# A

# DC fundamentals EE3103

## Student workbook 2020 for Ohms and Kirchhoffs laws with Series and parallel exercises


**Student name**

**WORKSHEET ASSIGNMENT ON RESISTOR CIRCUIT WORKSHEETS**

# WORKSHEET CHECKLIST

| | WORKSHEET NUMBER | TICK FINISHED |
|---|---|---|
| **OHMS LAW** | | |
| BASIC | 1A | |
| | 1B | |
| | 1C | |
| SERIES | 2A | |
| | 2B | |
| | 3A | |
| PARALLEL | 5A | |
| | 6A | |
| **RESISTIVE NETWORKS** | | |
| | 10A | |
| | 10B | |
| | 10C | |
| | 10D | |
| | 11A | |
| | 11B | |
| **SERIES-PARALLEL** | | |
| | 15A | |
| | 15B | |
| | 8A | |
| | 16A | |
| | 16C | |
| **LESSON ON BATTERY INTERNAL RESISTANCE** | | |
| INTERNAL R | 9A | |
| **HARD SERIES-PARALLEL** | | |
| | 16D | |
| | 16E | |
| **2 Assignment questions** | **assignment** | |

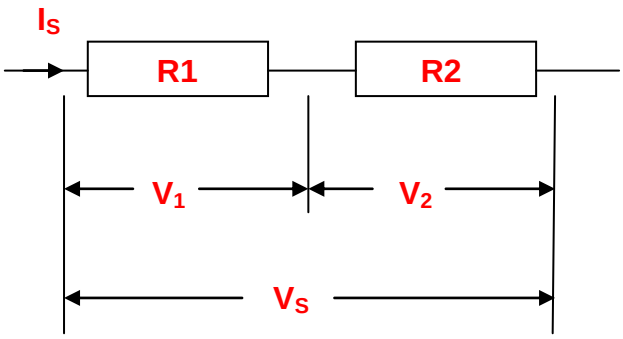
| | |
|---|---|
| **Tutor sign off for workbook completion** | **signature** |

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

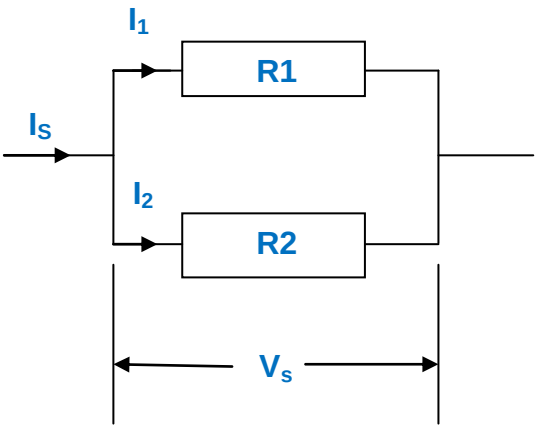
*Applies to either a **whole circuit** or a **part of a circuit** and all three factors must **all** apply to the same components*

## OHMS LAW

### SERIES RESISTIVE




### PARALLEL RESISTIVE

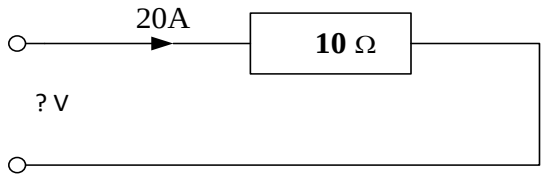



| | | |
|---|---|---|
| **CURRENT CONSTANT** | | $I_S = I_1 + I_2$ *Kirchhoffs current law* |
| $V_S = V_1 + V_2$ *Kirchhoffs voltage law* | | **VOLTAGE CONSTANT** |
| $R_T = R_1 + R_2$ | | $R_T^{-1} = R_1^{-1} + R_2^{-1}$ |

# Ohms Law.
# Work Sheet 1A
# Basic calculations.

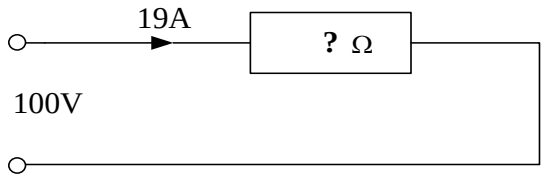
Determine the unknown value(s).
Layout your workings on another page.

**1.**



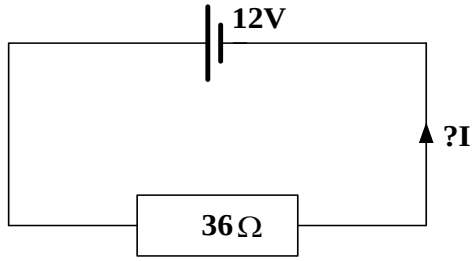

Answer = **Volts**

**2.**



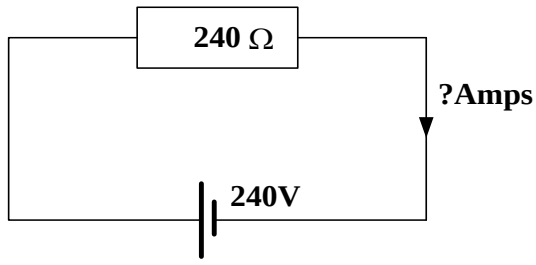

Answer = **Ohms**

**3.**



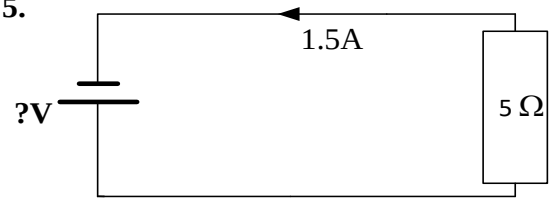

Answer = **Amps**

**4.**

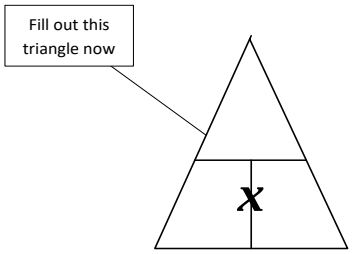



Answer = **Amps**

**5.**




Answer = **Volts**




**6.** Fill in the gaps - use the triangle above to help.

| Volts | Ohms | Amps |
|---|---|---|
| 25 | 10 | |
| 45 | 5 | |
| 1.5 | 1 | |
| | 6 | 12 |
| | 100 | 10 |
| | 7 | 8 |
| 160 | | 2 |
| 60 | | 30 |
| 27 | | 9 |
| | 50 | 4 |
| 18 | | 10 |
| 19 | 37 | |

**7.** A. If the Resistance in a circuit is <u>increased</u> and the Voltage remains constant, Does the Current increase or decrease?

B. If the Voltage to a circuit <u>increases</u> and the Resistance remains constant, does the Current increase or decrease?

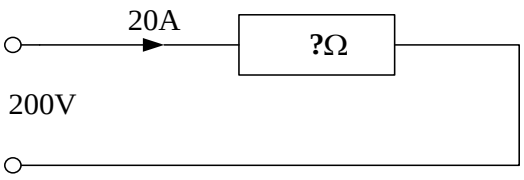
C. If the Resistance to a circuit is <u>doubled</u>, then what has happened to the Voltage?

# Ohms Law.
# Work Sheet 1B
# Basic calculations.

Determine the unknown value(s).

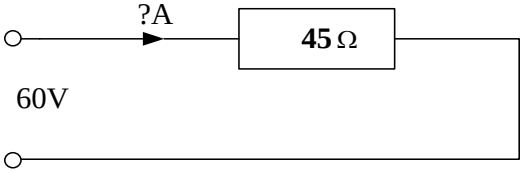
Layout your workings on another page.

**1.**



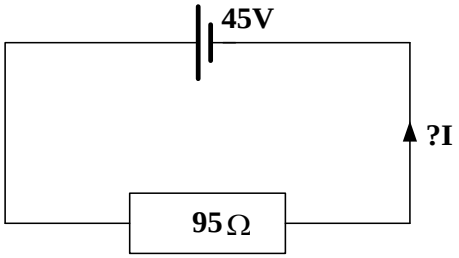

Answer = **Ohms**

**2.**



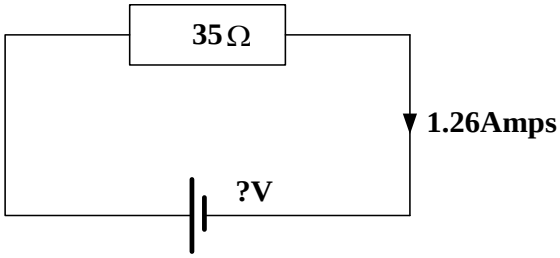

Answer = **Amps**

**3.**



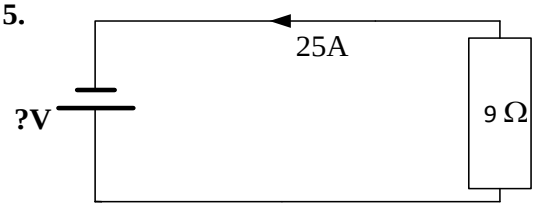

Answer = **Amps**

**4.**

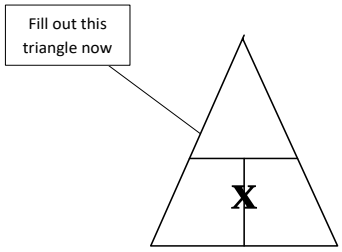



Answer = **Volts**

**5.**

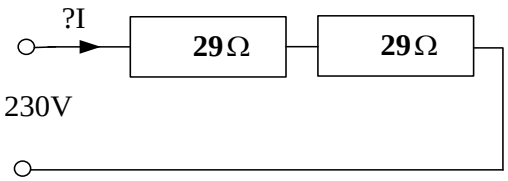



Answer = **Volts**



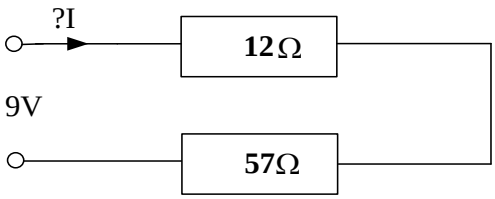

6. Now go and read your notes on series circuits characteristics. Write one of them below:

7.



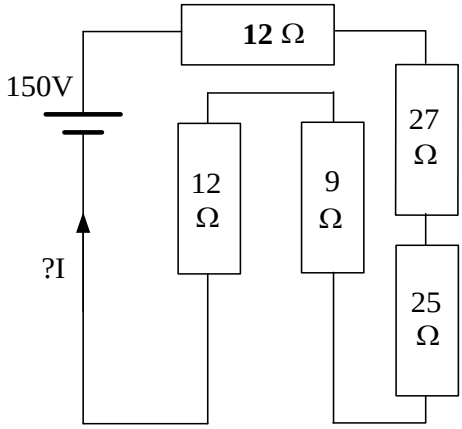

Answer = **Amps**

8.




Answer = **Amps**

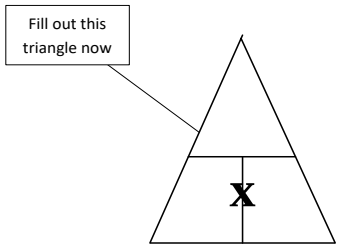
9.




Answer = **Amps**

10. State Ohms Law in words:

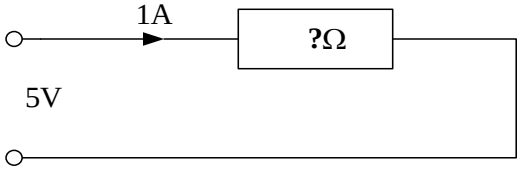
# Ohms Law.
# Work Sheet 1C
# Basic calculations.




Determine the unknown value(s).

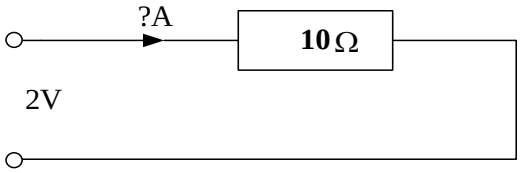
Do all workings on another page

**1.**



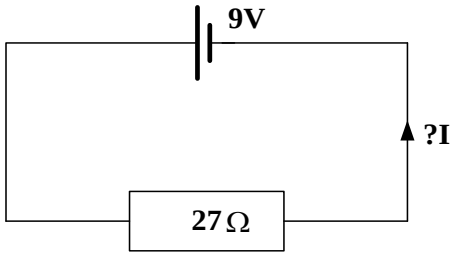

Answer = **Ohms**

**2.**



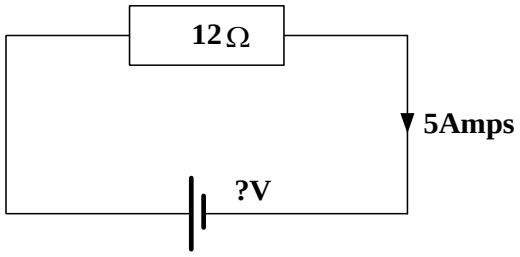

Answer = **Amps**

**3.**



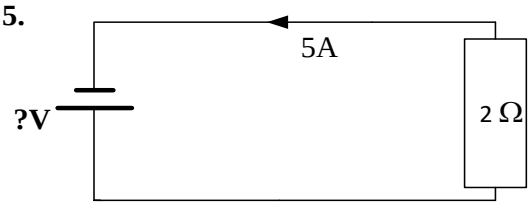

Answer = **Amps**

**4.**




Answer = **Volts**

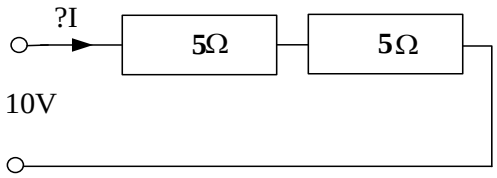
**5.**




Answer = **Volts**

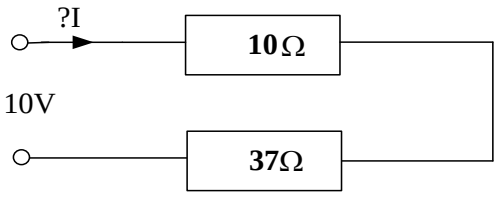
6. Now go and read your notes on series circuits characteristics.

7. To find total resistance, add together each series resistance.



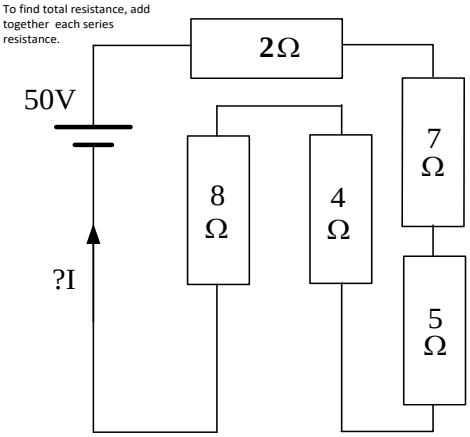

Answer = **Amps**

8. To find total resistance, add together each series resistance.




Answer = **Amps**

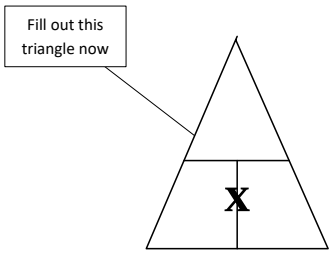
9. To find total resistance, add together each series resistance.




Answer = **Amps**

10. Draw the symbol for a Battery Cell, show polarity. Is the current shown on these drawings Conventional current flow or electron flow?.

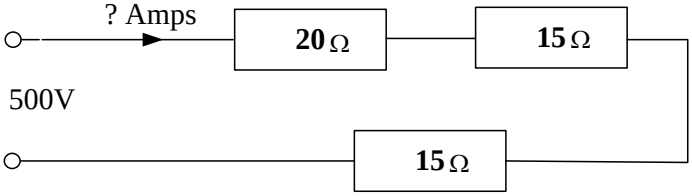
# Ohms Law.
# Work Sheet 2A
# Series calculations.




Determine the unknown value(s).

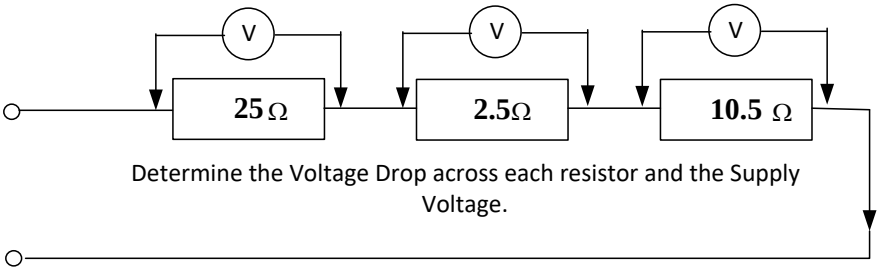
Layout your workings on another page.

**1.**




Answer = **Amps**

**2.**

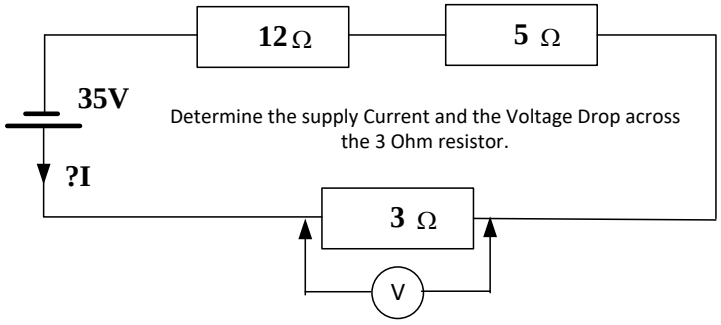



Determine the Voltage Drop across each resistor and the Supply Voltage.

Answers: $V_{25}$ = $V_{2.5}$ = $V_{10.5}$ =

$V_S$ =

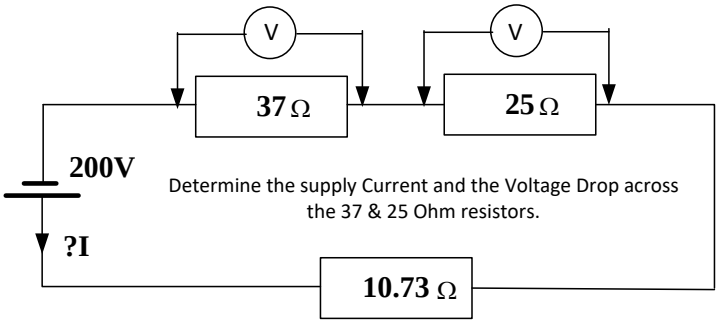
**3.**




Determine the supply Current and the Voltage Drop across the 3 Ohm resistor.

Answers: $I_s$ = $VD_3$ =

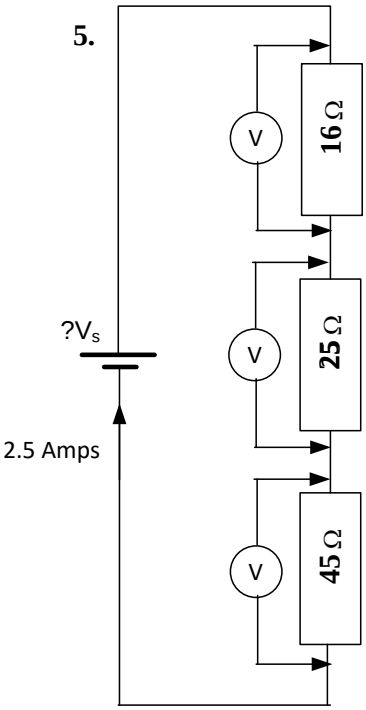
**4.**




Determine the supply Current and the Voltage Drop across the 37 & 25 Ohm resistors.

Answers: $I_s$ = $VD_{37}$ = $VD_{25}$ =

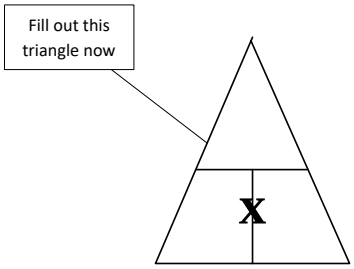
**5.**




$V_S$ = $VD_{25}$ =

$VD_{16}$ = $VD_{45}$ =

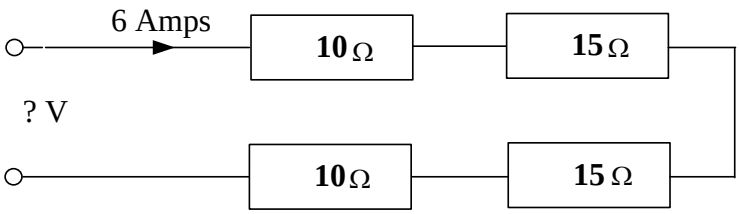
# Ohms Law.
# Work Sheet 2B
# Series calculations.




Determine the unknown value(s).

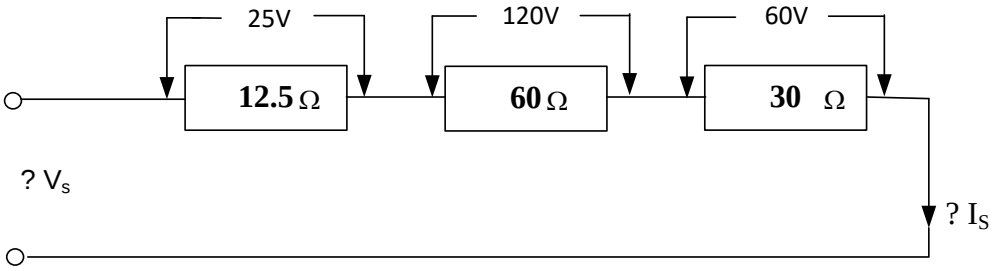
Layout your workings on another page.

**1.**



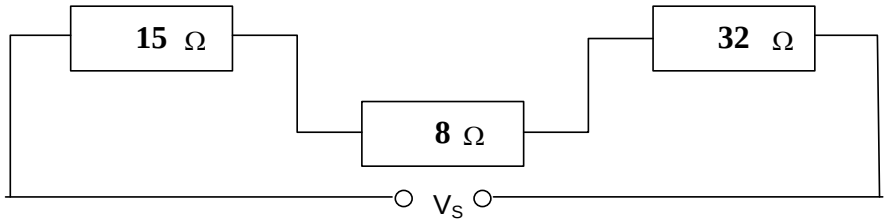

Answer = **Volts**

**2.**




Answers: $V_S$ = Volts $I_S$ = Amps

**3.**




Determine the total current flow if the Supply Voltage ( $V_S$ ) is:

a. 10 Volts

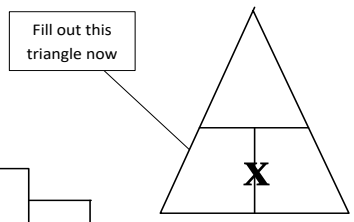
I =

b. 50 Volts. I =

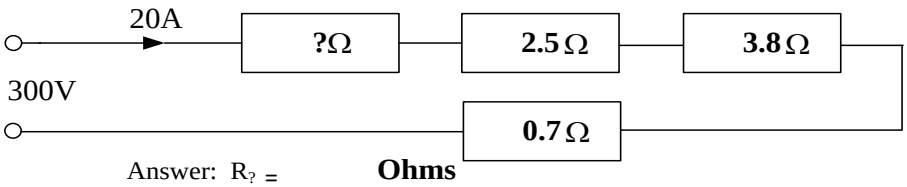
**4.** Four resistors are connected in series. Each resistor has a resistance of 15 Ohms. If the supply Voltage is 100 Volts, what is the current drawn from the supply and what Voltage Drop would be measured across each resistor. Draw the circuit below ( neatly ) and show on it your calculated answers.

Determine the ? value(s).
Layout workings on another sheet

# Ohms Law.
# Work Sheet 3A
# Hard Series calculations.

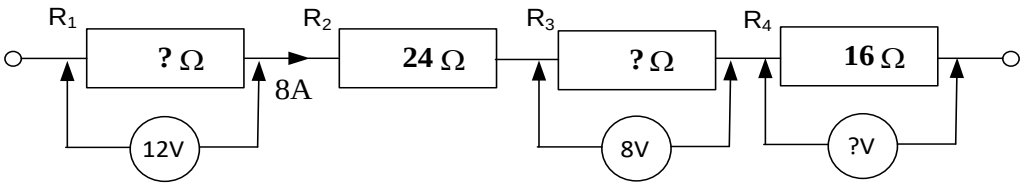



**1.**




Answer: $R_? =$ **Ohms**

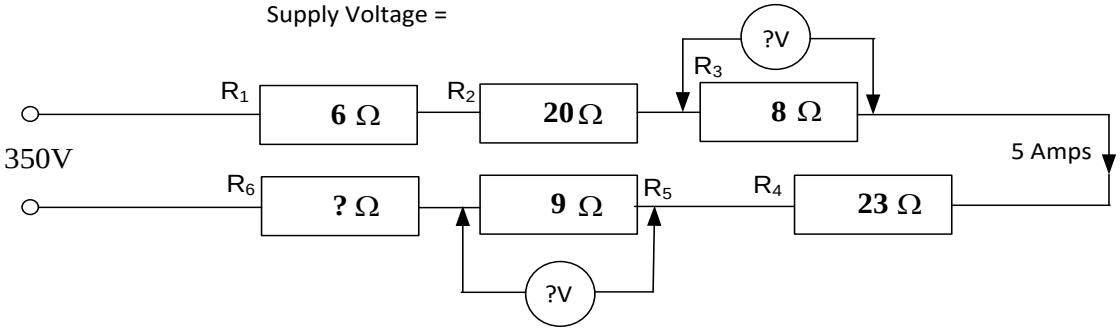
**2.**




Answers: $R_1 =$ $R_3 =$ $V_{R4} =$

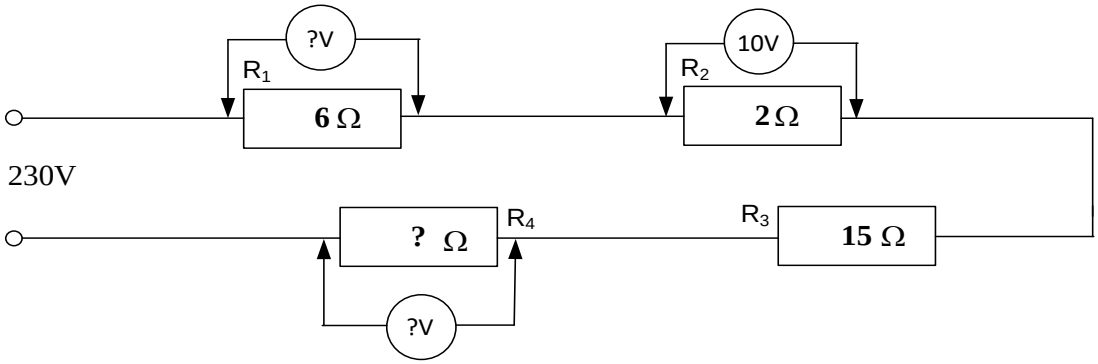
Supply Voltage =

**3.**




Answers: $R_6 =$ $V_{R3} =$ $V_{R5} =$

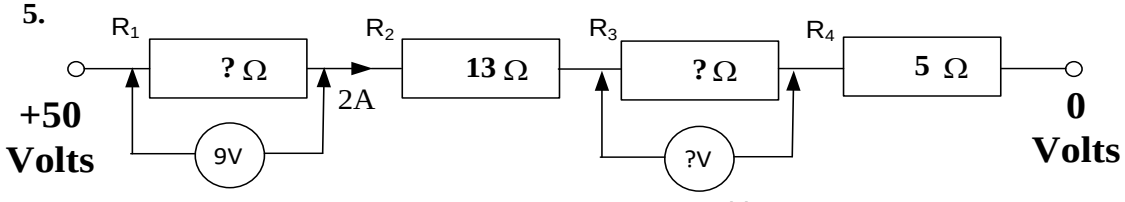
**4.**




Answers: $V_{R1} =$ $V_{R4} =$ $R_4 =$

Total Current =

**5.**

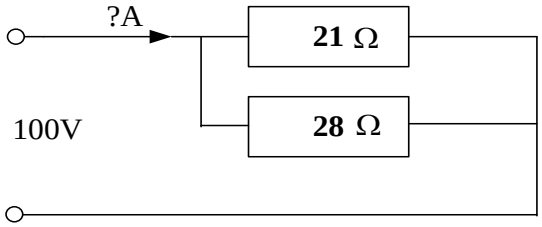



Answers: $R_1 =$ $R_3 =$ $V_{R3} =$

# Ohms Law.
# Work Sheet 5A
# Basic Parallel calculations.

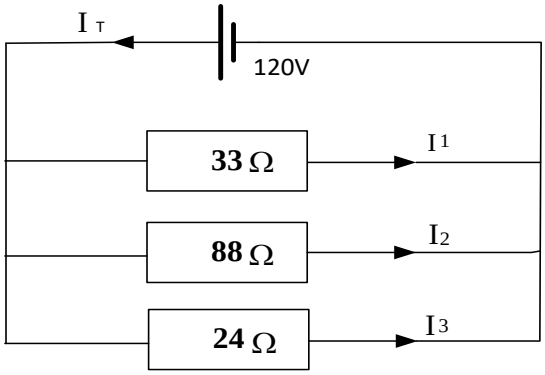
Determine the unknown value(s).
Layout your workings on another page.

**1.**



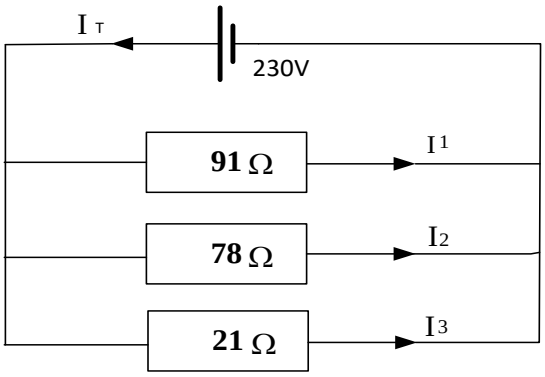

Answer = **Amps**

**2.**

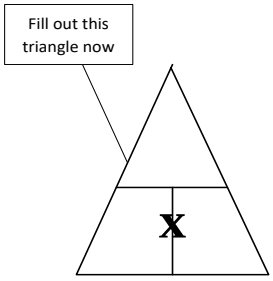



Answers: $I_T$ =
$I_1$ =
$I_2$ =
$I_3$ =

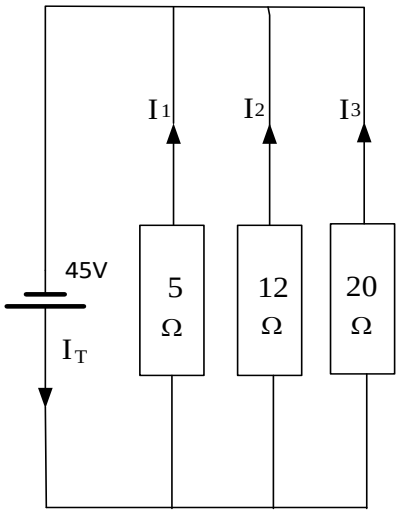
**3.**




Answers: $I_T$ =
$I_1$ =
$I_2$ =
$I_3$ =

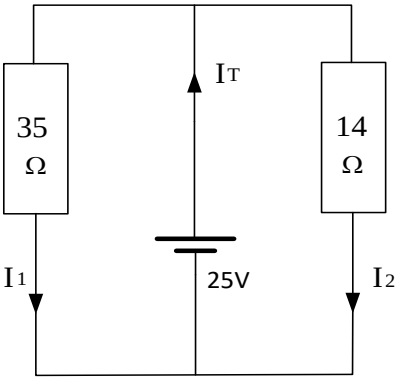



**4.**




Answers: $I_T$ =
$I_1$ =
$I_2$ =
$I_3$ =

**5.**



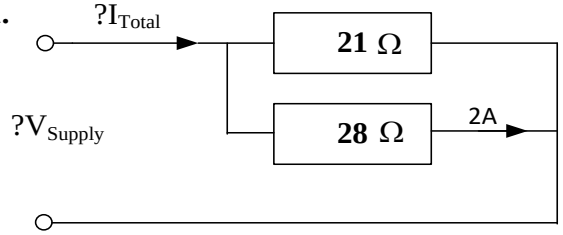

Answers: $I_T$ =
$I_1$ =
$I_2$ =

# Ohms Law.
# Work Sheet 6A
# Harder Parallel calculations.

Determine the unknown value(s).

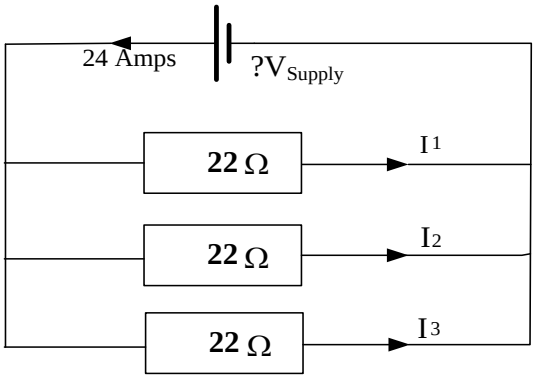
Layout your workings on another page.

**1.**




Answers : $I_{Total}$ = Amps. $V_{Supply}$ = Volts

**2.**



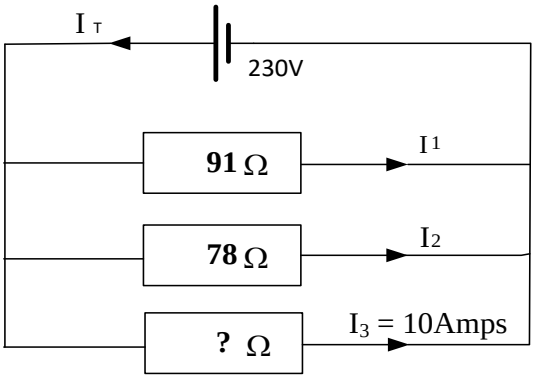

Answers: $I_1$ =

$I_2$ =

$I_3$ =

$V_{Supply}$ =

**3.**



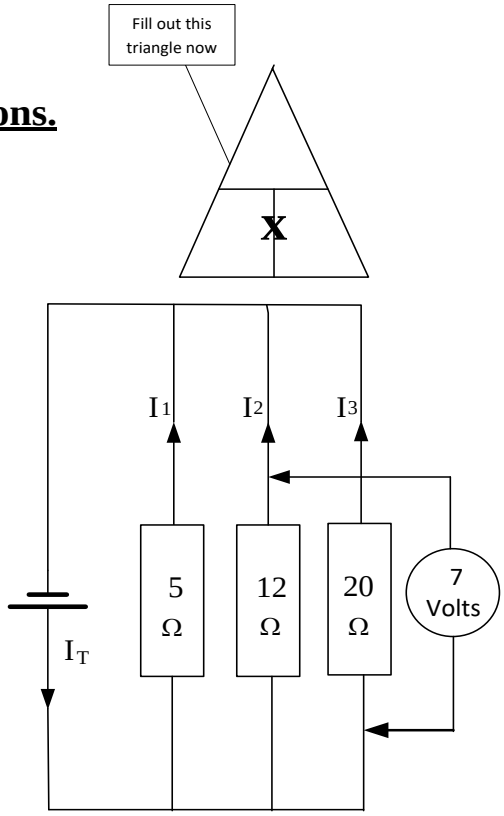

Answers: $I_T$ = Amps

$I_1$ = Amps

$I_2$ = Amps

$R_3$ = Ohms

**4.**




Answers: $I_1$ =

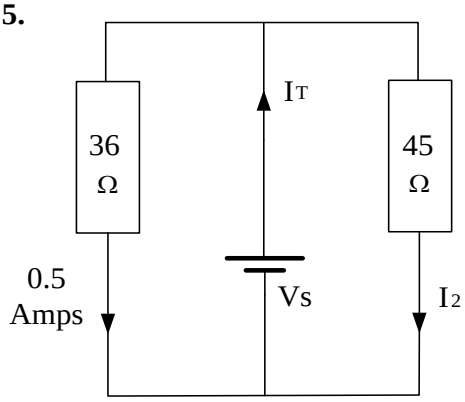
$I_2$ =

$I_3$ =

$I_T$ =

$R_T$ =

**5.**




Answers: $I_2$ =

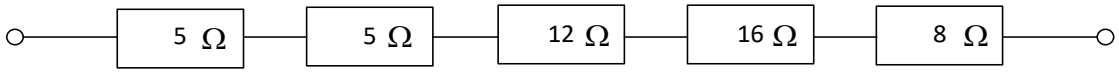
$I_T$ =

Vs =

Find the total resistance for each network.

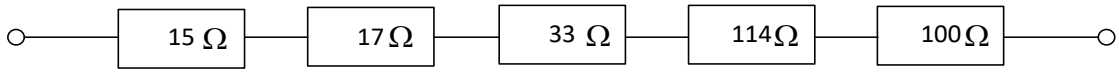
# Work Sheet 10A
# Total Resistance Network

**1.**



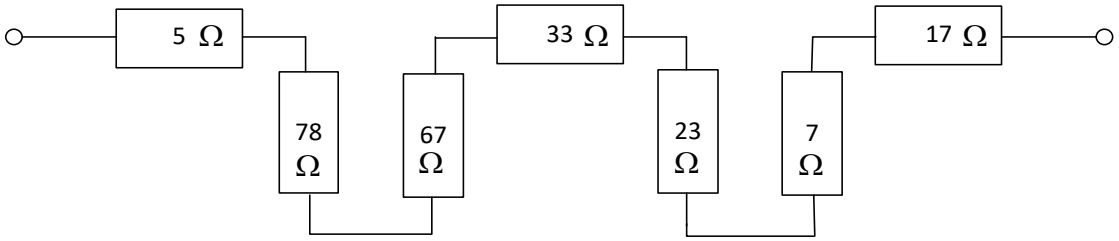

Answer = Ohms

**2.**



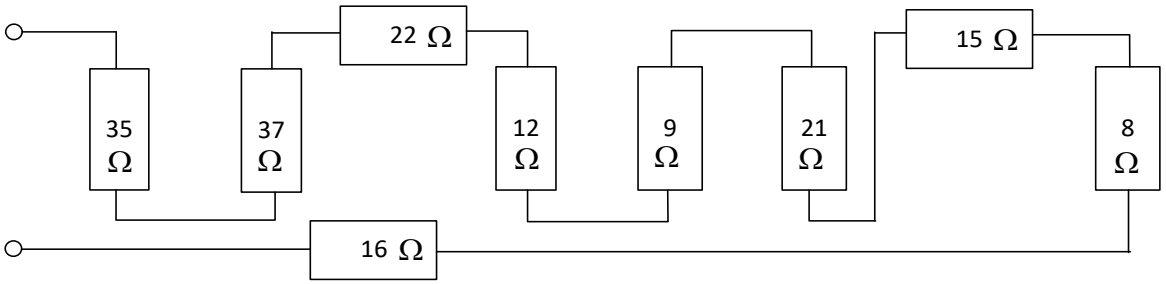

Answer = Ohms

**3.**



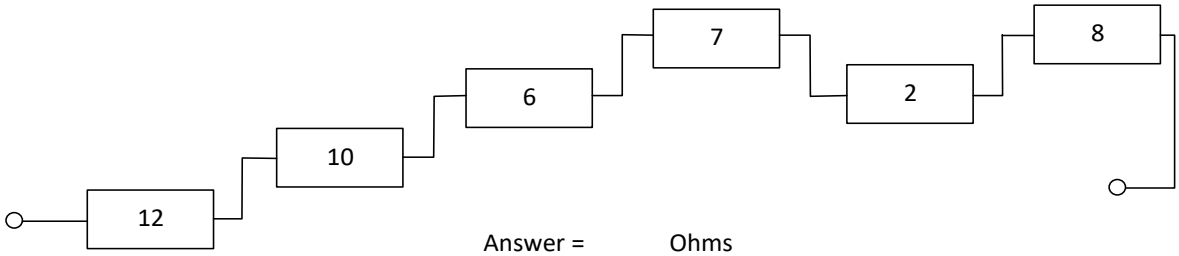

Answer = Ohms

**4.**




Answer = Ohms

**5.**




Answer = Ohms

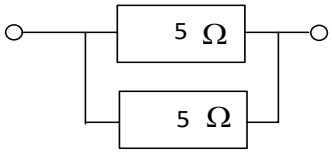
**6.** Six 15 Ohm, three 10 Ohm and two 8 Ohm resistors are connected in series in a random order. Draw the circuit and calculate the total resistance.

Answer = Ohms

Find the total resistance for each network.

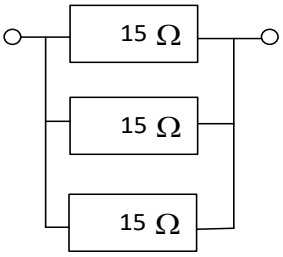
# Work Sheet 10B
# Total Resistance Network

**1.**



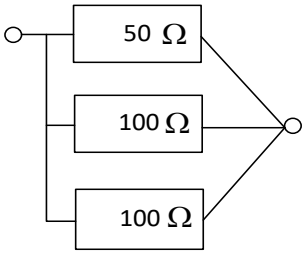

Answer = Ohms

**2.**



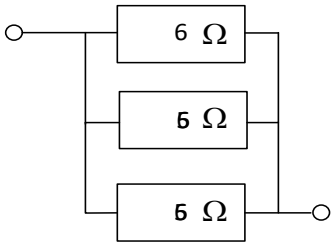

Answer = Ohms

**3.**



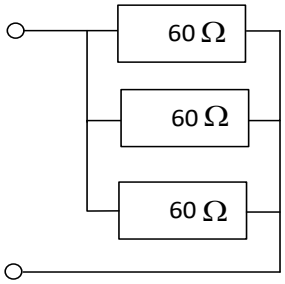

Answer = Ohms

**4.**



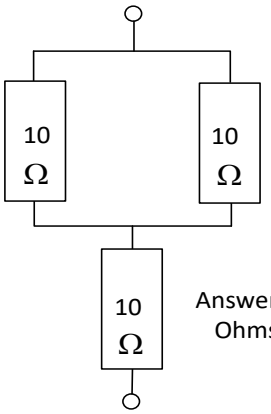

Answer = Ohms

**5.**



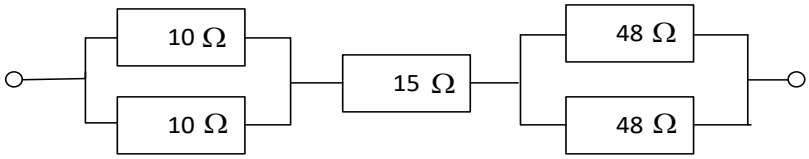

Answer = Ohms

**6.**



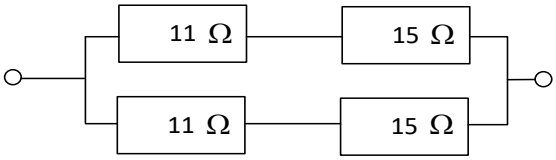

Answer = Ohms

**7.**



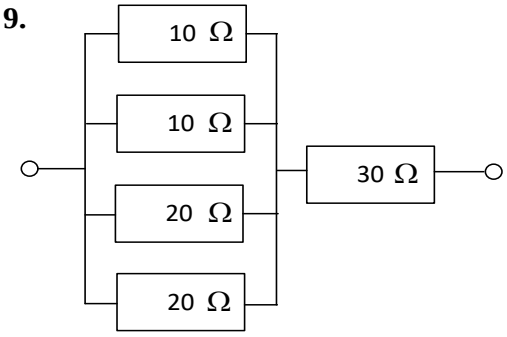

Answer = Ohms

**8.**




Answer = Ohms

**9.**

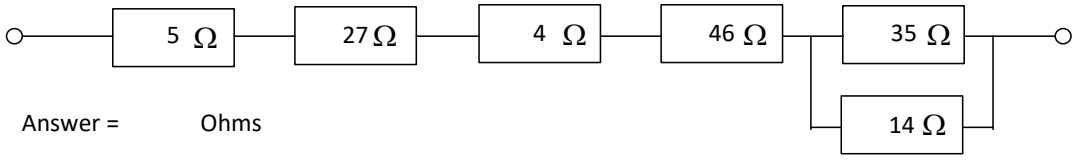



Answer = Ohms

Find the total resistance for each network.

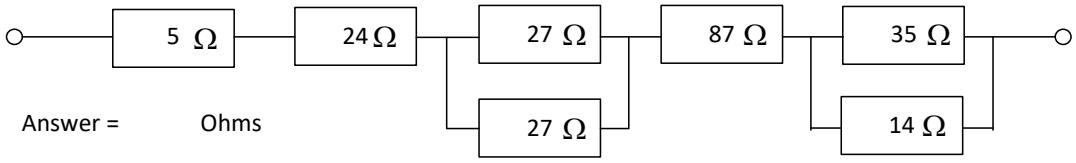
# Work Sheet 10C
# Total Resistance Network Calcs

**1.**



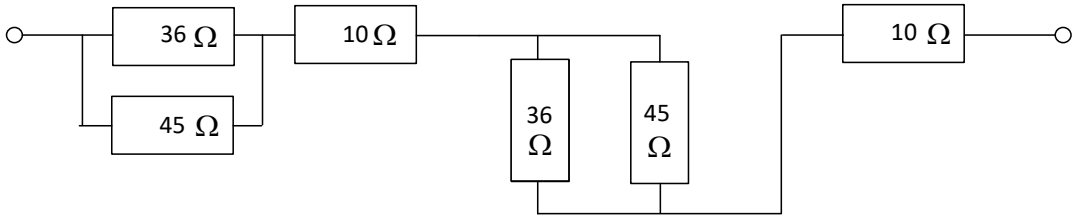

Answer = Ohms

**2.**



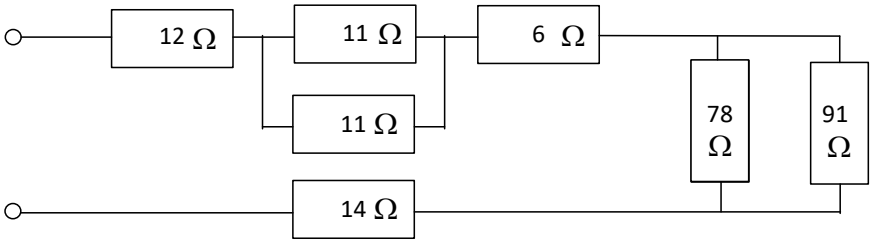

Answer = Ohms

**3.**



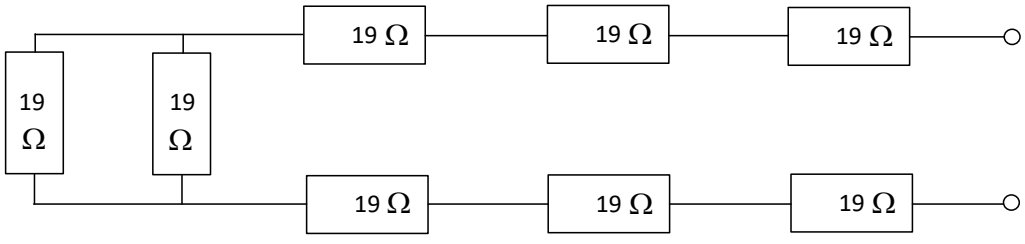

Answer = Ohms

**4.**




Answer = Ohms

**5.**




Answer = Ohms

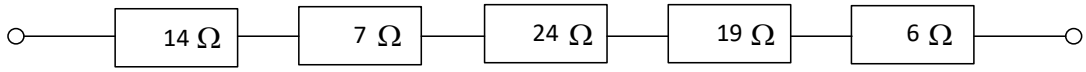
**6.** Three 27 Ohm resistors are connected in series and then two 5 Ohm resistors in parallel are also connected in series. Draw the circuit and find the total resistance in ohms.

Answer = Ohms

Find the total resistance for each network.

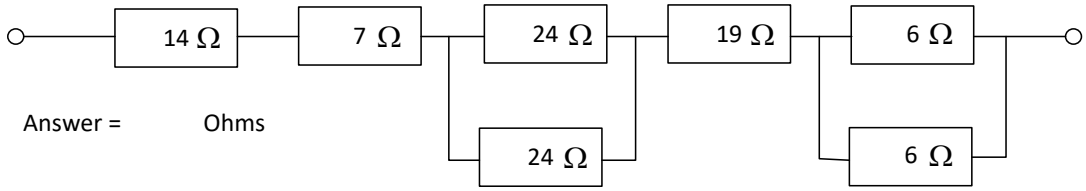
# Work Sheet 10D
# Total Resistance Network Calcs

**1.**



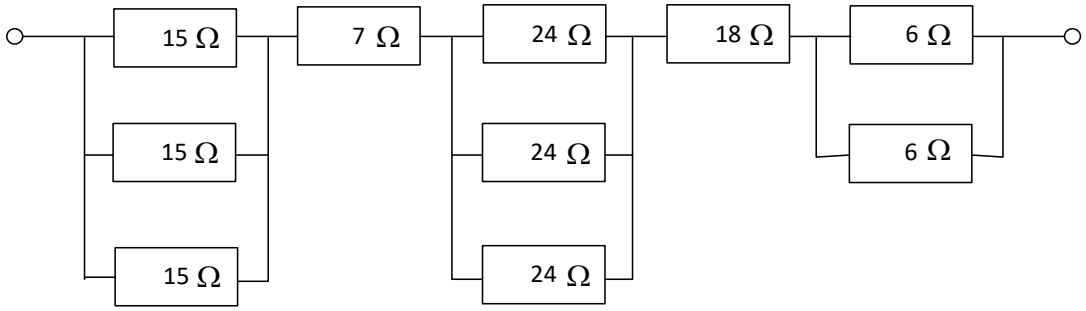

Answer = Ohms

**2.**



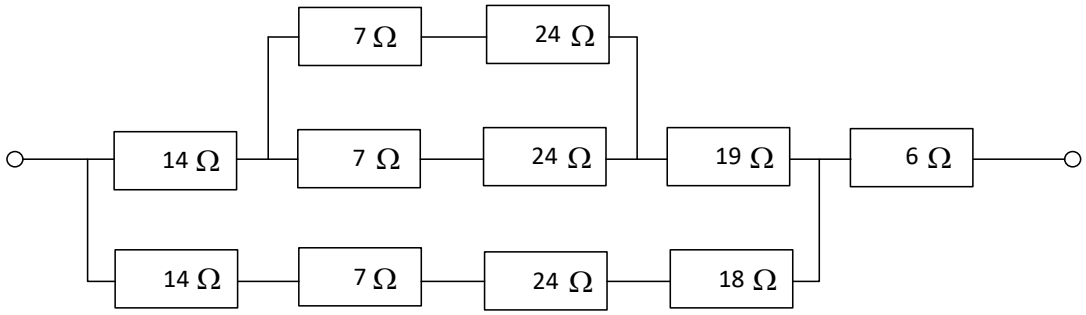

Answer = Ohms

**3.**



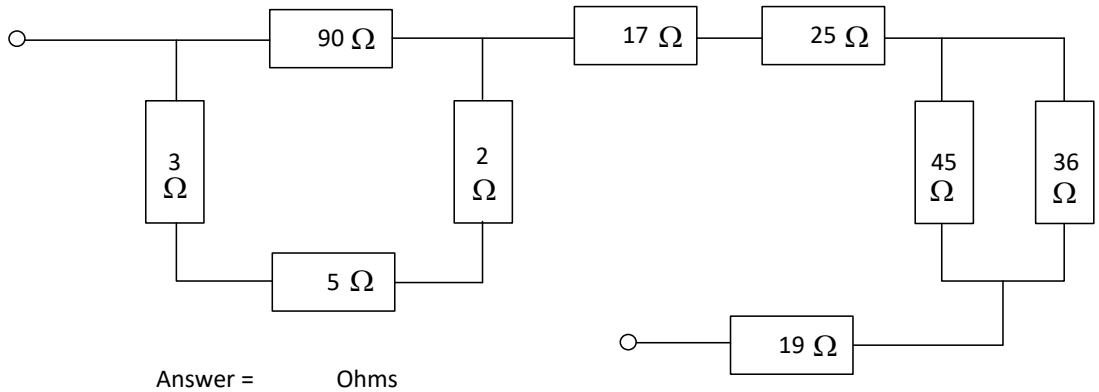

Answer = Ohms

**4.**




Answer = Ohms

**5.**



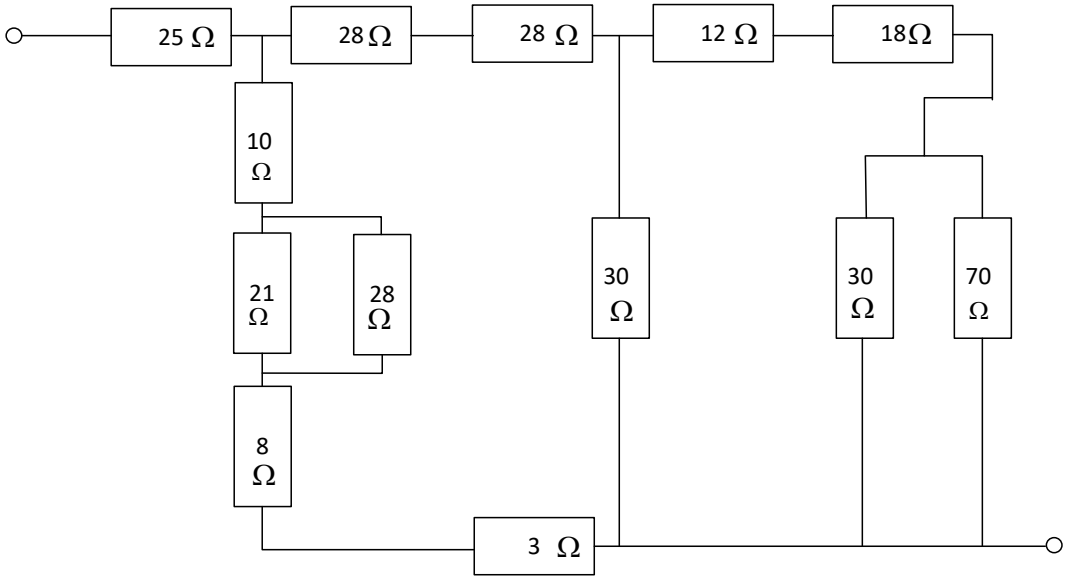

Answer = Ohms

Find the total resistance for each network.

# Work Sheet 11A

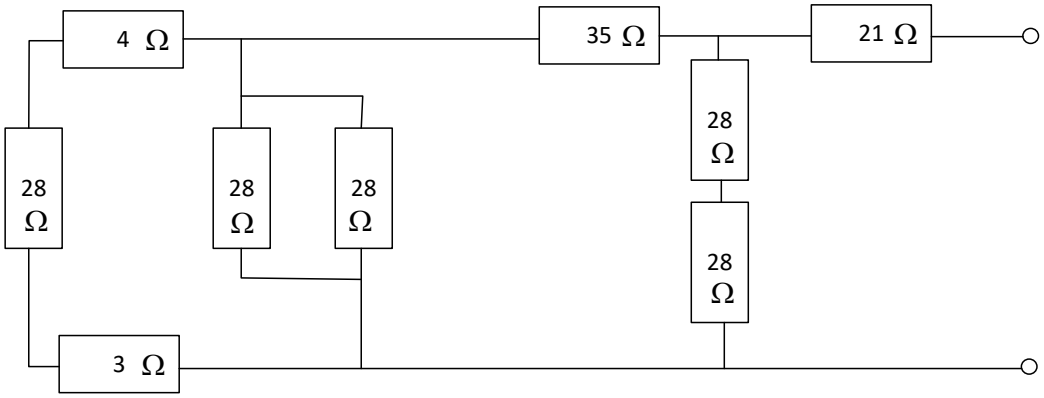
## Total Resistance Network Calcs - Harder

**1.**



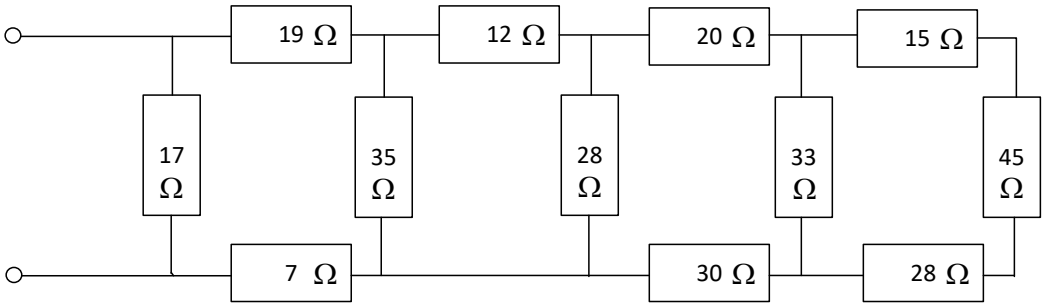

Answer = Ohms

**2.**




Answer = Ohms

**3.**



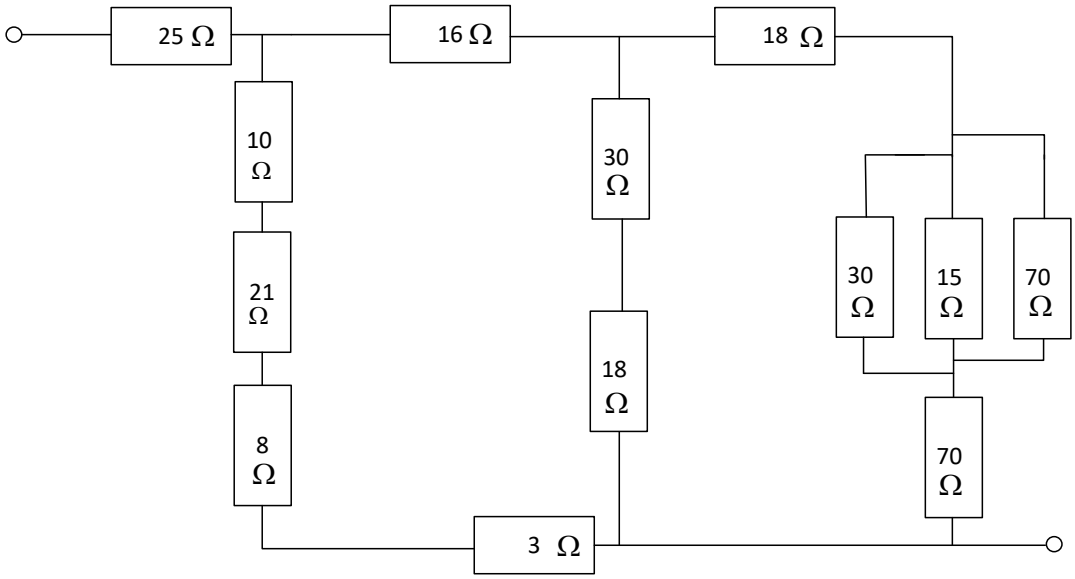

Answer = Ohms

Find the total resistance for each network.

# Work Sheet 11B

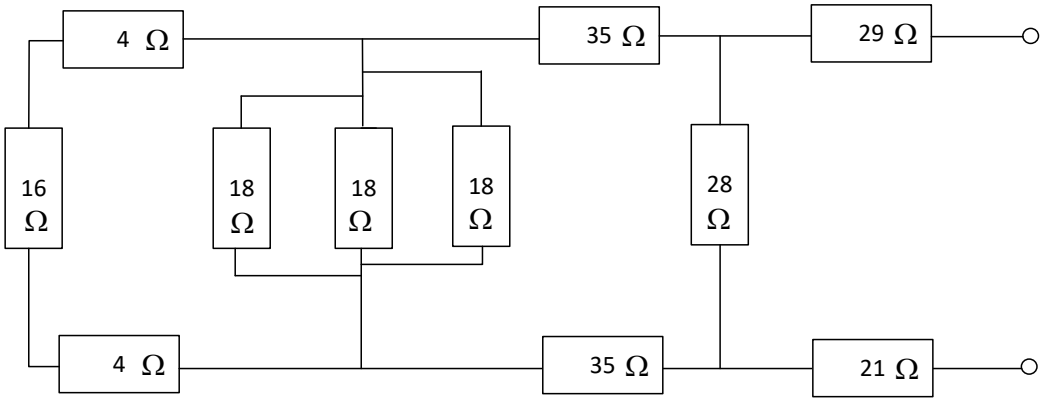
## Total Resistance Network Calcs - Harder

**1.**



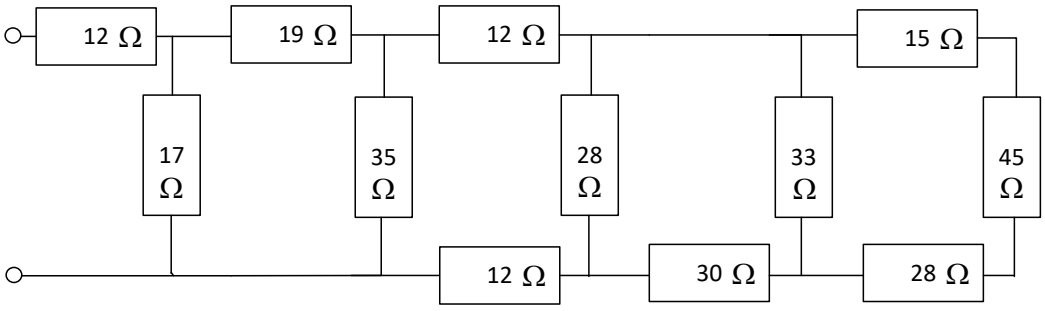

Answer = Ohms

**2.**



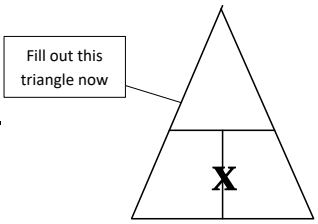

Answer = Ohms

**3.**



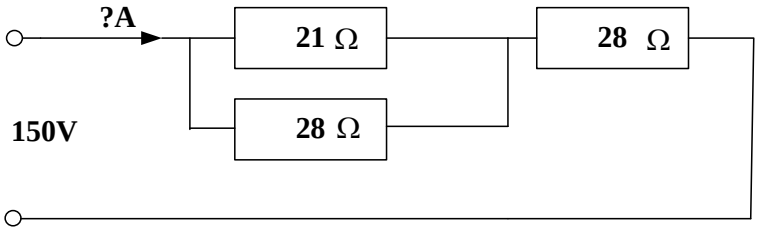

Answer = Ohms

# Ohms Law.
# Work Sheet 15A
# Basic Series-Parallel calculations.



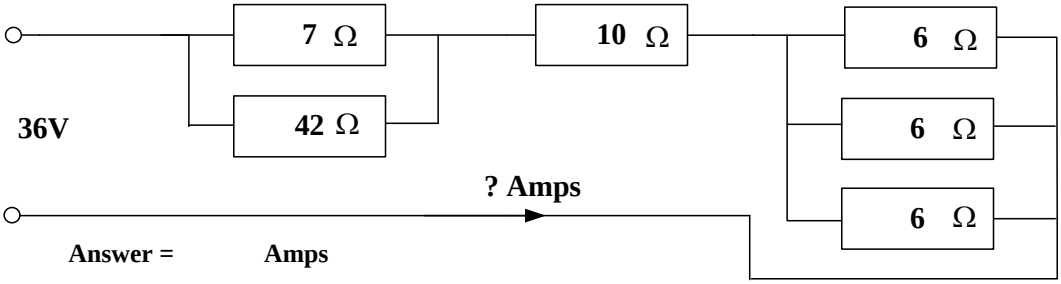

Determine the unknown value(s).
Layout your workings on another page.

**1.**



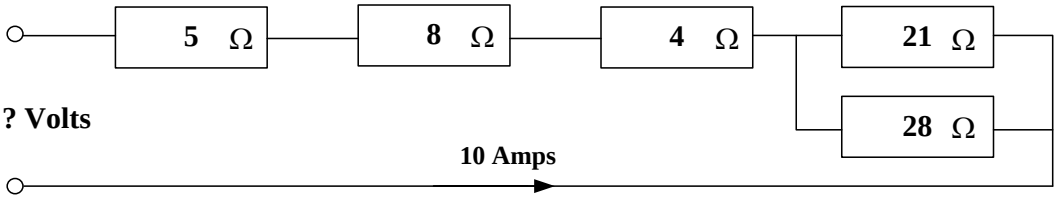

**Answer = Amps**

**2.**



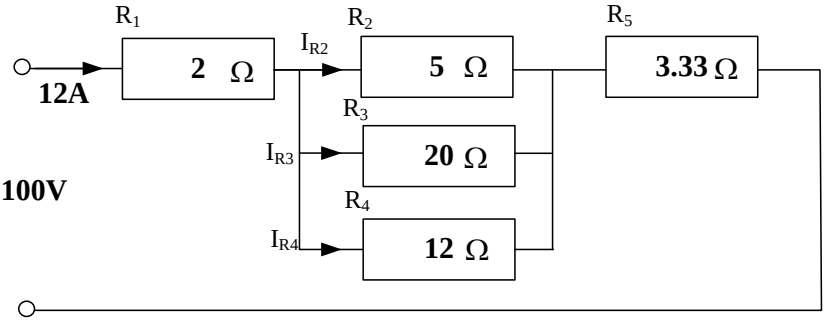

**Answer = Amps**

**3.**




**Answer = Volts**

**4.**



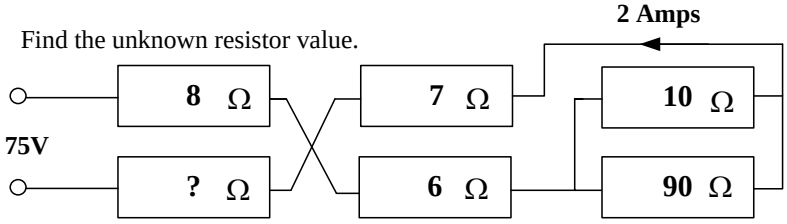

**Answers:**

**$I_{R2}$ = Amps**

**$I_{R3}$ = Amps**

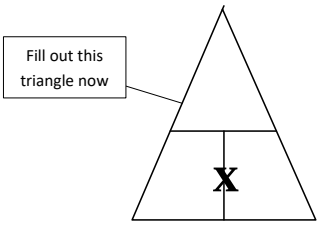
**$I_{R4}$ = Amps**

**5.** Find the unknown resistor value.



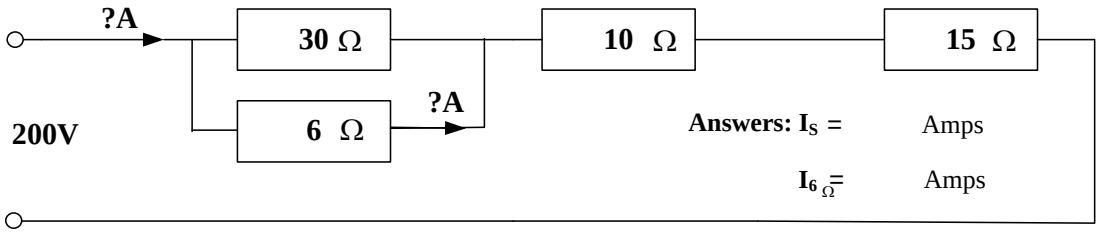

**Answer = Ohms**

# Ohms Law.
# Work Sheet 15B
# Basic Series-Parallel calculations.




Determine the unknown value(s).
Layout your workings on another page.

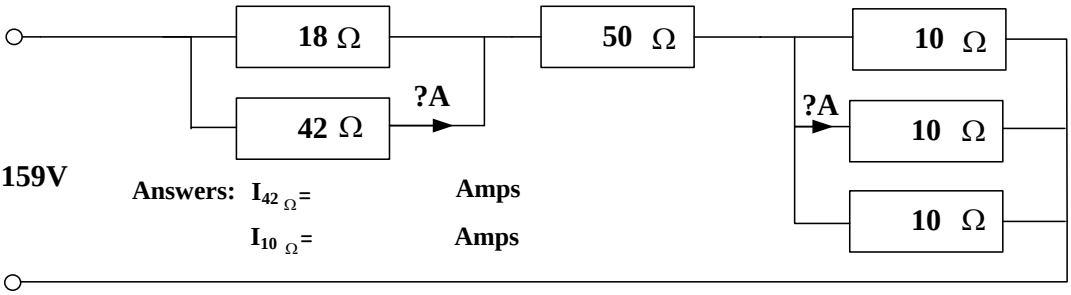
**1.**




**Answers: $I_S$ =** Amps

**$I_{6\,\Omega}$ =** Amps

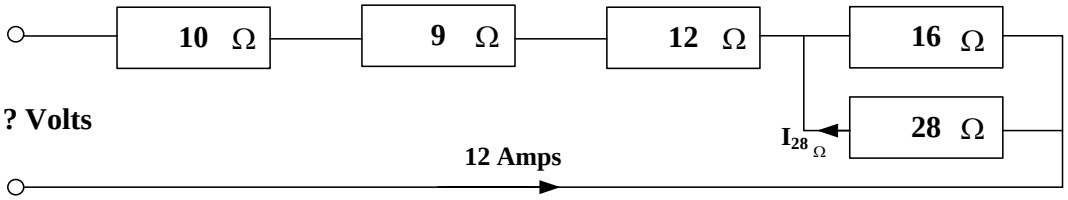
**2.**




**Answers: $I_{42\,\Omega}$ =** **Amps**

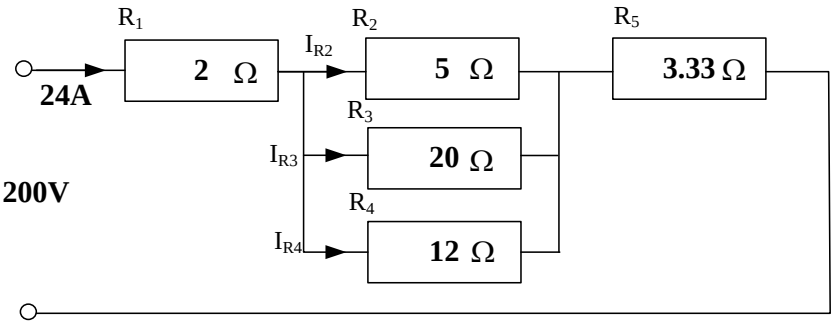
**$I_{10\,\Omega}$ =** **Amps**

**3.**




**Answers: Supply Voltage =** **Volts,** **$I_{28\,\Omega}$ =** **Amps**

**4.**



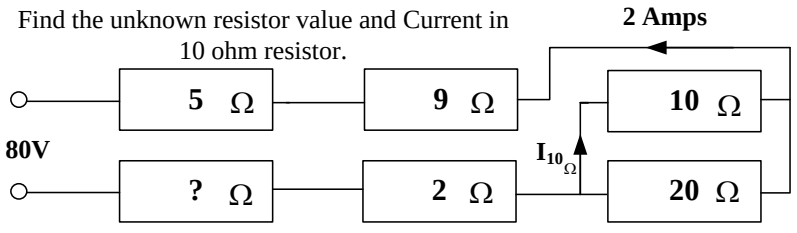

**Answers:**

**$I_{R2}$ =** **Amps**

**$I_{R3}$ =** **Amps**

**$I_{R4}$ =** **Amps**

**5.** Find the unknown resistor value and Current in 10 ohm resistor.




**Answers: $R_{?\,\Omega}$ =** **Ohms**

**$I_{10\,\Omega}$ =** **Amps**

# Work Sheet 8 A.
# Series and Parallel problems - Words.

For each problem DRAW the circuit, put the information from the question onto the drawing and then solve using
- guess who's law.

**1.** Three resistors are connected in parallel and then this combination is connected in series with a 10 Ohm resistor. When 500 Volts is applied to the circuit, 25 Amps flows in the 10 Ohm series resistor. If 2 of the parallel resistors are 28 Ohms each then what is the value of the unknown resistor, and what is the current through it and the voltage drop across it ?

**2.** A heating element is in two sections, each of 45 Ohms. Find the current drawn from the supply ( 230V ) when the sections are connected in a) series and b) parallel ?

**3.** Two cables having resistances of 0.5 Ohms and 0.8 Ohms carry between them a current of 30 Amps. What is the current in each cable and the Voltage Drop that occurs when the current is flowing ?

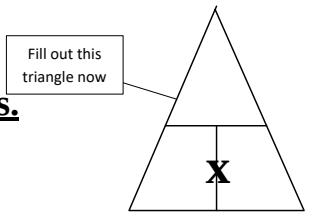
**4.** A cable carries a current of 45 Amps and when that happens a voltage drop of 21 Volts occurs. What would be the resistance value of a cable connected in parallel with the first to reduce the voltage drop to 5% of 230 Volts.

**5.** The specification for a wire to be used in a wire wound resistor says that its resistance is 0.6 Ohms per meter. How many meters would be required to give :
a) A resistance of 3.7 Ohms, and
b) 0.2 Ohms, given that the wire must be at least a meter long to reach from one end of the resistor to the other ?

**6.** A circuit consists of three resistors initially connected in series and then in parallel. What in general terms occurs to the following, given the changes listed.

| | Series | Parallel |
|---|---|---|
| Supply current: if Voltage is doubled ? | | |
| Total resistance: if one resistor is removed ? | | |
| Supply voltage : if the current has halved ? | | |
| Total current: if an extra resistor is added ? | | |
| Voltage drop across each resistor: if an extra resistor is added ? | | |

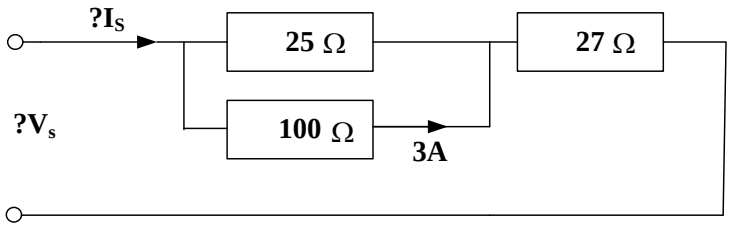
# Ohms Law.
# Work Sheet 16A
# Harder Series-Parallel calculations.




Determine the unknown value(s).

Layout your workings on another page.

**1.**

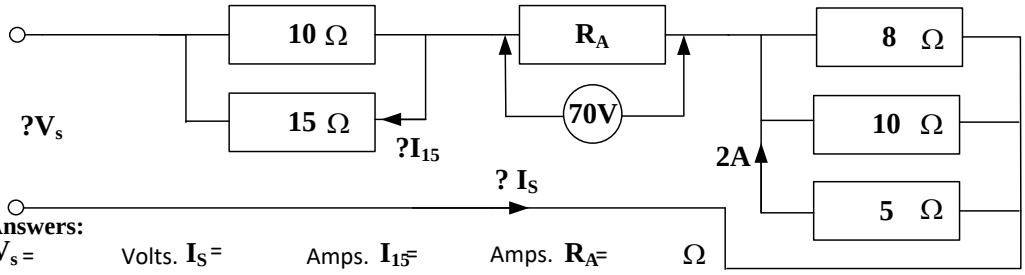



**Answers:**

$I_S$ = Amps

$V_s$ = Volts

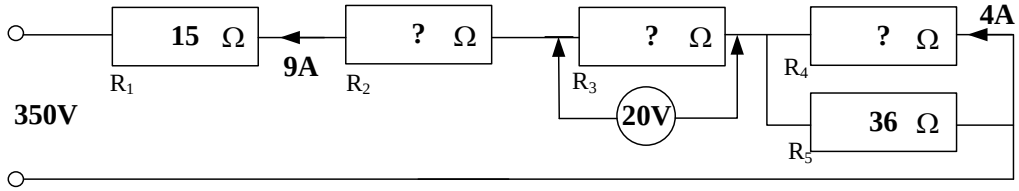
**2.**




**Answers:**

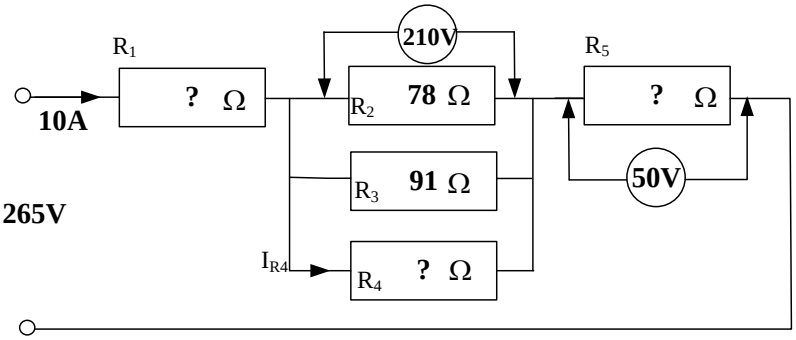
$V_s$ = Volts. $I_S$ = Amps. $I_{15}$ = Amps. $R_A$ = Ω

**3.**




**Answers:** $R_2$ = Ω $R_3$ = Ω $R_4$ = Ω

**4.**




**Answers:**

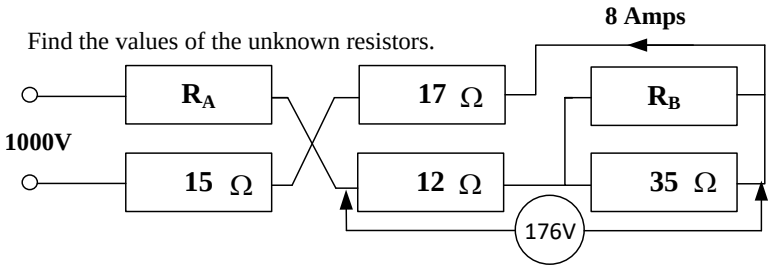
$R_1$ = Ω

$R_4$ = Ω

$R_5$ = Ω

$I_{R4}$ = Amps

**5.** Find the values of the unknown resistors.




**Answers:**

$R_A$ = Ω

$R_B$ = Ω

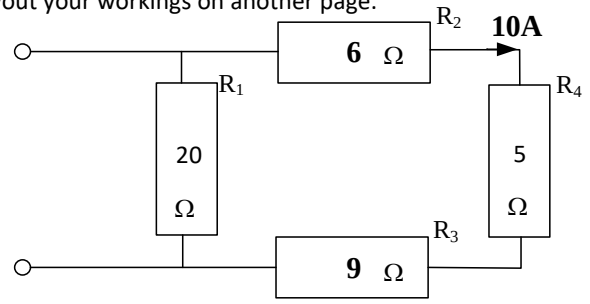
$I_{R_B}$ = Amps

# Ohms Law.
# Work Sheet 16C
# Harder Series-Parallel calculations.

Determine the unknown value(s).

Layout your workings on another page.

**1.**

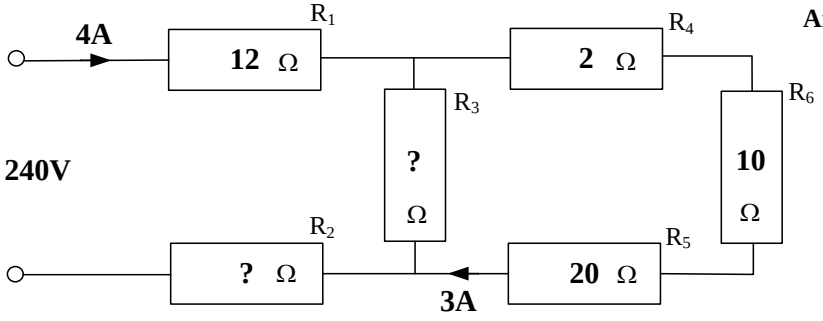



**Answers:**

$V_s$ = Volts

$I_{R1}$ = Amps

**2.**



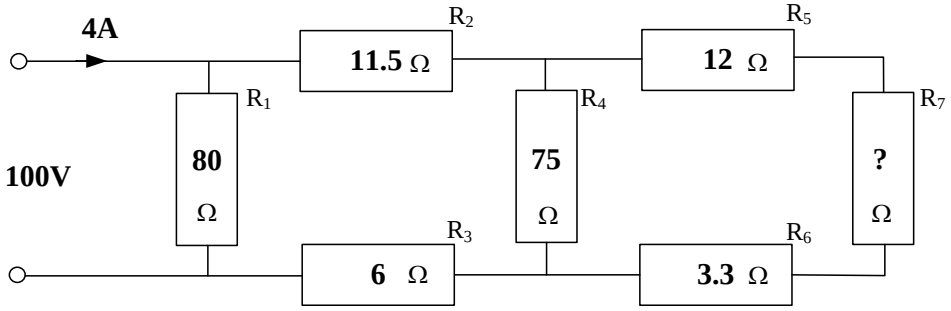

**Answers:**

$I_{R3}$ = Amps

$R_3$ = Ohms

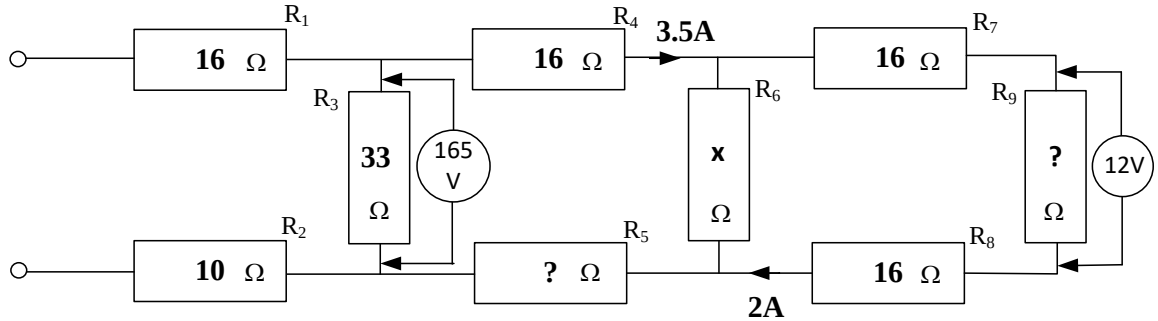
$R_2$ = Ohms

**3.**




$R_7$ = Ohms

**4.**

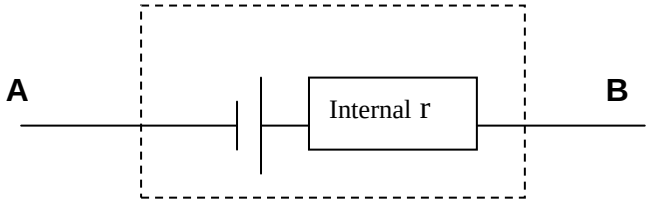



**Find: $V_S$= Volts, $R_T$ = Ohms, $R_9$ = Ohms.**

# Internal resistance
# 25070E6

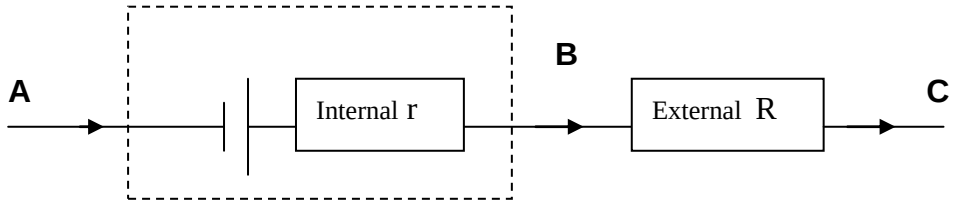
Every source of EMF, whether a cell/battery, power supply, generator or transformer has an internal resistance.

This internal resistance has an effect on the final voltage available to do any work.
As current is drawn, by ohms law, the voltage is reduced at the supply terminals.
This can be illustrated by diagram below.




When the power supply is measured with no load attached we see an EMF available.
This is measured across AB. No current is flowing and there is no volt drop across the internal resistance.

When we connect a load, as shown below, a current is drawn. By ohms law a voltage will drop across the internal resistance and across the external load resistance.
Some of the original EMF is "used up" inside the supply leaving less available for the external circuit.




By Kirchhoffs voltage law we see that; $V_{EMF} = V_{internal\ r} + V_{external\ load}$

For example:

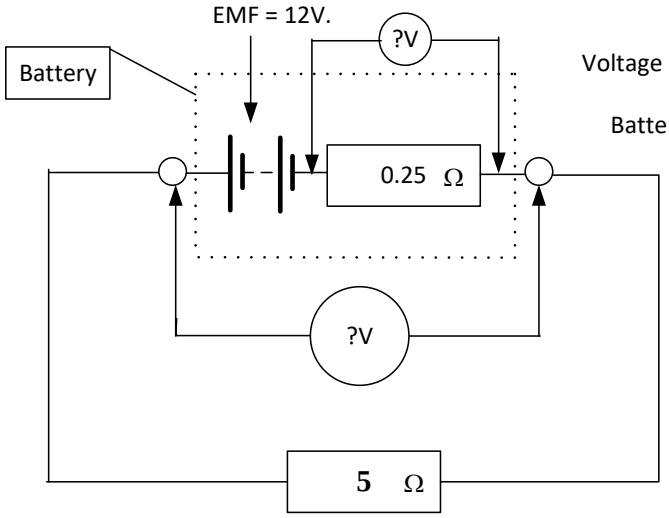
2.3v is measured across the terminals of a lead acid cell with no load connected. The internal r is 0.1Ω. When 3A flows what is the voltage available at the cells terminals

Voltage at the terminal = EMF — Voltage internal
Voltage internal = Supply current X internal resistance ( V = I x R )
Therefore terminal voltage = 2.3v — ( 3A x 0.1Ω )
= 2.0v
This shows that 0.3v is dropped or lost inside the cell under this load.

# Work Sheet 9A
# Internal Resistance of a power supply - e.g. Battery.

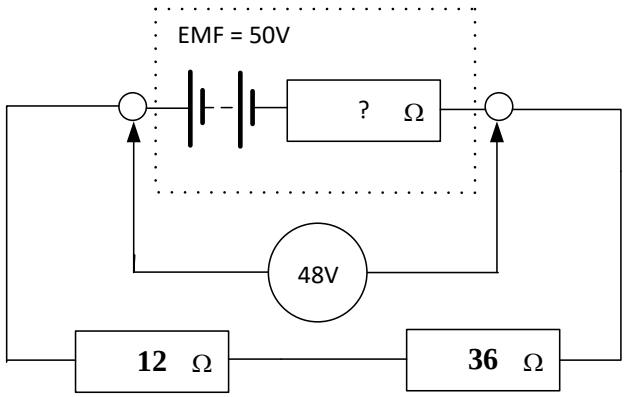
The internal resistance is represented by a series resistor within the source.

**1.** A battery has an EMF of 12 V and an internal resistance of 0.25 Ohms. Find the drop in voltage across the battery output terminals when a load of 5 Ohms is applied and the battery output Voltage?.




Answers:
Voltage Drop across internal resistance. = Volts.
Battery output Voltage. = Volts.

**2.** Determine the value of the internal resistance?.



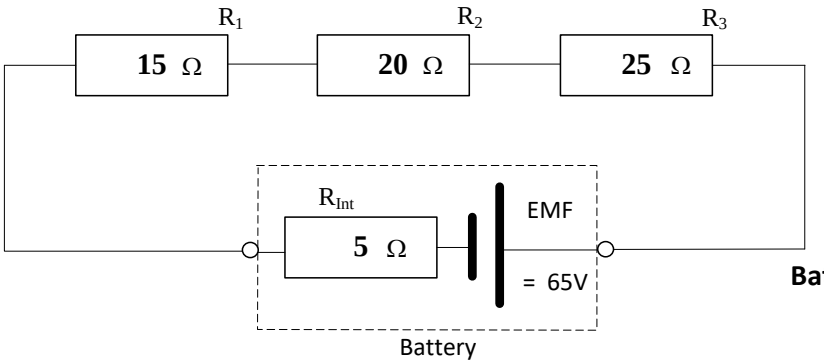

Answer = Ω

**3.** Ten 1.5V cells are connected in series. Each cell has an internal resistance of 0.15 Ohms. What would be the Voltage across a 6 Ohm load resistor placed across the complete battery?. ( Hint - Draw the circuit here )

Answer = Volts.

# Ohms Law.
# Work Sheet 16D
# Harder Series-Parallel calculations.

**1.**




**Answers:**

$V_{R1}$ = Volts

$V_{R2}$ = Volts

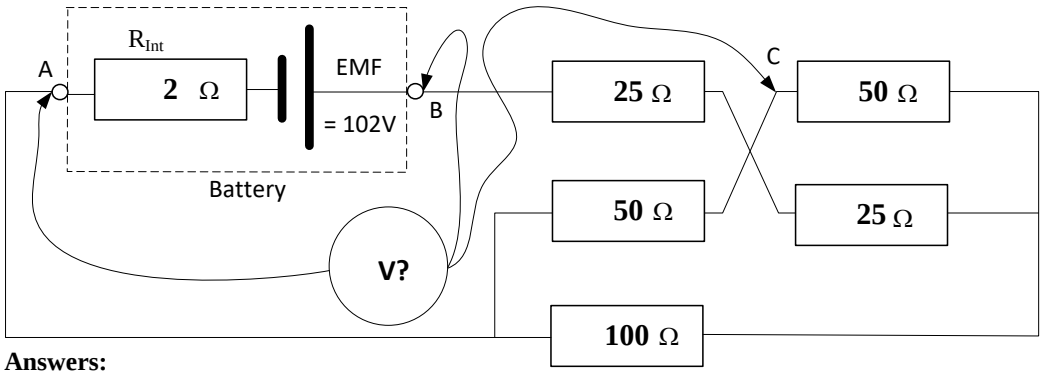
$V_{R3}$ = Volts

$V_{Int}$ = Volts

**Battery output Voltage**

= Volts

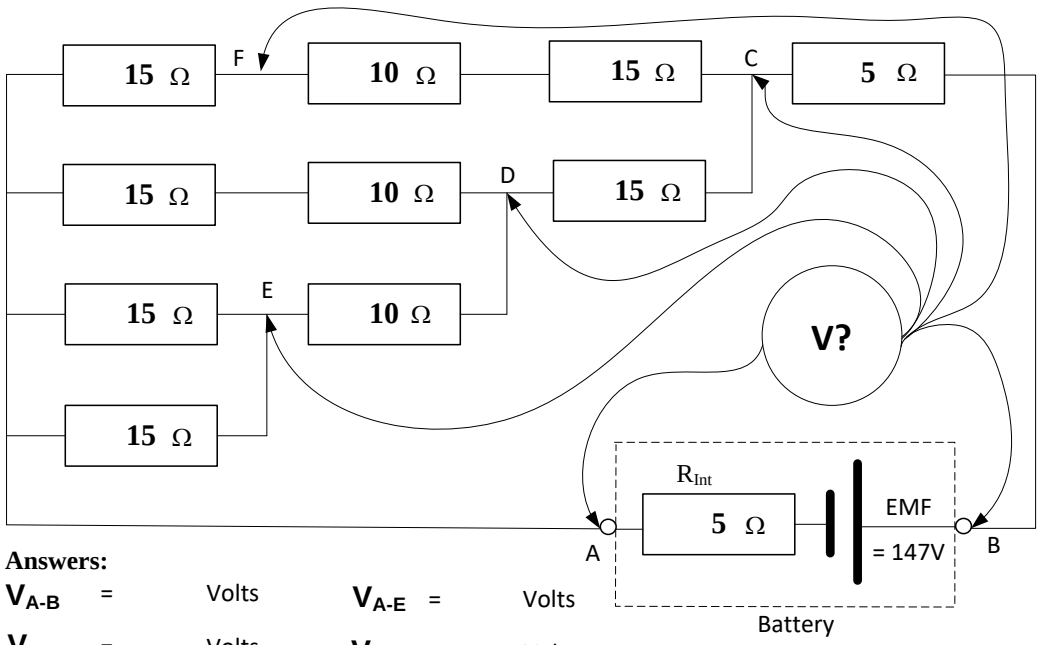
**2.**




**Answers:**

$V_{A-B}$ = Volts $V_{A-C}$ = Volts

**3.**




**Answers:**

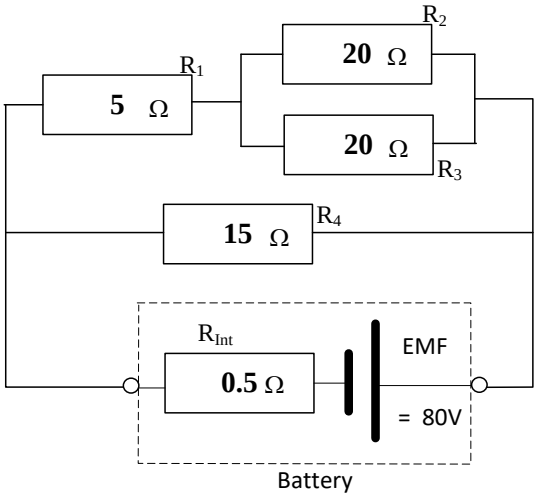
$V_{A-B}$ = Volts $V_{A-E}$ = Volts

$V_{A-C}$ = Volts $V_{A-F}$ = Volts

$V_{A-D}$ = Volts

# Ohms Law.
# Work Sheet 16E
# Harder Series-Parallel calculations.

**1.**




**Find:**

$V_{R1}$ = Volts

$V_{R2}$ = Volts

$I_{R3}$ = Amps

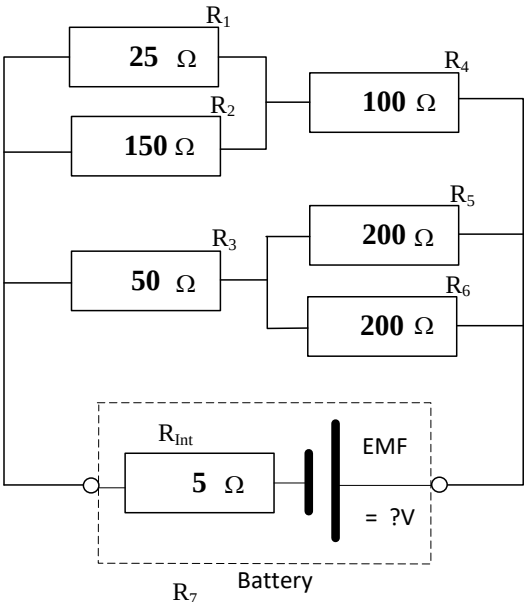
**Battery output Voltage**

= Volts

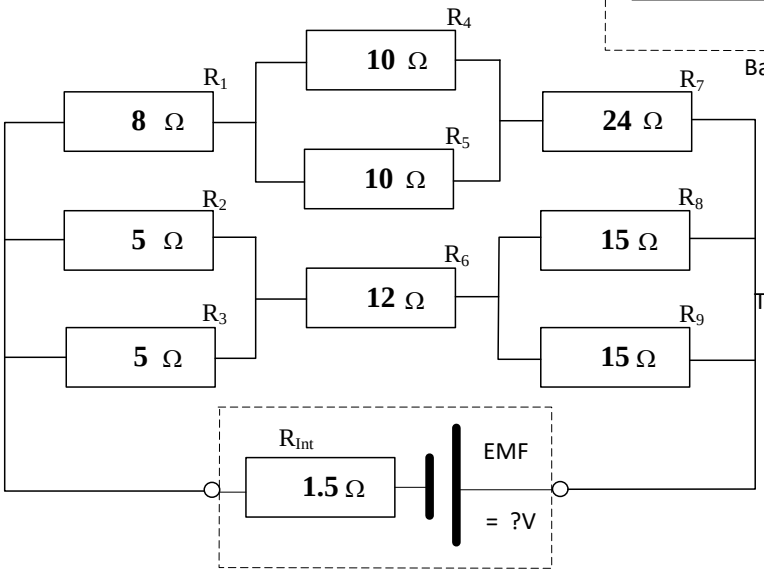
**2.** If the current through $R_2$ is 7.5 Amps, find:

The EMF produced by the Battery

= Volts




**3.**




If the Voltage measured across $R_5$ is 32 Volts, find:

The EMF produced by the Battery

= Volts &,

The Potential Difference that would be measured across $R_6$

= Volts

# Kirchhoff answers

These answers are listed to enable you to check if you have correctly solved the questions asked. If you cannot solve a particular problem ask your tutor for assistance. All answers must show line by line working before they will be signed off as completed.

1A) **1/** 200v **2/** 5.26Ω **3/** 0.33A **4/** 1A **5/** 7.5v
**6/** 2.5, 9, 1.5, 72, 1000, 56, 80, 2, 3, 200, 1.8, 0.514
**7a/** decrease **7b/** increase **7c/** doubled if current kept the same

1B) **1/** 10Ω **2/** 1.33A **3/** 0.47A **4/** 44.1v **5/** 225v **6/** see tutor
**7/** 3.97A **8/** 0.13A **9/** 1.76A **10/** see tutor

1C) **1/** 5Ω **2/** 0.2A **3/** 0.33A **4/** 60v **5/** 10v **7/** 1A **8/** 0.213A
**9/** 1.92A **10/** see tutor

2A) **1/** 10A **2/** 137.5v, 13.75v, 57.75v, 209v **3/** 1.75A, 5.25v
**4/** 2.75A, 101.75v, 68.75v **5/** 215v, 62.5v, 40v, 112.5v

2AX) **1/** 10A **2/** 36v, 30v, 24v, 90v **3/** 0.33A, 8.25v
**4/** 1.25A, 46.25v, 31.25 **5/** 860v, 250v, 160v, 450v

2B) **1/** 300v **2/** 205v, 2A **3/** 0.18A, 0.91A **4/** 1.67A, 25v each R

3A) **1/** 8Ω **2/** 1.5Ω, 1Ω, 128v **3/** 4Ω, 40v, 45v **4/** 30v, 115v, 23Ω
**5/** 4.5Ω, 2.5Ω, 5v

5A) **1/** 8.33A **2/** 10A, 3.64A, 1.36A, 5A **3/** 16.43A, 2.53A, 2.95A, 10.95A
**4/** 15A, 9A, 3.75A, 2.25A **5/** 2.5A, 0.71A, 1.79A

6A) **1/** 467A, 56v **2/** 8A, 8A, 8A, 176v **3/** 15.5A, 2.53A, 2.95A, 23Ω
**4/** 1.4A, 0.58A, 0.35A, 2.33A, 3Ω **5/** 0.4A, 0.9A, 18v

7A) **1/** 1.48Ω, 24Ω, 12Ω, 8Ω, 1.48Ω, 4.8A, 2.4A, 3A, 16.2A

7B) **1/** 3v, 3Ω, 0.5A, 1.5A

8A) **1/** 35Ω, 250v, 7.143A **2/** 2.56A, 10.22A **3/** 18.46A, 11.54A, 9.23v
**4/** 0.56Ω **5/** 6.17m, 3 parallel 1m lengths
**6/** series – doubles, reduces, halves, reduces, reduces
Parallel – doubles, increases, halves, increases, remains the same

9A) **1/** 0.57v, 11.43v **2/** 2Ω **3/** 12v

10A) **1/** 46Ω **2/** 279Ω **3/** 230Ω **4/** 175Ω **5/** 45Ω **6/** 136 Ω

10B) **1/** 2.5Ω **2/** 5Ω **3/** 2.5Ω **4/** 2Ω **5/** 20Ω **6/** 15Ω **7/** 44Ω
**8/** 13Ω **9/** 33.33 Ω

10C) **1/** 92Ω **2/** 139.5Ω **3/** 60Ω **4/** 79.5Ω **5/** 123.5Ω **6/** 83.5Ω

10D) **1/** 70Ω **2/** 55Ω **3/** 41Ω **4/** 33.4Ω **5/** 90Ω

11A) **1/** 47.9Ω **2/** 45.95Ω **3/** 12.17Ω

11B) **1/** 47.42Ω **2/** 70.37Ω **3/** 23.76Ω

12A) **1/** 25Ω **2/** 24Ω **3/** 64.6Ω **4/** 8.64Ω

12B) **1/** 31.5Ω **2/** 48.8Ω **3/** 5.3Ω

15A) **1/** 3.75A **2/** 2A **3/** 290v **4/** 7.28A, 1.82A, 3.033A **5/** 7.5Ω

15B) **1/** 6.67A, 5.55A **2/** 0.723A, 0.8A **3/** 494.18v, 4.36A
**4/** 14.4A, 3.6A, 6A **5/** 17.33Ω, 1.33A

16A) **1/** 15A, 705v **2/** 105v, 4.2A, 1.67A, 16.66Ω **3/** 1.67Ω, 2.22Ω, 45Ω
**4/** 0.5Ω, 42Ω, 5Ω, 5A **5/** 71Ω, 14Ω, 5.71Ω

16B) **1/** 64v, 2A, 32V **2/** 102v, 0.9A, 90V **3/** 75.88v, 1.8A, 5.5Ω
**4/** 127V, 3.5A, 27v, 37.5Ω, 7.71Ω

16C) **1/** 200v, 10A **2/** 1A, 96Ω, 24Ω **3/** 9.9Ω **4/** 386v, 45.41Ω, 6Ω

16D) **1/** 15v, 20v, 25v, 5v, 60v **2/** 100v, 25v
**3/** 118.2v, 89.4v, 36.53v, 15.89v, 33.53v

16E) **1/** 25v, 50v, 2.5A, 75v **2/** 6850v **3/** 262.54v, 129.16v

Congratulations, you should now be able to complete the assessment overleaf after showing this to your tutor

assignment name……..

1) Write the 4 equations you would generally employ when solving calculations with **series resistors only** in the circuit.

……

……

……

……

2) Write the 4 equations you would generally employ when solving calculations with **parallel resistors only** in the circuit.

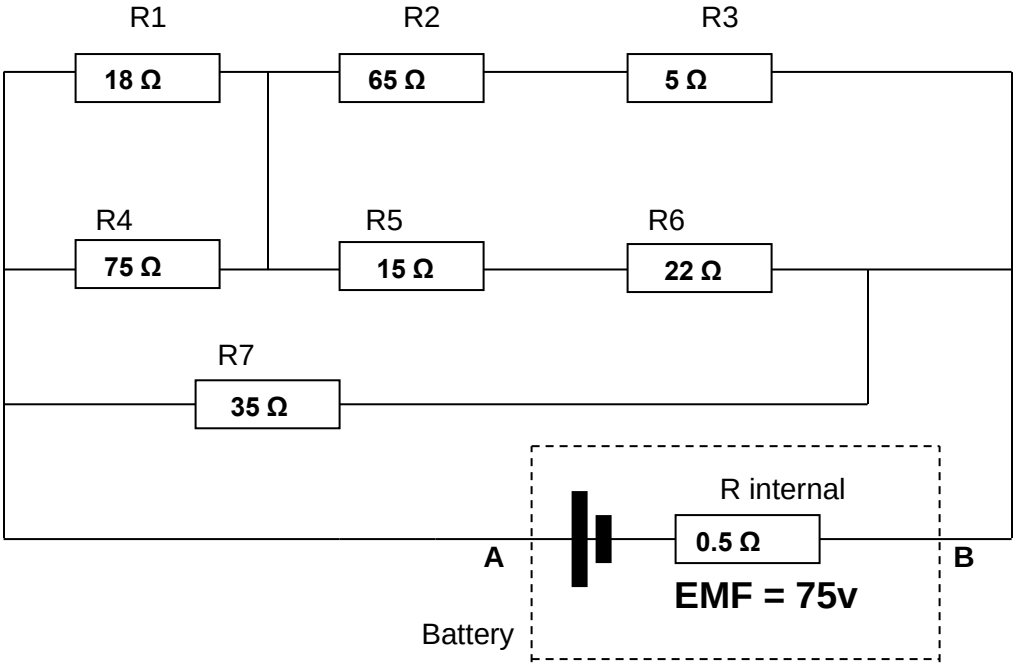
……

……

……

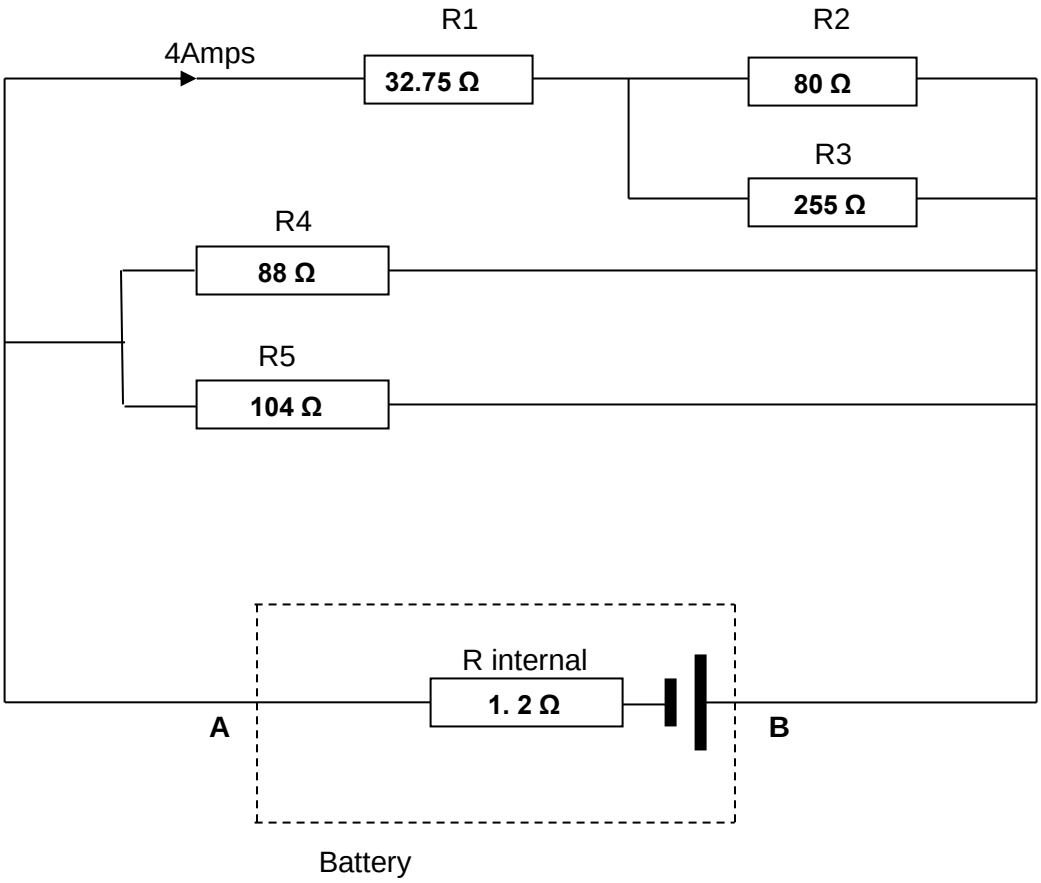
……

3)




a) Calculate total resistance of the external load.
b) Calculate the total current.
c) Calculate the voltage at the battery terminals d) Calculate the current through R1, R3, R4, R5, and R7.
e) Calculate the voltage across R4, R6

4)




From the circuit above.

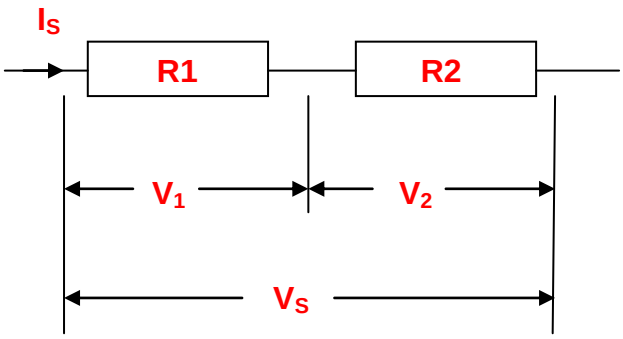
A) Calculate the total current.
B) What is the voltage drop across R3.
C) What is the value of the battery EMF

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

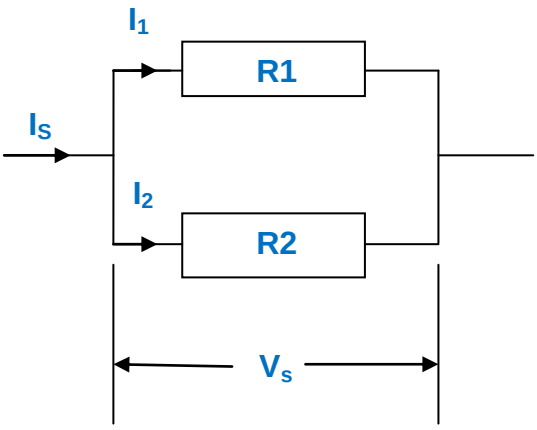
*Applies to either a **whole circuit** or a **part of a circuit** and all three factors must **all** apply to the same components*

## OHMS LAW

### SERIES RESISTIVE




### PARALLEL RESISTIVE




| | | |
|---|---|---|
| **CURRENT CONSTANT** | | $I_S = I_1 + I_2$ *Kirchhoffs current law* |
| $V_S = V_1 + V_2$ *Kirchhoffs voltage law* | | **VOLTAGE CONSTANT** |
| $R_T = R_1 + R_2$ | | $R_T^{-1} = R_1^{-1} + R_2^{-1}$ |