

Quantities:

Voltage

Current

Power

Devices:

Resistor

Capacitor

Inductor

LED

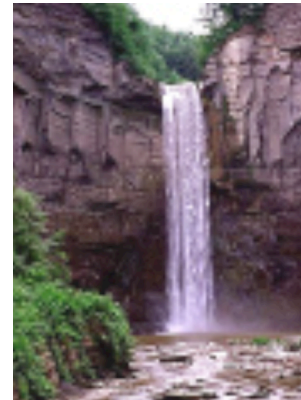
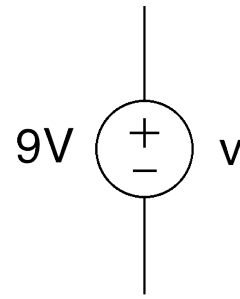
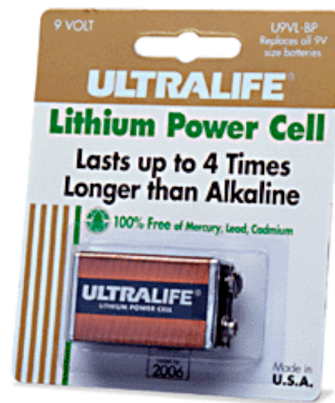
Transistor

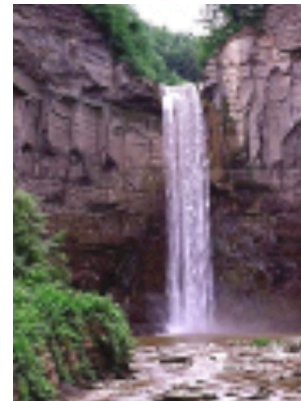
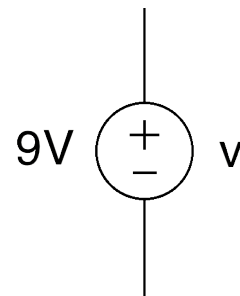
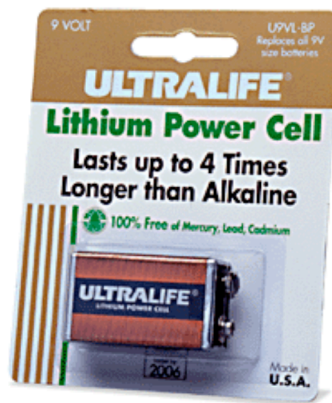
Op-Amp

Laws:

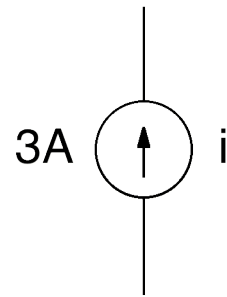
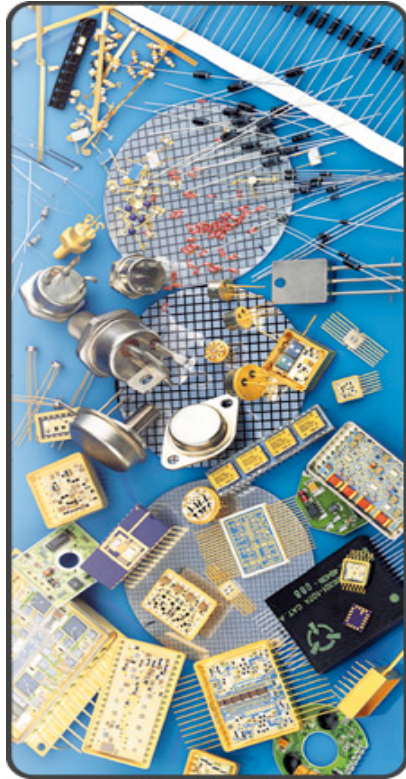
Ohm's Law

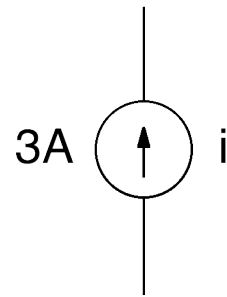
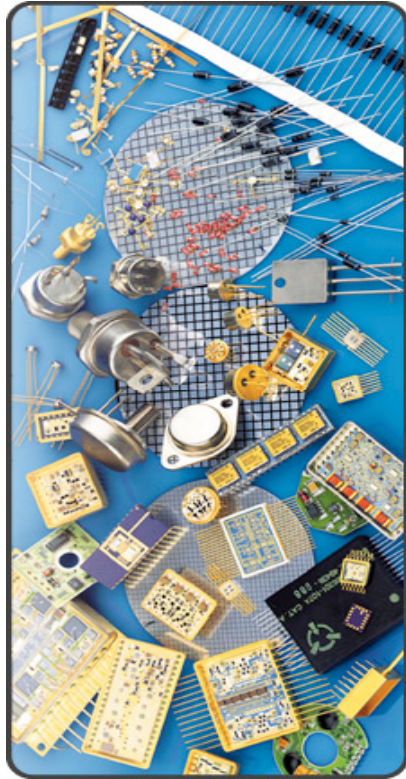
Kirchhoff's Laws





Voltage = pressure that pushes electrons through circuit
Water analogy: voltage = altitude of water

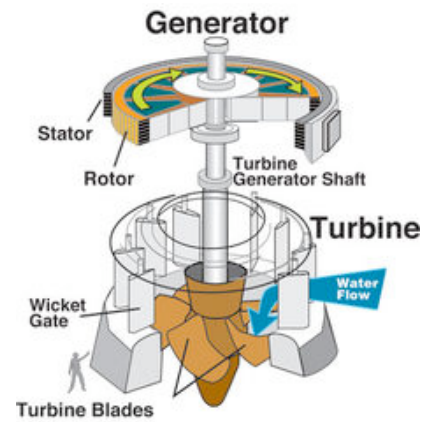




Current = flow of electrons through circuit
Water analogy: current = flow of water



<http://www.usbr.gov/power/data/sites/glencany/glencany.html>



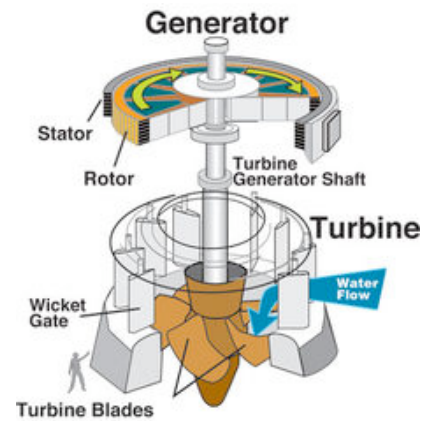
<http://en.wikipedia.org/wiki/Hydroelectric>



<http://www.wapa.gov/newsroom/cct/2005/july15/27no141a.htm>



<http://www.usbr.gov/power/data/sites/glencany/glencany.html>



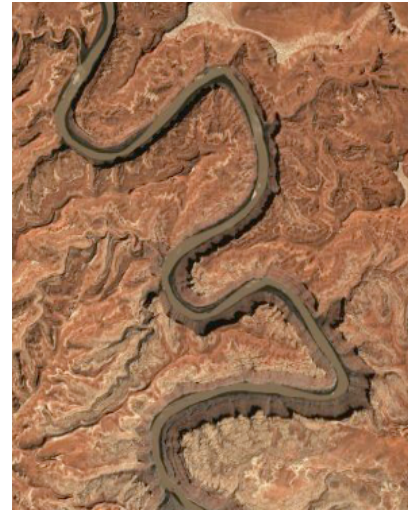
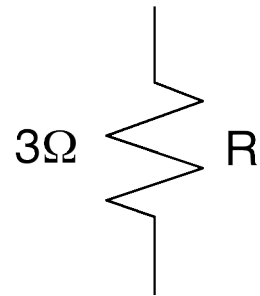
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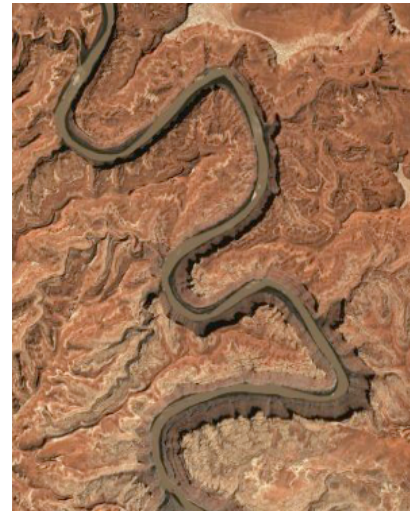
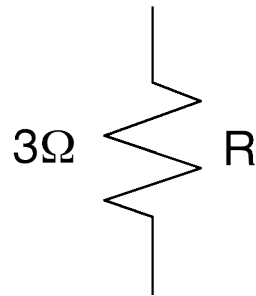


<http://www.wapa.gov/newsroom/cct/2005/july15/27no141a.htm>

Power = voltage \times current

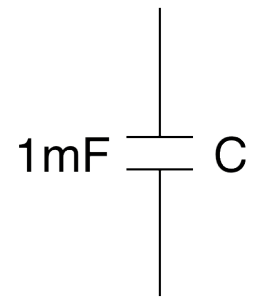
Water analogy: power = altitude drop \times flow

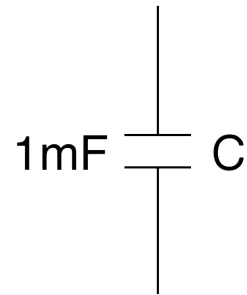




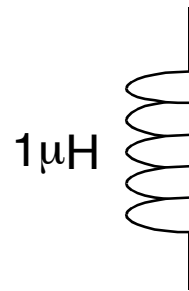
Resistor reduces current flow

Water analogy: flow less for winding river

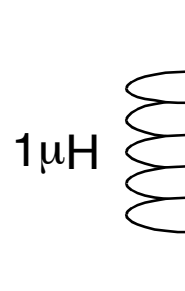




Capacitor stores charge
Water analogy: tank stores water



http://www.magnariders.com/html/Rides/rally/2005_Rally.html

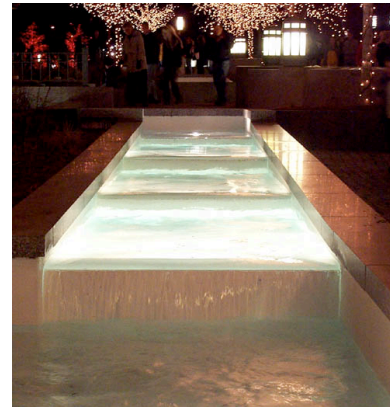
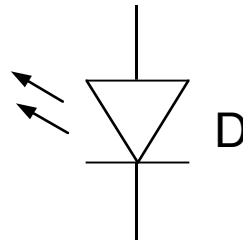


http://www.magnariders.com/html/Rides/rally/2005_Rally.html

Inductor creates magnetic field opposing current change
Water analogy: mill wheel with inertia opposes flow change



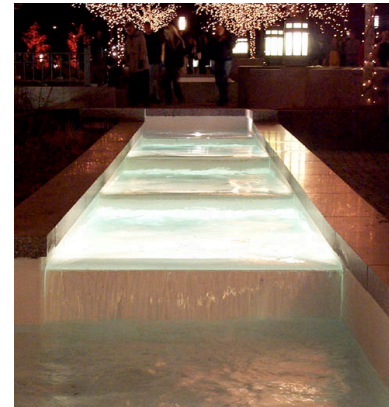
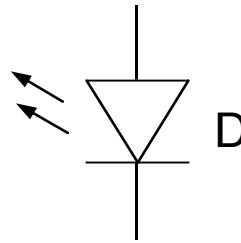
<http://www.furuier.com/english/product/index0.htm>



http://www.xmission.com/~m3lody/junk/xmas2002/lit_waterfall1.jpg

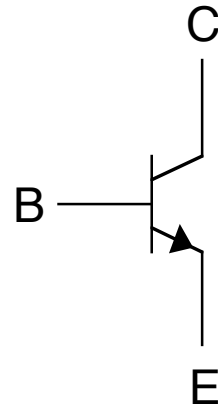


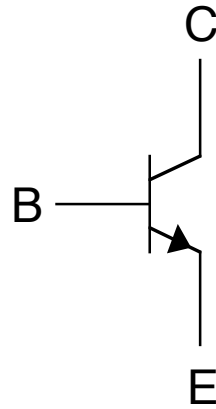
<http://www.furuier.com/english/product/index0.htm>



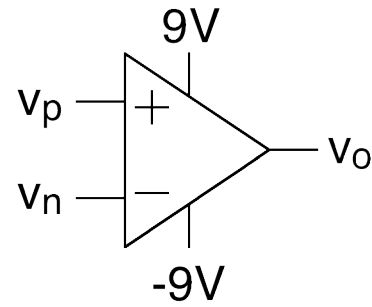
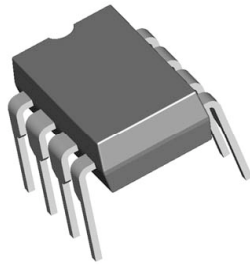
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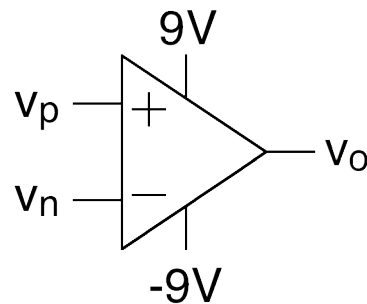
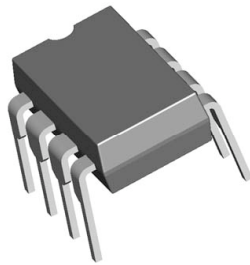
LED lights up and acts like voltage drop
Water analogy: lit waterfall





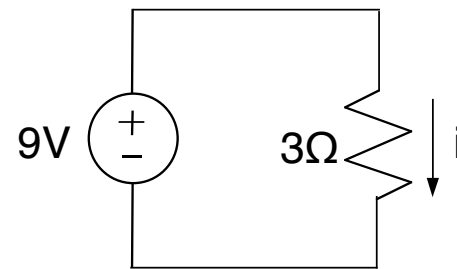
Transistor current flow controlled by second small current flow
Water analogy: spillway for dam controlled by hydraulic line

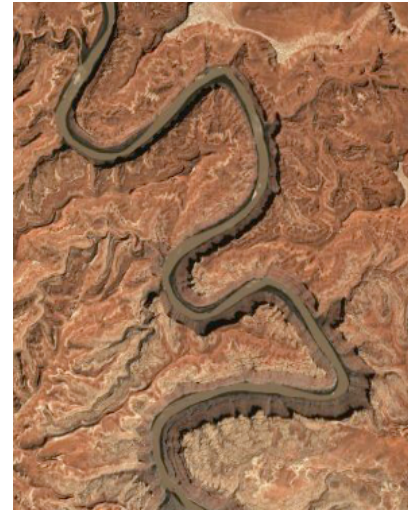
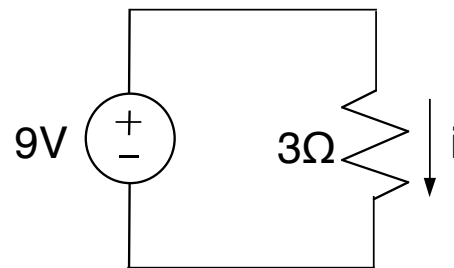




Op-amp magnifies voltage across inputs

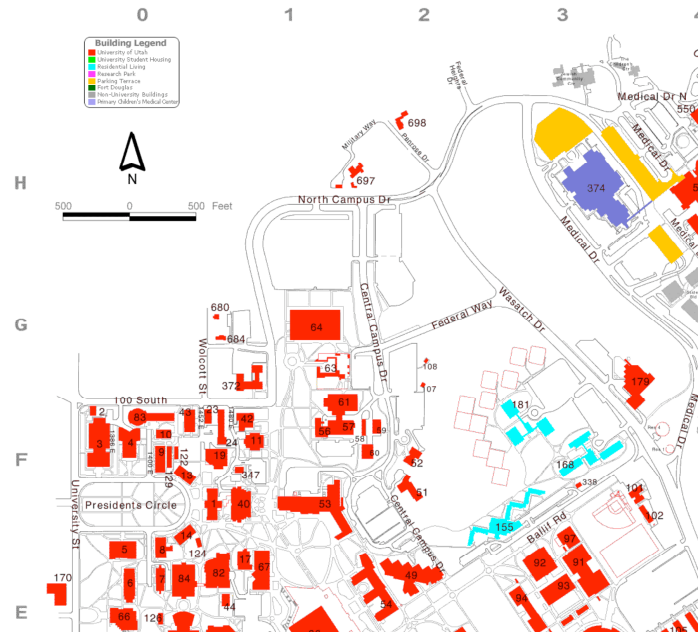
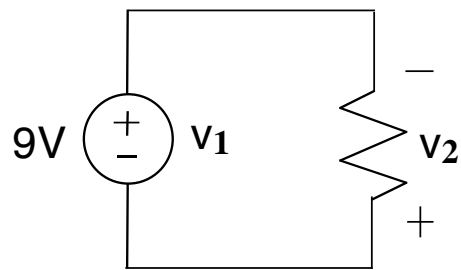
Water analogy: Lever translates small pressure into high pressure

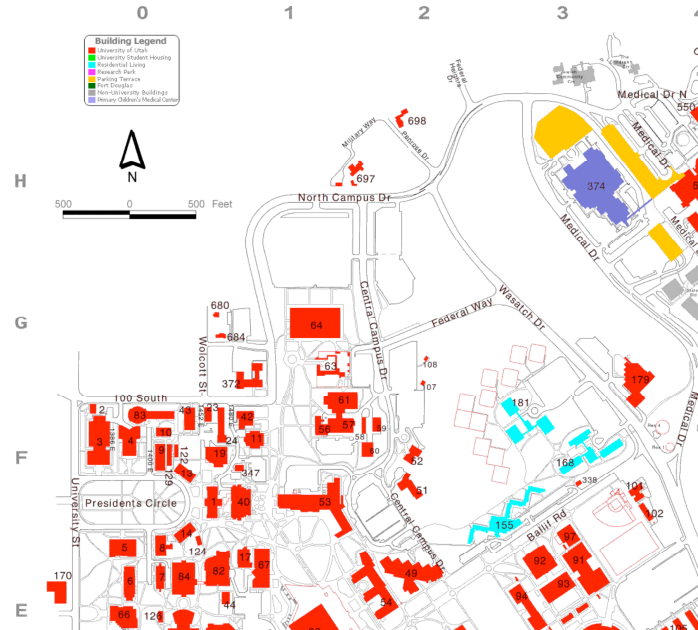
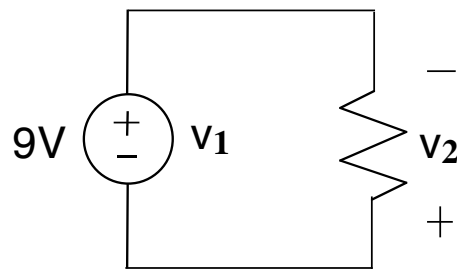




Current in resistor = voltage / resistance

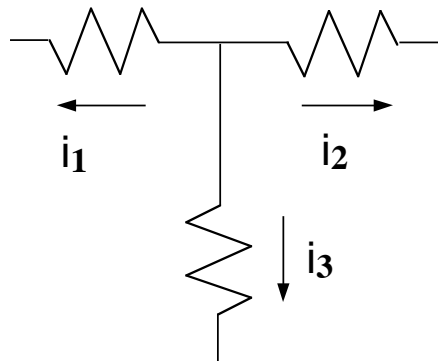
Water analogy: flow = altitude drop / length of river

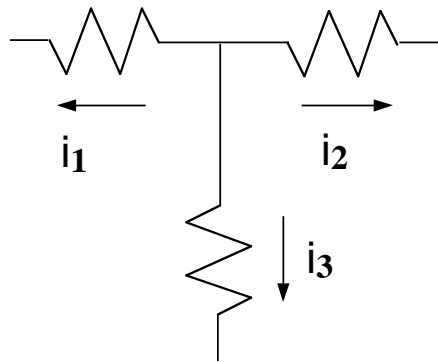




Sum of voltage drops around loop = 0

Water analogy: total altitude change for loop = 0





Sum of current flowing out of node = 0
Water analogy: what flows in must flow out