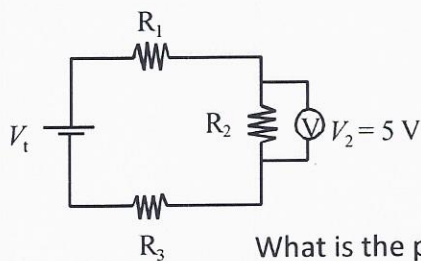


Enriched Circuit #2 Worksheet

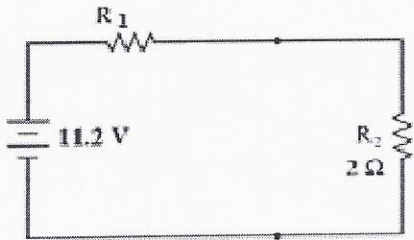
1. The following electric circuit consists of a power source, three identical resistors (R_1 , R_2 and R_3) and a voltmeter V . The potential difference (voltage), V_2 , across R_2 is 5 V.



$$5 + 5 + 5 = 15 \text{ V}$$

What is the potential difference (voltage), V_t , across the terminals of the power source?

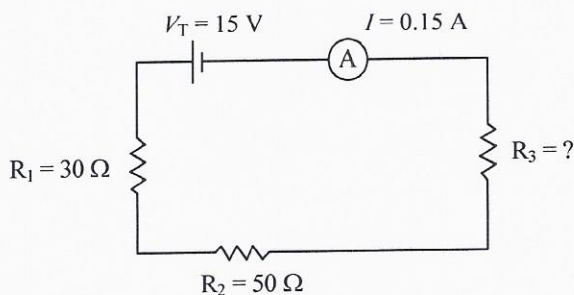
2. If the current intensity of the circuit is 0.035 A, what is the resistance for ' R_1 '?



$$R_T = \frac{V_T}{I_T} = \frac{11.2}{0.035} = 320 \Omega$$

$$320 - 2 = 318 \Omega$$

3. The following electric circuit consists of a power supply, an ammeter A and three resistors (R_1 , R_2 and R_3). The voltage across the power supply is 15 V, and the ammeter reads 0.15 A.



$$R_T = \frac{V_T}{I_T} = \frac{15}{0.15} = 100 \Omega$$

$$100 - 80 = 20 \Omega$$

What is the value of R_3 ?

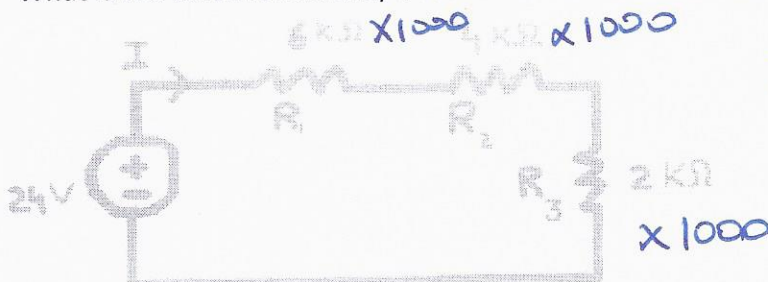
A) 20 Ω

B) 33 Ω

C) 80 Ω

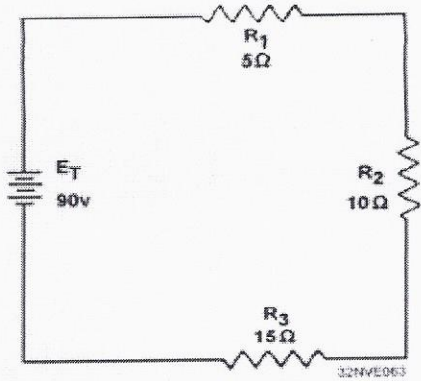
D) 100 Ω

4. What is the current intensity of the circuit? To convert a k Ω to an Ω , multiply by 1 000.



$$I_T = \frac{V_T}{R_T} = \frac{24}{12000} = 0.002 \text{ A}$$

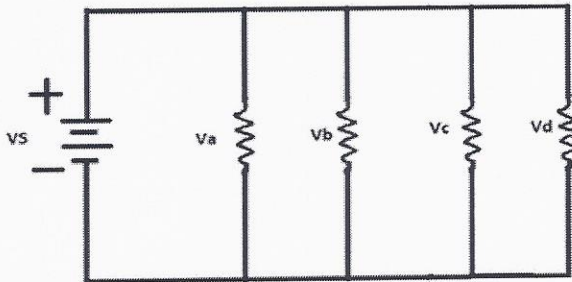
5. What is the potential difference for R_3 ?



$$V = RI \quad 15 \times 3 = 45V$$

$$I_T = \frac{V_T}{R_T} = \frac{90}{30} = 3A$$

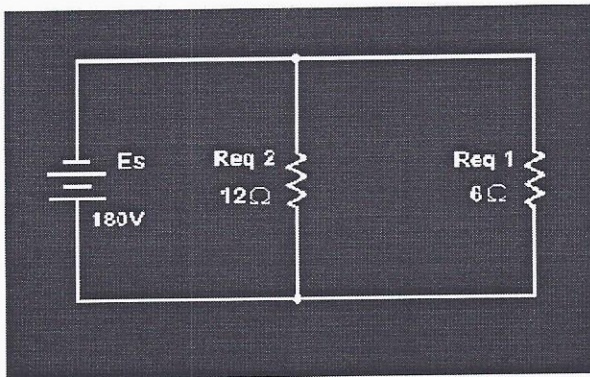
6. All resistors are of equal strength. The voltage for V_a is 25 V and the current going through V_a is 0.55 A. What is the equivalent resistance of the circuit?



$$R = \frac{V}{I} \quad \frac{25}{0.55} = 45.5\Omega$$

$$\frac{1}{45.5} + \frac{1}{45.5} + \frac{1}{45.5} + \frac{1}{45.5} = \frac{1}{11.4\Omega}$$

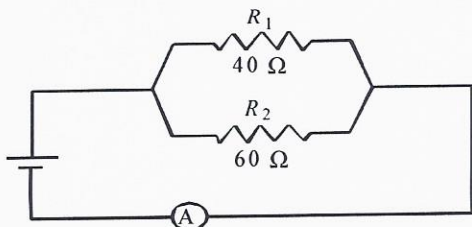
7. What is the current intensity coming from the power source?



$$\frac{1}{12} + \frac{1}{6} = 4\Omega$$

$$I_T = \frac{V_T}{R_T} = \frac{180}{4} = 45A$$

8. The following circuit consists of a power supply, two resistors (R_1 and R_2) and an ammeter.



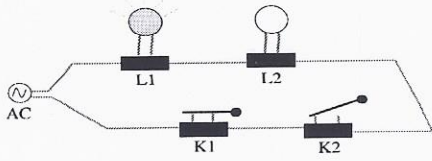
$$V = RI \quad 40 \times 2 = 80V$$

$$R_T = \frac{1}{\frac{1}{40} + \frac{1}{60}} = 24\Omega$$

$$I_T = \frac{V_T}{R_T} = \frac{80}{24} = 3.3A$$

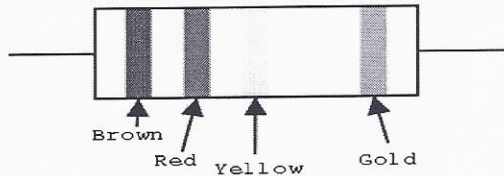
The current through resistor R_1 is 2 A. What is the current indicated by the ammeter?

9. What is wrong with the picture below?



In a series circuit, if the switch is open there is no current & the light cannot be on.

10. What is the value of the resistor?



$12 \times 10^4 \pm 5\%$

11. Identify the colours associated with the resistors if they have the following resistances.

a) $23\,000\ \Omega \pm 10\%$

b) $44\ \Omega \pm 10\%$

c) $180\ \Omega \pm 5\%$

red - orange - orange - silver

yellow - yellow - black - silver

brown - grey - brown - gold

12. Match the following terms with the pictures below:

a) single pole-single throw

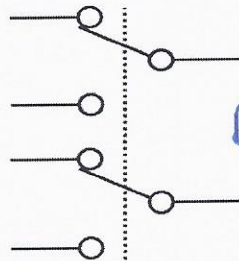
c) double pole-single throw

b) single pole-double throw

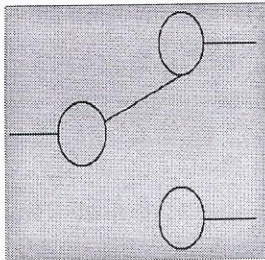
d) double pole-double throw



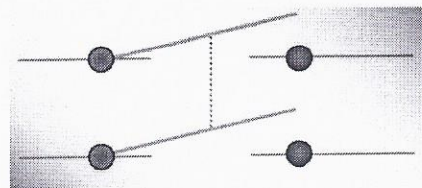
SPST



DPDT

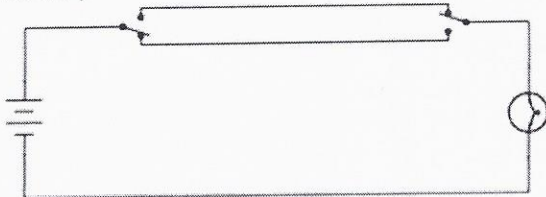


SPDT



DPST

13. What positions do the switches have to be in for the light bulb to receive power?

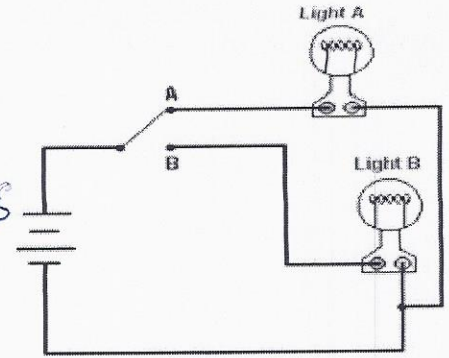


both up or down
so current can go through the circuit

14. Consider the circuit diagram below.

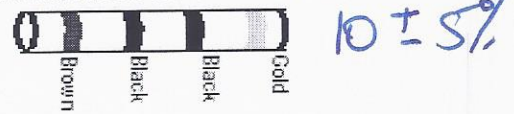
- a) Name the switch. **SPDT**
 b) How must the switch be placed so that light bulb A comes on **as is**
 c) Can light bulb A ever be on at the same time as light bulb B?

No, either A or B

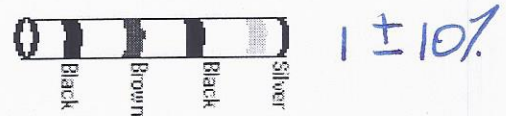


15. Nicolas has decided to participate in the *Engineering Challenge*. This year he plans to build a racecar that can move around obstacles. He needs a resistor to slow down the motor. He asks the laboratory technician for a resistor offering a resistance between $8\ \Omega$ and $12\ \Omega$. She offers him the four resistors below. Which resistor should he use?

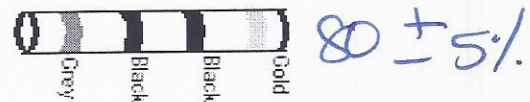
(A) Resistor 1 :



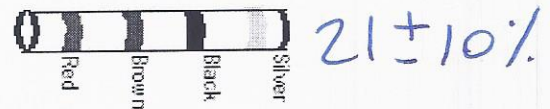
B) Resistor 2 :



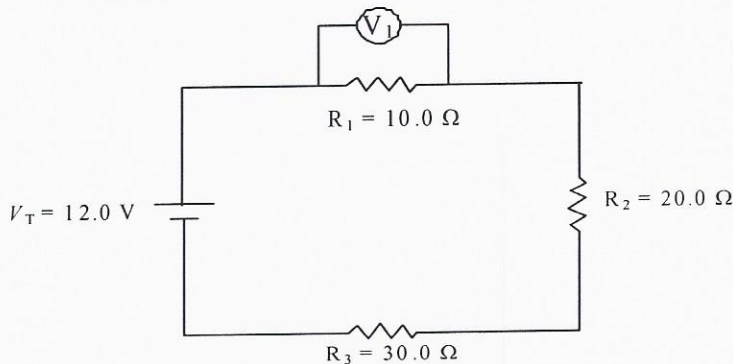
C) Resistor 3 :



D) Resistor 4 :



16. The following circuit consists of a power supply, V_T , three resistors, (R_1 , R_2 and R_3) and a voltmeter (V_1).

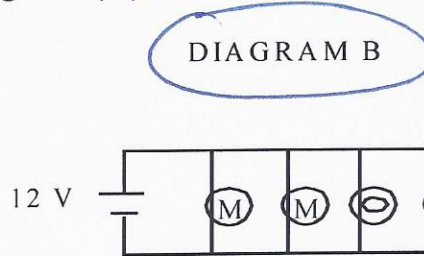
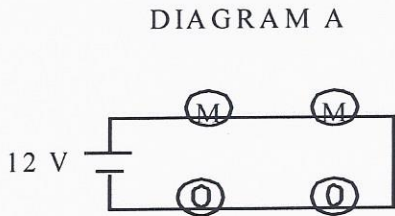


$$V = R \times I = 10 \times 0.2 = 2\text{V}$$

$$I_T = \frac{V_T}{R_T} = \frac{12}{60} = 0.2\text{A}$$

The potential difference across the power supply, V_T , is $12.0\ \text{V}$. What is the potential difference measured by voltmeter (V_1) ?

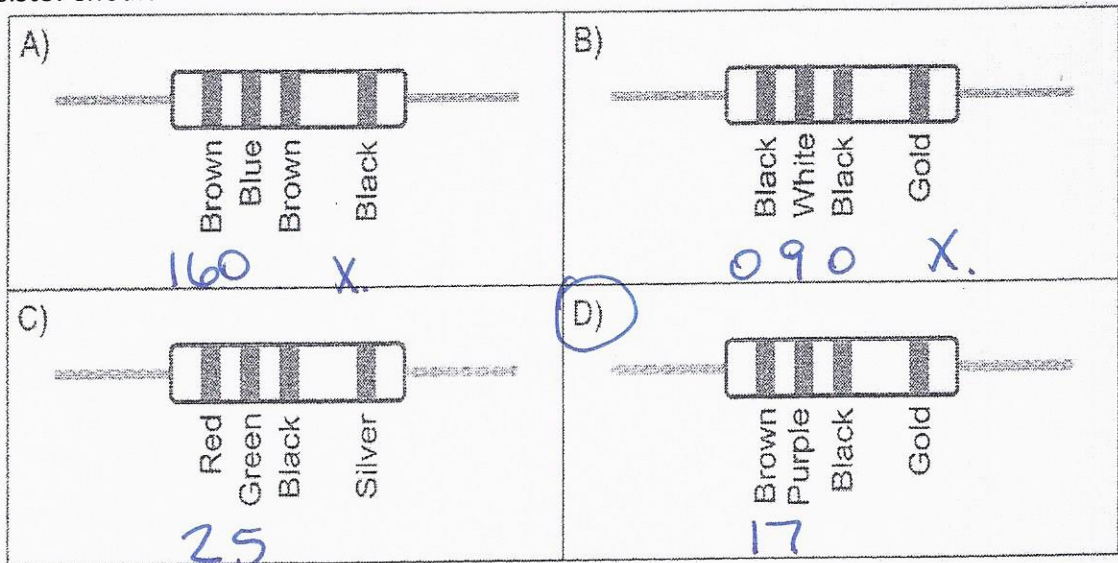
17. Your friend wants to add some electrical accessories to the circuit of his automobile. The circuit must supply 4 pieces of equipment : a de-mister (M), a small pump (M) and 2 bulbs. Each item can function with a 6 V or a 12 V power supply. The car's circuits provide a maximum of 12 volts. He proposes two ways of connecting the equipment.



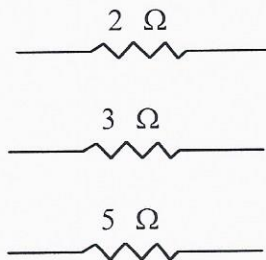
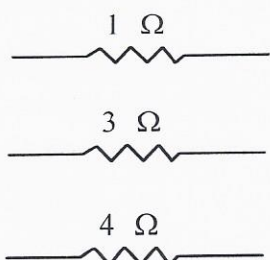
A, voltage is added up so would exceed 12V + need 24V minimum.
 B voltage not added, each = 12V + total = 12V

Which diagram must he choose for each item to function properly? Justify your answer.

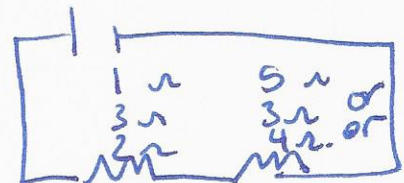
18. Veronica has recently decided to install a dimmer switch to her living room lights. In order to do so, she needs a resistor with a resistance between 15 Ω and 25 Ω. Which resistor should Veronica use?



19. In a laboratory, you are given a power supply, conducting wires and the six resistors shown below. The power supply produces a potential difference of 9 V. Using the power supply and **two** of the resistors above, you must build a circuit with a current of 1.5A flowing through the power supply. Draw your electric circuit with the resistors chosen.

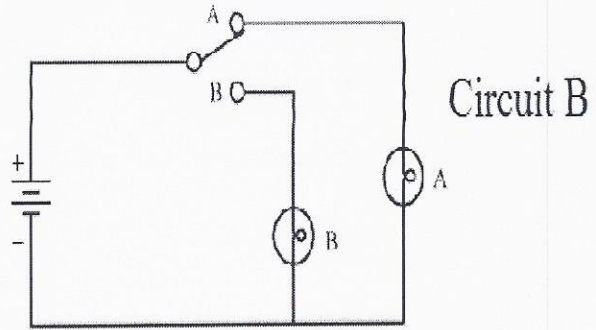
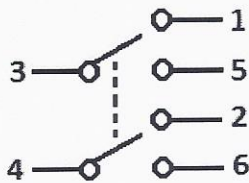


$$R_T = \frac{V}{I} = \frac{9}{1.5} = 6 \Omega$$



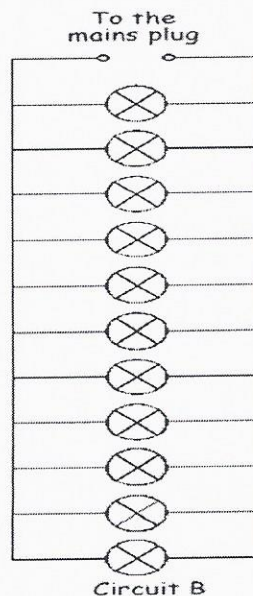
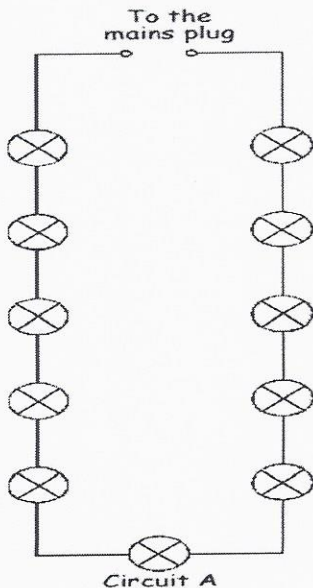
20. Which answer best explains the difference between circuit A and circuit B and has each circuit correctly named.

Circuit A



	Name of circuit A	Name of Circuit B	Difference between circuit
A	Double pole single throw	Single pole double throw	In circuit A, either 1 or 5 or 2 or 6 will be on at the same time. In circuit B, only A or B will be on at once.
B	Double pole double throw	Single pole single throw	In circuit A, either 1 or 5 and 2 or 6 will be on at the same time. In circuit B, only A or B will be on at once.
C	Double pole double throw	Single pole double throw	In circuit A, either 1 or 5 or 2 or 6 will be on at the same time. In circuit B, only A or B will be on at once.
D	Double pole double throw	Single pole double throw	In circuit A, either 1 or 5 and 2 or 6 will be on at the same time. In circuit B, only A or B will be on at once.

21. The current intensity of a fuse box cannot pass 2.4 A. Each light bulb in the circuits below draws 0.4 A of current intensity. If you do not want to blow the fuse, explain which circuit is best to use.



Circuit A because current is the same everywhere.

In circuit B, current is added up at each light bulb & would = to 4.4 A which exceeds 2.4 A.