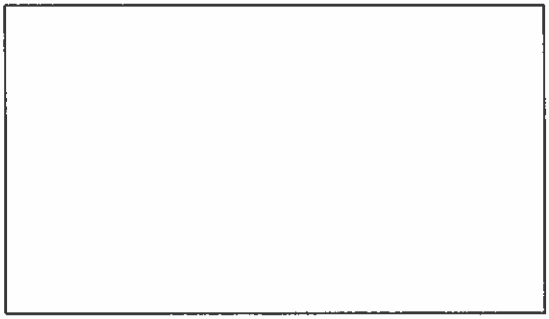
PHYSICS 12

ELECTROMOTIVE FORCE (emf) and TERMINAL VOLTAGE

- emf = $\mathcal{E}$ = ideal battery
- measured in Volts (it is **not a force** measured in Newtons)
- = maximum possible potential difference between terminals of the electric energy generator (such as battery)

TERMINAL VOLTAGE



By Kirchhoff's Law:

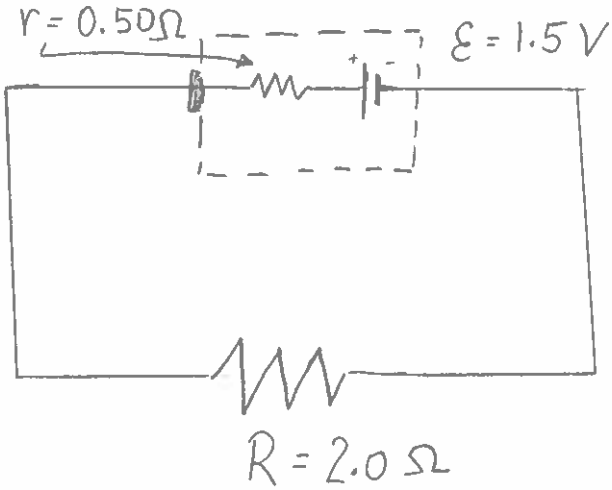
- r = internal resistance in the battery

Ex1: For a battery with emf of 12.0 V and 0.010 Ω of internal resistance, determine its terminal voltage when current drawn is 100 A.

Ex2: a) A battery delivering a current of 55 A to a circuit has a terminal voltage of 23.4 V. The internal resistance in the battery is 0.0112 Ω. What is the emf of the battery?

b) If **power** dissipation due to internal resistance is given by $P=I^2r$, how much **energy** was lost?

Ex3: A dry cell connected to a 2.0 Ω resistor as shown below:



a) How much current is drawn from the battery?

b) What is the cell's terminal voltage?

HW:

#1. Find the internal resistance in a 9.0 V battery that supplies 0.40 A of electric current and its terminal voltage is 8.75 V.

#2. If a 9.0 V battery has internal resistance of 12 Ω ,

a) What is the potential difference across its terminals when it supplies current of 50.0 mA?

b) What is the maximum current this battery could supply?