

Final Exam and End Material Test

Friday, May 12, 10:00-12:00

Test rooms:

Instructor	Sections	Room
• Dr. Hale	F, H	104 Physics
• Dr. Kurter	B, N	125 BCH
• Dr. Madison	K, M	B-10 Bertelsmeyer
• Dr. Parris	J	St. Pats Ballroom
• Dr. Parris	L	112 Bertelsmeyer
• Mr. Upshaw	A, C, E, G	St. Pats Ballroom
• Dr. Waddill	D	120 BCH
• Special Accommodations		Testing Center

(Contact me a.s.a.p. if you need accommodations different than for exam 3)

No calculators! All problems will be symbolic!

Announcements

Final exam day events (Friday, May 12, 10:00am to 12:00pm)

- 50-point multiple choice end-material test (covering material from chapters 33-36). (You get a free 8-point question!)
- 200 point comprehensive final exam, all problems (no multiple choice), about 50% emphasis on chapters 33-36

You may take neither, one, or both of these tests. Your choice. No one admitted after 10:15am!

You may spend your two hours however you see fit (all on end-material, all on final exam, some mix).

No calculators, no external communications, any use of cell phone, tablet, smartwatch etc. will be considered **cheating**

Announcements

Your end material test points have been set to 8 already.

You do **not** need to take the test to receive these points.

Posted grade spreadsheets are active – play with the scores to see how many points you need for the next higher grade.

Grade cutoffs will **not be lowered** under any circumstances.

If any of your scores need to be fixed contact your recitation instructor NOW!

Announcements

PLC

No PLC on Wednesday.

Teaching evaluations

<http://teacheval.mst.edu>

<http://teachevalm.mst.edu>

If you liked the class, please let us know! Constructive criticism is highly appreciated as well!

The links are available until Sunday before Finals Week.

LEAD Tutors/Peer Instructors Needed!

You can tutor or be a PLC peer instructor if you have at least a 3.6 GPA and get an "A" in the course you want to tutor.

Go to
<http://lead.mst.edu/>
to fill out the
[application form](#).

It looks good on your
resume, pays well,
and is fun!



Physics 2135 Topics

Part 1:

Coulomb's Law

electric fields

electric fields from charge distributions

motion of a charged particle in an electric field

Gauss' Law

electric potentials and electric potential energy

Final exam problems may come from topics not covered on test preparation homework or during the final lecture.

Physics 2135 Topics

Part 2:

capacitance, dielectrics, energy storage in capacitors,
capacitors in series and parallel
current density and drift speed
Ohm's law, resistors in series and parallel
electric power
emf, Kirchoff's Rules
rc circuits, electrical instruments

Final exam problems may come from topics not covered on
test preparation homework or during the final lecture.

Physics 2135 Topics

Part 3:

magnetic forces on moving charged particles
wires carrying currents
solenoids, magnetic fields from current-carrying wires
calculation of magnetic field using Biot-Savart Law
Faraday's Law, induction, motional emf
electric field produced by changing flux
motors, generators, transformers
electromagnetic waves

Final exam problems may come from topics not covered on test preparation homework or during the final lecture.

Physics 2135 Topics

Part 4:

Snell's Law, total internal reflection, fiber optics
mirrors
lenses
interference (double slits, thin films)
diffraction

Final exam problems may come from topics not covered on test preparation homework or during the final lecture.

Final Exam Format

200 points total from the following material:

20 to 40 points from test 1 material

20 to 40 points from test 2 material

20 to 40 points from test 3 material

80 to 100 points from end material.

All problems, some "in-line" multiple choice.

The problems may be 40-point problems, 40-point problems with more than one part, or two smaller problems worth 40 points total.

Test Preparation homework focuses on material after exam 3.

This lecture focuses on material before exam 3.

Be sure to study both if you intend to take the final!

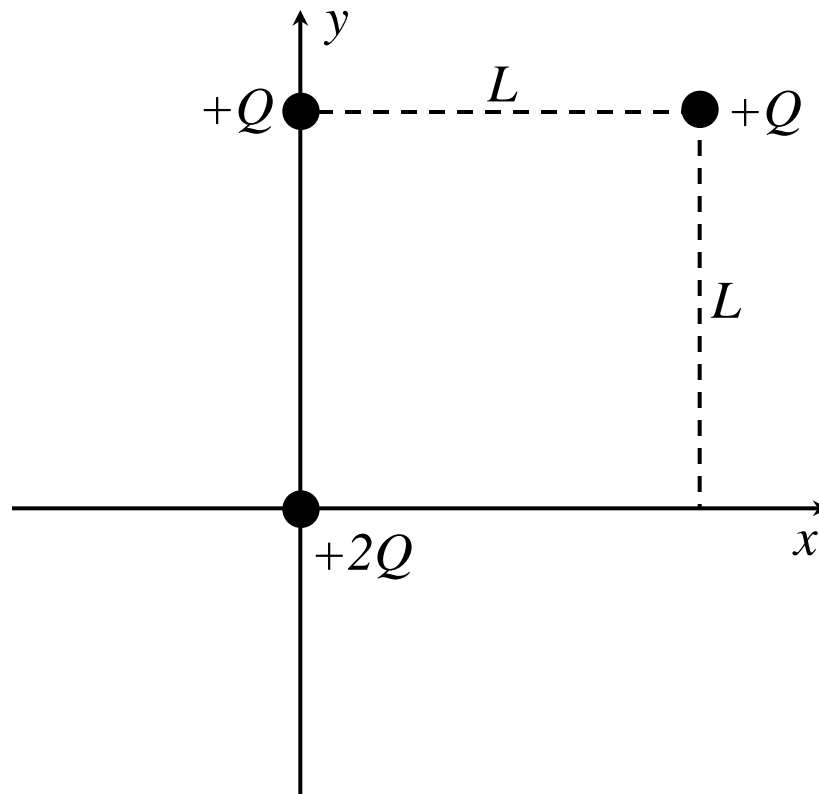
Final Exam Review

The problems in this lecture are the standard “exam review lecture” problems and are not a guarantee of the exam content, nor are they intended to “tell” you what to study for. Expect final exam questions from material not covered in today’s lecture!

Please Look at Prior Tests!

Two identical point charges $+Q$ are located on corners of a square of side L , as shown in the diagram. A point charge of $+2Q$ is located at the origin.

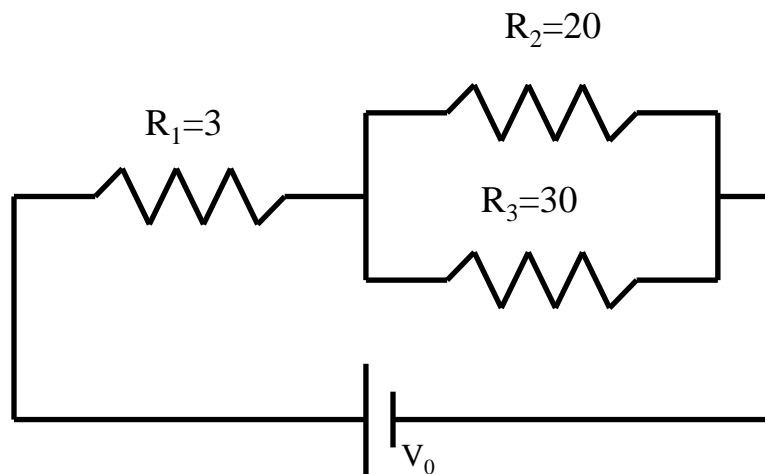
Find the Coulomb force on the point charge at the origin.



For the resistor system shown, $R_1 = 3 \Omega$, $R_2 = 20 \Omega$, and $R_3 = 30 \Omega$.

(a) Find the equivalent resistance.

(b) The power dissipated by R_3 is 480 W. Find V_0 .



A proton is accelerated from rest through a potential difference of ΔV . The proton then enters a uniform magnetic field that is perpendicular to its velocity. In the magnetic field, the proton follows a circular path with a radius R .

(a) Determine the speed, v , of the proton when it enters the magnetic field.

(b) Determine the magnitude of the magnetic field and the period, T , of the proton's motion in the magnetic field.

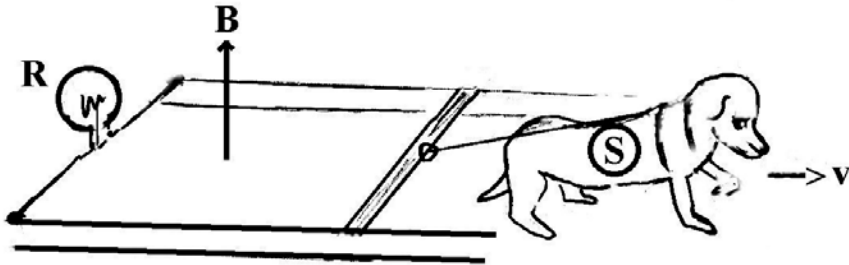
(c) Suppose the proton exits the magnetic field region after it has completed a half-circular path. What is the proton's speed when it exits the magnetic field region?

A small generator consists of a flat, square coil of 120 turns and sides of length 1.60 cm. The coil rotates in a magnetic field of 0.75 mT.

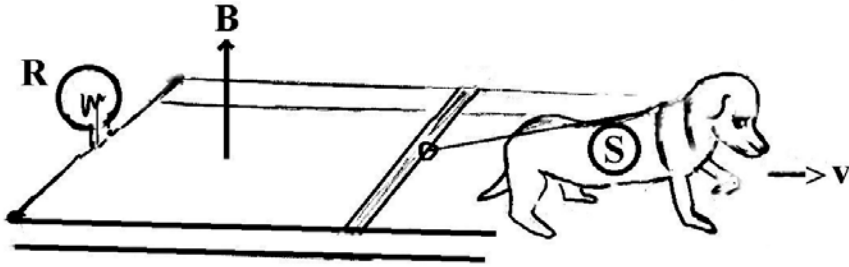
- (a) Derive an expression for the time dependence of the magnetic flux Φ_B through each turn.
- (b) What is the angular speed of the coil if the maximum emf produced is 24.0 mV?
- (c) What is the orientation of the coil when the emf is a maximum?
- (d) What is the orientation of the coil when the magnetic flux through the coil is a maximum?

Muffi the Super Dog pulls a metal bar of length L with constant speed v along two parallel horizontal frictionless metal tracks, as shown in the diagram. Between the tracks there is a constant magnetic field of magnitude B , directed vertically upward. A light bulb of resistance R is attached across the two tracks as shown.

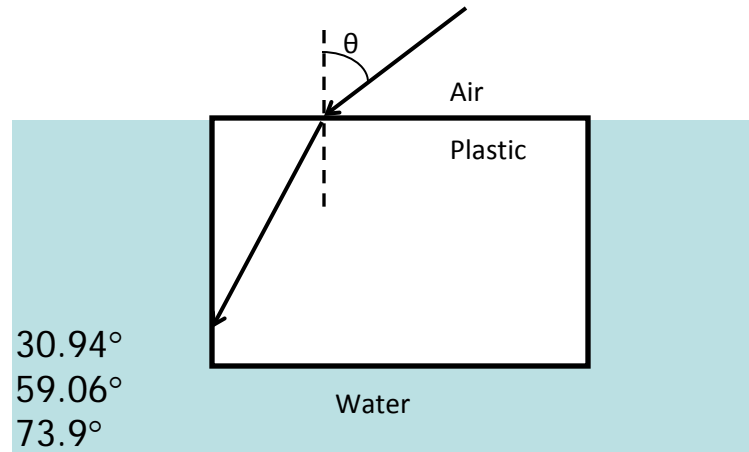
(a) What is the direction of the induced current through the wire connecting the light bulb to the tracks?



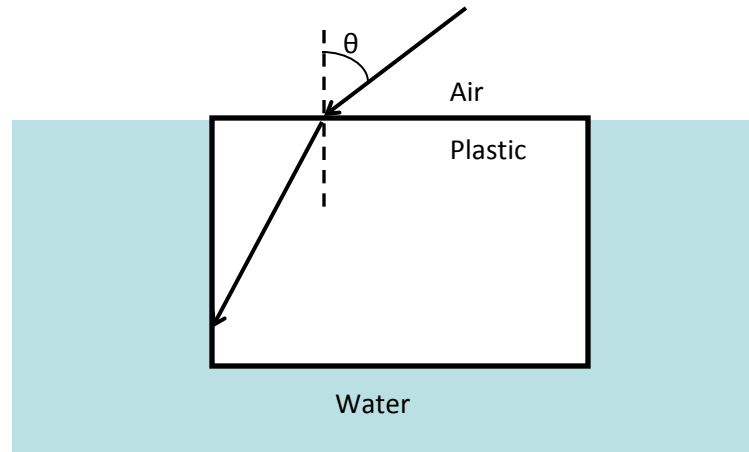
(b) Derive an algebraic expression for the speed v with which Muffi must run to generate power P_0 in the light bulb. Start the problem only with equations from the equation sheet. Express your answer in terms of the parameters B , L , and R .



A light beam is incident at an angle θ on the top surface of a block of plastic. The sides and bottom of the block are immersed in water. If $\theta=50^\circ$, find the angle the light makes with the normal to the plastic/water interface when it exits the block. ($n_{\text{plastic}}=1.49$, $n_{\text{water}}=1.33$).



A light beam is incident at an angle θ on the top surface of a block of plastic. Find the maximum value of θ for which the refracted light is totally reflected from the left face of the plastic block, if the block is immersed in water. ($n_{\text{plastic}}=1.49$, $n_{\text{water}}=1.33$).



63.20°
42.2°

"I regret to announce — this is The End. I am going now. I bid you all a very fond farewell. Goodbye."—Bilbo Baggins