

ADVANCED PHYSICS CLUB

APRIL 27, 2025

USEFUL RESOURCES

The updates, homework assignments, and useful links for APC can be found on SchoolNova's web page: https://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2024 The practical information about the club and contacts can be found on the same web page.

TODAY'S MEETING

We continue solving problems on electric circuits.

Homework

- 1. (a) N identical resistors, each of resistance R, are connected *in series*. An electric current I enters the first resistor. What is the current through each resistor? What is the voltage across each resistor? What is the equivalent resistance of the entire series?
 - (b) N identical resistors, each of resistance R, are connected *in parallel*. Voltage across the first resistor is V. What is the voltage across each resistor? What is the current through each resistor? What is the equivalent resistance of the entire parallel network?
- **2.** Two resistors, r and R, are connected in series. What is the equivalent resistance? How does it simplify if $R \gg r$? What if the resistors are connected in parallel?
- **3.** Find the equivalent resistance between points A and B; A and C; B and C for the system of resistors arranged in a triangle as shown in the figure.

4. In the circuit shown in the figure, each resistor has a resistance value indicated next to it (in ohms). What is the potential difference between the two open terminals? If an ideal ammeter is

connected between these terminals, what current will it register?





- 5. A wire is bent into a perfect circle and has a total resistance of 10 ohms. At which two points on the circle should an ohmmeter be connected so that it measures a resistance of exactly 1 ohm between those points?
- 6. A cube is constructed from wire, with each of its 12 edges having the same resistance r. A battery is connected across two vertices A and B, as shown on the figure. It is known that the current through one specific edge (marked in the figure) is *i*. Determine the following:
 - (a) The potential difference between points A and B
 - (b) The equivalent resistance between points A and B
 - (c) The total current flowing from A to B.



7. In the circuit shown in the figure, each side has the same resistance r. Determine the equivalent resistance a) between points A and B; b) between points C and D.



For the next meeting

IMPORTANT: The next club's meeting is at 2:30pm, in person, on Sunday, May 4.