Algebra-Based Physics-2: Electricity, Magnetism, and Modern Physics (PHYS135B-01): Review

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Review

Summary

1. Chapter 18 - Charges and Electric Fields
2. Chapter 19 - Electric Potential and Electric Field
3. Chapter 20 - Electric Current, Resistance, and Ohm's Law
4. Chapter 21 - Circuits and DC instruments
5. Chapter 22 - Magnetism
6. Chapter 23 - Electromagnetic Induction
7. Electromagnetic waves

Review

Charge $q_1 = 2$ nC and $q_2 = 1$ nC. Find the location on the x-axis with an E-field value of 0, if q_1 and q_2 are each 20 cm from the origin.

Suppose $q_1 = 1$ nC and $q_2 = 1$ nC. What is the right expression for the E-field a distance r that is far away from the origin?

- A: $E = k(q)/r^3$
- B: $E = kq^2/r^2$
- C: $E = kq/r^2$
- D: $E = 2kq/r^2$

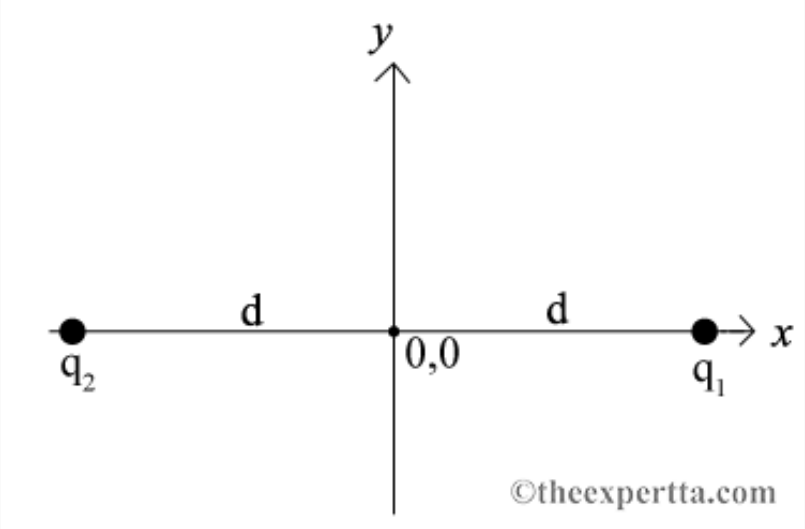

Figure 1

Review

Suppose the density of the oil droplets in the Millikan oil-drop experiment is 885 kg/m^3. If the radii of the drops is observed to be 1 μm, what is the mass of the drops?

What is the weight of the drops in Newtons?

Suppose an E-field of 4545 N/C is required to hold the drops motionless. How many electrons are on the drops, on average?

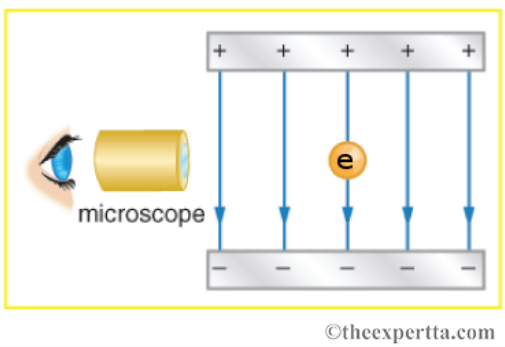

Figure 2

If the field were increased in magnitude, the charges would:

- A: accelerate upwards
- B: accelerate downwards
- C: move down at constant v
- D: move up at constant v

Review

Suppose the capacitances C_1, C_2, and C_3 are all 5 μF. What is the total capacitance?

Suppose $C_1 = C_2 = 5\mu$F, but $C_3 = 100\mu$F. What is the total capacitance?

Suppose a 1 μF capacitor is connected in series with a 1 kΩ resistor. What is the RC time?

When will the capacitor in the RC circuit reach 90% of the votlage of the charging battery?

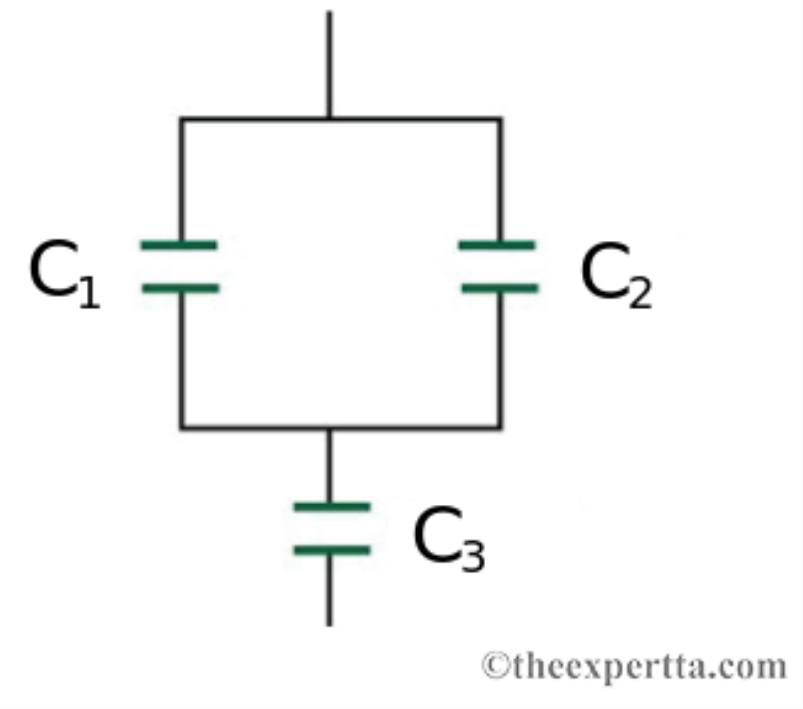

Figure 3

Review

What equation do you get when you apply the loop rule to the loop abcdefgha, in terms of the variables in the figure?

If the current through the top branch is $I_2 = 0.52$ A, what is the current through the bottom, I_3, in amps?

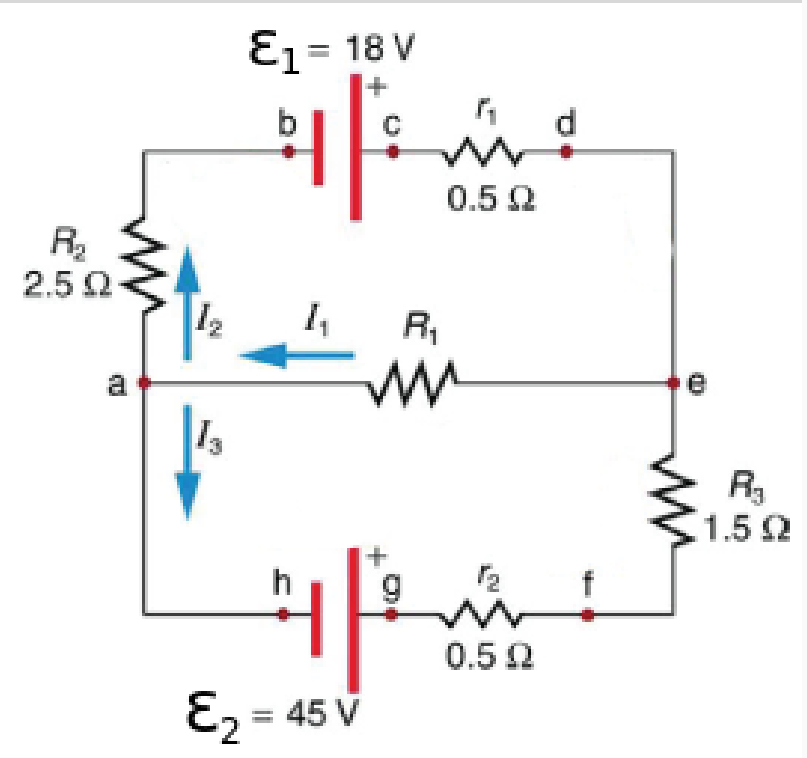

Figure 4

Review

What is the value of the B-field a distance of 1 cm from a 10A current?

If the current is cut in half, but the distance is doubled, what is the new B-field?

If two currents flowing in the same direction are placed near each other, they:

- A: repel each other always
- B: attract each other always
- C: repel each other if one changes
- D: attract each other if one changes

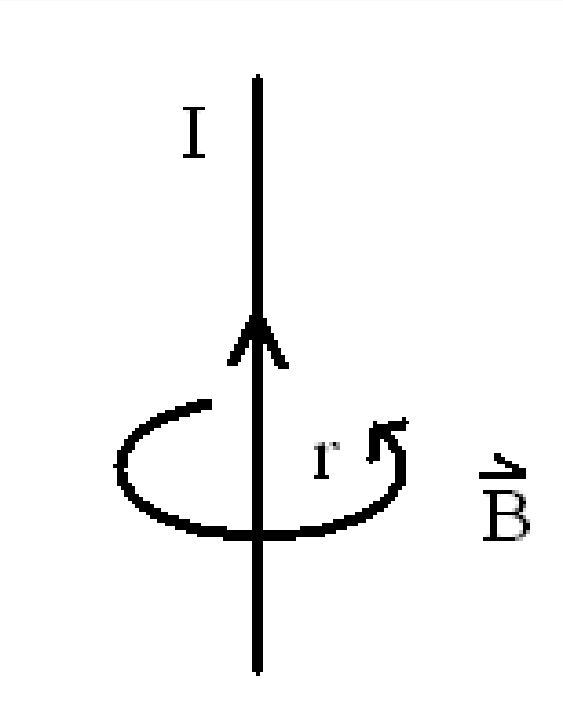

Figure 5

Review

If the total number of turns in the loop is 500, and the frequency is 1000 Hz, what is the peak emf in the 0.03 T B-field?

Double the frequency, f, will

- A: Make the graph at bottom right oscillate more rapidly, but not raise the amplitude.
- B: Raise the amplitude of the graph at bottom right.
- C: Lower the amplitude of the graph at bottom right.
- D: Both raise the amplitude of the graph at bottom right, and make it oscillate more rapidly.

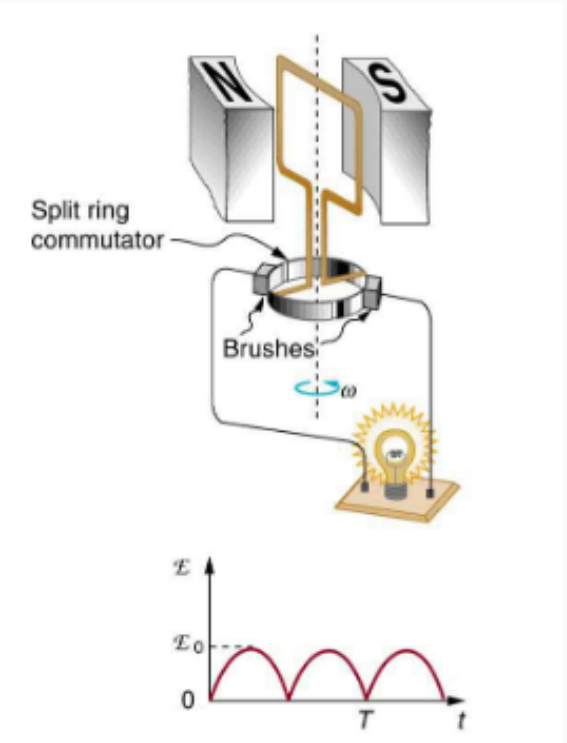

Figure 6

Conclusion

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