Potential Dividers

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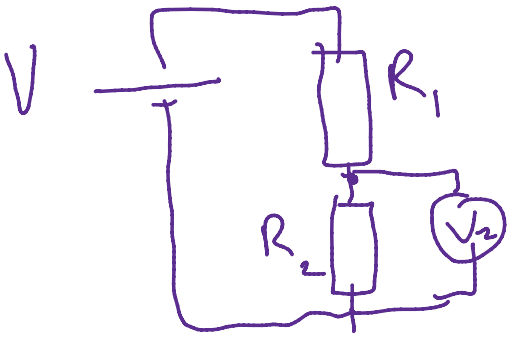


Find V across R_2

1) Find ~~total~~ current

$$\frac{V}{R_1+R_2} = I \quad \cdots (1)$$

2) Find voltage over R_2 (ie V_2)

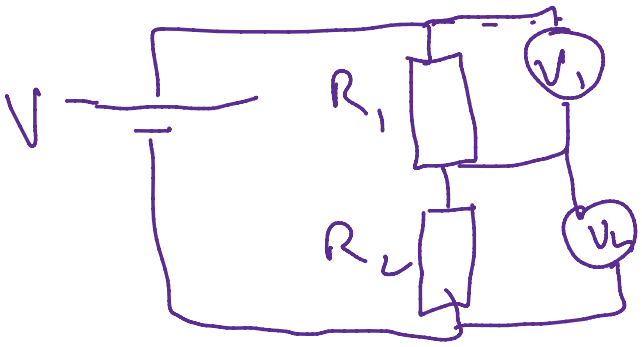
$$V_2 = I \times R_2 \quad \cdots (2)$$

($R_2 + R_1$ = total R)

3) (1) ... (2)

$$\therefore V_2 = \frac{V}{R_1+R_2} \times R_2 \text{ or } V \frac{R_2}{R_2+R_1}$$

Now change the circuit slightly to consider voltages across both resistors.
Using the method above we can get these formula.



$$V_1 = \frac{VR_1}{R_2+R_1}$$

$$V_2 = \frac{VR_2}{R_2+R_1}$$

Now divide V1 by V2. Algebra warning!

$$\frac{V_1}{V_2} = \frac{\left(\frac{V R_1}{R_2 + R_1}\right)}{\left(\frac{V R_2}{R_2 + R_1}\right)}$$

invert & multiply so:

$$\frac{V_1}{V_2} = \frac{\cancel{(R_2 + R_1)}}{\cancel{V} R_2} \times \frac{\cancel{V} R_1}{\cancel{(R_2 + R_1)}}$$

So....

$$\boxed{\frac{V_1}{V_2} = \frac{R_1}{R_2}}$$