Meter Sensitivity (ohm-per-volt Rating)

⊙ The ohms per volt figure is often called the "sensitivity" of the instrument.

→ Measured in Ω/V or ohm/volt

→ Higher the sensitivity, more accurate is the measurement

→ Sensitivity of meter is defined as $\boxed{S = \frac{1}{I_m}}$

Example: if $I_m = 50\mu A$

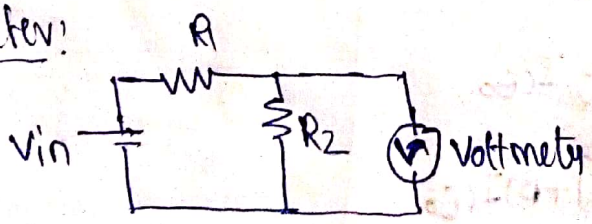
then $S = \frac{1}{I_m} = \frac{1}{50 \times 10^{-6}} = 2000\ \Omega/V$

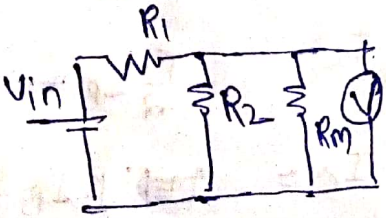
$\boxed{S = 2000\ \Omega/V}$

$$\Rightarrow \boxed{\text{Sensitivity} = \frac{\text{ohms}}{\text{volt}} = \frac{1}{\frac{\text{volt}}{\text{ohms}}} = \frac{1}{\text{Ampere}}}$$

Note: The sensitivity of a voltmeter is given in ohms-per-volt.

Voltmeter:





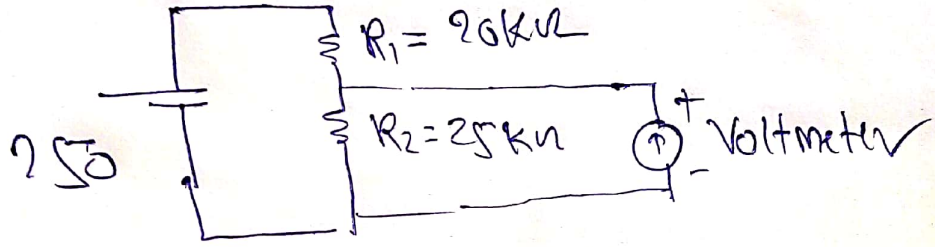
$$\boxed{V_m = \frac{(R_2 \| R_m) V_{in}}{R_1 + (R_2 \| R_m)}}$$

Prob! A simple series ckt of R_1 and R_2 connected to 250 dc source. If the voltage across R_2 is to be measured by the voltmeter having

i) a sensitivity of 500 Ω/V

(ii) a sensitivity of 10,000 Ω/V

find which voltmeter will read more accuracy. Both the meters are used on the 150 V range



Sol^n By voltage divider across R_2 —

$$V = \frac{250 \times 25}{(20+25)} = 138.88\,V$$

↓ True voltage

Case-i $S = 500\,\Omega/V$

The voltmeter resistance will be—

$$R_V = S \times V = 500 \times 150$$

$$= 75\,k\Omega$$

Case-ii $S = 10,000\,\Omega/V$

$$\therefore R_V = 10,000 \times 150 = 1.5\,M\Omega$$