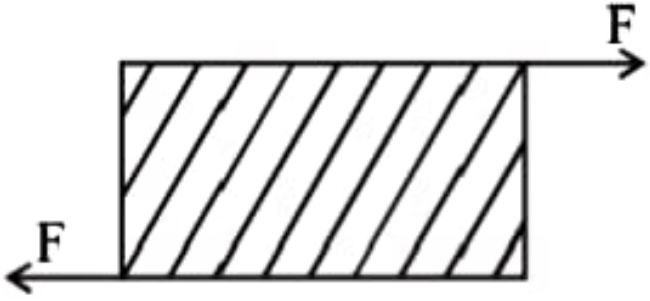
9. As shown in the figure, forces of $10^5$N each are applied in opposite directions, on the upper and lower faces of a cube of side 10cm, shifting the upper face parallel to itself by 0.5cm. If the side of another cube of the same material is, 20cm, then under similar conditions as above, the displacement will be: **[Online April 15, 2018]**




(a) 1.00cm
(b) 0.25cm
(c) 0.37cm
(d) 0.75cm

**9.** **(b)** For same material the ratio of stress to strain is same

For first cube

$$\text{Stress}_1 = \frac{\text{force}_1}{\text{area}_1} = \frac{10^5}{(0.1^2)}$$

$$\text{Strain}_1 = \frac{\text{change in length}_1}{\text{original length}_1} = \frac{0.5 \times 10^{-2}}{0.1}$$

For second block,

$$\text{stress}_2 = \frac{\text{force}_2}{\text{area}_2} = \frac{10^5}{(0.2^2)}$$

$$\text{strain}_2 = \frac{\text{change in length}_2}{\text{original length}_2} = \frac{x}{0.2}$$

$x$ is the displacement for second block.

For same material, $\frac{\text{stress}_1}{\text{strain}_1} = \frac{\text{stress}_2}{\text{strain}_2}$

or, $$\frac{\frac{10.5}{(0.1)^2}}{\frac{0.5 \times 10^{-2}}{0.1}} = \frac{\frac{10^5}{(0.2)^2}}{\frac{x}{0.2}}$$

Solving we get, $x = 0.25$ cm