

## Physics 200

### Chapter 27: Current and Resistance (Lecture Examples)

- Ex:1 A TV picture tube has a beam current,  $I$ . How many electrons strike the screen each second? (Electron charge is " $q$ ".)
- Ex:2 If there is a current,  $I$ , in a wire and the wire has a radius,  $a$ , how much time elapses until Avogadro's number of electrons passes a given cross section? What is the current density?
- Ex:3 Derive the current in a wire in terms of the charge drift speed.
- Ex:4 Derive Ohm's Law, ( $I = V/R$ ).
- Ex:5 Calculate the resistance of a circular cylinder. The resistor has radius,  $a$ , and length,  $L$ .
- Ex:6 A copper wire has a radius,  $a$ , and length,  $L$ . Find the current through the wire if the potential difference from one end of the wire to the other is " $V$ ".
- Ex:7 Does the resistance of a rectangular piece of copper depend upon where the current enters and leaves the piece?
- Ex:8 Calculate the resistance of a hollow circular cylinder. (current enters on the inner surface and leaves on the outer surface)
- Ex:9 Calculate the resistance of a circular truncated cone. The cone's small end has radius,  $a$ , and its large end has radius,  $b$ . (current enters and leaves the ends)
- Ex:10 What is the maximum current for a resistor rated at resistance,  $R$ , and power,  $W$ ?
- Ex:11 An immersion heater raises the temperature of a mass,  $m$ , of water from  $T_1$  to  $T_2$  in time,  $t$ , at a voltage,  $V$ . Find the current through the heater.