**Chapter 21-23 Review**

Chapter 21

* Charging
  + Friction (Tribo-electric series)
  + Conduction (Contact)
  + Induction (Proximity and grounding)
  + Charge separation (demo)
  + Lab
* Coulomb’s Law
  + Problem solving
  + Lab

Chapter 22

* Electric Fields
  + Use symmetry to determine 1) in which directions field vector cancel, 2) in which directions field vectors add, 3) net direction of e-field
  + Calculate from point charge or set of point charges
  + Calculate electric force on a given charge in an electric field
  + Force from E-field
  + Find E-fields using integration (rods and rings and variations thereof)
  + Activity

Chapter 23

* Electric Flux--this is a scalar (dot) product
  + 
* Flux into a surface is negative, out is positive
* Gauss’s law—relates flux through a closed surface to charge inside
* Specific examples that we analyzed:
  + Spheres within spheres—worksheet/Quest
  + Infinite plate
  + Infinite cylinders or lines of charge
  + Non-uniformly charged non-conductors
* Charge density
  + Per unit length, 
  + Per unit area, 
  + Per unit volume, 
  + on-uniform charge density—integrate to find *qenc*