Form a Cube & Find the Formula For Its Surface

OBJECTIVE

To form a cube and find the formula for its surface area experimentally.

Materials Required

1. Cardboard
2. Ruler
3. Cutter/Scissors
4. Adhesive tape
5. Pen/Pencil

Prerequisite Knowledge

1. Knowledge about basic properties of a cube.
2. Surface area, lateral surface area and diagonal of a cube.

Theory

1. For basic properties of a cube refer to Activity 7.

2. Surface Area of a Cube
   Let each edge of the cube be a units. Then,
   1. Total Surface Area (TSA) of the cube = Sum of areas of six faces
      = 6 (area of each faces)
      = 6 (a x a)
      => TSA = $6a^2$ sq units

   2. Lateral surface area of the cube
      = Sum of areas of four faces only leaving the top and bottom faces = 4(area of each face) = 4 (a x a)
      => Lateral surface area = $4a^2$ sq units

   3. Diagonal of the cube = $\sqrt{a^2 + a^2 + a^2}$ = $\sqrt{3a^2}$
      => Diagonal of the cube = $\sqrt{3}a$ units

Procedure

1. Take a cardboard of a suitable size, using cardboard make six identical squares each of side x units.

2. Now, arrange all six squares and join all of them with the help of tape, (see Fig. 26.1)

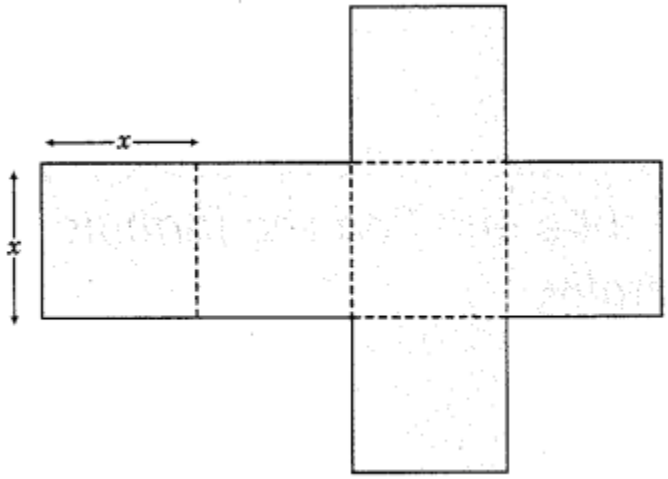

Fig. 26.1

3. Fold the square along the dotted markings (or along tape) (see Fig. 26.1) and form a cube using tape, (see Fig. 26.2)

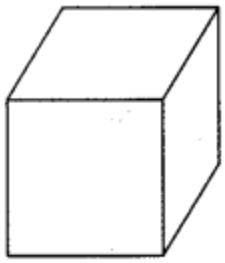

Fig. 26.2

Demonstration

Surface area of a cube of side x units =6x (area of each face of cube of side x units)
= $6x^2$ [since, each face of the cube is a square, so area of square = $(side)^2 = (x)^2$]

Note:

A net of a cube be directly prepared on the cardboard itself instead of making six squares separately.

Observation

By actual measurement,
Length of side x = …….. ,
Area of one square/one face = x^2 = …….. ,
So, sum of areas of all the squares = …….. + …….. + …….. + …….. + …….. + ……..
Hence, surface area of the cube is $6x^2$.

Result

We have verified the formula for calculating the surface area of the cube.

Application

This activity may be used in estimation of materials necessary in production of cubical boxes used for packing.

Viva Voce

Question 1:
How many edges are there in a cube?
Answer:
12

Question 2:
If each edge of a cube is 3 cm, then what is the area of each face of a cube?
Answer:
9 cm^2.

Question 3:
If a room is in the shape of cube of length x units, then what will be the area of room which has to be painted by painter including gate?
Answer:
$5x^2$ ($= 6x^2 – x^2$), because one face will be floor of the room.

Question 4:
What is the required condition for a room to be in the shape of cube?
Answer:
The length, breadth and height of the room should be equal.

Question 5:
How will you define a cube?
Answer:
A cube is a symmetric three dimensional solid shape bounded by six square faces.

Question 6:
Find the maximum length of the rod that can be placed in a cube of side x.
Answer:
The maximum length of the rod that can be placed in a cube is equal to the diagonal of the cube, i.e.$\sqrt{3}x$.

Question 7:
How many lateral surfaces a cube have?
Answer:
Their are 4 lateral surfaces of a cube.

Question 8:
Write three real life examples of cube.
Answer:
Dice, sugar free cube, rubiks cube.

Question 9:
How many dimensions of a cube?
Answer:
A cube has three dimensions.

Question 10:
“If we take one surface of a folding paper cube, then it is a two dimensional plane”. Is this statement true?
Answer:
Yes

Suggested Activity

Using the above activity, find the area of a cube, if each edge of a cube is 6 cm.