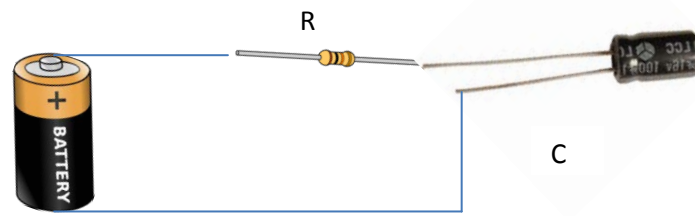


Police Lights

CA Science Standards Addressed:

Physics 5a

Introduction:



In an “RC” circuit, a battery represented by V_s sends electrical current through resistor (R) and begins to charge up the capacitor. Resistor R acts like a valve controlling the amount of current flowing through to C. The larger the resistance, the slower C is charged up. Similarly the capacitance (C) of a capacitor is a measure of how much charge that the capacitor can hold. The larger the capacitor, the longer it takes to charge to maximum capacity.

Electrical circuits and water have analogy. Resistors are like the size of a water pipe. The larger the resistance, the smaller the pipe and the harder it is for any type of “current” to flow. A capacitor is like a water tank. The larger the capacitance (C), the larger the water tank. If we imagined our faucet to be the battery, then the voltage of the battery is like the pressure at the faucet head.

Abstract:

When charging up a capacitor, what dictates how fast it charges to its maximum capacity? Does its capacity matter? Does the resistor connected to the capacitor control the speed at which it charges and discharges at?

Materials:

- 1) 10uF Capacitor (Electrolytic)
- 2) 33uF Capacitor (Electrolytic)
- 3) 10k Resistor
- 4) 68k Resistor
- 5) Breadboard
- 6) 4 jumper breadboard wires
- 7) 555 timer
- 8) 2 LEDs (preferably one red and one blue)
- 9) 9V with Connector leads
- 10) Two 220ohm Resistor

Name: _____

Period: _____

Date: _____

Data:

| Capacitor Value | Resistor Value | No. of Blinks from ONE LED in 20 secs. | Blinks per second |
|-----------------|----------------|--|-------------------|
| 10 uF | 68k | | |
| 33 uF | 68k | | |
| 33 uF | 10k | | |
| 10 uF | 10k | | |

Analysis:

1) Which one capacitor value causes the blinking to go faster? Why?

Answer: _____

2) If we kept the capacitor the same, what would happen if the resistor R3 was changed? What would happen if the resistor was smaller?

Answer: _____

3) What would happen to the LED if R3 was larger? Why?

Answer: _____

Conclusion:

