

# LAB: RC CIRCUITS

## Driving Question | Objective

Today we will be learning about resistors and capacitors and determine how their relationship has an effect on the circuits.

## Materials and Equipment

- Resistors
- Capacitors
- Batteries
- Modular circuit components
- Switch
- Pasco Software
- Laptop
- Voltmeter
- Ammeter

## Background

Capacitors were originally invented in October of 1745 by German Ewald Georg von Kleist. The first capacitors were in the form of Leyden Jars which was created by Pieter van Musschenbroek a Dutch physicist. Today capacitors are everywhere around us in the modern world in most things we use.

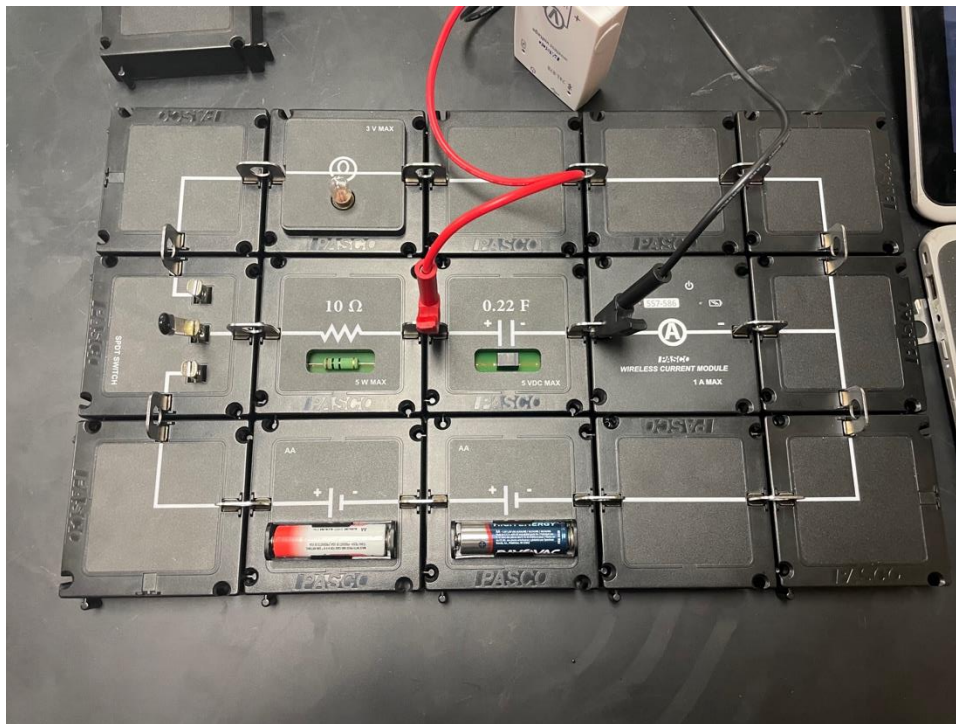
## Safety

- Keep water and drinks away from electronics

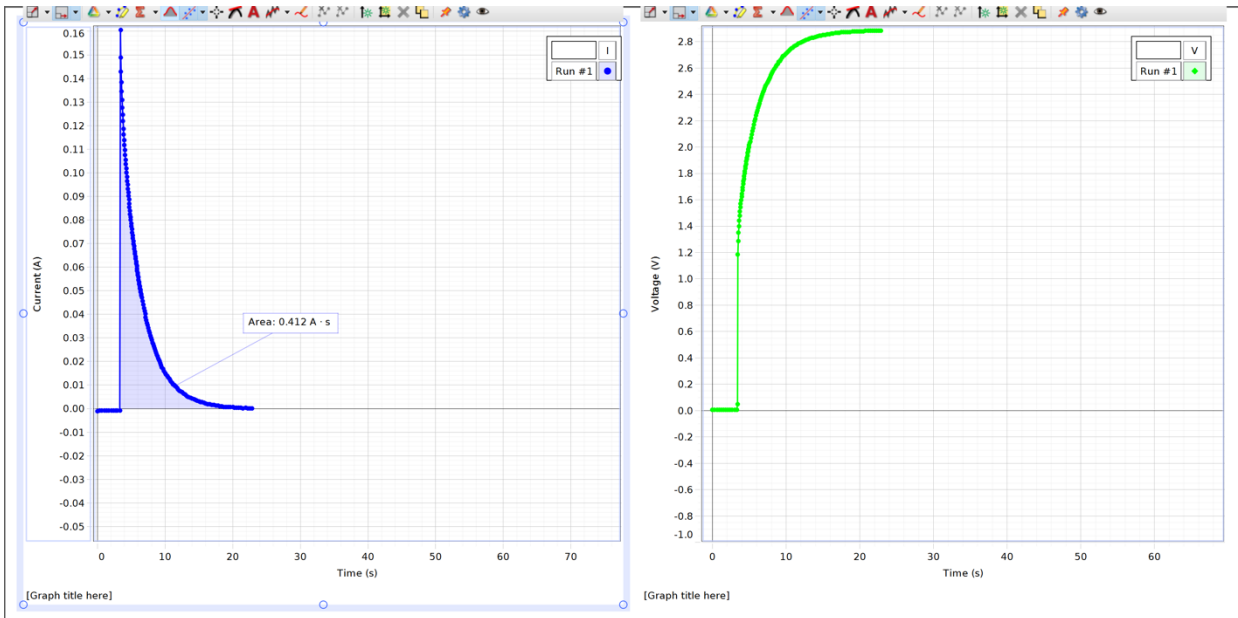
## Procedure

### Trial 1

1. Download and open the PASCO file. Then connect the volt and ammeter
2. Create the circuit pictured bellow



3. Now we will be using a graph to track the relationship between voltage and time as well as current and time.
4. Now make sure you discharge the capacitor by flipping the switch up the light bulb will go out when the charge has been fully discharged.
5. When you are ready press record in capstone
6. Flip the switch to the down position and watch the relationships between the 2 graphs.
7. and watch the relationship between the voltage and time and current and time change as the capacitor charges up.
8. Take a screen shot of the graph and paste it bellow



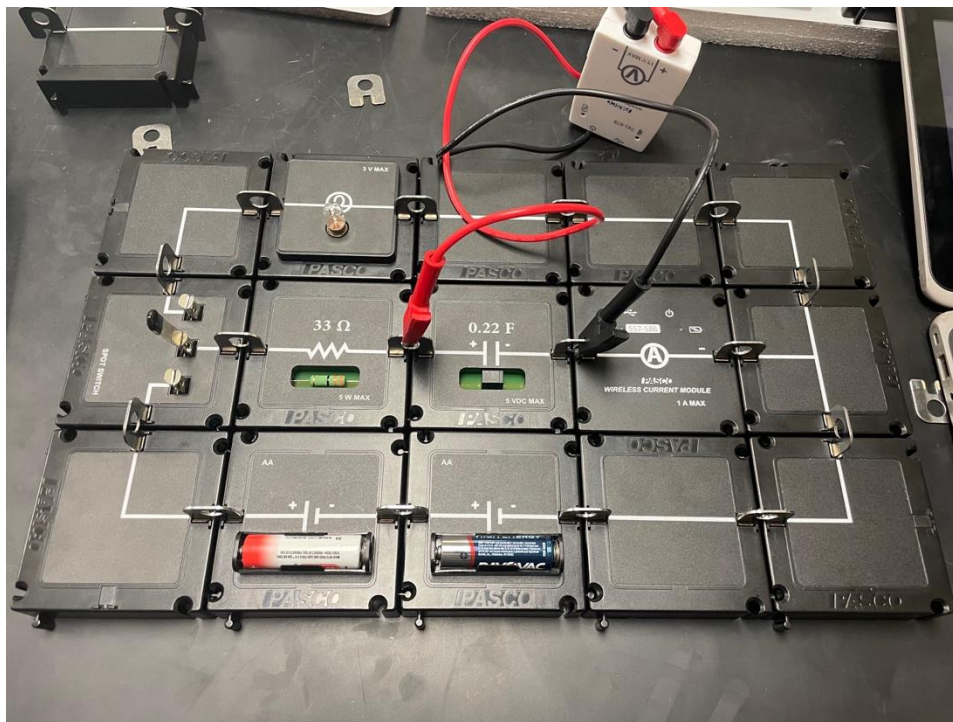
## QUESTIONS

- What is the area under the curve?  
0.400 A\*s
- Why does the light bulb turn on when you discharge the circuit?  
Charges are released from the capacitor.
- What kind of graph is being shown?

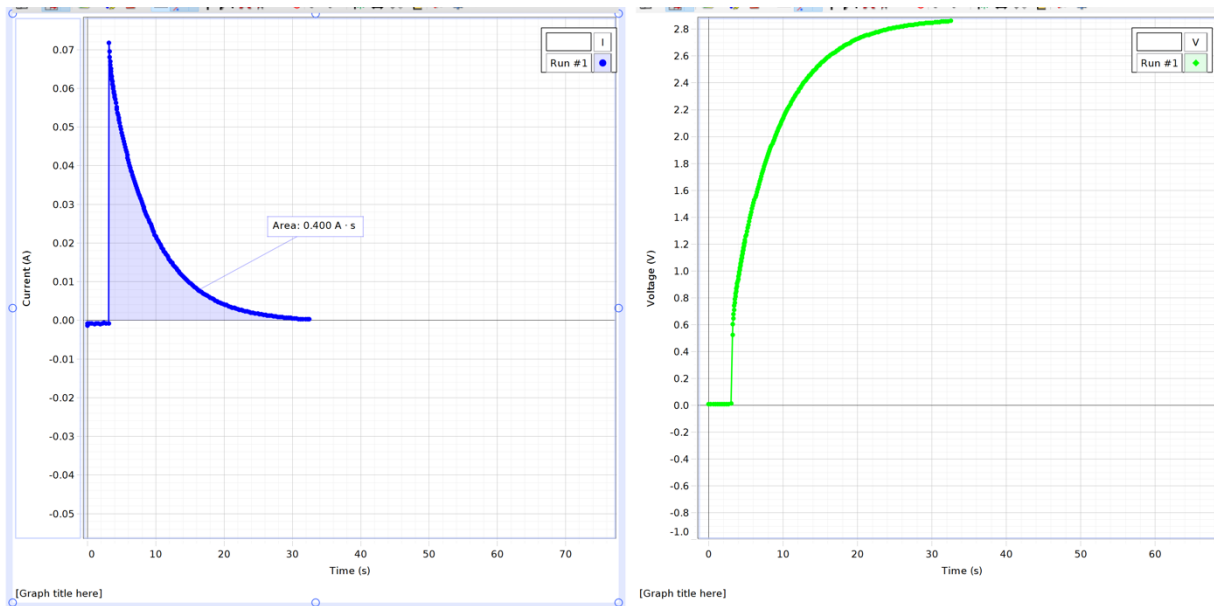
Inverse relationship

## Trial 2

1. Now use the same circuit except replace the resistor with the 33 OHM one



- Repeat steps 3-7 in the Trial 1.
- Take a screen shot of the graph and paste it bellow



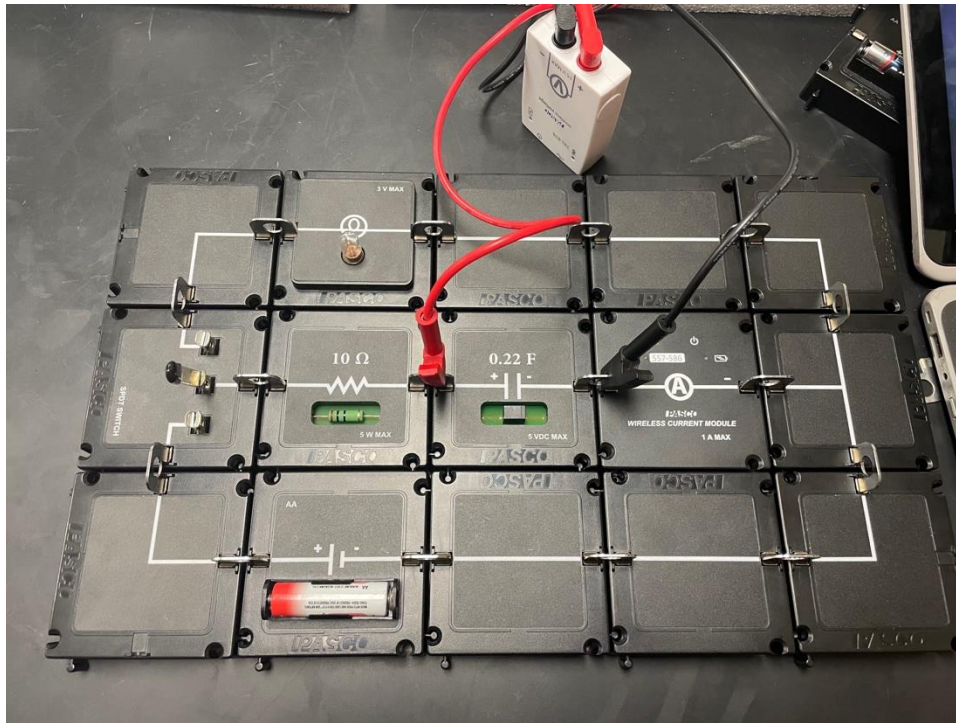
## QUESTIONS

- Compare the 2 graphs from trial 1 and 2 what is different?
- What is the area under the curve?  
0.400 A\*s
- How do the area under the curves compare? Why?  
They are about the same.
- Does the bigger resistor impact how fast the capacitor charges?

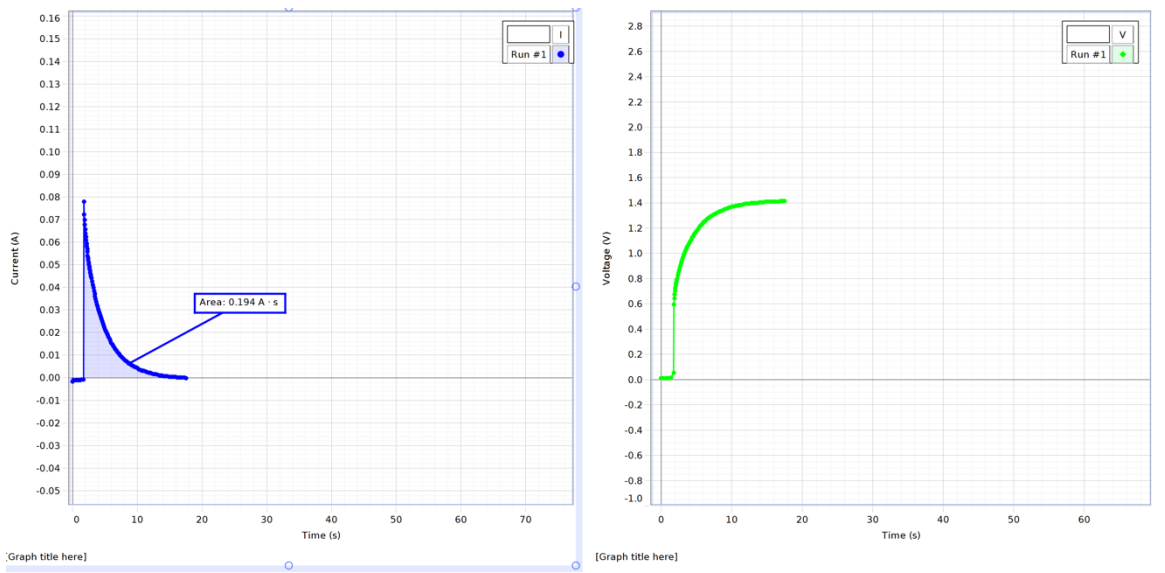
The bigger resistor leads to a smaller rate of the change within the capacitor. (slower)

## Trial 3

- Assemble the circuit bellow with only 1 battery
- Make sure to setup exactly as shown



3. Repeat steps 3-7 in trial 1.
4. Paste graph bellow



## QUESTIONS

- What change do you notice in the graphs when you swap the battery

The area is smaller

- What is the area under the graph

0.194

- Does the capacitor charge faster with 1 or 2 battery's

2 batteries

