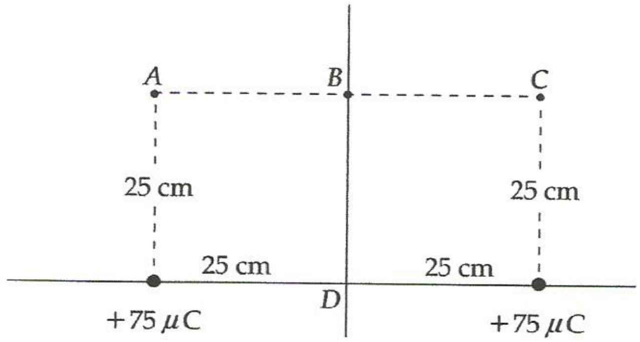
7. Electrons leave the cathode of a TV tube at essentially zero speed and are accelerated toward the front by 10,000 V potential. At what speed do they strike the screen? Express this value also as a fraction of the speed of light.

8. A charge of $-4.00\ \mu C$ is fixed in place. From a horizontal distance of 55.0 cm, a particle of mass 2.50×10^{-3} kg and charge $-3.00\ \mu C$ is fired with an initial speed of 15.0 m/s directly toward the fixed charge. How far does the particle travel before it stops and begins to return back?

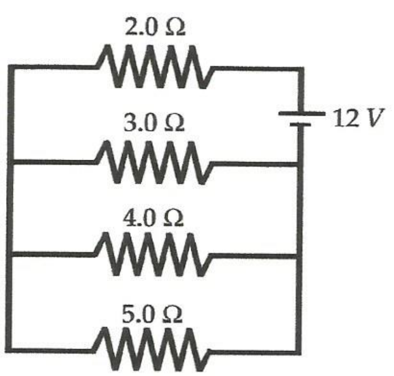
9. In the figure to the right, find the magnitude and direction of the electric field at points *A*, *B*, *C* and *D*.



10. In Question 9, calculate the work needed to move a 1.5 μC test charge from point *B* to point *D*.

11. A 15 μF capacitor is connected to a 55 V battery and becomes fully charged. The battery is removed and the circuit is left open. A slab of dielectric material is inserted to completely fill the space between the plates. It has a dielectric constant of 4.8. What is the voltage across the capacitor plates after the slab is in place?

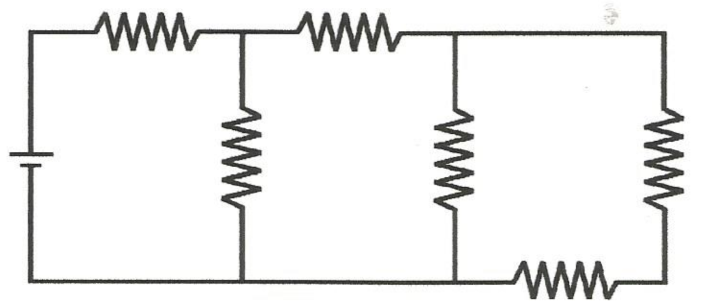
12. For the simple circuit shown at the right, determine the current through each resistor and the potential difference across the 5 Ω resistor.



13. A galvanometer of coil resistance 50.0 Ω deflects full scale for a current of 3.50 mA. What series resistance should be used with this galvanometer to construct a voltmeter which deflects full scale for 35.0 V?

14. When connected in series to a 110-V line, two resistors use one-fourth the power that is used when they are connected in parallel. If one resistor is 2.0 kΩ, what is the resistance of the other?

15. Find the equivalent resistance of the circuit shown below. Each of the six resistors has a resistance equal to 12 Ω.

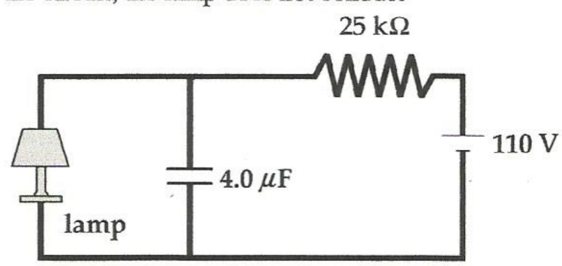


16. A 9.0 μF and 4.0 μF capacitors are connected in parallel, and this combination is connected in series with a 12.0 μF capacitor.

  a. What is the net capacitance?

  b. If 32 V is applied across the whole network, calculate the voltage across each capacitor.

17. A simple type of blinking light circuit can be constructed using a neon lamp. The circuit shown here has a 4.0 μF capacitor in parallel with a neon lamp. When the voltage is low in the RC portion of the circuit, the lamp does not conduct electricity. Therefore, it is effectively not there from an electrical point of view. The RC circuit will then charge from the 110 V power supply. However, when the voltage across the capacitor reaches 75 V, the neon will ionize very quickly and the neon lamp will become a very good conductor, and will immediately discharge the capacitor. The energy stored in the capacitor will be given off as a flash of orange light, making this a useful circuit. After the flash, the charging process will start once more since the voltage will again be low.



  a. Determine the flash frequency with the resistance value shown.

  b. Make a sketch of the voltage across the capacitor versus time in such a circuit, showing several periods.

18. Consider the circuit shown to the right.

  a. Calculate the current though the 22 Ω resistor.

  b. What is the voltage across *ab*.