Surface Areas and Volume of a Cuboid and Cube Ex 18.2 Q4

Answer :

We have,

$V \rightarrow$ Volume of the cuboid

$S \rightarrow$ Surface area of the cuboid

$a, b, c \rightarrow$ Dimensions of the cuboid

We need to prove, $\frac{1}{V} = \left(\frac{2}{S}\right)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

We know that,

$S = 2(ab + bc + ca)$

And

$V = abc$

$$\frac{1}{V} = \frac{1}{abc}$$

$$= \frac{S}{S(abc)}$$

$$= \frac{2(ab + bc + ca)}{S(abc)} \qquad \{\text{Since}, S = 2(ab + bc + ca)\}$$

$$= \left(\frac{2}{S}\right)\left(\frac{ab}{abc} + \frac{bc}{abc} + \frac{ca}{abc}\right)$$

$$= \left(\frac{2}{S}\right)\left(\frac{1}{c} + \frac{1}{a} + \frac{1}{b}\right)$$

$$= \left(\frac{2}{S}\right)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

Hence,

$$\boxed{\frac{1}{V} = \left(\frac{2}{S}\right)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)}$$

Surface Areas and Volume of a Cuboid and Cube Ex 18.2 Q5

Answer :

Let,

$l \rightarrow$ Length of the cuboid

$b \rightarrow$ Breadth of the cuboid

$h \rightarrow$ Height of the cuboid

$V \rightarrow$ Volume of the cuboid

$x, y, z \rightarrow$ Areas of three adjacent faces of the cuboid

We know that, areas of three adjacent faces of the cuboid are lb, bh, and hl respectively

Hence,

$$\begin{aligned} xyz &= (lb)(bh)(hl) \\ &= (lbh)(lbh) \\ &= (lbh)^2 \\ &= V^2 \qquad \{\text{as, } V = (lbh)\} \end{aligned}$$

Hence,

$$\boxed{V^2 = xyz}$$

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