# Potentiometers

# A potentiometer is a type of VARIABLE RESISTOR where the voltage is divided up!

+5V

0V

# If the Formula for a series circuit



R3

R2

R1

V3

V2

V1

VS

I

*In a* SERIES circuit *the current through each resistor is the same. To find the current use the formula:*



*We already know that IT is the same as the current going through R1, R2, R3 etc. So to find V1, V2, V3, use:*



*As IT is the same*



*To find the voltage across resistors you do not need to work out the current.*



V2

12V

12 V

90 Ω

30 Ω

Either work out by ratios (quick if you can do it but costly if it goes wrong!)

EITHER:

1. Summarise

VS = 12 V, R1 = 90 Ω, R2 = 30 Ω

V1 = ?, V2 = ?

1. Find RT

Find RT = R1 + R2

RT = 90 + 30 = 120 Ω

1. Find V1



1. Find V2



1. Check

Vs = V1 + V2 = 9 + 3 = 12 V ☺

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OR:

1. Summarise

VS = 12 V, R1 = 90 Ω, R2 = 30 Ω

V1 = ?, V2 = ?

1. Find RT

Find RT = R1 + R2

RT = 90 + 30 = 120 Ω

1. Find IT



1. Find V1



1. Find V2



1. Check

Vs = V1 + V2 = 9 + 3 = 12 V ☺

See Virtual int 2 or Virtual Higher (old) Physics for practice on this!

OR USE





VOLTAGE DIVIDERS

FIND THE VOLTAGE DROP ACROSS BOTH RESISTORS.

12V

0 V

4.7 Ω

14.1 Ω

10 V

0 V

80 Ω

20 Ω

24 V

0 V

2 kΩ

6 kΩ

3 V

0 V

500 Ω

100 Ω

1.5 V

0 V

25 Ω

75 Ω

6 V

0 V

3 MΩ

2 MΩ

1.5 V

0 V

5 Ω

10 Ω

6 V

0 V

24 Ω

8 Ω

12 V

0 V

900 Ω

300 Ω

1a) 3V, 9V b) 8V, 2V, c) 6V, 18V

2a) 2.5V, 0.5V b) 0.375V, 1.125V c) 3.6V, 2.4V

3a) 0.5V, 1V b) 4.5V,1.5V c) 9V, 3V

24 V

0 V

2 kΩ

6 kΩ

**18V**

**6V**

6 V

0 V

24 Ω

8 Ω

**1.5V**

**4.5V**

1.5 V

0 V

5 Ω

10 Ω

**1V**

**0.5V**

12 V

0 V

900 Ω

300 Ω

**3V**

**9V**

6 V

0 V

3 MΩ

2 MΩ

**2.4V**

**3.6V**

1.5 V

0 V

25 Ω

75 Ω

0.375V

**1.125V**

3 V

0 V

500 Ω

100 Ω

**0.5V**

**2.5V**

10 V

0 V

80 Ω

20 Ω

**2V**

**8V**

12 V

0 V

4.7 Ω

14.1 Ω

**9V**

**3V**