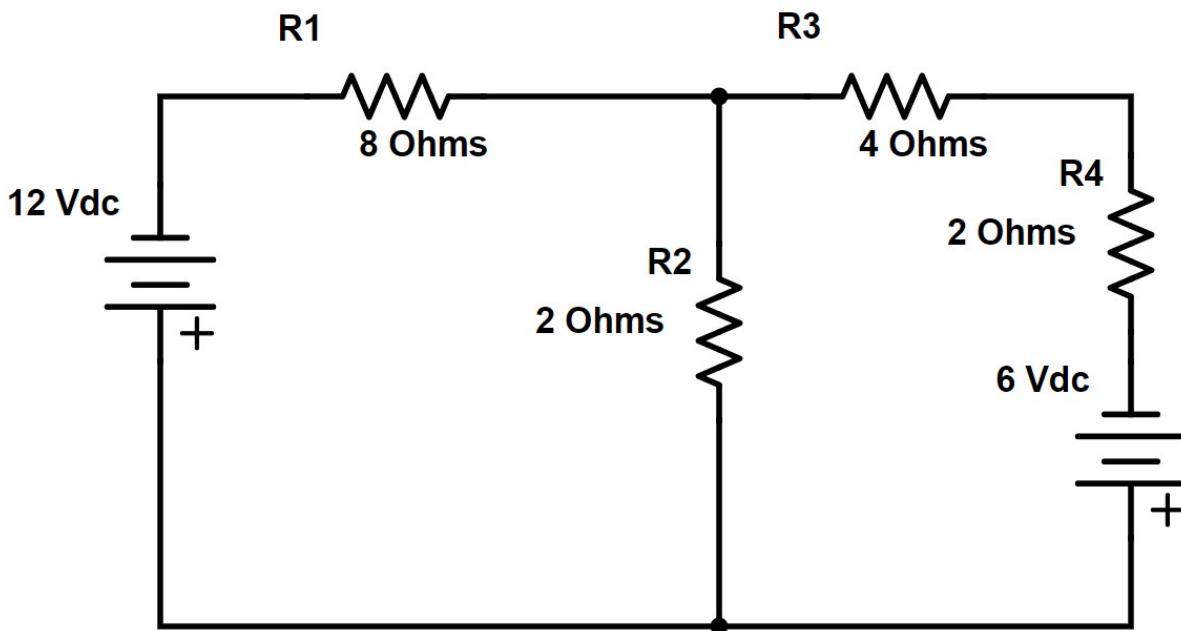


## Problems for Kirchhofs Laws

Find the voltage accross and currents flowing in R1 R2 R3 & R4 Using MeshCurrent Method.



Find:

Current thru R1, R3, R4. Find the effective current flowing thru R3.

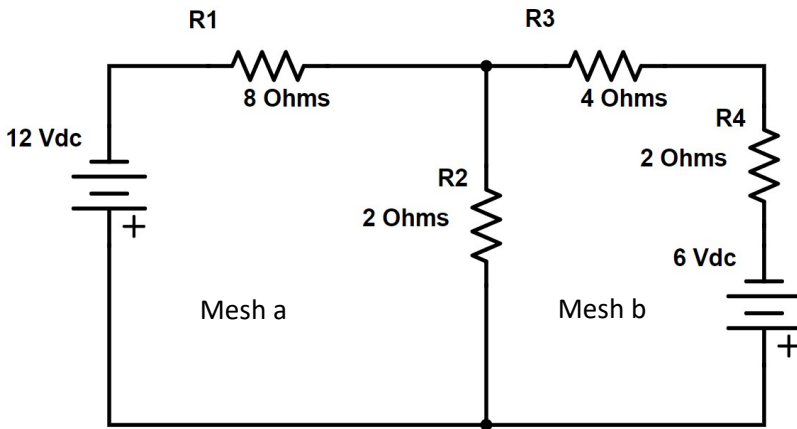
Find:

VR1 , VR2, VR3

# Solutions

## Problems for Kirchhoff's Laws

Find the voltage across and currents flowing in R1 R2 R3 & R4 Using Mesh, Current Method.



1. Mesh a Loop equation:  $10I_a - 2I_b = 12 \text{ Vdc}$

Mesh b Loop equation:  $-2I_a + 8I_b = 6 \text{ Vdc}$

2. Mesh a Loop equation:  $40I_a - 8I_b = 48 \text{ Vdc}$  (Multiply mesh a loop in 1 x 4)

3. Mesh a Loop equation:  $40I_a - 8I_b = 48 \text{ Vdc}$  (Add Mesh Loop a to Mesh Loop b )

Mesh b Loop equation:  $-2I_a + 8I_b = 6 \text{ Vdc}$

4. Solve for  $I_a$ ,  $I_b$  adds out  $38I_a = 54 \text{ Vdc}$

5.  $I_a = 54/38 = 1.42 \text{ amps}$

6. Solve for  $I_b$ :  $10I_a - 2I_b = 12 \text{ vdc}$

$(10 \times 1.42) - 2I_b = 12 \text{ vdc}$

$14.2 - 2I_b = 12 \text{ vdc}$  (Simplify the Equation)

$(14.2 - 14.2) - 2I_b = 12 - 14.2$  (subtract 14.2 from both sides of the equation)

$-2 I_b = -2.2$

$1 I_b = 1.1 \text{ amps}$

$$VR1 = R1 \times 1a; 8 \times 1.42a = 11.36 \text{ Vdc}$$

$$VR2 = R2 \times (1a - 1b) = 2 \times (1.42 - 1.1) = 2 \times 0.32 = 0.64 \text{ Vdc}$$

$$VR1 + VR2 = V \text{ mesh a; } 11.36 + 0.64 = 12$$

$$7. VR3 = R3 \times 1b = 4 \times 1.1 = 4.4 \text{ Vdc}$$

$$VR4 = R4 \times 1b = 2 \times 1.1 = 2.2 \text{ Vdc}$$

$$VR2 = R2 \times (1a - 1b) = 2 \times (1.42 - 1.1) = 2 \times 0.32 = 0.64 \text{ Vdc}$$

$$VR3 + VR4 + VR2 = V \text{ mesh b} = 4.4 \text{ vdc} + 2.2 \text{ vdc} - 0.64 = 6 \text{ vdc}$$

$$5.96 \text{ vdc} = 6 \text{ vdc error repeating decimal}$$