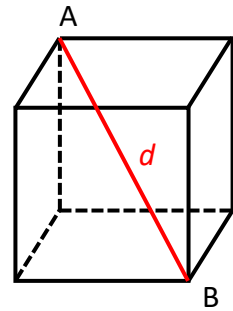


**GEOMETRY EXAMPLE 5**

In the diagram, the diagonal AB of the cube has a length of  $d$  cm.  
What is the surface area of the cube in  $\text{cm}^2$ ?

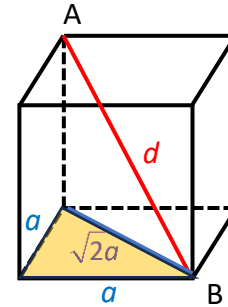
- (A)  $2d^2$       (B)  $2\sqrt{2}d^2$       (C)  $2\sqrt{3}d^2$       (D)  $3\sqrt{3}d^2$

**SOLUTION**

Let the side of the cube be  $a$  cm and draw a face diagonal.

From this horizontal triangle,  $a^2 + a^2 = 2a^2$

So, the face diagonal has length  $\sqrt{2}a$



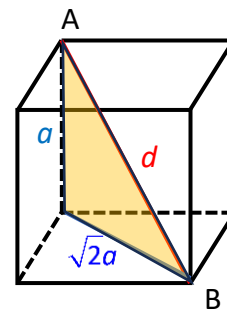
From this vertical triangle,  $d^2 = a^2 + (\sqrt{2}a)^2$

$$= a^2 + 2a^2$$

$$= 3a^2$$

$$\therefore d = \sqrt{3}a$$

$$\text{i.e., } a = \frac{d}{\sqrt{3}}$$



The area of a face of the cube is  $a^2 \text{ cm}^2$

So, the area of the 6 faces of the cube is  $6a^2 \text{ cm}^2$

$$\begin{aligned} \text{This means that } 6a^2 &= 6\left(\frac{d}{\sqrt{3}}\right)^2 \\ &= 2d^2 \end{aligned}$$

So, the correct answer is A.