Final Exam

Wednesday, December 12, 10:00 am – 12:00 pm

Instructor	Section(s)	Exam Room
Le	A, C	Schrenk G3
Madison	L	St. Pat's
	N	BCH 125
Musser	E, H	Bert B10
Parris	M, Q	HSS G5
Peacher	F, J	BCH 125
Waddill	B, D, P, R	St. Pat's
Wilemski	G, K	BCH 120

End Material Test

All multiple choice questions

- 7 Multiple Questions worth 6 points each
- 1 Free Question worth 8 points
  (already in grade)

Topics from End Material including

- Concave and convex mirrors
- Lenses and optical instruments
- Double slit interference
- Single slit interference
- Diffraction
- Thin films

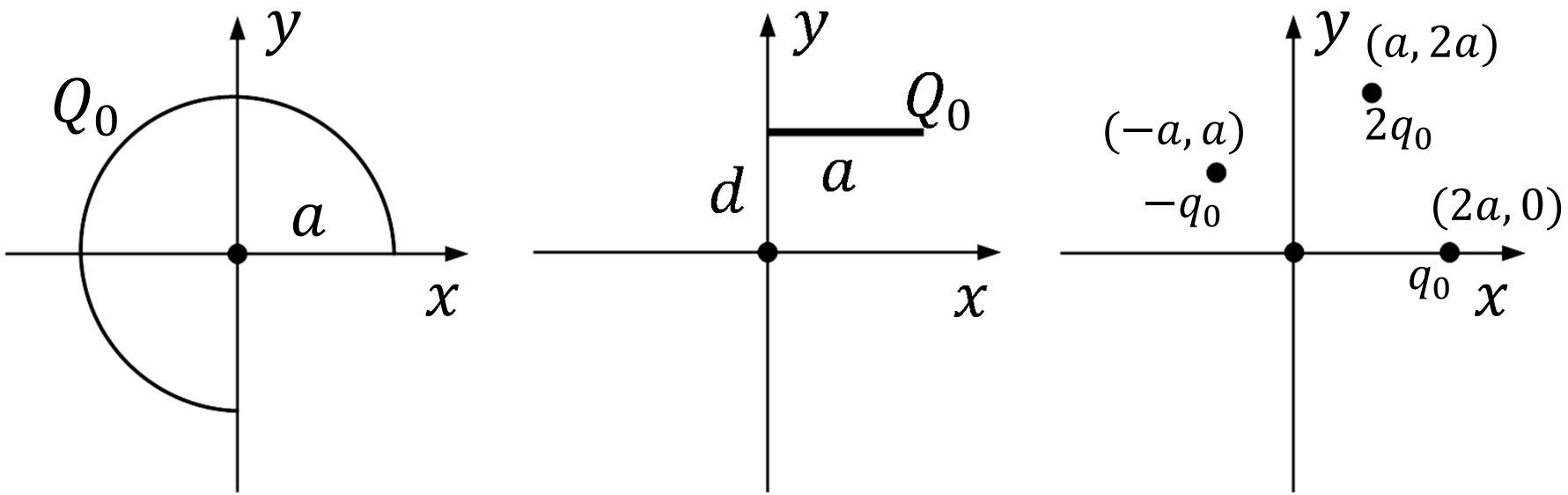
Final Exam

All problems with topics from entire course

- 40 points from topics that could have been on Exam I
- 40 points from topics that could have been on Exam II
- 40 points from topics that could have been on Exam III
- 80 points from End Material

Electric Fields, Forces, Potentials and Energy

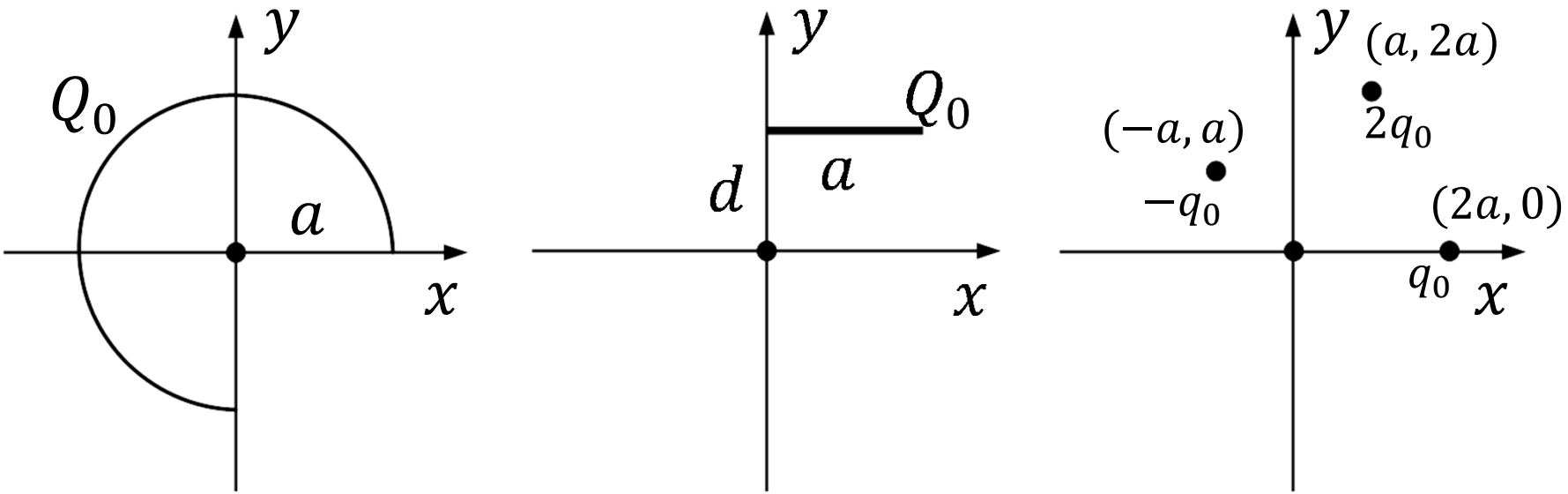
Note that many questions could be asked of the same situation. Consider any of the following three charge arrangements.



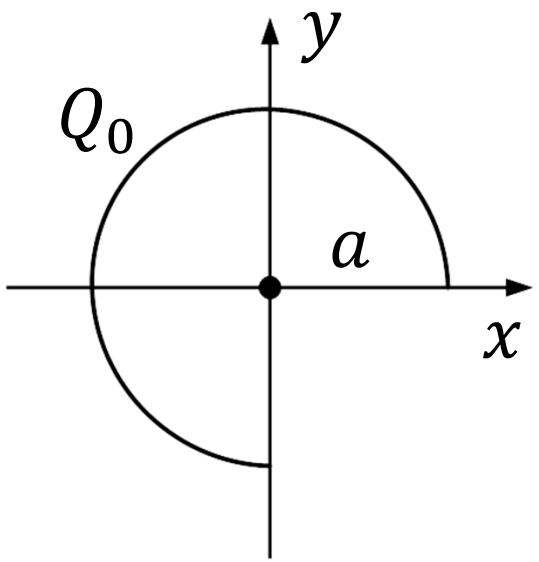
Electric Fields, Forces, Potentials and Energy

Types of questions that could be asked

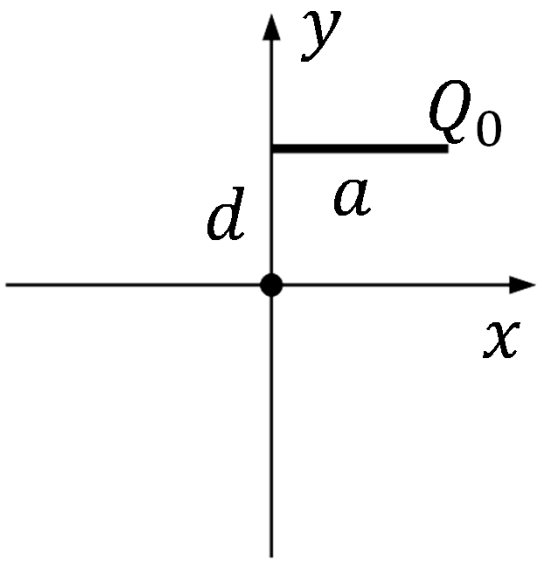
- Determine the electric field at the origin
- Determine the force on a charge q_0 at the origin
- Determine the electric potential at the origin
- Determine the potential energy of the system



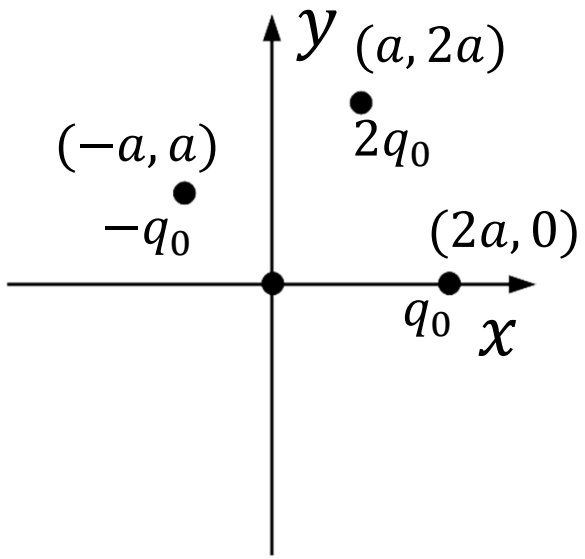
Example: Determine the electric field at the origin.



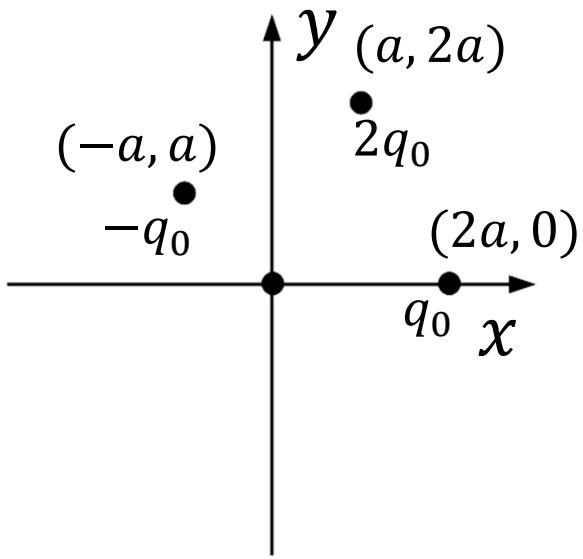
Example: Determine the electric force on a charge q_0 at the origin.



Example: Determine the potential energy of a charge q_0 at the origin.

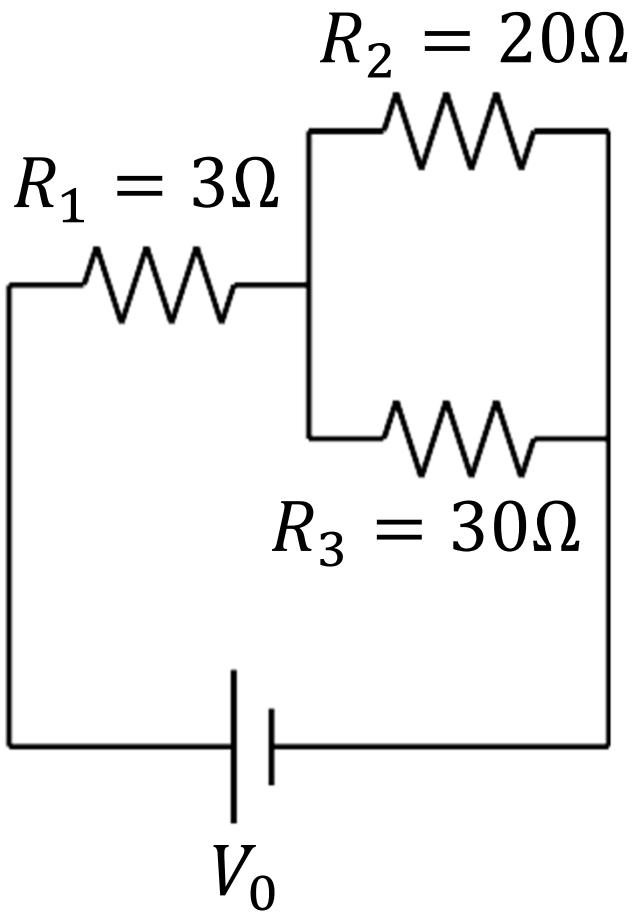


Example: Determine the potential energy of a charge q_0 at the origin.



Could have asked for the final speed for a charge q_0 released at the origin.

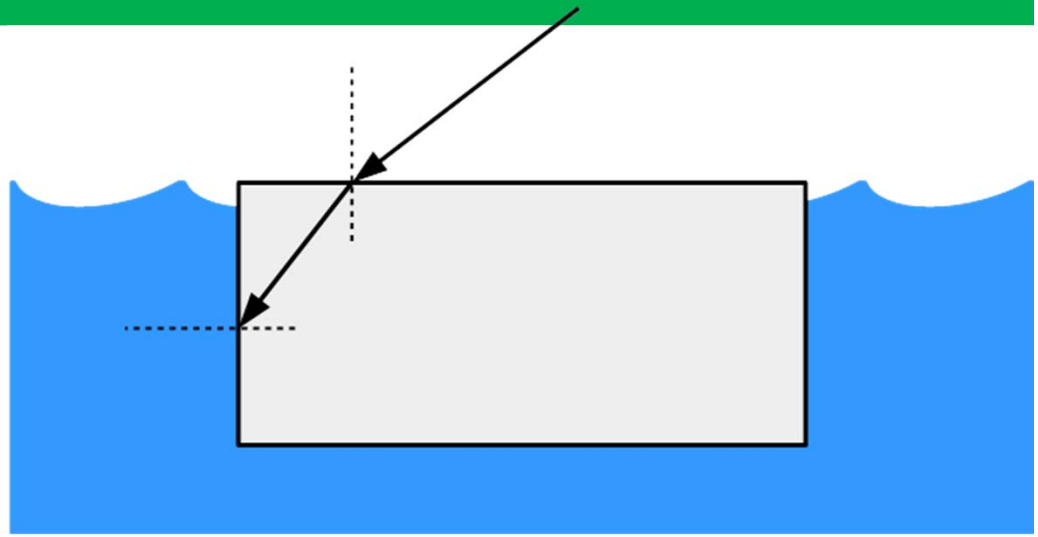
Example: (a) Determine the equivalent resistance of the given circuit. (b) The power dissipated by R_3 is 480W. Determine V_0.



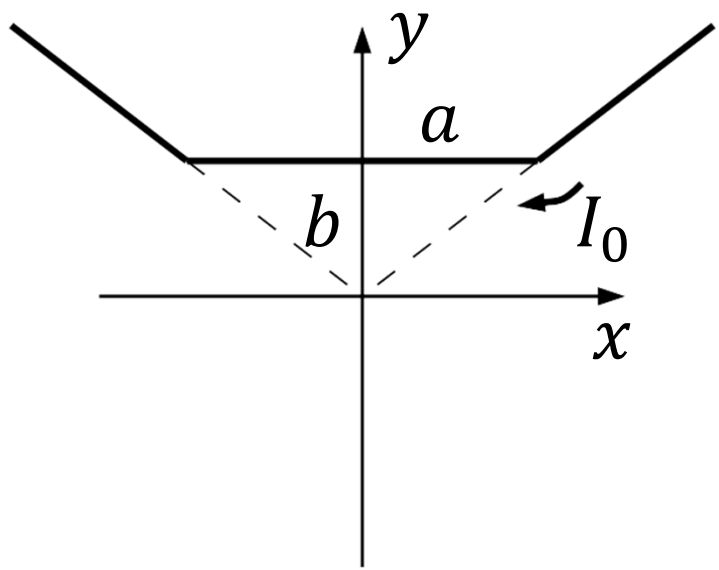
Example: A proton is accelerated from rest through a potential difference of ΔV. The proton then enters a uniform magnetic field perpendicular to its velocity. (a) Determine the speed of the proton when it enters the magnetic field. (b) The proton trajectory has a diameter D in the field. Determine the magnitude of the magnetic field and the period of the proton's motion.

Example: A small generator consists of a flat square coil of 120 turns and sides of 1.60cm. The coil rotates in a uniform magnetic field of 0.75mT. (a) Determine the time dependence of the magnetic flux. (b) Determine the angular speed of the coil if the maximum emf is 24mV.

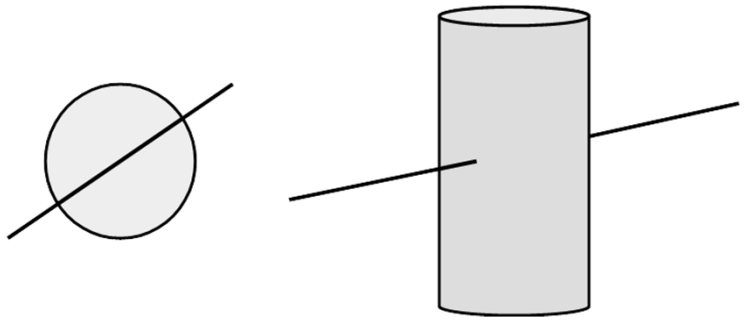
Example: A light beam incident on the top surface of a block of plastic ($n_P = 1.49$) makes an angle of $50°$ with respect to normal. Determine the angle the light makes with respect to the normal as it exits the side of the block into water ($n_W = 1.33$).



Example: Determine the magnetic field at the origin due to the given circuit.



Example: A wire carrying a current I_W runs along a diameter of a solenoid of length L and number of turns N carrying a current I_S. Determine the force on the wire.



Example: A rod of radius a has a uniform charge per length λ. A neutral conducting cylindrical shell of inner radius b and outer radius c is coaxial with the charged rod. (a) Determine the electric field for all regions with $r > a$. (b) Determine any induced charges. (c) Determine the potential difference between the rod and the cylindrical shell.