25-55 GIVEN: SPACE HEATER (NICHROME WIRE)

$\rho = 100\times10^{-8}\ \Omega\text{-m}$ $\alpha = 0.4\times10^{-3}\ K^{-1}$

$R = 8.00\Omega$ AT $20°C$

$120V \rightarrow T = 1000°C$

FIND: CURRENT AT $20.0°C$
RESISTANCE AT $1000°C$) $T - T_0 = 980°K$
OPERATING POWER

$$I = \frac{V}{R} = \frac{120V}{8\Omega} = \boxed{15\ A}$$

$$\alpha = \frac{\frac{\rho-\rho_0}{\rho_0}}{T-T_0} = \frac{\frac{R-R_0}{R_0}}{T-T_0} = \frac{\frac{R}{R_0}-1}{T-T_0}$$

$$0.4\times10^{-3}\ \cancel{K^{-1}} = \frac{\frac{R}{8\Omega}-1}{980\cancel{K}}$$

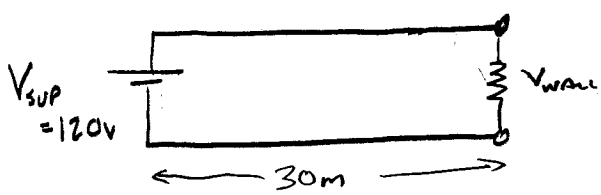
$$.392 = \frac{R}{8\Omega}-1$$

$$R = 8\Omega(1.392) = \boxed{11.1\Omega}$$

$$P = \frac{V^2}{R} = \frac{(120V)^2}{11.1\Omega} = \boxed{1.3\ kW}$$

25-66 GIVEN: 12 GAUGE COPPER $l = 30m$ $(A = 3.309\ mm^2)$
$I = 12.5A$ $V_{SUP} = 120V$ $(\rho = 1.7\times10^{-8}\ \Omega\text{-m})$

FIND: V_{WALL}



$$R = \frac{\rho l'}{A} = \frac{(1.7\times10^{-8}\ \Omega\text{-m})(60m)}{3.309\ mm^2}\left(\frac{1000\ mm}{1\ m}\right)^2 = .308\ \Omega$$

$$V_{WALL} = V_{SUP} - IR = 120V - (12.5A)(.308\Omega)$$
$$= \boxed{116\ V}$$