A
DC fundamentals EE3103
Student workbook 2020 for
Ohms and Kirchhoffs laws with
Series and parallel exercises

ARE YOU SURE IT'S
$E = \sqrt{\frac{P}{R}}$ NOT $E = P \times R$?

Student name

INTERNAL RESISTANCE
WORKSHEETS 9A, 16D, 16E

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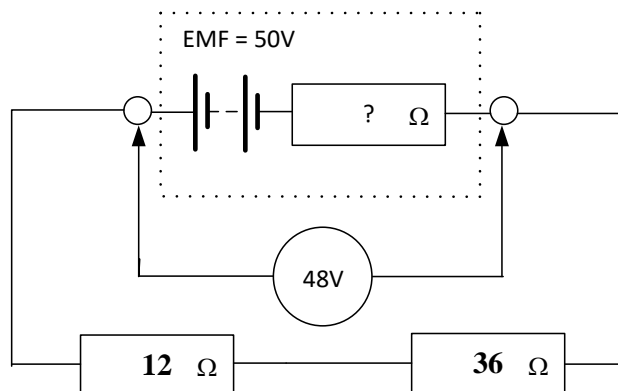# e.g. Battery.

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?.

EMF = 12V.

Battery

?V

0.25 Ω

?V

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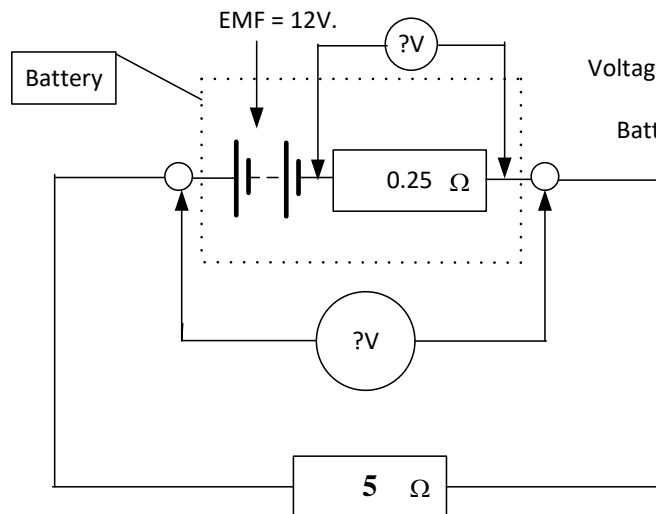
Answers:
Voltage Drop across internal resistance. =
Volts.
Battery output Voltage. =   Volts.

2.   Determine the value of the internal resistance?.

EMF = 50V

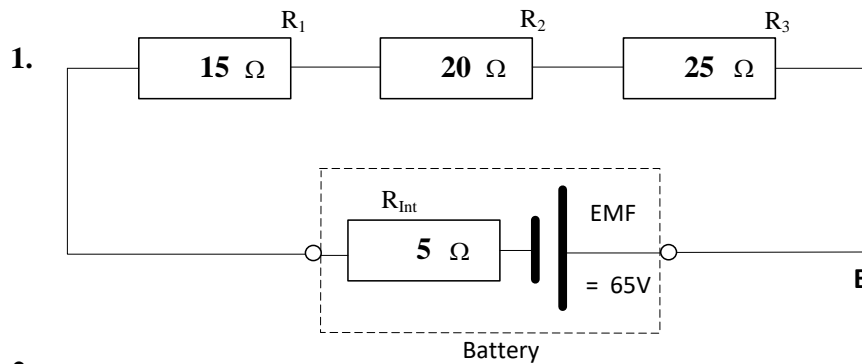? Ω

48V

12 Ω   36 Ω

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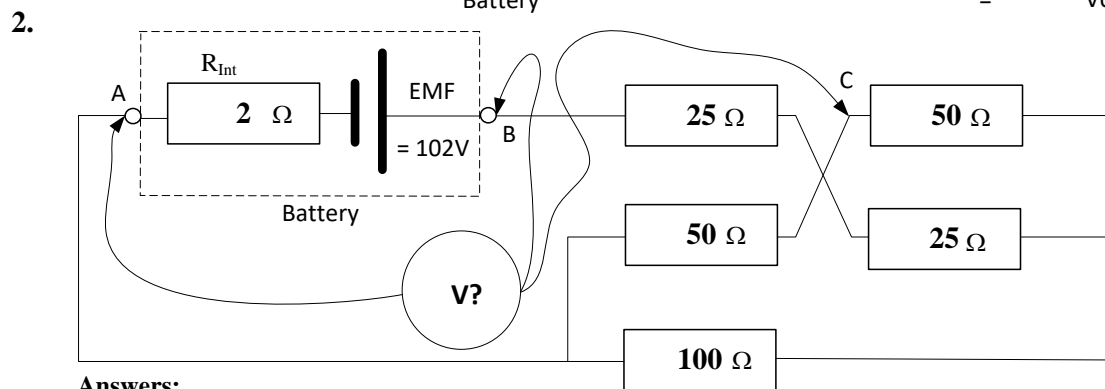# Work Sheet 16D
Harder Series-Parallel calculations.

1.

R_1	R_2	R_3
15 Ω	20 Ω	25 Ω

R_{Int} 5 Ω   EMF = 65V

Battery

Answers:

V_{R1} = Volts

V_{R2} = Volts

V_{R3} = Volts

V_{Int} = Volts

Battery output Voltage

= Volts

2.

A R_{Int} 2 Ω   EMF = 102V   B

Battery

V?

25 Ω   C   50 Ω

50 Ω   25 Ω

100 Ω

Answers:

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

3.

15 Ω	F	10 Ω	15 Ω	C	5 Ω

15 Ω		10 Ω	D	15 Ω

15 Ω	E	10 Ω

15 Ω

V?

R_{Int} 5 Ω   EMF = 147V

A   B
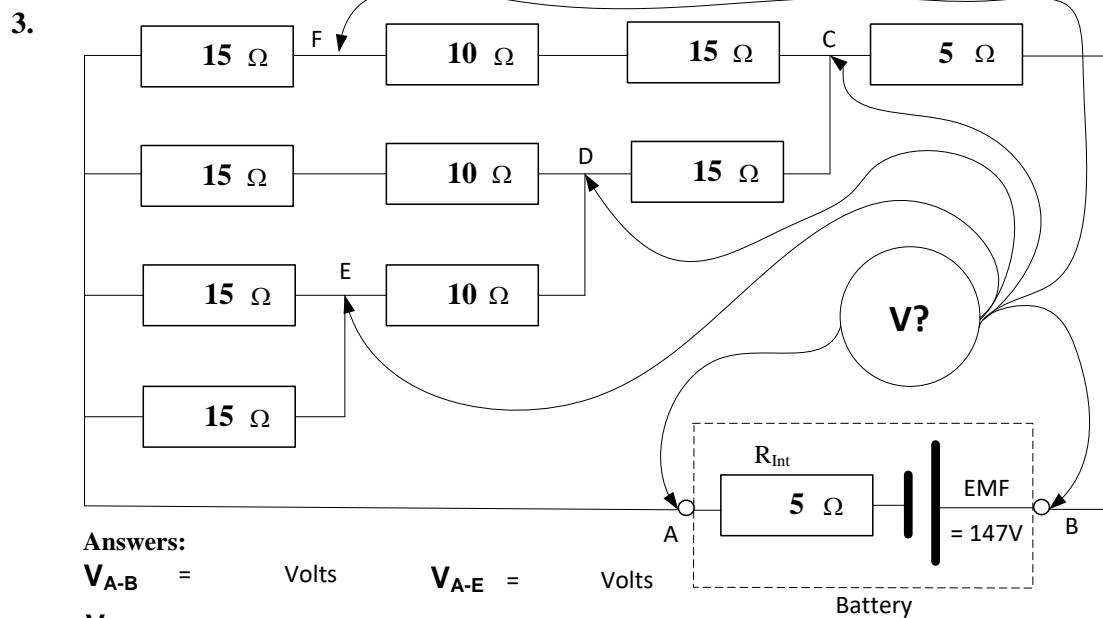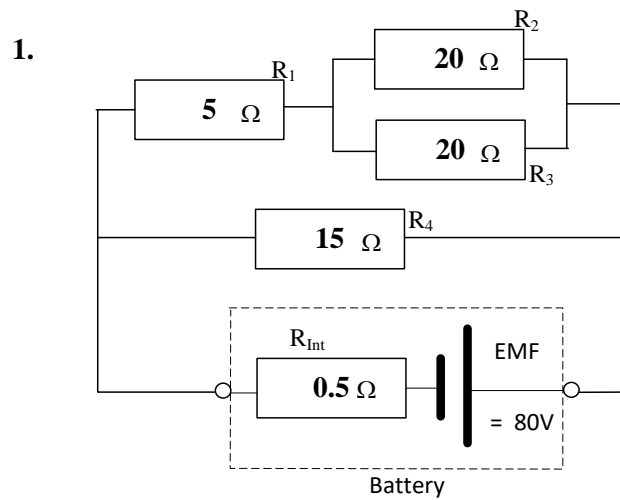
Battery

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

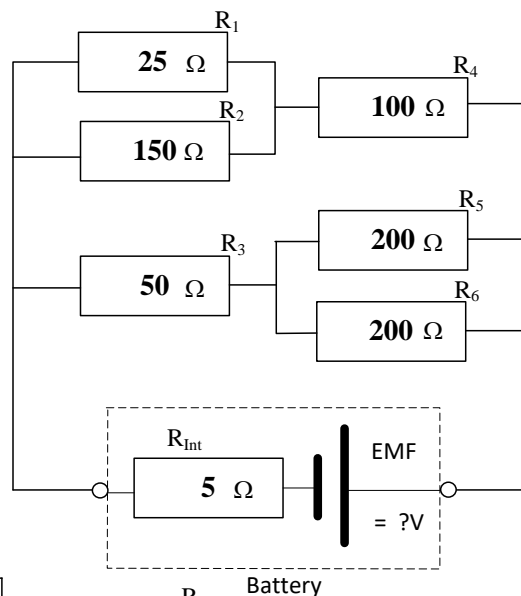I_{R3} = _____ Amps

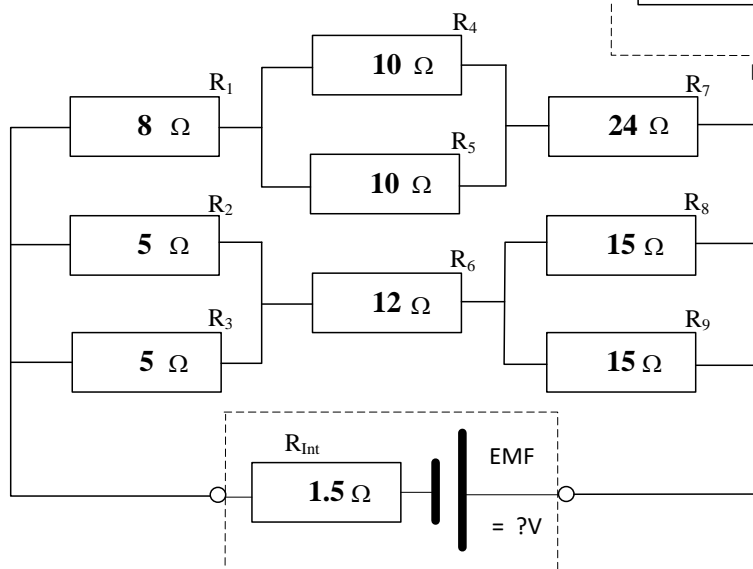**Battery output Voltage**

= _____ 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