



Center for Academic Resources in Engineering (CARE) Peer Exam Review Session

PHYS 212 – University Physics: Electricity and Magnetism

Mid-semester Review Worksheet

The problems in this review are designed to help prepare you for your upcoming exam. Questions pertain to material covered in the course and are intended to reflect the topics likely to appear in the exam. Keep in mind that this worksheet was created by CARE tutors, and while it is thorough, it is not comprehensive. In addition to exam review sessions, CARE also hosts regularly scheduled tutoring hours.

Tutors are available to answer questions, review problems, and help you feel prepared for your exam during these times:

Session 1:

Can't make it to a session? Here's our schedule by course:

<https://care.grainger.illinois.edu/tutoring/schedule-by-subject>

Solutions will be available on our website after the last review session that we host.

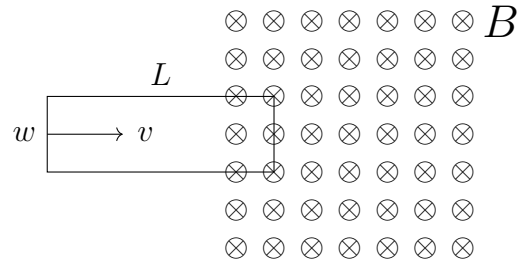
Step-by-step login for exam review session:

1. Log into Queue @ Illinois: <https://queue.illinois.edu/q/queue/848>
2. Click “New Question”
3. Add your NetID and Name
4. Press “Add to Queue”

Please be sure to follow the above steps to add yourself to the Queue.

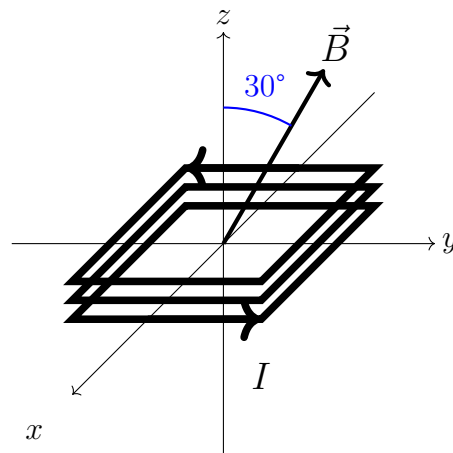
Good luck with your exam!

1. A loop of wire with resistance $R = 3 \Omega$ enters an infinite uniform magnetic field, $B = 3 \text{ T}$. It has a length $L = 2 \text{ m}$ and width $W = 1 \text{ m}$. It enters the field with velocity $v = 2 \text{ m/s}$. When the loop is entering the field, what is the force on the rightmost wire?



2. There is an infinite wire with a radius R carrying a current I . Use Ampere's law to find the magnetic field on the inside and outside of the wire for any distance r from the center of the wire.

3. A square coil of 5 loops is carrying a current of $I = 2 \text{ A}$. The loops all have a width of 1 m . The coil is in a magnetic field of 4 T , and the normal vector to the plane of the coil is at an angle of 30 degrees to the magnetic field.



- (i) What is the magnitude and direction of torque on the coil?
- (ii) What is the potential energy of the coil?

4. There are two current carrying wires, 2 meters apart. The left wire carries a current $I_1 = 20\text{ A}$. The right wire experience an attractive force of $4 \times 10^{-5}\text{ N/m}$ due to the left wire. What is the direction and magnitude of the second current I_2 ?

