

Enriched Circuit Notes

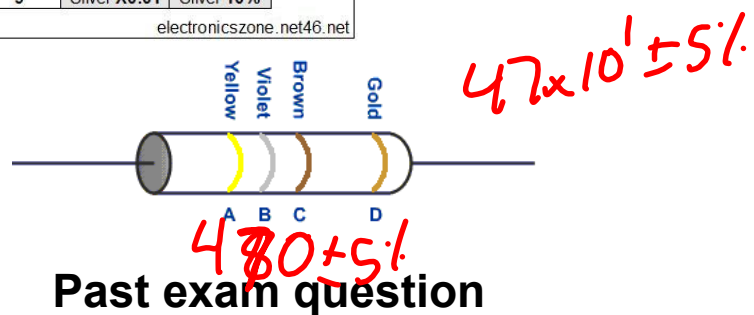
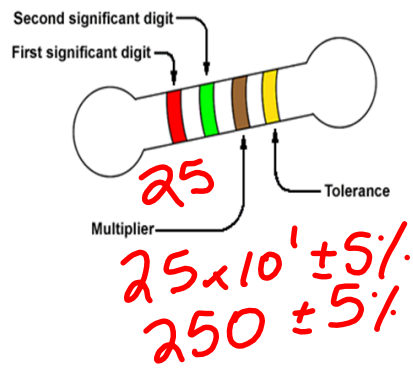
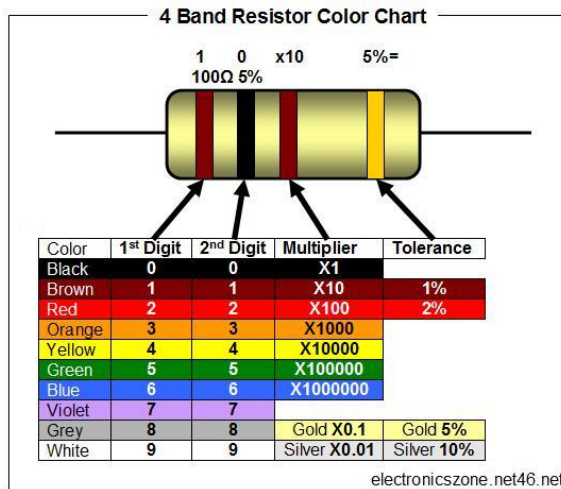
I love it!!

So will you!!

Coloured Resistors

Resistors may have various coloured strips around them. These colours give the strength of the resistor.

- 1st colour = 1st digit of the resistor value.
- 2nd colour = 2nd digit of the resistor value.
- 3rd colour = multiplier ($10^?$)
- 4th colour = tolerance (the amount the answer can be off by).



Past exam question

1. The resistance of a resistor can be determined using the four coloured bands on the resistor as well as a colour code. What would the colours on the resistor be if the resistance of the resistor was $4200 \Omega \pm 10\%$?

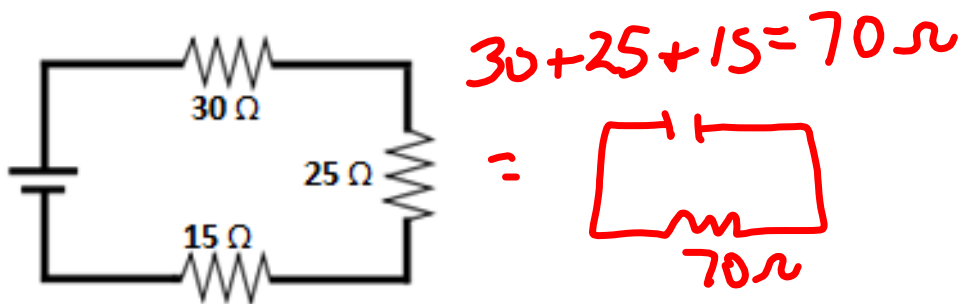
- A) Silver, red, yellow, blue
- B) Silver, red, red, yellow
- C) Yellow, red, black, silver
- D) Yellow, red, red, silver**

Equivalent resistance

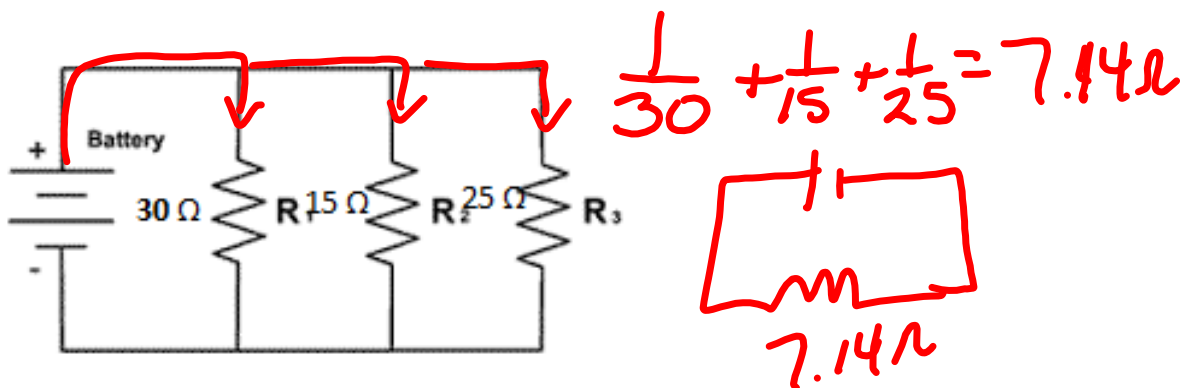
Def: Sum of all the resistors in a circuit. The current intensity of the circuit is maintained with the equivalent resistor.

symbol: R_{eq} or R_t

Series rule: $R_{eq} = R_1 + R_2 + R_3 \dots$



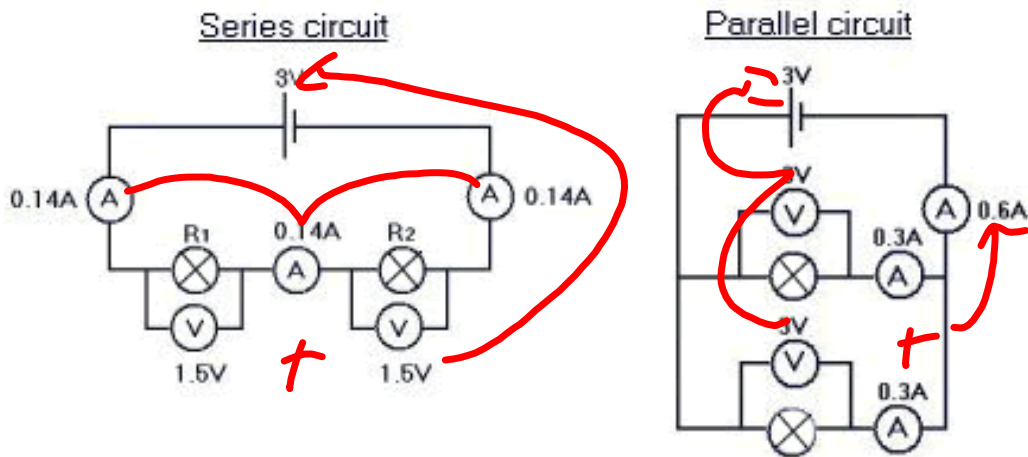
Parallel rule: $1/R_{eq} = 1/R_1 + 1/R_2 + 1/R_3$ $1/x$ or x^{-1}



Solving Circuits Theory

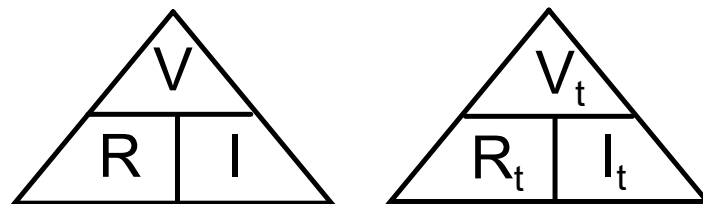
1. Kirchoff's law

	Series	Parallel
current intensity	$I_1 = I_2 = I_3$	$I_s = I_1 + I_2$
potential difference	$V_s = V_1 + V_2$	$V_s = V_1 = V_2$
resistance	$R_{eq} = R_1 + R_2$	$1/R_{eq} = 1/R_1 + 1/R_2$



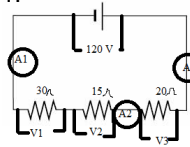
2. Ohm's Law

$$R = V/I$$



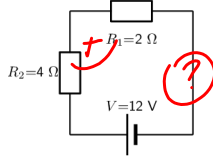
Solving circuits practice

1.



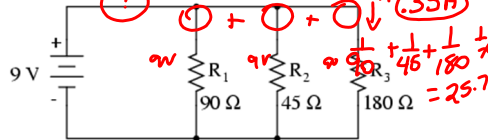
	I	R	V = R x I
1	1.9	20Ω	38V
2	1.9	15Ω	28.5V
3	1.9	30Ω	57V
T	1.9	65Ω	120V

2. What is the current intensity coming from the power source?



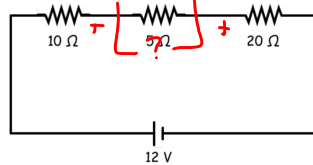
$$I_T = \frac{V_T}{R_T} = \frac{12}{6} = 2A$$

3. What is the current coming from the power source?



$$I_T = \frac{V}{R_T} = \frac{9}{\frac{1}{90} + \frac{1}{45} + \frac{1}{180}} = 25.7A$$

4. What is the voltage of R₂?

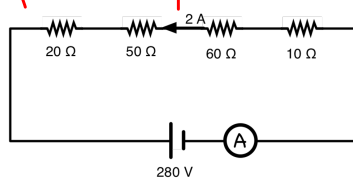


$$V = R \times I$$

$$5 \times 34 = 170V$$

$$I_T = \frac{V_T}{R_T} = \frac{12}{35} = 34mA$$

5. What is the voltage of resistor 1 and resistor 2 combined together?

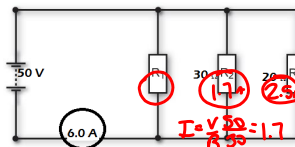


$$V = R I$$

$$70 \times 2 = 140V$$

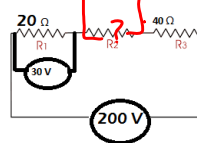
$$I_T = \frac{V_T}{R_T} = \frac{280}{140} = 2A$$

5. What is the current intensity of resistor 1?



$$6 - 1.7 - 2.5 = 1.8A$$

7. What is the voltage of resistor 2?



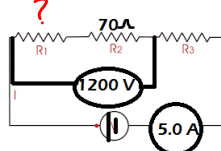
$$V = R I = 110V$$

$$I = \frac{V}{R} = \frac{30}{20} = 1.5A$$

$$R_T = \frac{V_T}{I_T} = \frac{200}{1.5} = 133.3\Omega$$

$$133.3 - 20 - 40 = 73.3\Omega$$

8. What is the resistance of resistor 1?

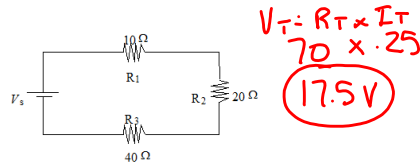


$$R_{1+2} = \frac{1200}{5} = 240\Omega$$

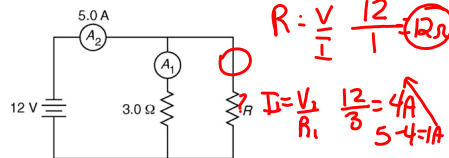
$$240 - 70 = 170\Omega$$

Past exam Questions

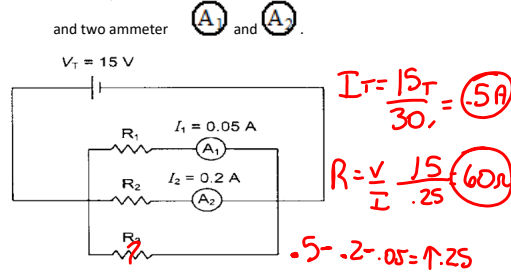
1. In the electric circuit illustrated below, the current intensity (I) is 0.25 A. What is the potential difference across the terminals of the power source, V_s ?



2. A 3.0-ohm resistor, an unknown resistor, R , and two ammeters, A_1 and A_2 , are connected as shown below with a 12-volt source. Ammeter A_2 reads a current of 5.0 amperes. What is the value of R ?

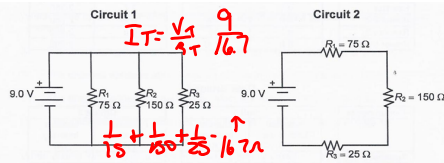


3. The following electric circuit consists of a power supply, three resistors (R_1 , R_2 , and R_3) and two ammeter (A_1 and A_2).



The equivalent resistance (R_{eq}) of the circuit is 30 Ω . What is the value of resistor R_3 ?

4. Two different circuits were constructed using a 9.0 V power supply and 3 resistors. Resistor 1 has a value of 75 Ω , resistor 2 has a value of 150.0 Ω and resistor 3 has a value of 25 Ω .



A student collected data for the potential difference and the current intensity at different points in the circuits.

Data Sheet 1

Components	Circuit 1		Circuit 2	
	Potential Difference (V)	Current Intensity (A)	Potential Difference (V)	Current Intensity (A)
Resistor 1	9.0	0.12	2.7	0.036
Resistor 2	9.0	0.06	5.4	0.036
Resistor 3	9.0	0.36	0.9	0.036
Power Supply	9.0	0.54	9.0	0.036

Data Sheet 2

Components	Circuit 1		Circuit 2	
	Potential Difference (V)	Current Intensity (A)	Potential Difference (V)	Current Intensity (A)
Resistor 1	2.7	0.036	9.0	0.12
Resistor 2	5.4	0.036	9.0	0.06
Resistor 3	0.9	0.036	9.0	0.36
Power Supply	9.0	0.036	9.0	0.54

Data Sheet 3

Components	Circuit 1		Circuit 2	
	Potential Difference (V)	Current Intensity (A)	Potential Difference (V)	Current Intensity (A)
Resistor 1	9.0	675	2.7	2 250
Resistor 2	9.0	1 350	5.4	2 250
Resistor 3	9.0	225	0.9	2 250
Power Supply	9.0	2 250	9.0	2 250

Data Sheet 4

Components	Circuit 1		Circuit 2	
	Potential Difference (V)	Current Intensity (A)	Potential Difference (V)	Current Intensity (A)
Resistor 1	2.0	150	9.0	675
Resistor 2	1.0	150	9.0	1 350
Resistor 3	6.0	150	9.0	225
Power Supply	9.0	150	9.0	2 250

Which data sheet correctly represents the data recorded from each circuit?

- A) Data sheet 1 C) Data sheet 3
 B) Data sheet 2 D) Data sheet 4