Physics 2020 Exam 1 Review 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 (Serway & Vuille Textbook Problem: SV 15.30, electric field lines), and I-5 (SV 15.41, electric flux) in the class notes. Make sure you understand CAPA Problems 1.2 (electric force); 1.3 and 1.4 (electric fields). Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 1 (SV 15.9, Coulomb's law), 2 (SV 15.18, superposition principle of E-fields), 3 (SV 15.32, E-fields), and 4 (SV 15.45, 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 (SV 16.25, geometric properties of capacitors), II-4 (SV 16.39, capacitors in circuits), and II-5 (internal energy of a capacitor) in the class notes. Make sure you understand CAPA Problems 1.5 and 1.6 (potential differences) and 1.7 (capacitance). Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 6 (SV 16.17, superposition principle of potential), 7 (SV 16.30, 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 (SV 17.7, drift speed), III-2 (SV 17.17, resistivity), III-3 (thermistors), and III-4 (SV 17.34, power and energy) in the class notes. Make sure you understand CAPA Problems 1.8 (resistivity); 1.9 (Ohm's law); and 1.10 (electric power). Finally, make sure you understand how to do the Supplemental Homework Problem Set 1: 9 (current), 10 (resistivity), 11 (SV 17.27, Ohm's law), and 12 (SV 17.37, electric power).