

Physics 2020 Exam 1

Review Items and Questions

Dr. Luttermoser's Class

1. Robert Millikan made a fundamental discovery about electric charges in 1909. What was it?
 2. What is the difference between conductors, semiconductors, and insulators?
 3. What is meant by *a conductor being grounded*?
 4. What is **Coulomb's Law**? Compare it to Newton's Law of Gravity. What is the principle of superposition?
 5. Describe the electric field for a proton in isolation, and electron in isolation, an electron-proton pair, and a proton-proton pair. What is the magnitude of the electric field of a point charge?
 6. What is meant by electrostatic equilibrium?
 7. What is the **electric flux** and what does it measure? What is **Gauss's law**?
 8. Review the summary of Chapter 15 in the textbook and learn the definition of all boldface terms in this chapter.
 9. Review Examples I-1 (Coulomb's force), I-2 (one-dimensional motion for charges), I-3 (superposition principle of E -fields), I-4 (electric field lines), and I-5 (electric flux) in the class notes. Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 1 (Coulomb's law), 2 (superposition principle of E -fields), 3 (E -fields), and 4 (Gauss's law).
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10. What is meant by the phrase *the electrostatic force is conservative*? What is the work done on an electric field?
 11. Define **potential difference**. What units is it measured in? What is the electric potential of a point charge? What is an electron volt?
 12. Describe the concept of an equipotential surface. How much work is done to move a charge on an equipotential surface?
 13. Define **capacitance**. What units is it measured in? What is the capacitance of a parallel-plate capacitor? How is Coulomb's constant related to the permittivity of free space?
 14. One can often reduce a complicated circuit to a simple circuit. How do capacitors add in a parallel circuit? And in a series circuit?

15. Describe how the internal energy of a capacitor changes as the voltage changes within it.
 16. What is a **dielectric**? How does it affect the capacitance, charge, potential difference, and internal energy of a capacitor? Why isn't the air a good dielectric?
 17. Review the summary of Chapter 16 in the textbook and learn the definition of all boldface terms in this chapter.
 18. Review Examples II-2 (superposition principle of potential), II-3 (geometric properties of capacitors), II-4 (capacitors in circuits), and II-5 (internal energy of a capacitor) in the class notes. Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 6 (superposition principle of potential), 7 (geometric properties of capacitors), and 8 (capacitors in circuits).
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19. Define electric current. What direction does current flow? What is the drift speed?
20. What is **Ohm's Law**? How is resistance different from resistivity? What is meant by *Resistance is futile*?
21. How does resistance and resistivity change with temperature? What is a thermistor? What is a superconductor? Who is superman?
22. Know the various forms of the equation of power in a electric circuit.
23. Review the summary of Chapter 17 in the textbook and learn the definition of all boldface terms in this chapter.
24. Review Examples III-1 (drift speed), III-2 (resistivity), III-3 (thermistors), and III-4 (power and energy) in the class notes. Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 9 (current), 10 (resistivity), 11 (Ohm's law), and 12 (electric power).