A car radio designed to operate from 6.3 volts draws 4.5 A of current. What should the value of resistor \( R \) be if the radio is to be used in a 12.6 volts car?

What should the power rating of the resistor be?

\[
\begin{align*}
\sum V_{\text{across branches}} &= 0 \\
VR &= 6.3 - 12.6V = 0 \\
R &= \frac{6.3 \text{ Volts}}{4.5 \text{A}} = 1.4 \Omega \\
\end{align*}
\]

\[
P = VI = I^2R = (4.5)^2 \times 1.4\Omega = 28.35 \text{ Watts}
\]

* However, in a practical design, it is common design practice to design for a tolerance of 10%, so the power rating would be

\[
P = 1.1 P_{\text{min}} = (1.1)(28.35 \text{W}) = 31.19 \text{W}
\]