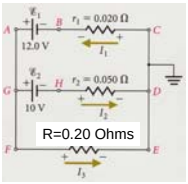
- Online quiz on Circuits (Ch. 26)
- Available:
- 12PM Tuesday – midnight Wednesday

Kirchhoff's rules

- Terminology: Arm, Junction, Loop
- A junction of a circuit is a point where currents split or merge
- An arm of a circuit carries a single current and connects junctions
- A loop is a closed path around the circuit



Kirchhoff's rules

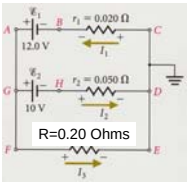
- Arm, Junction, Loop (of a circuit)

Kirchhoff's junction rule: The sum of currents entering a junction equals the sum of currents leaving the junction.

$$\sum I_{in} = \sum I_{out}$$

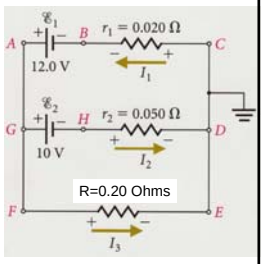
Kirchhoff's loop rule: the sum of the potential changes around any loop in a circuit is zero.

$$\sum \Delta V = 0$$



Algorithm

- Define a current variable for each arm of the circuit
- Choose a positive sense for each current variable
- Write junction equations until each current shows up in at least one equation
- Write loop equations until each arm of the circuit occurs in at least one equation
- Solve for unknowns, taking notice of the signs



Kirchhoff's rules - Example

$$I_2 = \frac{R \cdot V_1 - (r_1 + R) \cdot V_2}{R(r_1 + r_2) + r_1 r_2}$$

$$I_2 = 13.3 \text{ A} > 0$$

$$I_3 = \frac{r_2 \cdot I_2 + V_2}{R}$$

$$I_3 = 53.3 \text{ A} > 0$$