces of the cube meet. A cube has 12 edges.
Corner (or) Vertex	A point where three edges meet. A cube has 8 vertices.

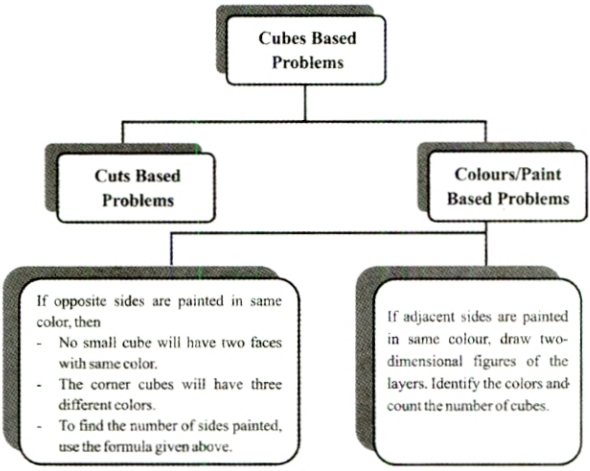
- If we make a cut (along any one of the sides of the cube), we get two pieces.
- If we make 1 cut on each dimension of the cube, (along height, length & breadth) we get $2 \times 2 \times 2 = 8$ pieces

A cube is painted with red colour on all the six faces. If (n - 1) cuts are made along each of the three dimensions of a cube, then there will be n small identical cubes along each dimension of the large cube, with a total of n^3 small cubes.

Of the smaller cubes, the number of cubes with,

- Three of its faces painted (Corner cubes) = 8
- Two of its faces painted (Edge cubes) = 12 x (n - 2)
- One face painted (Face cubes) = 6 x $(n - 2)^2$
- No face painted (Core cubes) = $(n - 2)^3$

Types of problems in cubes:



Drill 4

a. If you make 4 cuts on one side of a cake, how many pieces do you get?

_____

b. How many pieces will you get if you make 4 cuts along the length and 4 cuts along the breadth of a solid cube? _____

c. If you make 4 cuts along all the three dimensions of a cube, then how many small cubes will you get? _____

d. How many cuts should be made to get 64 small cubes out of a cube?

e. A cube of side 4 cm is cut into smaller cubes of side 1 cm.

   i. How many smaller cubes are painted on two faces?

   ii. How many cubes are painted on three faces?

   iii. What is the maximum number of cubes that can be taken out of the bigger cube and make it a hollow one?