The temperature at which the tungsten filament of a 12V and 36W lamp operates is 1730 Degrees Celsius. If the temperature coefficient of resistance of tungsten is 610^−3/K, find the resistance of the lamp at a room temperature of 20 Degrees Celsius.

(A) 10.00 ohms

(B) 0.45 ohms

(C) 0.39 ohms

(D) 4.00 ohms

$$R_{1730} = R_{20}\left(1 + \alpha(T_{1730} - T_{20})\right) \rightarrow R_{20} = \frac{R_{1730}}{\left(1 + \alpha(T_{1730} - T_{20})\right)}$$

$$R_{1730} = \frac{U^2}{P}$$

Finally:

$$R_{20} = \frac{U^2}{P}\frac{1}{\left(1 + \alpha(T_{1730} - T_{20})\right)}$$

$$R_{20} = \frac{(12V)^2}{36W}\frac{1}{(1 + 6 * 10^{-3}1/K * 1710)} = 0.35Ohms$$

Answer: $R_{20} = 0.35Ohms$