

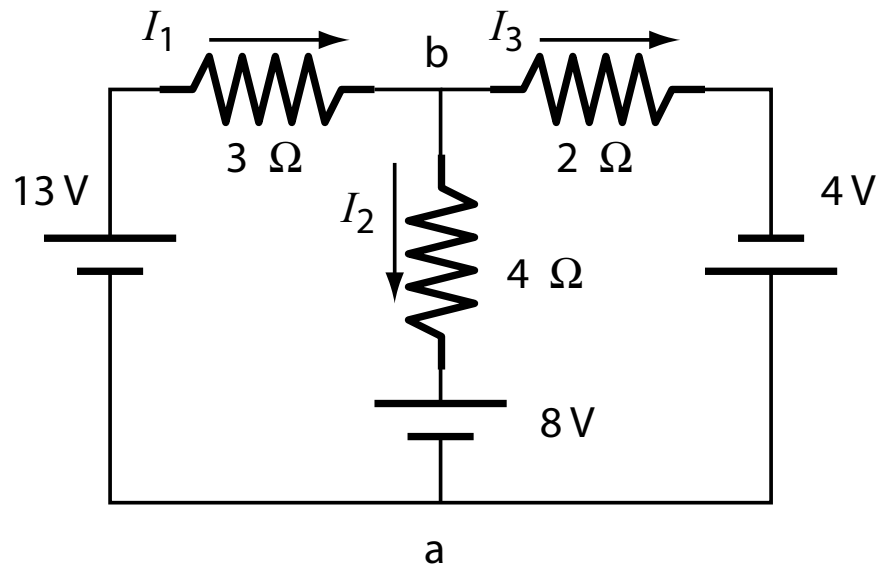
# Hour Exam Wednesday

- 4:10 pm in Packard 101
- info on web

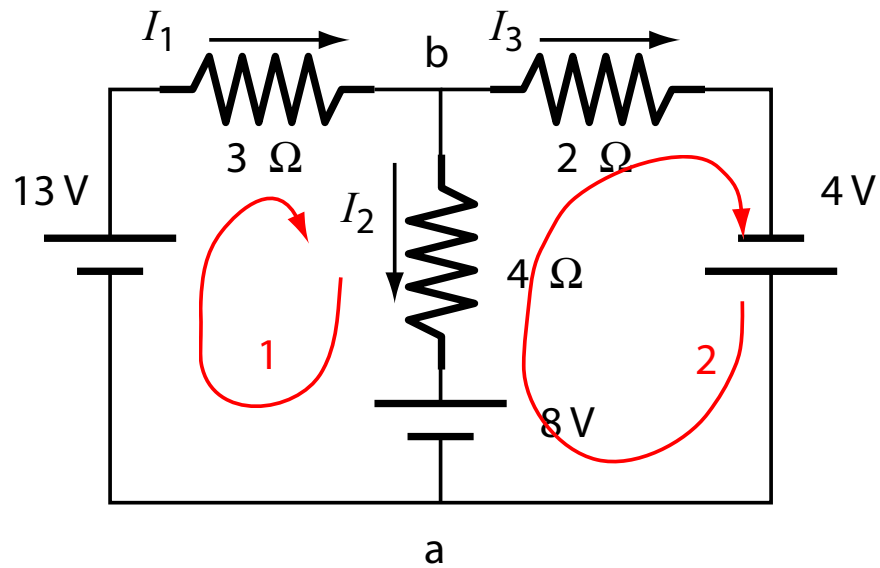
# Today

- review Practice Exam
- answer questions

# Practice Exam, Q 1



# Practice Exam, Q 1



# Physics 21 Fall, 2004

## Information about Exam-1

**First Hour Exam:** There will be an exam on Wednesday, September 22, 2004 at 4:10 pm in Packard 101. The time limit will be one hour. The exam will be closed book and closed notes. Any physical constants and integrals you will need will be given on the exam. The equation sheet posted on the course web site will be included with the exam.

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**Use of Calculators:** You should bring a calculator. For some questions you may need to solve simultaneous algebraic equations, for example, three equations in three unknowns. You must solve such equations by hand and show the solutions for full credit. In general, setting up the equations correctly will be worth more than solving them.

**Coverage:** The exam will cover all the reading assignments through and including L-9: (lecture 9).

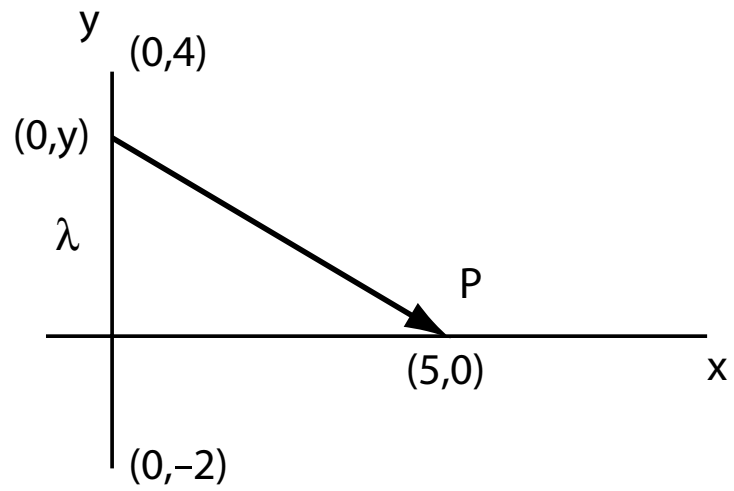
- Chapter 21: §1–10
- Chapter 22, 23, 24: all
- Chapter 25: §1–6,8
- Chapter 26: §1–5

The exam will emphasize the material covered in lecture, recitation or homework. The following is a list of topics and questions you should be familiar with. This list is not necessarily complete but is representative.

- 2 • Know the vector form of Coulomb's Law.
- 2 • Find the electric field of several point charges.
- 2 • For a distribution of charges on a line, find  $\lambda$ . Find  $\sigma$  or  $\rho$  for two- or three- dimensional distributions.
- 4 • Know how to integrate over a linear charge distribution to get the electric field or potential at an arbitrary point.
- What is the relation between the electric field and the electric potential?
- Find the electric potential of several point charges.
- Draw the electric field lines and the equipotential lines of a point charge. Do the same for a dipole.
- What is the electric field of an infinite sheet of charge? Use this result to find the electric field between the parallel plates of a capacitor.
- What is the energy density in an electric field?
- How much energy is stored in a charged capacitor?

- Find the speed of an electron in a circular orbit about a proton, given the mass and radius.
- 3 • What is Gauss's Law?
- 3 • Use Gauss's Law to find the field of a spherical, planar, cylindrical, or linear charge distribution.
- 1 • In a circuit diagram, what are the symbols for battery, capacitor, and resistance? Know how the battery symbol indicates the + and - terminals of a battery.
- 3 • What is the electric field inside a conductor?
- 3 • What is the direction of the electric field at the surface of a conductor?
- On a microscopic level, how does a dielectric (insulator) respond to an electric field?
- Describe qualitatively the operation of a simple electric cell made from carbon and zinc electrodes immersed in sulfuric acid.
- How much power is dissipated when a current passes through a resistor?
- What is Ohm's Law?
- How does a current divide when it branches to flow through two resistors in parallel?
- What does it mean that a battery is rated for a certain number of ampere-hours?
- 4 • How do the charges arrange themselves on two capacitors connected in parallel?
- Know how to set up the integral to find the potential of a circular charge distribution at a point off axis.
- 3 • What does it mean to do a surface integral  $\int \mathbf{E} \cdot d\mathbf{A}$  over a surface  $S$ ? If  $S$  is closed, what is the convention for the direction of  $d\mathbf{A}$ ?
- 1 • Know how to find the potential difference between any two points on an electric circuit.
- 4 • What is the effective capacitance for two capacitors in series or parallel? What about resistors?
- 1 • What are Kirchoff's Rules? Know how to apply them.
- 5 • Know how to write the loop equation for any loop of a circuit.
- 5 • What is the time constant for an  $RC$  circuit? Know how to analyze such a circuit.
- 5 • What is current?
  - What is an electron volt?
  - What is an equipotential surface?
- 4 • What is the dielectric constant? What happens to the capacitance if an insulator with dielectric constant  $K$  is placed between the capacitor plates?

# Practice Exam, Q 2



# Physics 21 Fall, 2004

## Information about Exam-1

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**Coverage:** The exam will cover all the reading assignments through and including L-9: (lecture 9).

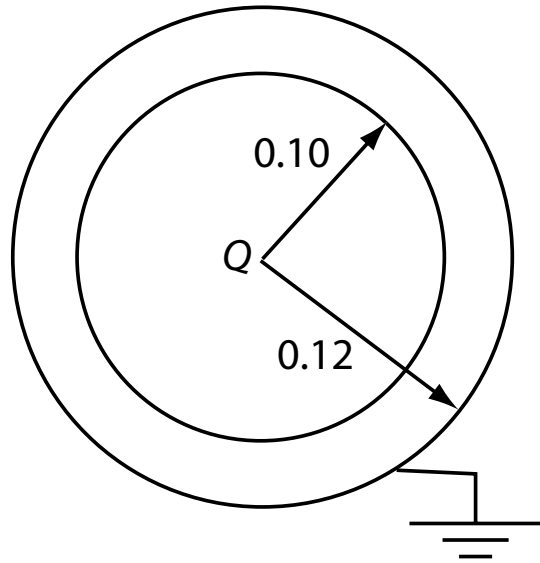
- Chapter 21: §1–10
- Chapter 22, 23, 24: all
- Chapter 25: §1–6,8
- Chapter 26: §1–5

The exam will emphasize the material covered in lecture, recitation or homework. The following is a list of topics and questions you should be familiar with. This list is not necessarily complete but is representative.

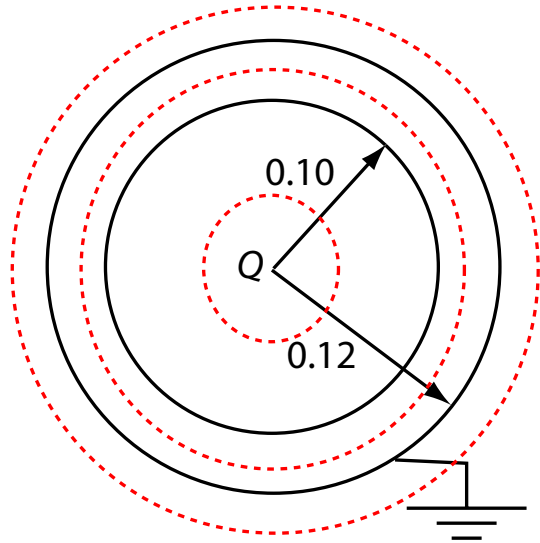
- 2 • Know the vector form of Coulomb's Law.
- 2 • Find the electric field of several point charges.
- 2 • For a distribution of charges on a line, find  $\lambda$ . Find  $\sigma$  or  $\rho$  for two- or three- dimensional distributions.
- 4 • Know how to integrate over a linear charge distribution to get the electric field or potential at an arbitrary point.
- What is the relation between the electric field and the electric potential?
- Find the electric potential of several point charges.
- Draw the electric field lines and the equipotential lines of a point charge. Do the same for a dipole.
- What is the electric field of an infinite sheet of charge? Use this result to find the electric field between the parallel plates of a capacitor.
- What is the energy density in an electric field?
- How much energy is stored in a charged capacitor?

- Find the speed of an electron in a circular orbit about a proton, given the mass and radius.
- 3 • What is Gauss's Law?
- 3 • Use Gauss's Law to find the field of a spherical, planar, cylindrical, or linear charge distribution.
- 1 • In a circuit diagram, what are the symbols for battery, capacitor, and resistance? Know how the battery symbol indicates the + and - terminals of a battery.
- 3 • What is the electric field inside a conductor?
- 3 • What is the direction of the electric field at the surface of a conductor?
- On a microscopic level, how does a dielectric (insulator) respond to an electric field?
- Describe qualitatively the operation of a simple electric cell made from carbon and zinc electrodes immersed in sulfuric acid.
- How much power is dissipated when a current passes through a resistor?
- What is Ohm's Law?
- How does a current divide when it branches to flow through two resistors in parallel?
- What does it mean that a battery is rated for a certain number of ampere-hours?
- 4 • How do the charges arrange themselves on two capacitors connected in parallel?
- Know how to set up the integral to find the potential of a circular charge distribution at a point off axis.
- 3 • What does it mean to do a surface integral  $\int \mathbf{E} \cdot d\mathbf{A}$  over a surface  $S$ ? If  $S$  is closed, what is the convention for the direction of  $d\mathbf{A}$ ?
- 1 • Know how to find the potential difference between any two points on an electric circuit.
- 4 • What is the effective capacitance for two capacitors in series or parallel? What about resistors?
- 1 • What are Kirchoff's Rules? Know how to apply them.
- 5 • Know how to write the loop equation for any loop of a circuit.
- 5 • What is the time constant for an  $RC$  circuit? Know how to analyze such a circuit.
- 5 • What is current?
  - What is an electron volt?
  - What is an equipotential surface?
- 4 • What is the dielectric constant? What happens to the capacitance if an insulator with dielectric constant  $K$  is placed between the capacitor plates?

# Practice Exam, Q 3



# Practice Exam, Q 3



# Physics 21 Fall, 2004

## Information about Exam-1

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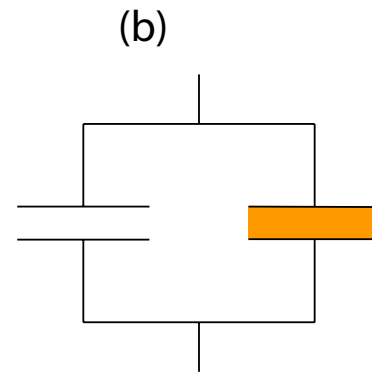
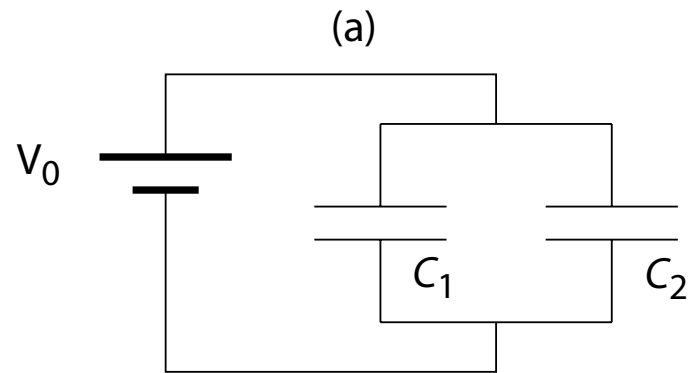
- Chapter 21: §1–10
- Chapter 22, 23, 24: all
- Chapter 25: §1–6,8
- Chapter 26: §1–5

The exam will emphasize the material covered in lecture, recitation or homework. The following is a list of topics and questions you should be familiar with. This list is not necessarily complete but is representative.

- 2 • Know the vector form of Coulomb's Law.
- 2 • Find the electric field of several point charges.
- 2 • For a distribution of charges on a line, find  $\lambda$ . Find  $\sigma$  or  $\rho$  for two- or three- dimensional distributions.
- Know how to integrate over a linear charge distribution to get the electric field or potential at an arbitrary point.
- What is the relation between the electric field and the electric potential?
- Find the electric potential of several point charges.
- Draw the electric field lines and the equipotential lines of a point charge. Do the same for a dipole.
- What is the electric field of an infinite sheet of charge? Use this result to find the electric field between the parallel plates of a capacitor.
- What is the energy density in an electric field?
- How much energy is stored in a charged capacitor?

- Find the speed of an electron in a circular orbit about a proton, given the mass and radius.
- 3 • What is Gauss's Law?
- 3 • Use Gauss's Law to find the field of a spherical, planar, cylindrical, or linear charge distribution.
- 1 • In a circuit diagram, what are the symbols for battery, capacitor, and resistance? Know how the battery symbol indicates the + and - terminals of a battery.
- 3 • What is the electric field inside a conductor?
- 3 • What is the direction of the electric field at the surface of a conductor?
- On a microscopic level, how does a dielectric (insulator) respond to an electric field?
- Describe qualitatively the operation of a simple electric cell made from carbon and zinc electrodes immersed in sulfuric acid.
- How much power is dissipated when a current passes through a resistor?
- What is Ohm's Law?
- How does a current divide when it branches to flow through two resistors in parallel?
- What does it mean that a battery is rated for a certain number of ampere-hours?
- 4 • How do the charges arrange themselves on two capacitors connected in parallel?
- Know how to set up the integral to find the potential of a circular charge distribution at a point off axis.
- 3 • What does it mean to do a surface integral  $\int \mathbf{E} \cdot d\mathbf{A}$  over a surface  $S$ ? If  $S$  is closed, what is the convention for the direction of  $d\mathbf{A}$ ?
- 1 • Know how to find the potential difference between any two points on an electric circuit.
- 4 • What is the effective capacitance for two capacitors in series or parallel? What about resistors?
- 1 • What are Kirchoff's Rules? Know how to apply them.
- 5 • Know how to write the loop equation for any loop of a circuit.
- 5 • What is the time constant for an  $RC$  circuit? Know how to analyze such a circuit.
- 5 • What is current?
  - What is an electron volt?
  - What is an equipotential surface?
- 4 • What is the dielectric constant? What happens to the capacitance if an insulator with dielectric constant  $K$  is placed between the capacitor plates?

# Practice Exam, Q 4



# Physics 21 Fall, 2004

## Information about Exam-1

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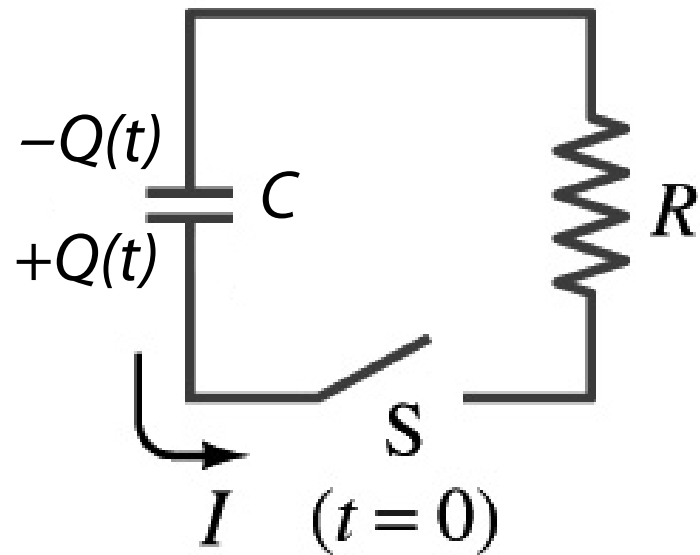
- Chapter 21: §1–10
- Chapter 22, 23, 24: all
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- 4 • Know how to integrate over a linear charge distribution to get the electric field or potential at an arbitrary point.
- What is the relation between the electric field and the electric potential?
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- Find the speed of an electron in a circular orbit about a proton, given the mass and radius.
- 3 • What is Gauss's Law?
- 3 • Use Gauss's Law to find the field of a spherical, planar, cylindrical, or linear charge distribution.
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- What is Ohm's Law?
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- 5 • What is the time constant for an  $RC$  circuit? Know how to analyze such a circuit.
- 5 • What is current?
  - What is an electron volt?
  - What is an equipotential surface?
- 4 • What is the dielectric constant? What happens to the capacitance if an insulator with dielectric constant  $K$  is placed between the capacitor plates?

# Practice Exam, Q 5



# Physics 21 Fall, 2004

## Information about Exam-1

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- 4 • Know how to integrate over a linear charge distribution to get the electric field or potential at an arbitrary point.
- What is the relation between the electric field and the electric potential?
- Find the electric potential of several point charges.
- Draw the electric field lines and the equipotential lines of a point charge. Do the same for a dipole.
- What is the electric field of an infinite sheet of charge? Use this result to find the electric field between the parallel plates of a capacitor.
- What is the energy density in an electric field?
- How much energy is stored in a charged capacitor?

- Find the speed of an electron in a circular orbit about a proton, given the mass and radius.
- 3 • What is Gauss's Law?
- 3 • Use Gauss's Law to find the field of a spherical, planar, cylindrical, or linear charge distribution.
- 1 • In a circuit diagram, what are the symbols for battery, capacitor, and resistance? Know how the battery symbol indicates the + and - terminals of a battery.
- 3 • What is the electric field inside a conductor?
- 3 • What is the direction of the electric field at the surface of a conductor?
- On a microscopic level, how does a dielectric (insulator) respond to an electric field?
- Describe qualitatively the operation of a simple electric cell made from carbon and zinc electrodes immersed in sulfuric acid.
- How much power is dissipated when a current passes through a resistor?
- What is Ohm's Law?
- How does a current divide when it branches to flow through two resistors in parallel?
- What does it mean that a battery is rated for a certain number of ampere-hours?
- 4 • How do the charges arrange themselves on two capacitors connected in parallel?
- Know how to set up the integral to find the potential of a circular charge distribution at a point off axis.
- 3 • What does it mean to do a surface integral  $\int \mathbf{E} \cdot d\mathbf{A}$  over a surface  $S$ ? If  $S$  is closed, what is the convention for the direction of  $d\mathbf{A}$ ?
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- 1 • What are Kirchoff's Rules? Know how to apply them.
- 5 • Know how to write the loop equation for any loop of a circuit.
- 5 • What is the time constant for an  $RC$  circuit? Know how to analyze such a circuit.
- 5 • What is current?
  - What is an electron volt?
  - What is an equipotential surface?
- 4 • What is the dielectric constant? What happens to the capacitance if an insulator with dielectric constant  $K$  is placed between the capacitor plates?