16. If the ratio of lengths, radii and Young's moduli of steel and brass wires in the figure are a, b and c respectively, then the corresponding ratio of increase in their lengths is :

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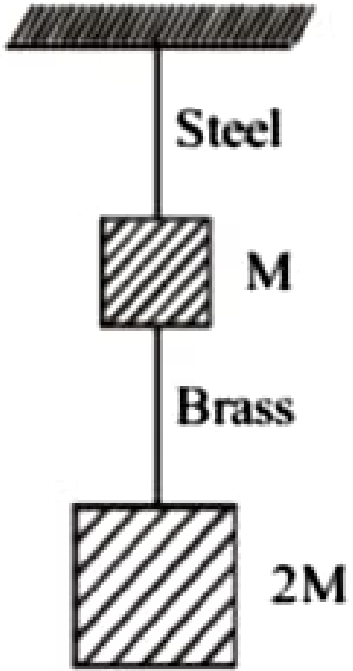

(a) $\frac{3c}{2ab^2}$ (b) $\frac{2a^2c}{b}$ (c) $\frac{3a}{2b^2c}$ (d) $\frac{2ac}{b^2}$

16. (c) According to questions,

$$\frac{\ell_s}{\ell_b} = a,\ \frac{r_s}{r_b} = b,\ \frac{y_s}{y_b} = c,\ \frac{\Delta \ell s}{\Delta \ell_b} = ?$$

$$\text{As, } y = \frac{F\ell}{A\Delta\ell} \Rightarrow \Delta\ell = \frac{F\ell}{Ay}$$

$$\Delta\ell_s = \frac{3mg\ell_s}{\pi r_s^2 . y_s} \quad [\because F_s = (M + 2M)g]$$

$$\Delta\ell_b = \frac{2Mg\ell_b}{\pi r_b^2 . y_b} \quad [\because F_b = 2Mg]$$

$$\therefore \frac{\Delta\ell_s}{\Delta\ell_b} = \frac{\frac{3Mg\ell_s}{\pi r_s^2 . y_s}}{\frac{2Mg.\ell_b}{\pi r_b^2 . y_b}} = \frac{3a}{2b^2C}$$