- 3 carbon resistors, 100 Ω
- 3 carbon resistors, 220 Ω
- 1 multimeter

Recommended Group Size:	2	Interactive Demo OK?:	N

23.10.1. Activity: The Equivalent Resistance for a Network

a. Consider the sets of identical resistors you just used to explore parallel and series resistances. Use the color-coded value for your lowest identical resistor for R_1 and the color-coded value for your highest identical resistor for R_2 to calculate the equivalent resistance between points A and B for the network shown below. *You must show your calculations on a step-by-step basis*.

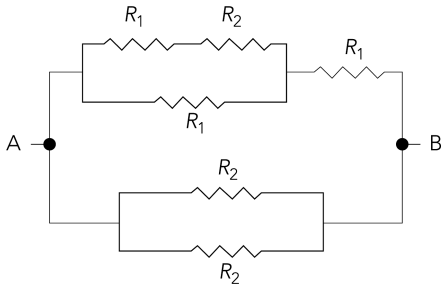


Fig. 23.16.

b. Set up the network of resistors and check your calculation by measuring the equivalent resistance directly.

Calculated value: R_{eq} = _____ Ω

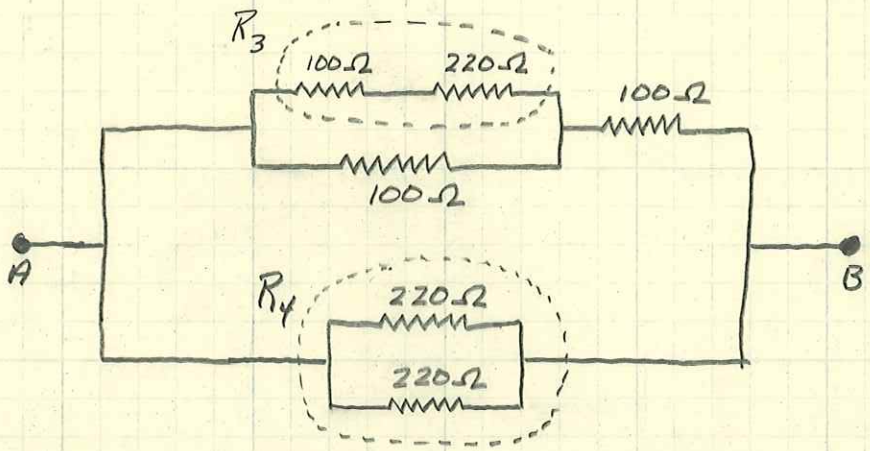
Measured value: R_{eq} = _____ Ω

CONFIRMING KIRCHHOFF'S LAWS

23.11. KIRCHHOFF'S LAWS

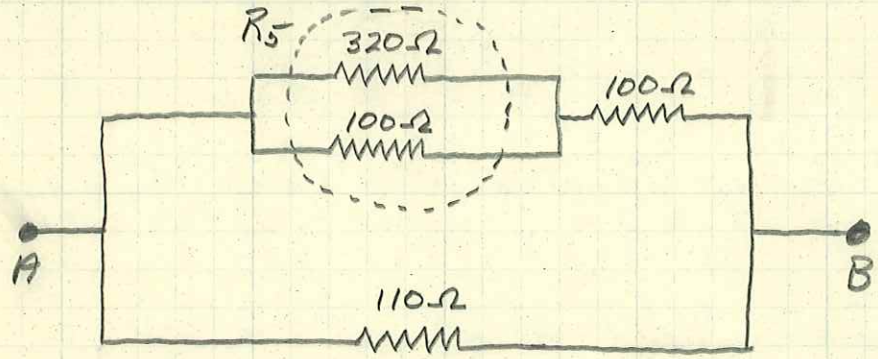
Suppose we wish to calculate the currents in various branches of a circuit that has many components wired together in a complex array. In such circuits, simplification using series and parallel combinations is often impossible. Instead we can state and apply a formal set of rules known as Kirchhoff's laws to use in the analysis of current flow in circuits. These rules are:

Act 23.10.1

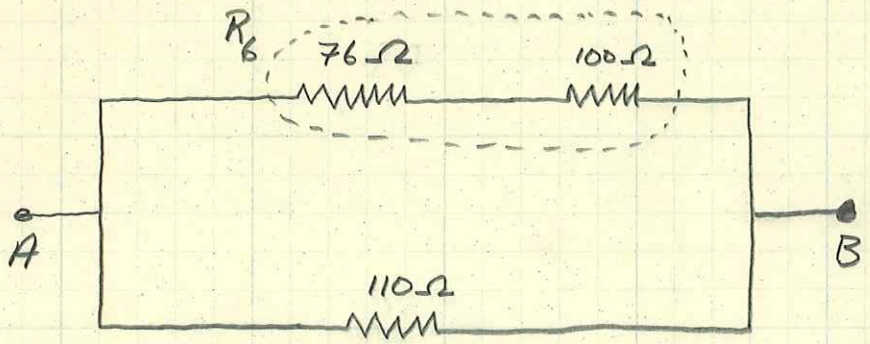


$$R_3 = 100\Omega + 220\Omega$$
$$= 320\Omega$$

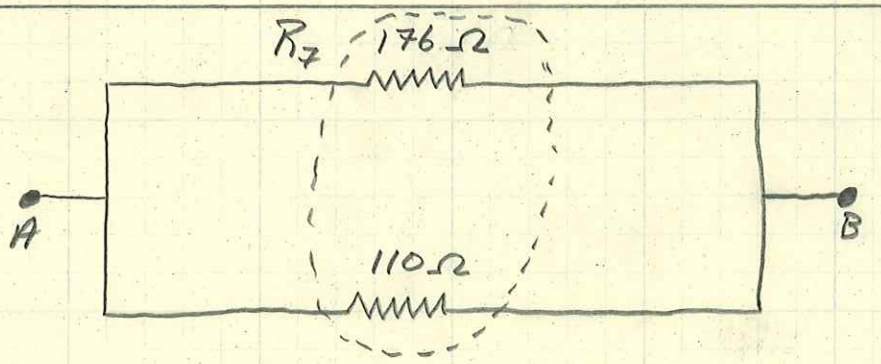
$$R_4 = \frac{(220\Omega)(220\Omega)}{220\Omega + 220\Omega}$$
$$= 110\Omega$$



$$R_5 = \frac{(320\Omega)(100\Omega)}{320\Omega + 100\Omega}$$
$$= 76\Omega$$



$$R_6 = 76\Omega + 100\Omega$$
$$= 176\Omega$$



$$R_7 = \frac{(176\Omega)(110\Omega)}{(176\Omega + 110\Omega)}$$
$$= 68\Omega$$