Surface Areas and Volume of a Cuboid and Cube Ex 18.1 Q10

Answer :

Let,

$l \rightarrow$ Initial edge of the cube

$A_1 \rightarrow$ Initial surface area of the cube

$L \rightarrow$ Increased edge of the cube

$A_2 \rightarrow$ Increased surface area of the cube

We need to find the percentage increase in the total surface area of the cube

We know that,

$A_1 = 6l^2$

And

$L = l + \dfrac{50}{100}l$

$\quad = \dfrac{3}{2}l$

Now,

$A_2 = 6L^2$

$\qquad = 6\left(\dfrac{3}{2}l\right)^2 \qquad\qquad \left\{\text{Since } L = \dfrac{3}{2}l\right\}$

$\qquad = \left(\dfrac{3}{2}\right)^2 \left(6l^2\right)$

$\qquad = \left(\dfrac{3}{2}\right)^2 \left(A_1\right) \qquad\qquad \left\{\text{Since } A_1 = 6l^2\right\}$

$\qquad = \dfrac{9}{4}A_1$

$\qquad = A_1 + \dfrac{5}{4}A_1$

$A_2 - A_1 = \dfrac{5}{4}A_1$

$\dfrac{A_2 - A_1}{A_1} = \dfrac{5}{4}$

Percentage increase in A_1

$= \dfrac{A_2 - A_1}{A_1} \times 100$

$= \dfrac{5}{4} \times 100$

$= 125$

Percentage increase in the surface area of the cube is $\boxed{125\%}$.

Surface Areas and Volume of a Cuboid and Cube Ex 18.1 Q11

Answer :

The dimensions of the rectangular box are in the ratio $2:3:4$.

So let the dimensions be,

Length $(l) = (4x)\,\mathrm{m}$

Breadth $(b) = (3x)\,\mathrm{m}$

Height $(h) = (2x)\,\mathrm{m}$

We are asked to find the dimensions of the box

The total surface area of the box,

$$A = 2(lb + bh + hl)$$
$$= 2\big[(4x)(3x) + (3x)(2x) + (2x)(4x)\big]$$
$$= (52x^2)\,\mathrm{m}^2$$

The cost of covering it at the rate of Rs.8 per m^2

$$= \mathrm{Rs.}(8 \times A)$$

The cost of covering it at the rate of Rs.9.50 per m^2

$$= \mathrm{Rs.}(9.50 \times A)$$

We know that, the difference between above two costs is Rs.1248.

So,

$$1248 = (9.50)A - (8)A$$
$$= 1.50A$$
$$A = 832\,\mathrm{m}^2$$

$$52x^2 = 832 \qquad \{\text{Since } A = 52x^2\}$$

$$x^2 = \frac{832}{52}$$
$$= \frac{64}{4}$$
$$= 16$$

$$x = 4$$

So the dimensions of the box are;

$$2x = 2 \times 4$$
$$= 8\,\mathrm{m}$$
$$3x = 3 \times 4$$
$$= 12\,\mathrm{m}$$
$$4x = 4 \times 4$$
$$= 16\,\mathrm{m}$$

Hence the dimensions of the box are $\boxed{8\,\mathrm{m}, 12\,\mathrm{m} \text{ and } 16\,\mathrm{m}}$.

********** END *********