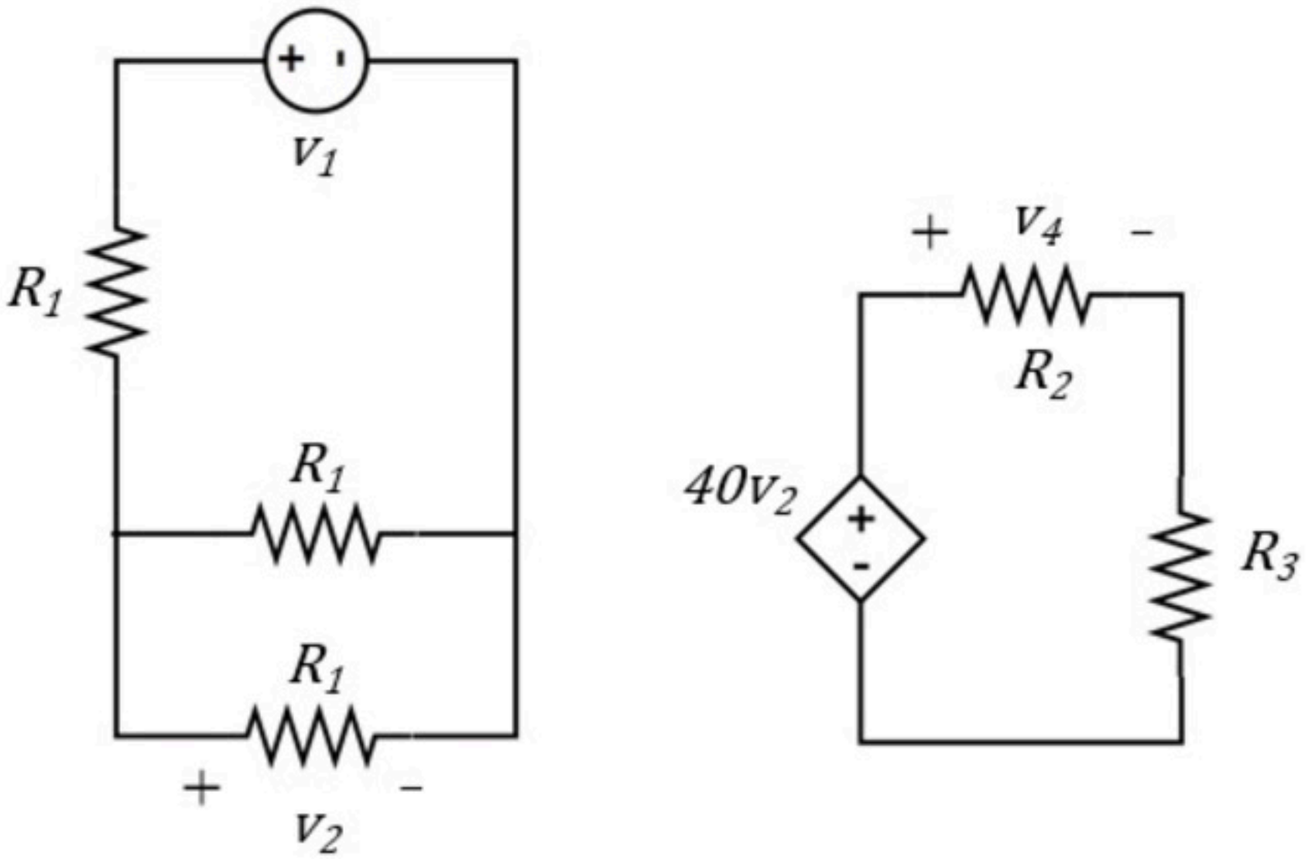
Basic analysis 007

Problem has been graded.

In this circuit, v_1 is an input, but you don't know what its value is. Find v_4 as a function of v_1.

More specifically, find X = $\frac{V_4}{V_1}$.



Given Variables:

R1 : 10 ohm

R2 : 3 ohm

R3 : 5 ohm

Calculate the following:

X (V/V) :

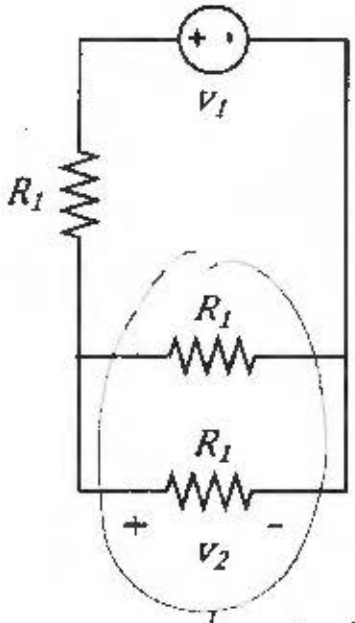
In this circuit, v_1 is an input, but you don't know what its value is. Find v_4 as a function of v_1.

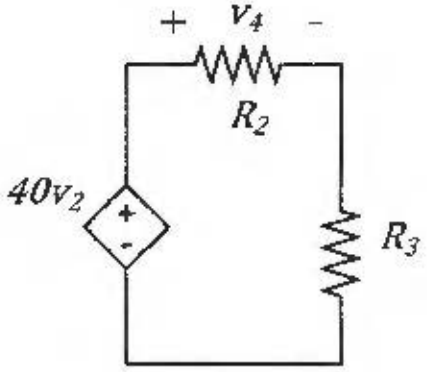
More specifically, find $X = \frac{v_4}{v_1}$.

R1 = 20 Ω

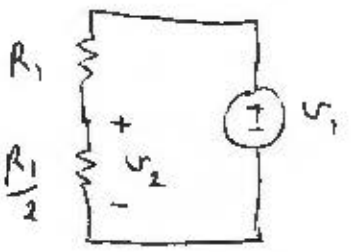
R2 = 12 Ω

R3 = 20 Ω



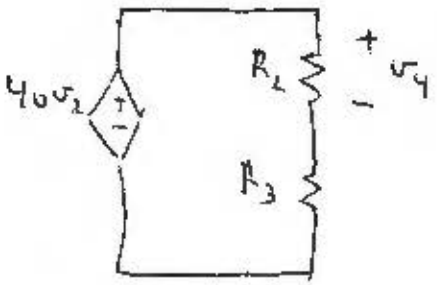


$\hookrightarrow R_1 // R_1 = \left(\frac{1}{R_1} + \frac{1}{R_1}\right)^{-1} = \left(\frac{2}{R_1}\right)^{-1} = \frac{R_1}{2}$



VOLTAGE DIVIDER

$$v_2 = v_1 \cdot \frac{\frac{R_1}{2}}{R_1 + \frac{R_1}{2}} = v_1 \frac{\frac{1}{2}}{1 + \frac{1}{2}} = \frac{v_1}{3}$$



VOLTAGE DIVIDER

$$v_4 = 40\, v_2 \cdot \frac{R_2}{R_2 + R_3} = \frac{40}{3} \cdot \frac{v_1}{3} \cdot \frac{12}{32} = 5\, v_1$$

$$\boxed{X = \frac{v_4}{v_1} = 5}$$