

USEFUL RESOURCES

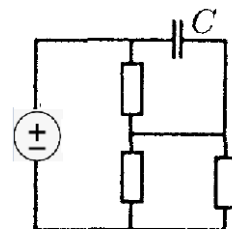
The updates, homework assignments, and useful links for APC can be found on SchoolNova's web page:  
[https://schoolnova.org/nova/classinfo?class\\_id=adv\\_phy\\_club&sem\\_id=ay2021](https://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2021)  
 The practical information about the club and contacts can be found on the same web page.

TODAY'S MEETING

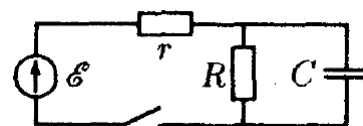
We continue the discussion about electricity and magnetism. The new assignment continues the topic of electric circuits. **Note that some of the notations in the circuits might differ from what you are used to.** In particular, throughout the assignment a resistor is denoted by a hollow rectangle.

HOMEWORK

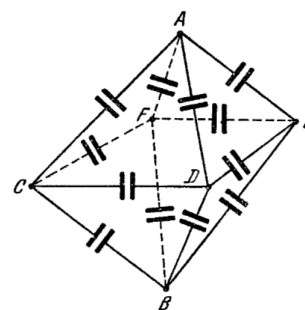
1. In the scheme shown on the figure all resistors have the same resistance  $R$  and the voltage source has voltage  $V$ . Find the charge on the capacitor  $C$  in steady state.



2. In the circuit shown on the figure the switch is initially closed. In what time after opening the switch will the charge of the capacitor change by a)  $1/1000$  of its initial value? b)  $1/2$  of its initial value?

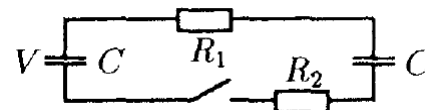


3. Twelve capacitors having the same capacitance  $C$  are arranged into an octahedron as shown on the figure. What is the total capacitance between points  $A$  and  $B$ ?

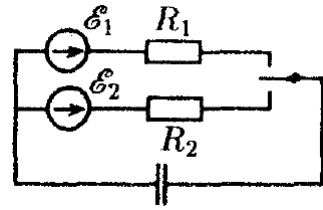


4. The thermal power released into the environment from a stove top burner is proportional to the temperature difference between the burner and the air in the room :  $P = k(T - T_0)$ . The resistance of the burner also linearly depends on the same temperature difference:  $R = R_0[1 + \alpha(T - T_0)]$ . What will be the equilibrium temperature of the spiral if a constant current  $I$  goes through it?

5. At the initial state the switch is in the open position, one of the capacitors is charged to voltage  $V$  and the other one is uncharged. Find the amount of heat dissipated in each of the resistors after the switch is closed.



- \*6. The switch is alternately connected to each of the two contacts (see the figure) for very brief and equal time intervals. What will be the charge of the capacitor after a large number of alternations? What will be the charge of the capacitor if the first circuit is closed for a time  $k$  times shorter than the second circuit?



FOR THE NEXT MEETING

**IMPORTANT:** The next club's meeting is at 3:00pm, via Zoom, on Sunday, May 8.