SHOW ALL WORK!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

In the network shown, all resistors have a resistance of 5.00 ohm.

(a) Calculate the effective resistance between a and b.
(b) If a 75.0 volt potential is applied between a and b, what is the current in the resistor labeled x?
(c) With the same 75.0 volt potential between a and b, calculate the potential across y.

10 a) All resistors = R
Top branch: \( R + \frac{1}{2}R + R = \frac{5R}{2} \)
Middle branch: \( R + R = 2R \)
Bottom branch: \( R \)

\[
\text{Req} = \left( \frac{2}{5R} + \frac{1}{2R} + \frac{1}{R} \right)^{-1} + R = \left( \frac{4 + 5 + 10}{10R} \right)^{-1} + R = \frac{29R}{19} \]

\[
= \frac{29}{19} (5.00 \Omega) = \boxed{7.63 \Omega} \]

10 b) \( I_{\text{tot}} = \frac{V_{\text{AB}}}{\text{Req}} \Rightarrow \text{calculate} \ V_{\text{ac}} \ \text{(which I must do, anyway, for part c)} \)

\[
\text{Vac} = I_{\text{tot}} \cdot \text{(resistance in parallel branches)}
\]

\[
= \frac{V_{\text{AB}}}{\text{Req}} \cdot \frac{10R}{19} = \frac{75V}{29} \cdot \frac{10R}{19} = \boxed{\frac{750V}{29}}
\]

\( \Rightarrow \) so current in top branch is: \( I_{\text{top}} = \frac{750V}{29} \sqrt{5R/2} \)

\[
= \frac{60}{29} \ A
\]

\( \Rightarrow \) current through x must be \( \frac{1}{2} \) of this:

\[
I_x = \frac{30}{29} A = \boxed{1.03 A}
\]

5 c) \( V_{\text{ac}} = \frac{750}{29} V = \boxed{25.9 V} \)