Worksheet: Capacitor Combinations

Question Video

Q1:

What total capacitance can you make by connecting a 5.00-μF capacitor and an 8.00-μF capacitor in series?

A 13.0 μF

B 1.60 μF

C 3.00 μF

D 6.25 μF

E 3.08 μF

What total capacitance can you make by connecting a 5.00-μF capacitor and an 8.00-μF capacitor in parallel?

A 6.50 μF

B 1.60 μF

C 3.08 μF

D 6.25 μF

E 13.0 μF

Q2: The capacitor C_1 has a capacitance of 2.00 μF and the capacitor C_2 has a capacitance of 4.00 μF. C_1 and C_2 are connected in series with each other and a 1.00 kV potential difference is applied across them until they become fully charged. After charging, C_1 and C_2 are disconnected from the potential difference and connected to each other in parallel.

- Find the charge stored by C_1 when connected only with C_2.

A 1.78 mC

B 2.11 mC

C 1.04 mC

D 0.444 mC

E 1.33 mC

- Find the charge stored by C_2 when connected only with C_1.

A 1.33 mC

B 2.11 mC

C 0.890 mC

D 0.889 mC

E 1.04 mC

- Find the potential difference across C_1 when connected only with C_2.

A 349 V

B 282 V

C 474 V

D 222 V

E 402 V

Find the potential difference across C_2 when connected only with C_1.

A 333 V

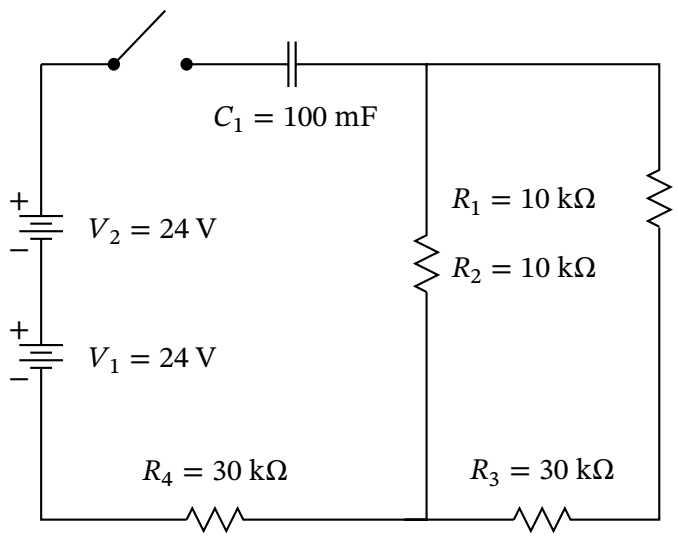
B 228 V

C 545 V

D 222 V

E 490 V

Q3: Consider the circuit shown.



What is the RC time constant of the circuit?

A 4 300 s

B 4 000 s

C 3 800 s

D 3 600 s

E 3 300 s

What is the initial current in the circuit once the switch is closed?

A 2.2 A

B 2.0 A

C 1.3 A

D 1.6 A

E 1.0 A

How much time passes between the instant the switch is closed and the instant that the instantaneous current is half the initial current?

A 3 100 s

B 2 900 s

C 2 600 s

D 2 200 s

E 2 000 s

Q4: A 4.00-pF capacitor is connected in series with an 8.00-pF capacitor. A 400-V potential difference is applied across the capacitors.

Question Video

What is the charge on the 4.00-pF capacitor?

A 1.33 nC

B 1.45 nC

C 1.18 nC

D 1.26 nC

E 1.07 nC

What is the charge on the 8.00-pF capacitor?

A 1.20 nC

B 1.25 nC

C 1.02 nC

D 1.13 nC

E 1.07 nC

What is the voltage across the 4.00-pF capacitor?

A 226 V

B 245 V

C 143 V

D 177 V

E 267 V

What is the voltage across the 8.00-pF capacitor?

A 190 V

B 231 V

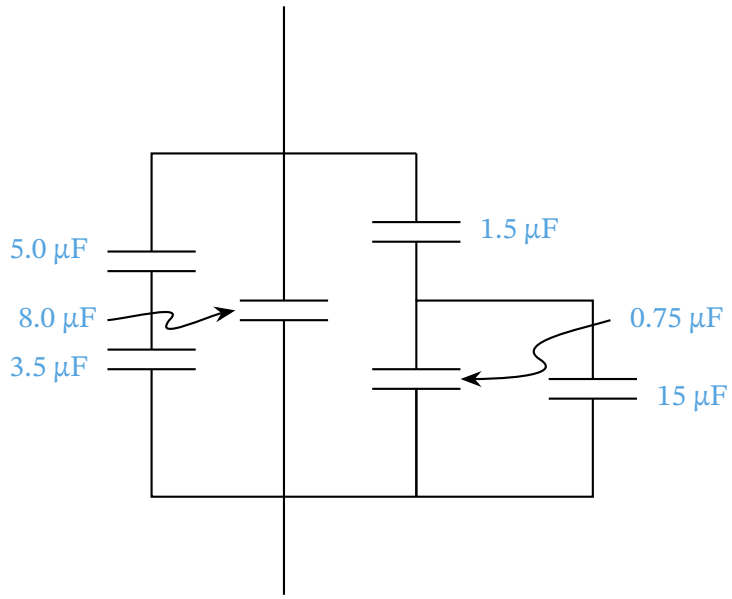
C 143 V

D 165 V

E 133 V

Q5: Find the net capacitance of the combination of series and parallel capacitors shown.

Question Video



A 0.75 μF

B 5.5 μF

C 11 μF

D 15 μF

E 1.0 μF

Q6: Suppose you need a capacitor bank with a total capacitance of 0.810 F but you only have 1.70 mF capacitors at your disposal. What is the smallest number of capacitors you could connect together to achieve your goal?

A 159

B 2

C 238

D 50

E 476

Q7: Three capacitors having capacitances of 8.40 μF, 8.40 μF, and 4.20 μF, respectively, are connected in series across a 36.0 V potential difference.

- What is the charge on the 4.20 μF capacitor?

A 75.6 μC

B 86.8 μC

C 82.1 μC

D 78.2 μC

E 80.3 μC

The capacitors are disconnected from the potential difference without allowing them to discharge. The capacitors are then reconnected in parallel with each other, their positively charged plates all connected so as to be at the same potential. What is the voltage across each of the capacitors in the parallel combination?

A 10.8 V

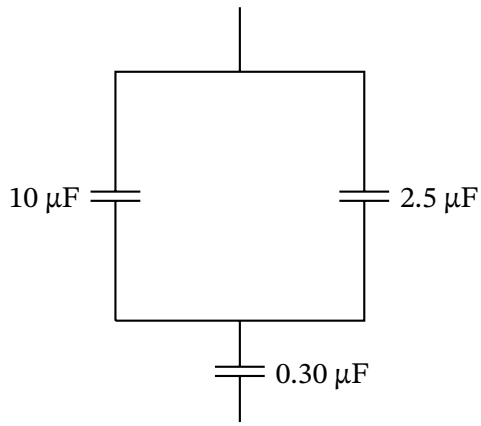
B 12.0 V

C 11.7 V

D 10.2 V

E 11.2 V

Q8: Find the total capacitance of the combination of series and parallel capacitors shown in the figure.



A 0.48 μF

B 0.34 μF

C 0.39 μF

D 0.54 μF

E 0.29 μF

Q9: The capacitance of a variable capacitor can be manually changed from 200 pF to 500 pF by turning a dial connected to one set of plates by a shaft from 0° to 180°, where a dial setting of 180° corresponds to a capacitance of 500 pF. the capacitor is connected to a 470 V source. After charging, the capacitor is disconnected from the source and the dial is turned to 0°.

- What is the charge on the capacitor?

A 0.024 μC

B 0.94 μC

C 0.59 μC

D 0.094 μC

E 0.24 μC

- What is the voltage across the capacitor when the dial is set to 0°?

A 790 V

B 1 100 V

C 840 V

D 470 V

E 1 200 V

Q10: Three capacitors with capacitances of $C_1 = 1.5$ μF, $C_2 = 5.0$ μF, and $C_3 = 8.0$ μF are connected in parallel. A 720 V potential difference is applied across the combination.

Question Video

What is the voltage across the C_1 capacitor?

A 0.056 V

B 74 V

C 18 V

D 1.4 V

E 720 V

What is the charge across the C_2 capacitor?

A 140 mC

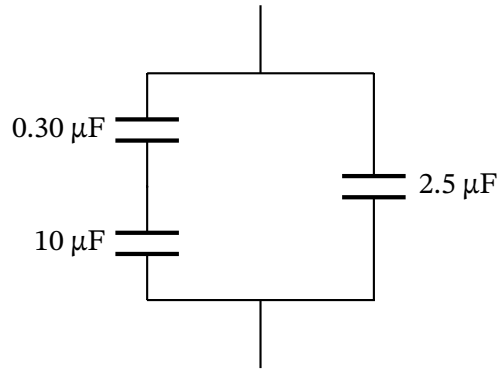
B 36 mC

C 280 mC

D 6.9 mC

E 3.6 mC

Q11: What is the equivalent capacitance of the combination of series and parallel capacitors shown?



A 2.8 μF

B 13 μF

C 6.5 μF

D 2.0 μF

E 11.4 μF