RC Timing Challenge

Thursday classroom worksheet

Name _____

Use the supplied values and data. The demonstration is optional evidence.

1 Same type different capacitance



Capacitor A	**100 µF**
Capacitor B	**220 µF**
Capacitor C	**470 µF**

With the same resistor, which capacitor takes the longest to charge? _____

Explain using capacitance. _____

2 Calculate the time constants

Use tau = R x C. Convert kΩ to Ω and µF to F before multiplying.

Resistance	Capacitance	Time constant
10 kΩ	100 µF	
10 kΩ	220 µF	
10 kΩ	470 µF	

Show the calculation for Capacitor C.

tau = _____

3 Use supplied test data

A 5 V circuit used R = 10 kΩ and C = 470 µF. These readings were recorded.

Time in seconds	Capacitor voltage
0	0.0
5	3.3
10	4.4
15	4.8
20	4.9

Photo: Open Circuits, Windell Oskay and Eric Schlaepfer, No Starch Press.

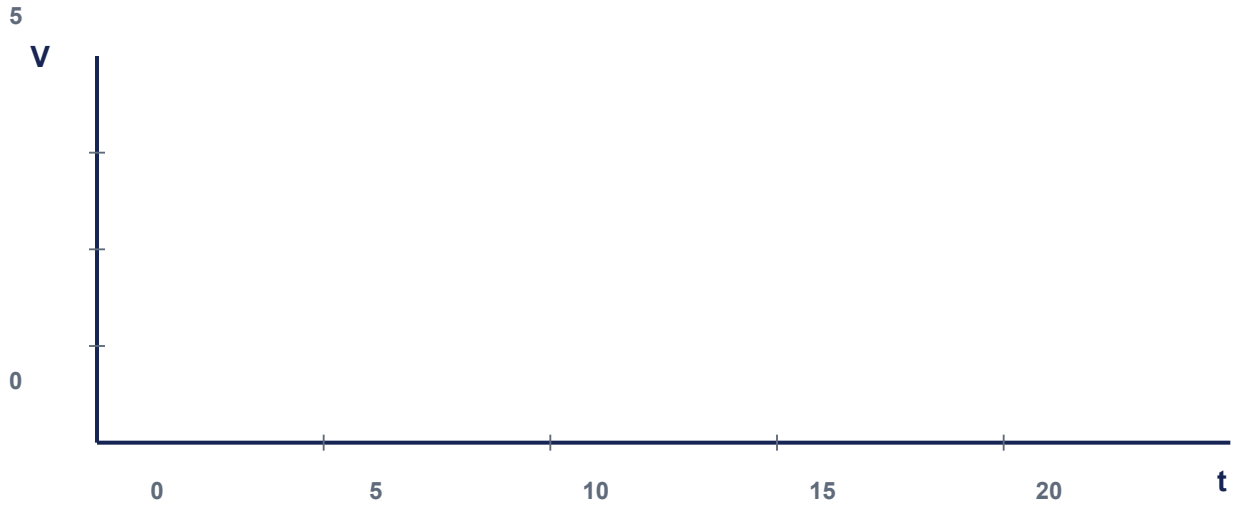
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4 Graph the supplied data

Plot all five points from page 1. Draw one smooth charging curve through the points.



5 Find a mystery capacitor

A circuit uses R = 22 kΩ. It reaches 63% of the supply after 4.84 s.

C = tau ÷ R

Convert R 22 kΩ = _____ Ω

Substitute C = 4.84 ÷ _____

Answer C = _____ F = _____ µF

6 Choose a 10 second design

Circle one pair that gives a time constant closest to 10 seconds.

- ○ 10 kΩ and 100 µF
- ○ 22 kΩ and 470 µF
- ○ 47 kΩ and 220 µF

Show tau = R x C

_____

_____

_____

Photo submission

Upload clear photos of both completed pages. Make sure your name and answers are readable.