Electricity

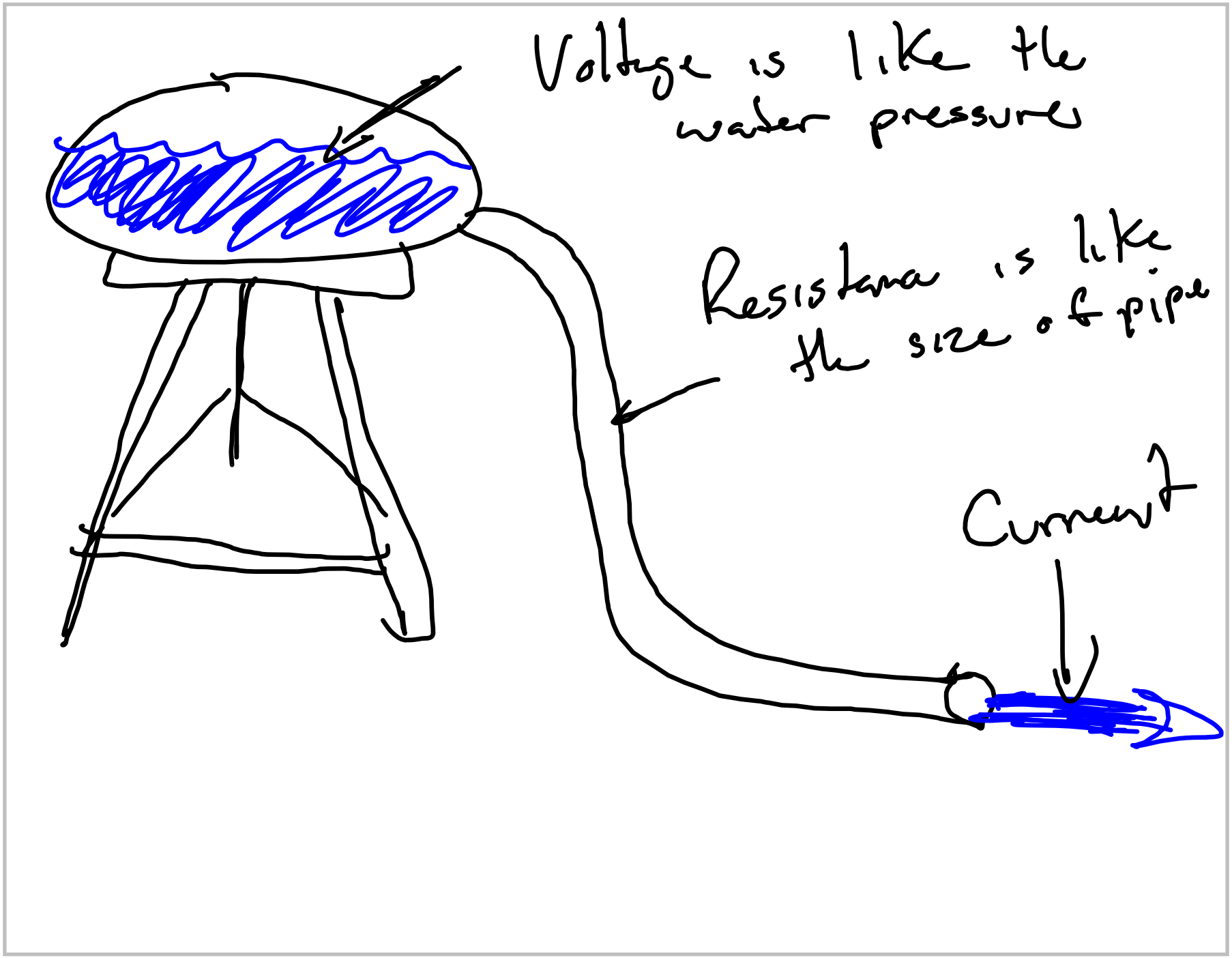
- Flow of electrons
  - = flows through conductors
  - 'Flow restricted by insulators

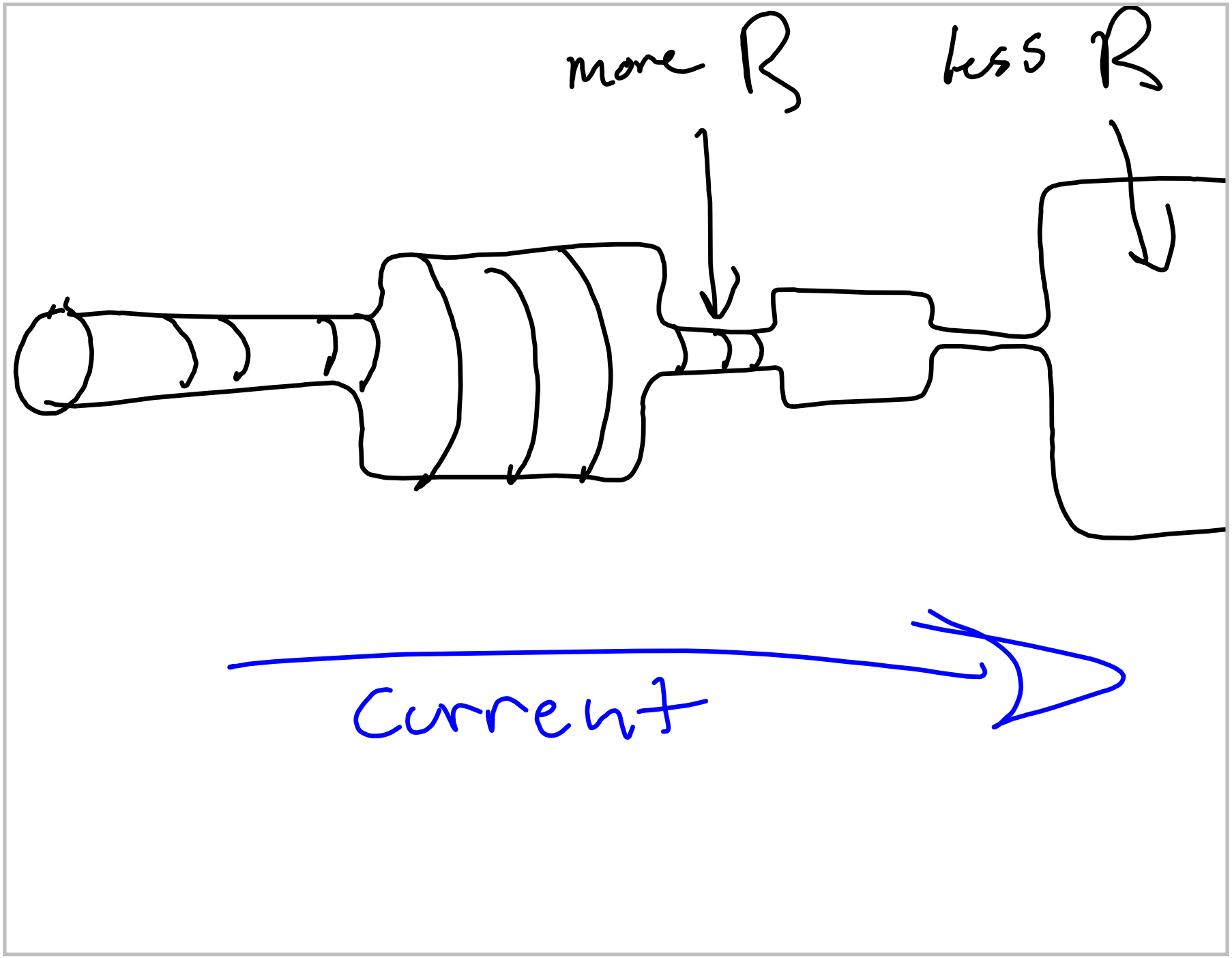
Resistance, Current, & Voltage

Voltage = Potential difference of electricity

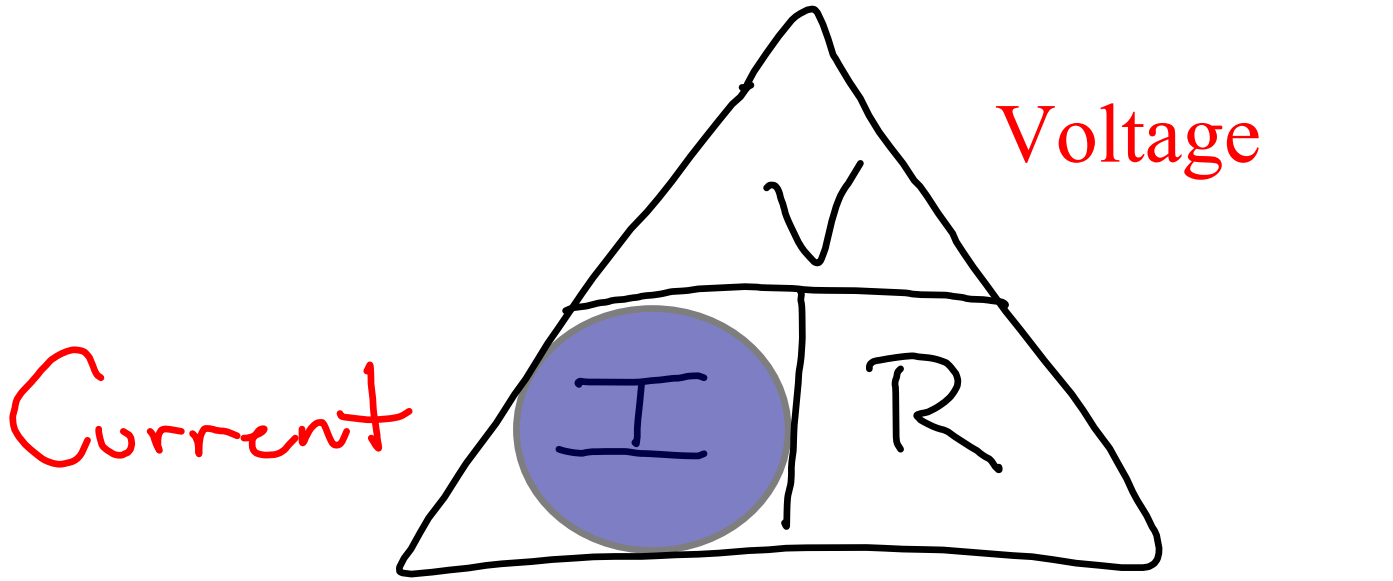
Current = speed of flow

Resistance = how much we are restricting flow


Voltage is like the water pressure
Resistance is like the size of pipe
Current


more R
less R
Current

Ohms Law



Voltage

Current

Resistance

$V = I \times R$ Volts

Ohms

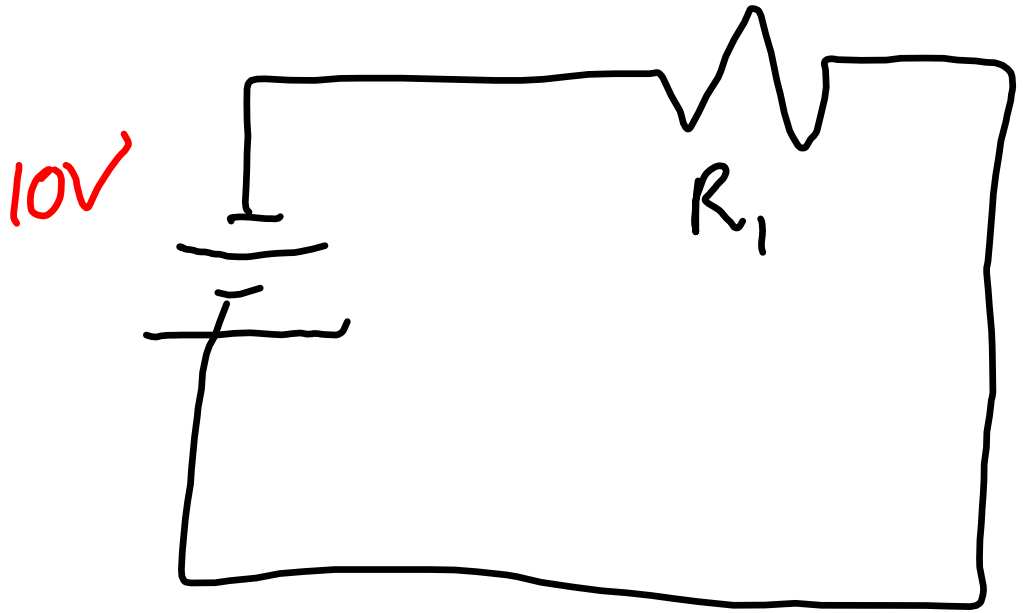
$I = V/R$ Amps

Law

$R = V/I$ Ω → "Ohms"

ex 1.

$R_1 = 200\Omega$



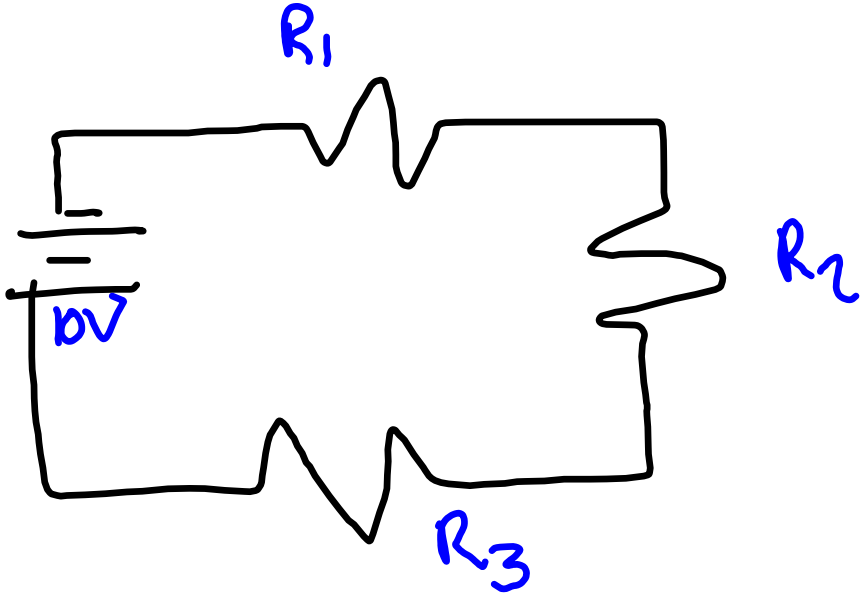
$$I = \frac{V}{R}$$

$$= \frac{10V}{200\Omega}$$

$$= 0.05\,A$$

$$= 50\,mA$$

Series Circuits



$R_1 = 100\ \Omega$

$R_2 = 330\ \Omega$

$R_3 = 700\ \Omega$

$V = I \times R$

$R_{Total} = R_1 + R_2 + R_3$

$= 100 + 330 + 700$

$= 1130\ \Omega$

$I = V/R$

$= \frac{10}{1130}$

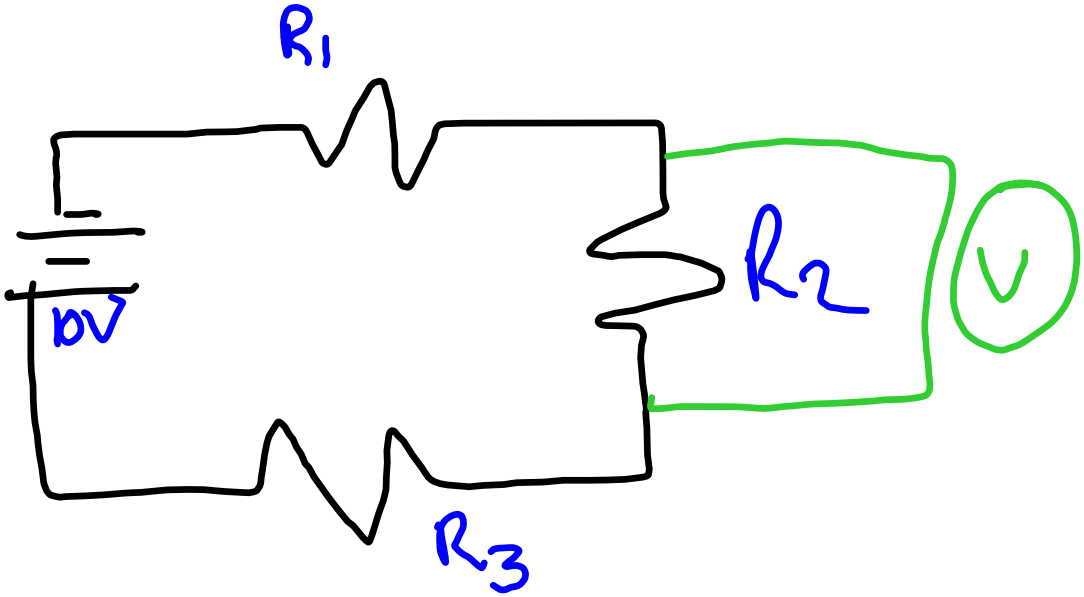
$= 0.00884\ A$

$= 8.84\ mA$

Series Circuits

$R_2 = 330\,\Omega$

ln series, Voltage drops occur at each resistor



$I = 0.0084$

$V_2 = I \times R_2$

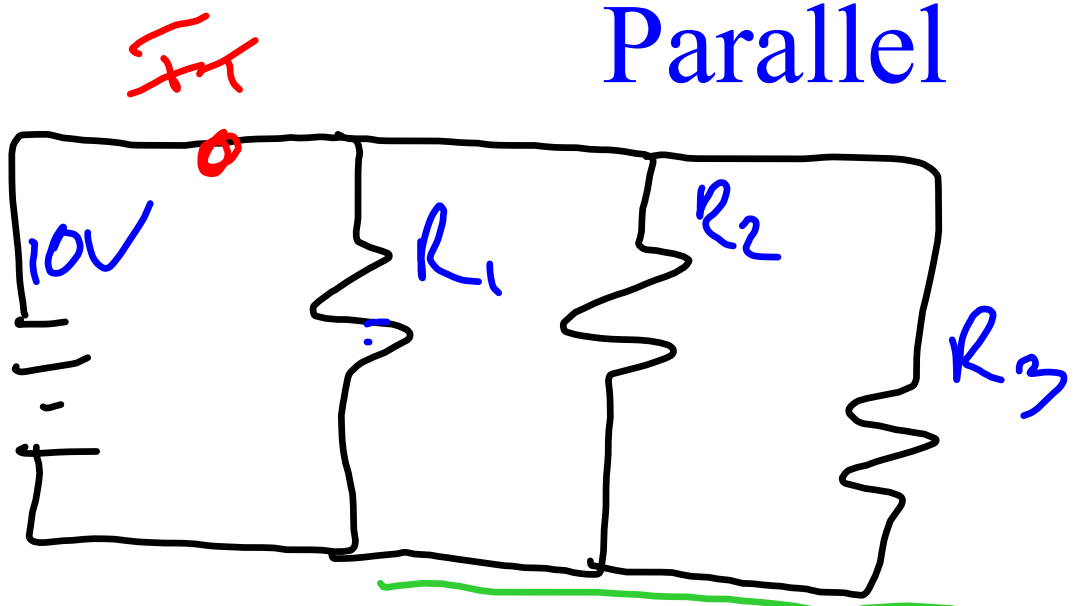
$= 0.0084 \times 330$

$= 2.772\ V$

Voltage drops:

$$V_1 + V_2 + V_3 = V_{Total}$$

Parallel



$R_1 = 330\,\Omega$

$R_2 = 720\,\Omega$

$R_3 = 1000\,\Omega$

$I_1 = V/R_1$

$= \frac{10}{330}$

$= 0.0303\,A$

$= 30.30\,mA$

$I_T = I_1 + I_2 + I_3$

$= 30.3 + 13.8 + 0.001$

$= 44.101\,mA$

Kirchoff's Law

$I_2 = \frac{10}{720}$

$= 0.0138\,A$

$= 13.8\,mA$

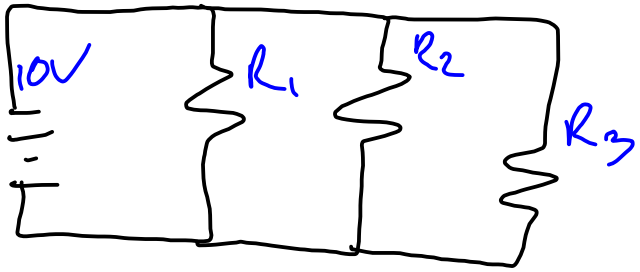
$I_3 = \frac{10}{1000}$

$= 0.001$

$R_T = \frac{V}{I}$

Parallel

$R_1 = 330\,\Omega$
$R_2 = 720\,\Omega$
$R_3 = 1000\,\Omega$



$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$= \frac{1}{330} + \frac{1}{720} + \frac{1}{1000}$$

$$\frac{720 \times 1000 + 330 \cdot 1000 + 330 \times 720}{330 \times 720 \times 1000}$$

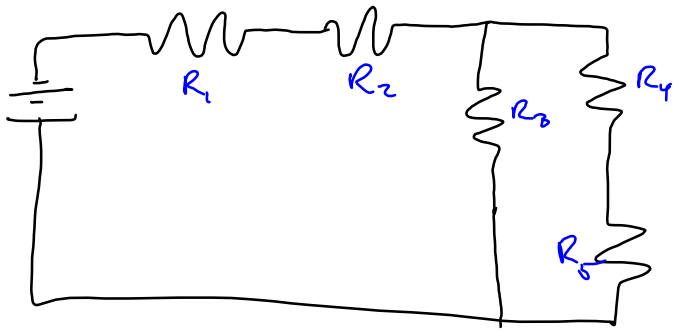
$$= \frac{x}{y} = \frac{1}{2}$$

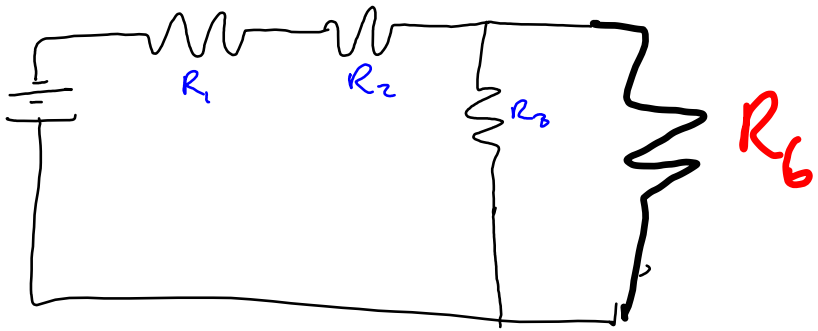
Plug into calc → 0.00183

$$\frac{1}{R_T} = \frac{0.00183}{1}$$

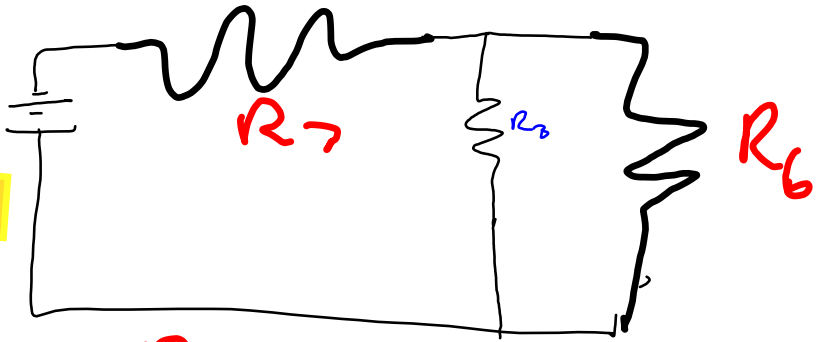
$$R_T = 2$$

Combination Circuits





$R_6 = R_4 + R_5$



$R_7 = R_1 + R_2$

Simple Series

$R_8 = R_6 + R_3$

Series	Parallel
Current static	Current changes at each resistor
Voltage drops occur	No Voltage drops
$R_T = R_1 + R_2 \cdots$	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \cdots$