

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ measure voltage and current in a simulated circuit
- ☐ verify Ohm's law and the series and parallel rules
- ☐ compare calculated and simulated results
- ☐ design a resistor network to a target value

I DO**Key ideas** Use these to check your simulations**V = IR**

Voltage = current × resistance (Ohm's law)

- V in volts, I in amps, R in ohms (Ω)
- Convert first: 4.7 k Ω = 4700 Ω , 30 mA = 0.03 A

	Series	Parallel
Resistance	$R_T = R_1 + R_2 + \dots$	$1/R_T = 1/R_1 + 1/R_2 + \dots$ (two: $R_1 R_2 \div (R_1 + R_2)$)
Current	The same everywhere	Splits: $I_T = I_1 + I_2 + \dots$
Voltage	Shared: $V_S = V_1 + V_2 + \dots$	The same across every branch

YOU DO**Yenka tasks** Build each circuit in Yenka, record results, then compare with calculations.**Task 1: Verifying Ohm's law****1** Build: a 6 V d.c. supply, a 100 Ω resistor, an ammeter in series and a voltmeter across the resistor.**a)** Record the supply voltage, the current and the voltage across the resistor.

b) Calculate the expected current using $I = V \div R$, and compare it with the simulation.

c) Change the supply to 3 V, 9 V and 12 V. Record the results and describe the pattern.

Voltage (V)	Resistance (Ω)	Current (A)
3	100	
9	100	
12	100	

Task 2: Series circuit

2 Build: a 9 V supply with 220 Ω and 470 Ω resistors in series, an ammeter, and a voltmeter across each resistor.

a) Record the current and the voltage across each resistor.

b) Show that the voltages add up to the supply and that the current is the same everywhere.

c) Calculate the expected values and explain any difference.

d) Predict what happens if the two resistors swap places, then test it.

Task 3: Parallel circuit

3 Build: a 12 V supply with 100 Ω and 300 Ω resistors in parallel, an ammeter in the main line and one in each branch.

a) Record the branch currents and the total current.

b) Show that the total current is the sum of the branch currents, and state the voltage across each branch.

c) Add a third resistor of 300 Ω in parallel. Predict the new total resistance and the effect on the total current.

Task 4: Combined circuit

4 Build: a 20 V supply, a 100 Ω resistor in series with 400 Ω and 600 Ω resistors in parallel.

a) Calculate the total resistance before you build the circuit.

b) Measure the total current and the voltage across the parallel section, and compare with calculated values.

c) Explain why the current through the 400 Ω resistor is greater than through the 600 Ω resistor.

Task 5: Design challenge

5 A student needs 50 Ω but only has two 100 Ω resistors.

a) Build a 50 Ω combination in Yenka and prove it with meter readings.

b) Explain why your solution works.

c) Extension: make 25 Ω using four 100 Ω resistors, and 150 Ω using three.

Task 6: Practical data task

Build: a 6 V supply, a 15 Ω resistor in series with two 30 Ω resistors in parallel.

6 Complete the results table.

Quantity	Calculated	Simulated
Total resistance (Ω)		
Circuit current (A)		
Voltage across parallel section (V)		
Current in one 30 Ω resistor (A)		

7 Higher thinking: investigate and explain what happens when (a) a parallel resistor is removed, (b) a series resistance increases. Then build a circuit that draws exactly 0.2 A from 12 V.

Check and reflect

Mark your answers with the answer sheet. Which “I can” statement above still needs work? Look back at the notes for that topic on the site.
