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Quiz 18

1)a) $I_{cm} = \frac{P_{cm}}{V} = \frac{1200\,W}{120V} = \underline{10A}$

$P_{cm} = 1200$ watts
$P_t = 1100$ watts
$P_{WI} = 1400$ watts

$I_t = \frac{P_t}{V} = \frac{1100\,W}{120V} = \underline{9.17A}$

$I_{WI} = \frac{P_{wf}}{V} = \frac{1400\,W}{120V} = 11.67A$

b) $I_{total} = I_{cm} + I_t + I_{WI} = 10A + 9.17A + 11.67A = 30.84\,A$

c) Yes a 35-A circuit breaker is sufficient since the total current is less than 35A so there won't be a problem when all devices are on.

2) $R_1 = ?$ $R_2 = ?$

in series $R_{eq} = R_1 + R_2 \Rightarrow 690\Omega = R_1 + R_2$, $R_1 = 690\Omega - R_2$

in parallel $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow \frac{1}{150\Omega} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow \frac{R_1 + R_2}{R_1 R_2}$

$\Rightarrow R_1 + R_2 = \frac{R_1 R_2}{150\Omega}$

$(690\Omega - R_2) + R_2 = \frac{(690 - R_2)R_2}{150\Omega}$

$690\Omega = \frac{690\Omega R_2 - R_2^2}{150\Omega} \Rightarrow 103,500\Omega = 690R_2 - R_2^2$

$\Rightarrow R_2^2 - 690R_2 + 103,500\Omega = 0$

$x = \frac{-(-690) \pm \sqrt{(690)^2 - 4(1)(103,500)}}{2(1)}$ $+ = 469.59\Omega$

$R_2 = 220.4\Omega$

$220.4 + R_1 = 690\Omega$ $R_1 = 469.6\Omega$ $R_2 = 220.4\Omega$

$\underline{R_1 = 469.6\Omega}$