

8. A battery supplies current to a circuit with 4 resistors, as shown below in figure 4. What is the correct expression for the potential V_1 ? Hint – you do not need to keep track of V_2 to find V_1 .

- A. $1/3 V_B$
- B. $1/2 V_B$
- C. $2/3 V_B$
- D. $4/5 V_B$
- E. $2 V_B$

9. What is the correct expression for the potential V_2 in Figure 4? Think carefully before you start!

- A. $1/5 V_B$
- B. $1/4 V_B$
- C. $1/3 V_B$
- D. $1/2 V_B$
- E. $2/5 V_B$

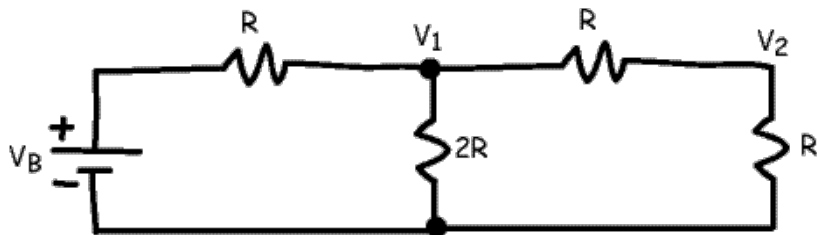


Figure 4

Brute Force Solution

Node 1
$$\frac{V_1 - V_B}{R} + \frac{V_1 - V_2}{R} + \frac{V_1}{2R} = 0$$

or
$$\frac{2(V_1 - V_B) + 2(V_1 - V_2) + V_1}{2R} = 0$$

or
$$5V_1 - 2V_2 = 2V_B$$

Node 2
$$\frac{V_2 - V_1}{R} + \frac{V_2}{R} = 0$$

or
$$\frac{2V_2 - V_1}{R} = 0$$

or
$$V_1 = 2V_2$$

Combining
$$5 \times 2V_2 - 2V_2 = 2V_B$$

or
$$V_2 = V_B/4$$

and
$$V_1 = V_B/2$$