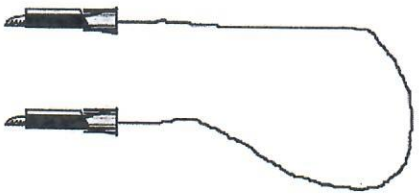
Practice Problems A

1. Alligator clips are used to connect the components of an electric circuit.



Which substance can be used to make the jaws of these alligator clips?

a) Aluminum
b) Rubber
c) Plastic
d) Porcelain

2. Porcelain is used to support electrical wires on poles.

Which properties of porcelain make it desirable for this use?

1. Is a good insulator.
2. Is non-ductile.
3. It rusts.
4. Breaks easily.

a) 1 and 2
b) 1 and 3
c) 2 and 4
d) 3 and 4

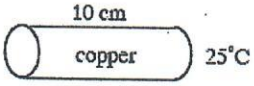
3. The four conductors shown below are made out of copper.

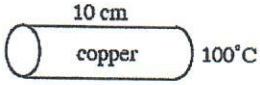
Which one has the greatest conductance?

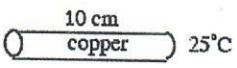
a) 
b) 
c) 
d) 

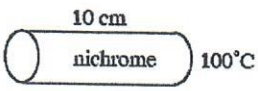
4. Several factors can influence the electrical conductivity of a wire.

Which of the following diagrams shows the wire with the best electrical conductivity?

a) 

b) 

c) 

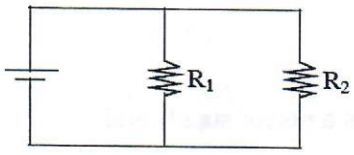
d) 

5. Which of the following would increase the conductivity of a circuit ?

1 - A thicker wire
2 - A longer wire
3 - A decrease in the temperature of the wire
4 - The use of porcelain wire

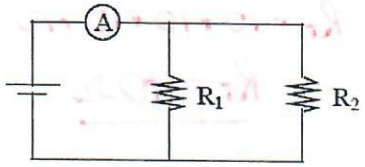
a) 1 and 2 b) 1 and 3 c) 2 and 4 d) 3 and 4

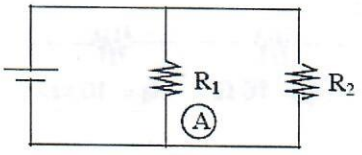
6. The diagram of a parallel electric circuit is shown below.

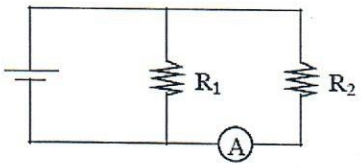


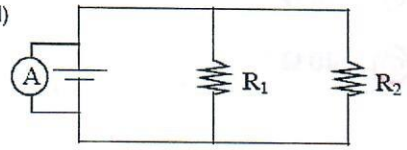
You have to connect ammeter (A) into this circuit so that you will be able to read the total current flowing through resistors R_1 and R_2.

Which diagram shows the right way to connect the ammeter?

a)


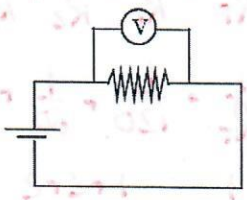
c)


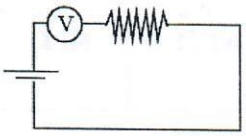
b)


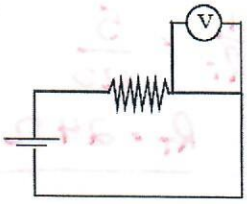
d)


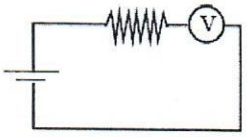
7. You have to connect a voltmeter to determine the potential difference across the terminals of a resistor in a simple circuit.

In which diagram below is the voltmeter properly connected?

a)


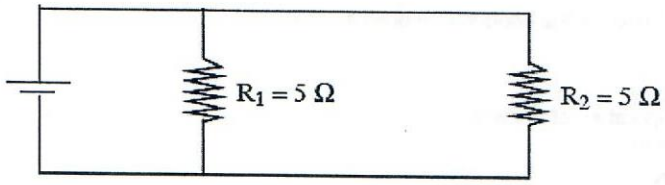
c)


b)


d)


Practice Problems B

1. A parallel circuit is illustrated below.



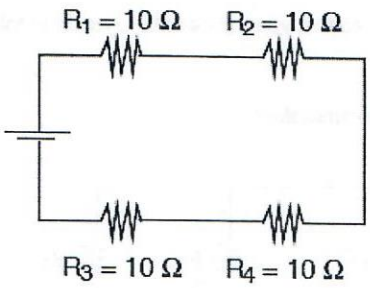
What is the equivalent resistance of this circuit?

a) 0.4 Ω c) 5 Ω

b) 2.5 Ω d) 10 Ω

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$
$$\frac{1}{R_T} = \frac{1}{5} + \frac{1}{5}$$
$$\frac{1}{R_T} = \frac{1+1}{5}$$
$$\frac{1}{R_T} = \frac{2}{5}$$
$$R_T = 2.5\ \Omega$$

2. The electric circuit illustrated below consists of a power supply and resistors R_1, R_2, R_3 and R_4.



Series

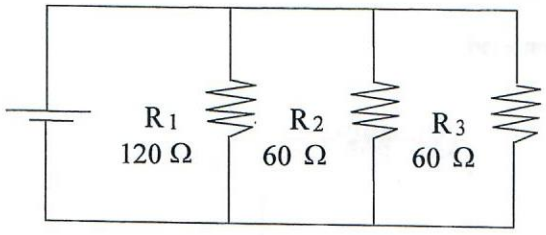
$$R_T = R_1 + R_2 + R_3 + R_4$$
$$R_T = 10 + 10 + 10 + 10$$
$$R_T = 40\ \Omega$$

What is the equivalent resistance of the circuit?

a) 0.4 Ω c) 10 Ω

b) 2.5 Ω d) 40 Ω

3. The circuit illustrated below consists of three resistors (R_1, R_2 and R_3) and a power supply.



Parallel

What is the equivalent resistance of this circuit?

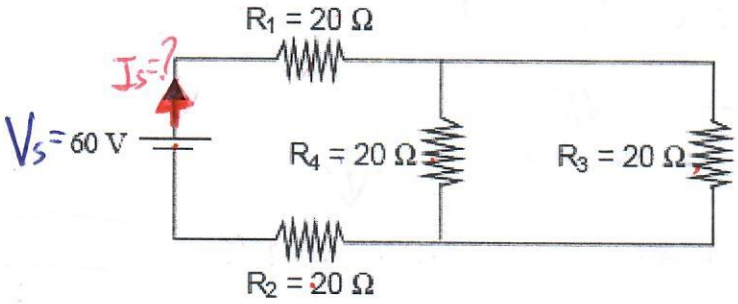
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$
$$\frac{1}{R_T} = \frac{1}{120} + \frac{1}{60} + \frac{1}{60}$$
$$\frac{1}{R_T} = \frac{1+2+2}{120}$$
$$\frac{1}{R_T} = \frac{5}{120}$$
$$R_T = 24\ \Omega$$

Practice Problems C

Equivalent Resistance: Combined Circuits:

t Show All Work:

1) The electric circuit illustrated below consists of a power supply and resistors R1, R2, R3, and R4.



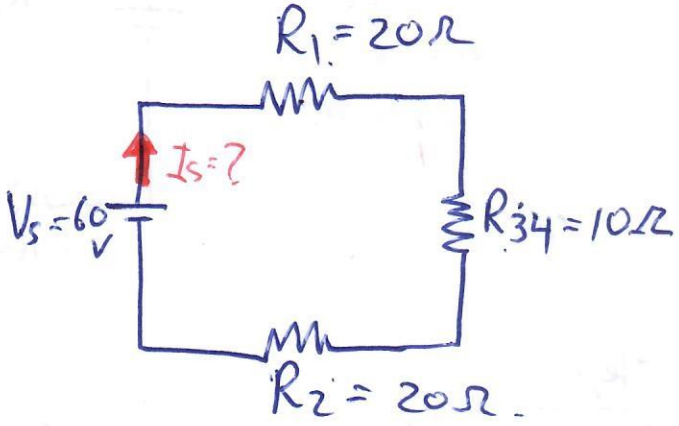
R3 & R4 are in parallel

a) What is the total resistance of this circuit ?
b) What is the current provided by the source ?

① step 1 $\frac{1}{R_{34}} = \frac{1}{R_3} + \frac{1}{R_4}$

$\frac{1}{R_{34}} = \frac{1}{20} + \frac{1}{20}$

$R_{34} = 10\,\Omega$



step 2 $R_T = R_1 + R_2 + R_{34}$ (series)

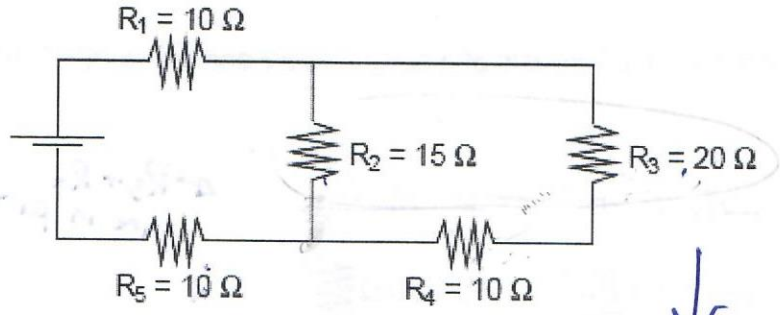
$R_T = 20 + 20 + 10$

$R_T = 50\,\Omega$

b) $R_T = \frac{V_s}{I_s}$

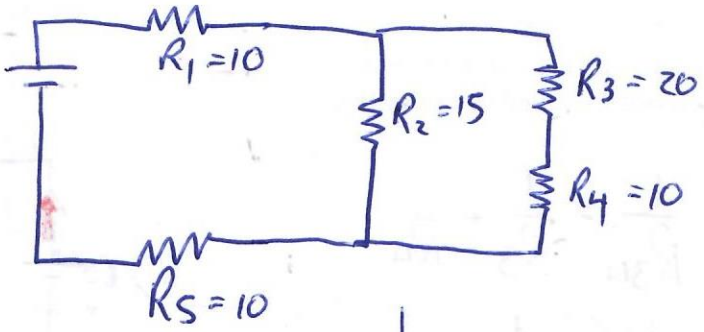
$I_s = \frac{V_s}{R_T}$ $I_s = \frac{60}{50} = 1.2\,A$

2) A series-parallel electric circuit is illustrated below.



What is the equivalent resistance of this circuit?

a) 2.4 Ω
b) 24.6 Ω
c) 30.0 Ω
d) 65.0 Ω



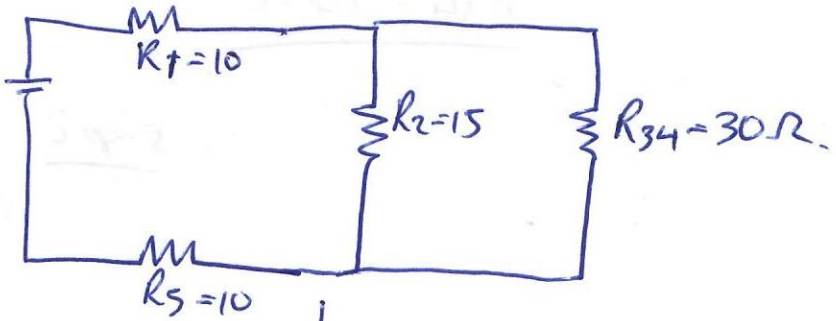
step 1

$R_{34} = R_3 + R_4$

series

$R_{34} = 20 + 10$

$R_{34} = 30\ \Omega$



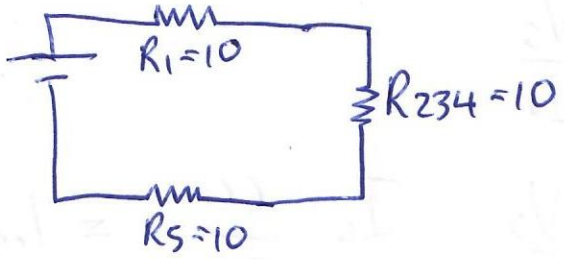
step 2

$\frac{1}{R_{234}} = \frac{1}{R_2} + \frac{1}{R_{34}}$

(Parallel)

$\frac{1}{R_{234}} = \frac{1}{15} + \frac{1}{30}$

$R_{234} = 10\ \Omega$



step 3: $R_T = R_1 + R_{234} + R_5$

(series) $R_T = 10 + 10 + 10$

$R_T = 30\ \Omega$