Parallelepiped Rectangular Solid Cube
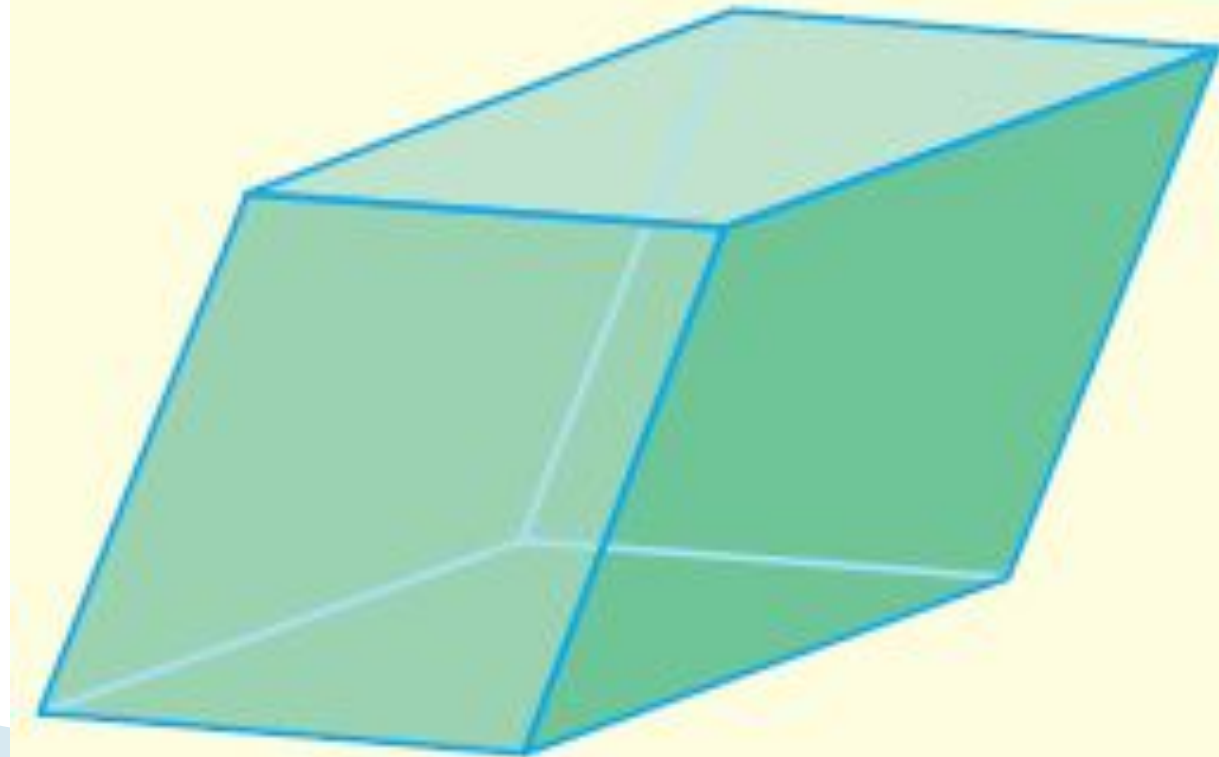
SOME SPECIAL PRISMS
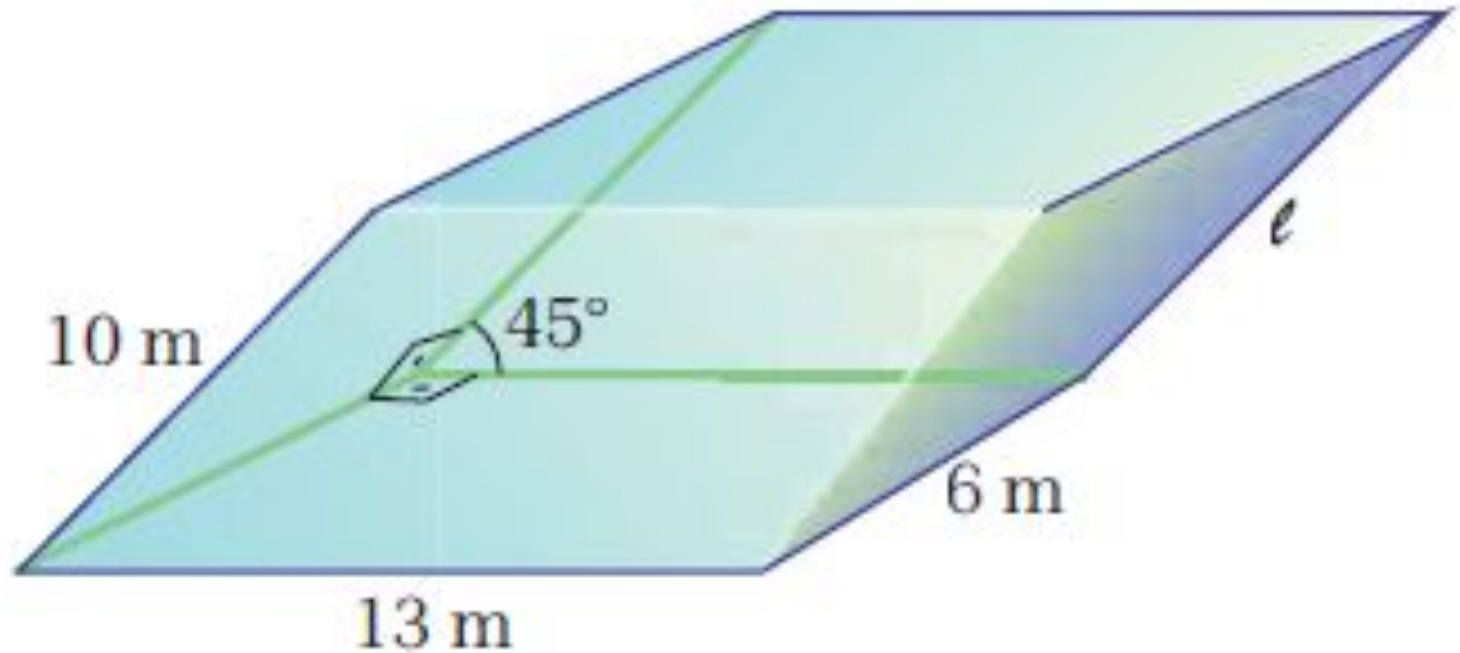
1. **Parallelepiped**

A **Parallelepiped** is a prism with six faces which are all parallelograms.

The opposite faces of a parallelepiped are congruent and parallel.
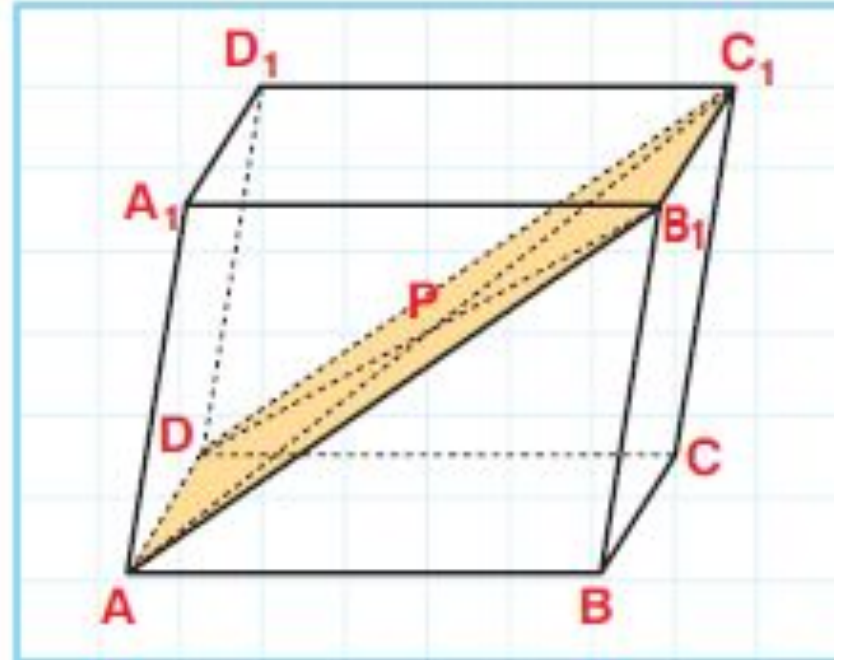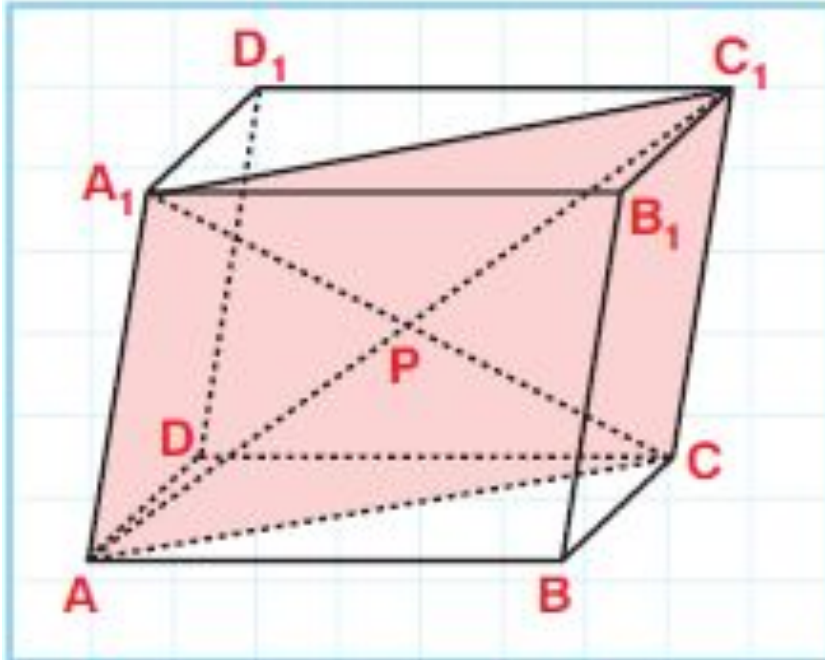
EXAMPLE:

10 m

45°

13 m

6 m

ℓ

What is the height of the adjacent parallelepiped if its lateral edge is 10 m?
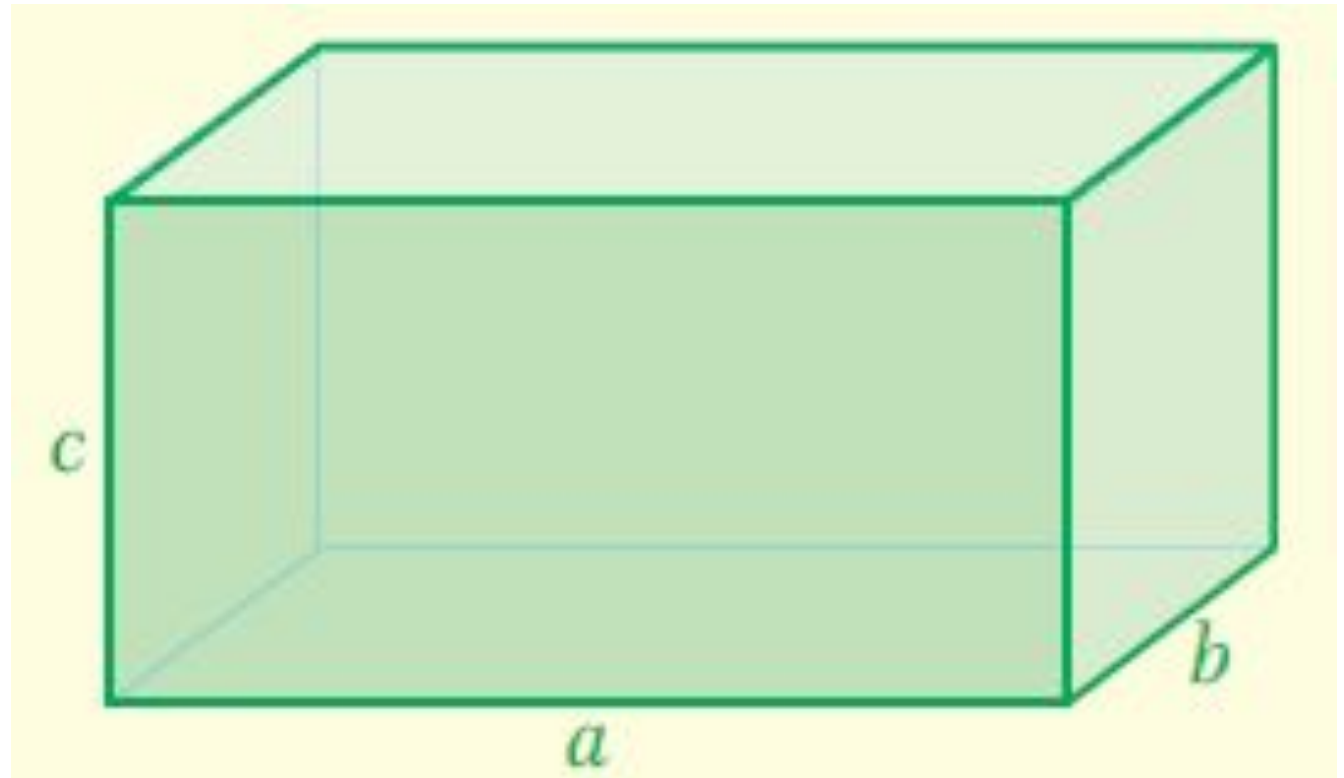
THEOREM:

The diagonals of any parallelepiped are concurrent and bisect one another.
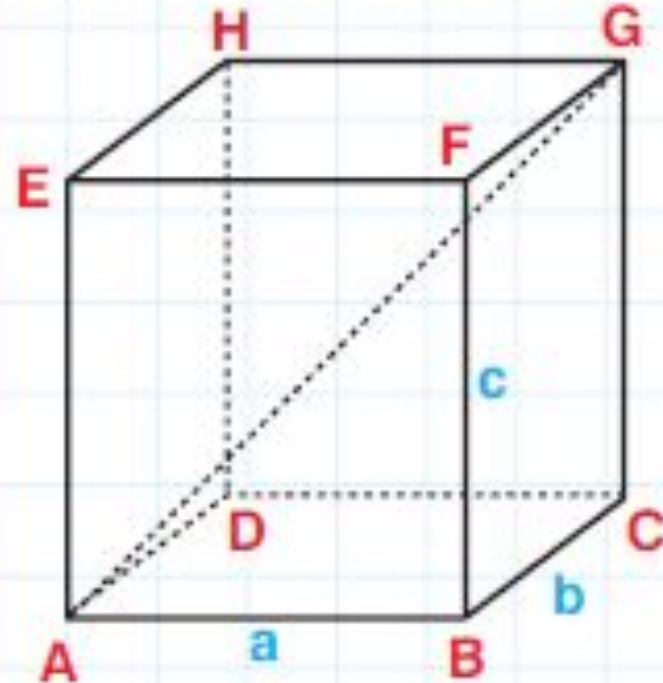
2. Rectangular Solid (Cuboid)

- It is a parallelepiped whose faces are all rectangles.

THEOREM

If the length of a diagonal of a rectangular solid is d and its dimensions are a, b, c then
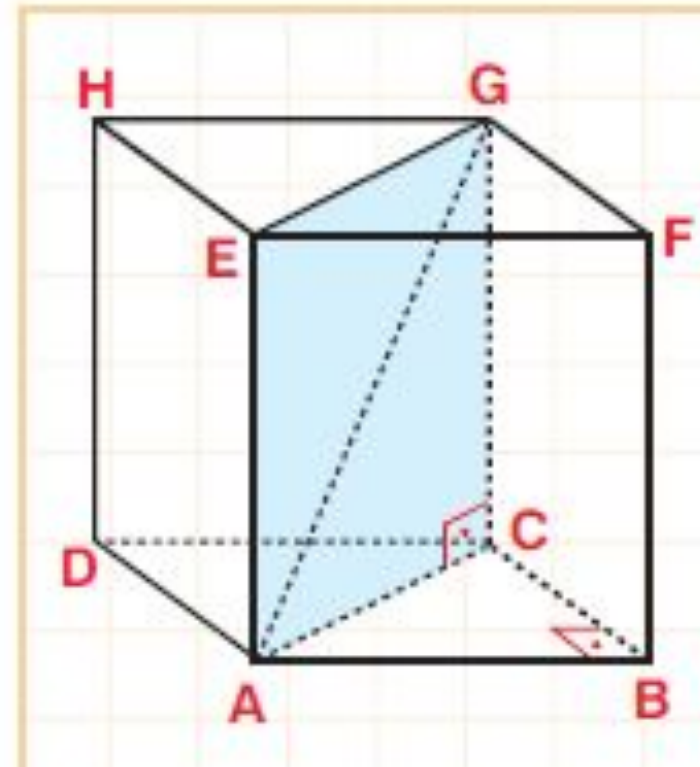
$$d = \sqrt{a^2 + b^2 + c^2} \quad \text{(Figure 3.40)}$$

EXAMPLE

In the rectangular solid in the adjacent figure, $AB = 12$ cm, $BF = 4$ cm, and $BC = 5$ cm.
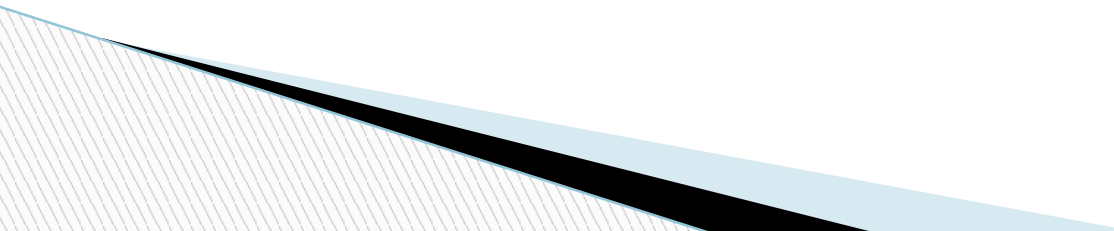
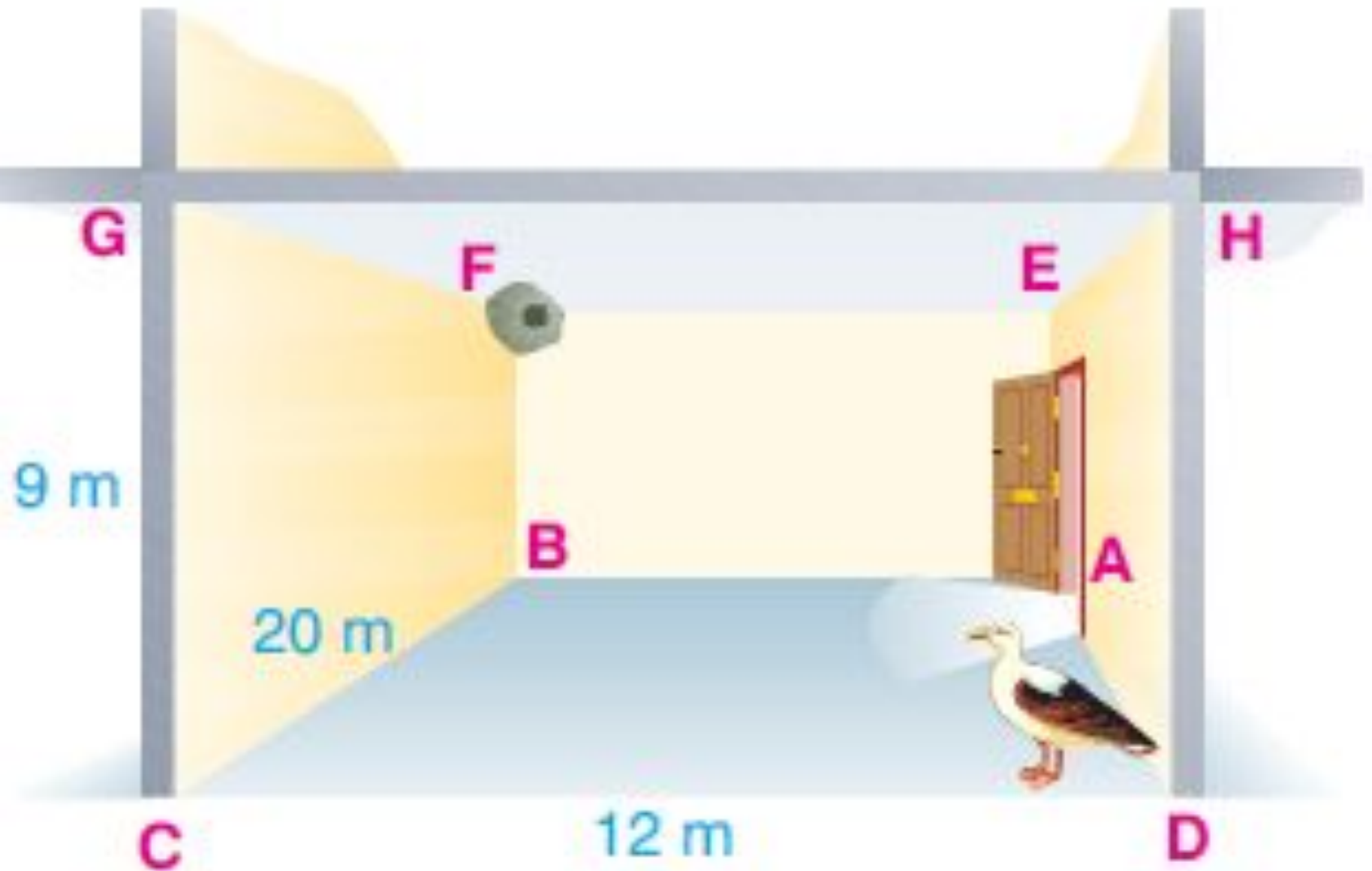Accordingly,

a) find AG .

b) find the area of section ACGE .

EXAMPLE

Find the lengths of the face diagonals of a cuboid with dimensions
3 m × 4 m × 6 m.
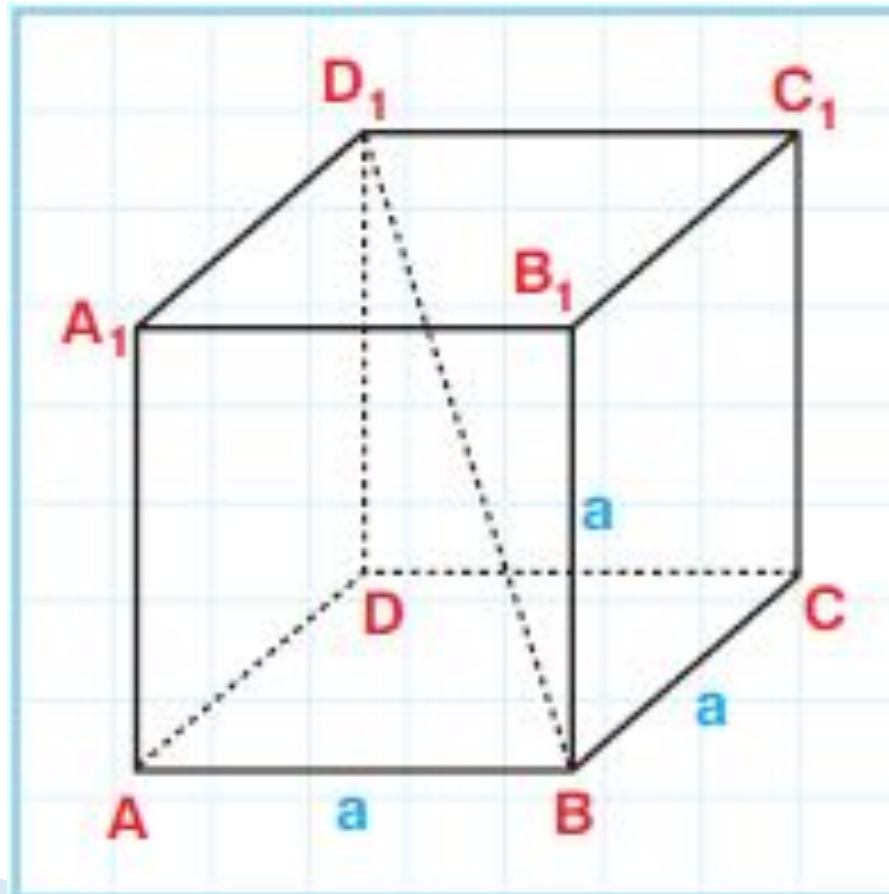
EXAMPLE
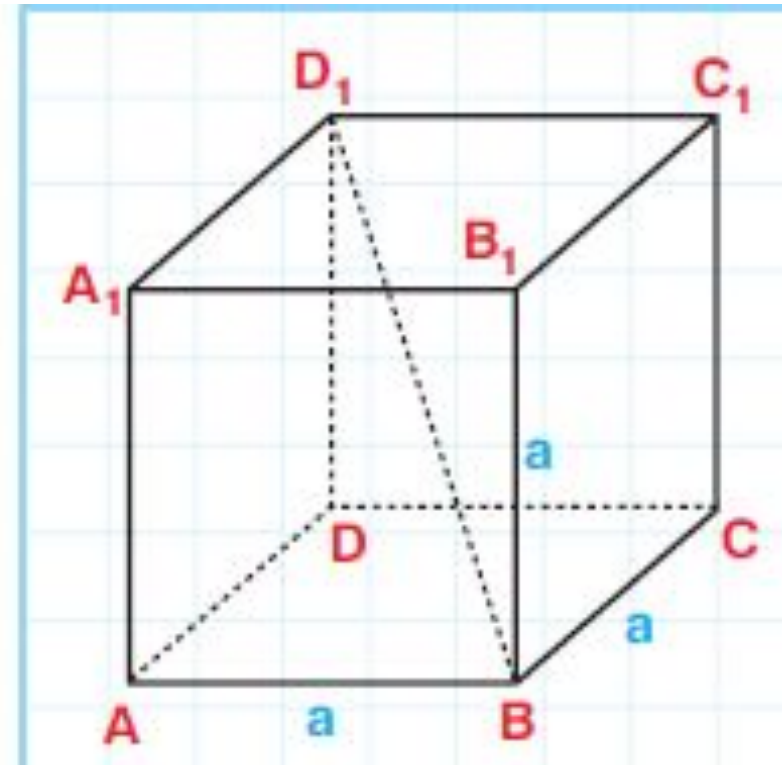

9 m

20 m

12 m

G F E H B A C D

3. Cube

A parallelepiped whose six faces are all squares is called a **cube.**

THEOREM

If the length of one edge of a cube is **a** then the length of its diagonal is d = BD_1 = $\sqrt{3} \cdot$ **a** (Figure 3.43)
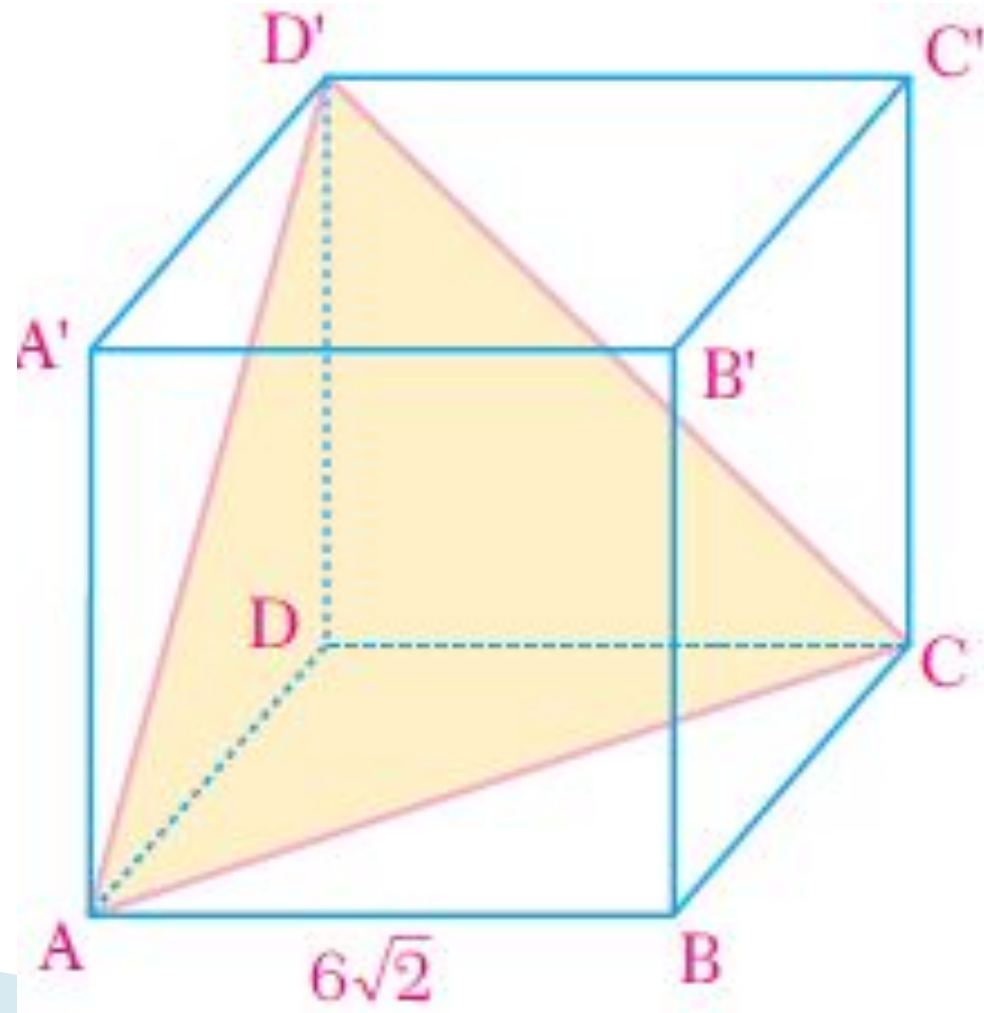
EXAMPLE

The length of the diagonal of a face of a cube is equal to $5\sqrt{2}$ cm Accordingly, find the length of a diagonal of the cube.

EXAMPLE

Find the area of triangle ACD' in the adjacent cube if the edge length is $6\sqrt{2}$ cm.

EXAMPLE

A cuboid has length $2\sqrt{5}$ m, width $2\sqrt{2}$ m and space diagonal 8 m. What is the height this cuboid?