20.1 **Electric Power**
- Energy transfer from voltage to charged particles
- Energy transfer from the charged particles to the wire
- Steady State equivalence

  **Example 1:** Back to our light bulb. Again, the filament of our light bulb has a resistance of 580 $\Omega$ and it is screwed into a ceiling light socket, with a voltage of 120V across the terminals. What is its Wattage?

20.2 **Alternating Current** - Skip for now. Not on Test. We’ll come back to when it’s more appropriate.

**Multi-component circuits**

**Introduction**
Negligible Wire resistance in a circuit

20.3 **Series Wiring**
- Current
- Voltage
  - **Kirchhoff’s Loop Rule**
- Resistance
  - effective or equivalent resistance

  **Example 2:** Say you have three resistors in series across a 24-V battery. If the first one has a potential drop of 10V, the second has a drop of 12V, and the third has a resistance of 200 $\Omega$:
  - A) What is the current passing through the circuit?
  - B) What are the resistances of the other two?
  - C) What is the power dissipated in each?

20.4 **Parallel Wiring**
- How do the Resistances, Currents, and Voltages relate?
  - Current
    - **Kirchhoff’s Junction Rule**
  - Voltage

**Quantities**
1: $\Delta V_1 = 10$Volts, $R_1 = ?$, $I_1 = ?$, $P_1 = ?$
2: $\Delta V_2 = 12$Volts, $R_2 = ?$, $I_2 = ?$, $P_2 = ?$
3: $\Delta V_3 = ?$, $R_3 = 200\Omega$, $I_3 = ?$, $P_3 = ?$
S: $\Delta V_s = |emf| = 24V$, $R_s = ?$, $I_s = ?$
- **Resistance**
  - Extend to any number of parallel resistors.

- **Example 3:** Warning – *if the units are up-sided-down, so is the number.* Three speakers are connected in parallel across the terminals of an amplifier. If one has a resistance of 16 $\Omega$ and each of the other two have 8 $\Omega$, what is the equivalent resistance of the combo?

### 20.5 Circuits wired partially in series and Partially in Parallel

- **Parallel:** \[ \frac{1}{R_p} \equiv \frac{1}{R_1} + \frac{1}{R_2} + \ldots \]
- **Series:** \[ R_s = R_1 + R_2 \ldots \]

- **Example 4:** Determine the Equivalent Resistance of the pictured Circuit.

![Circuit Diagram]

- $R_1 = 20.0 \Omega$
- $R_2 = 3.0 \Omega$
- $R_3 = 9.0 \Omega$
- $R_4 = 8.0 \Omega$
- $R_5 = 4.0 \Omega$
- $R_6 = 6.0 \Omega$

### HW 14

22. A cigarette lighter in a car is a resistor that, when activated, is connected across the 12-V battery. Suppose a lighter dissipates 33W of power. Find (a) the resistance of the lighter and (b) the current that the battery delivers to the lighter.

43. Three resistors, 25, 45, and 75 $\Omega$, are connected in series, and a 0.52-A current passes through them. What is (a) the equivalent resistance and (b) the potential difference across the three resistors?

52. A wire whose resistance is $R$ is cut into three equally long pieces, which are then connected in parallel. In terms of $R$, what is the resistance of the parallel combination?

58. Find the equivalent resistance between points A and B in the drawing.

![Circuit Diagram]