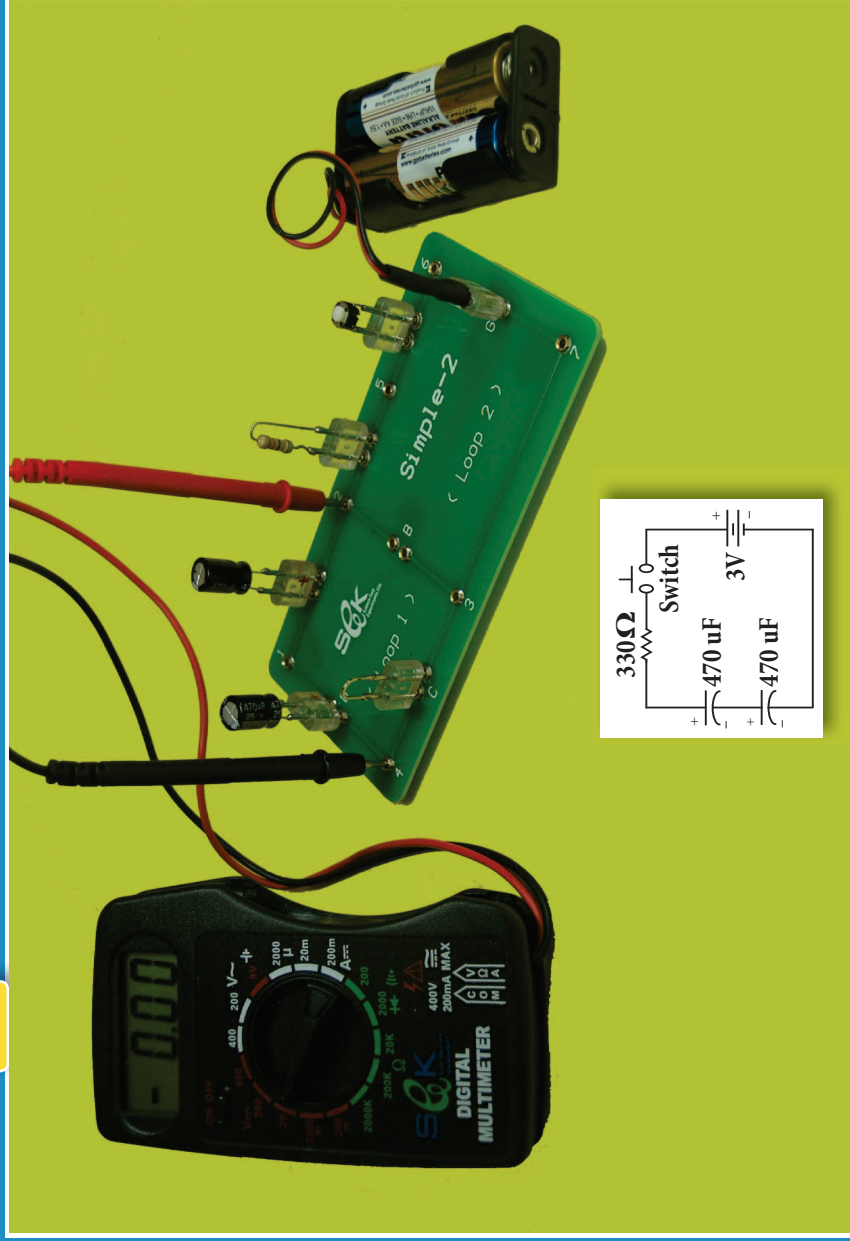


Experiment

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Capacitors in Series & in Parallel



Objectives

1. The student will connect capacitors in series.
2. The student will connect capacitors in Parallel.
3. The student will determine the effective capacitance when capacitors are connected in series or in parallel.

Apparatus

- Experiments Board (Simple-2)
- DMM
- Switch
- 2xAA Battery Holder w/AA batteries
- Resistor 330Ω
- Jumpers
- Two Capacitor $470\ \mu\text{F}$
- LED

Procedure & Conclusions

Capacitors in Series

1. Build a simple circuit consists of 3V battery connected at the pair (G) in a way that the positive side (red wire) will be towards the point (6), Capacitor $470\ \mu\text{F}$ at pair (A) in a way that its positive terminal will be towards point (2), another Capacitor $470\ \mu\text{F}$

at pair (D) in a way that its positive terminal will be towards point (1), resistor 330Ω at the pair (E) and switch at the pair (F), and a jumper at the pair (C), as shown in the photo.

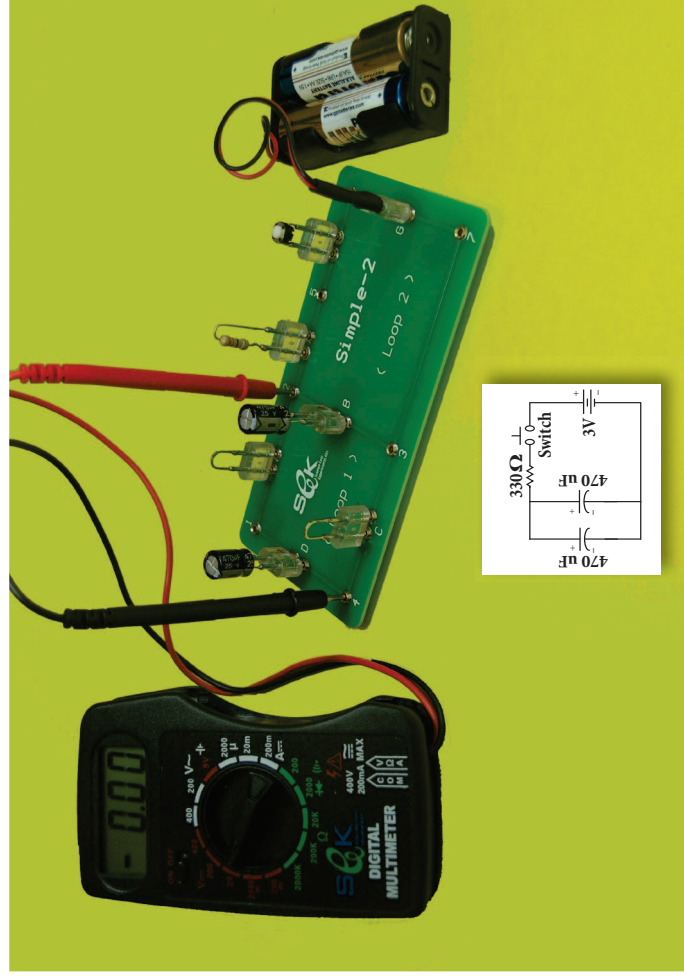
2. Set the mode of the DMM to (DVC) (range 20), insert its probes at the points (2) & (4)

Note1: In series combination, the positive terminal of one capacitor is connected to the negative terminal of the other capacitor.

3. Press the switch button continuously for few seconds while watching the time of charging process of the two capacitors connected in series through the DMM reading, when the reading reaches the applied voltage (3V) then the capacitors are fully charged, and hence the Voltmeter reading becomes still.
4. Insert a LED at the the pair (G) instead of the battery in a way that the positive terminal of the LED will be towards the point (6).
5. Press the switch button continuously for few seconds while watching the time of discharging process of the two capacitors connected in series through the DMM reading and the LED.

Capacitors in Parallel

6. Take off the capacitor from the pair (A) and insert it at the pair (B) in a way that its positive terminal will be towards point (2), insert a jumper at the pair (A), as shown in the below photo.



7. Connect again a 3V battery at the pair (G) in a way that its positive side (red wire) will be towards the point (6).

Note2: In parallel combination, the positive terminal of one capacitor is connected to the positive terminal of the other capacitor.

8. Press the switch button continuously for few seconds while watching the time of charging process of the two capacitors connected in parallel through the DMM reading, when the reading reaches the applied voltage (3V) then the capacitors are fully charged, and hence the Voltmeter reading becomes still.

9. Insert a LED at the the pair (G) instead of the battery in a way that the positive terminal of the LED will be towards the point (6).

10. Press the switch button continuously for few seconds while watching the time of discharging process of the two capacitors connected in parallel through the DMM reading and the LED, compare it with the result you have got in step 5

- We conclude that the equivalent capacitance of a parallel combination is always ...less than / greater than / equal to ... series combination, and hence the charging & discharging time is ... longer / shorter ...

- From charging/discharging time, we conclude that the total capacitance of capacitors connected in series is ... less than / greater than / equals ... the total capacitance of capacitors connected in parallel.