Exam 3 Review

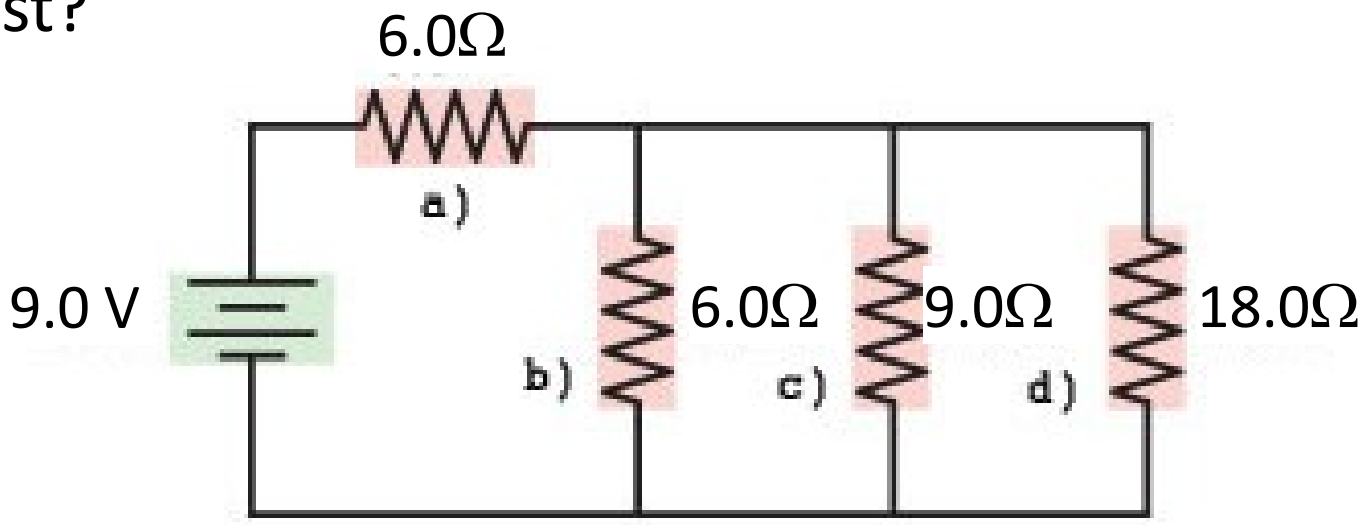
4/29/13

2012 Exam problem

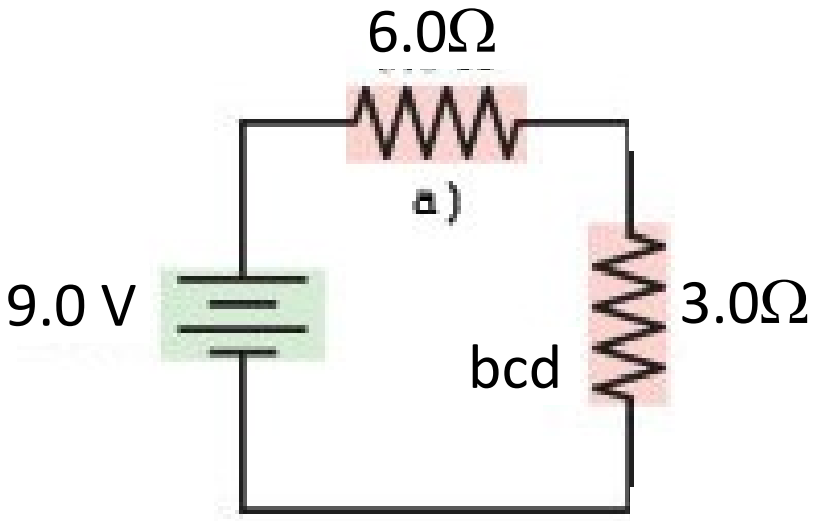
1. Two point charges are placed 12 meters apart. The charge on the left is +10 nC and the charge on the right is +20nC.
   A. Find the electric field at a point between the charges, 4.0 meters from the +20nC charge.
   B. If an electron is placed between the charges, 4.0 meters from the +20nC charge, find the electrostatic force on the electron.

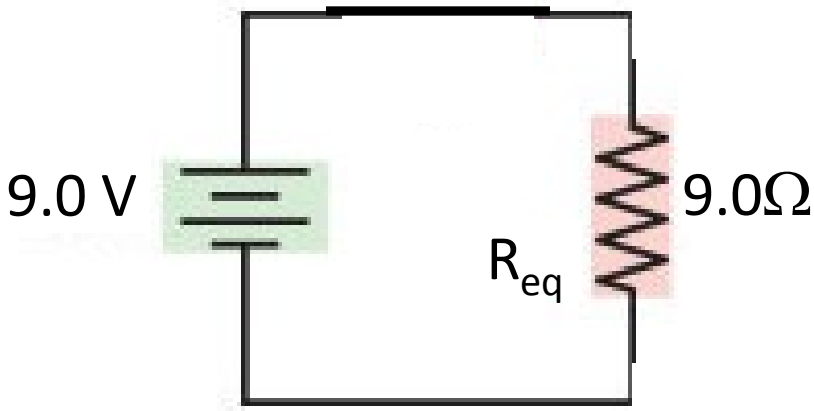
Circuits

- For each resistor - a, b, c and d -find
  - Current through
  - Voltage across
  - Power dissipated
  - If these resistors are light bulbs, which is brightest?



- Step 1 – find the equivalent resistance of the circuit.



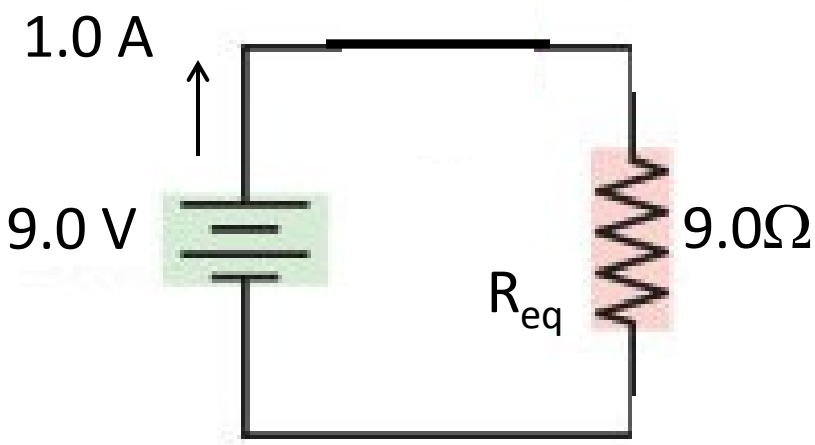


- Step 2 – Find total current through the circuit

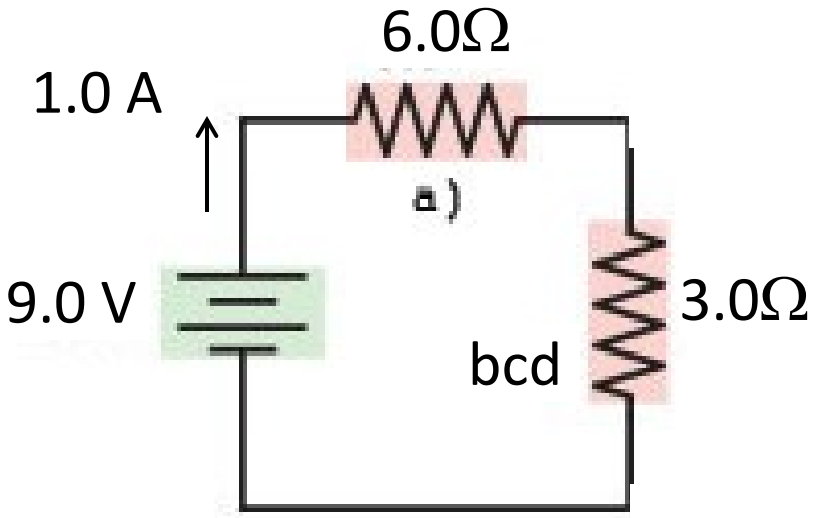
$V = IR$

So $I = V/R$

I = 9.0 V/ 9.0 $\Omega = 1.0$ A



- Step 3 – build back out one step at a time, finding voltage and current for each resistor as you build out.



V_a = 1.0A * 6.0Ω = 6.0 V

V_{bcd} = 1.0 A * 3.0Ω = 3.0 V

Check 3.0 V + 6.0 V = 9.0 V

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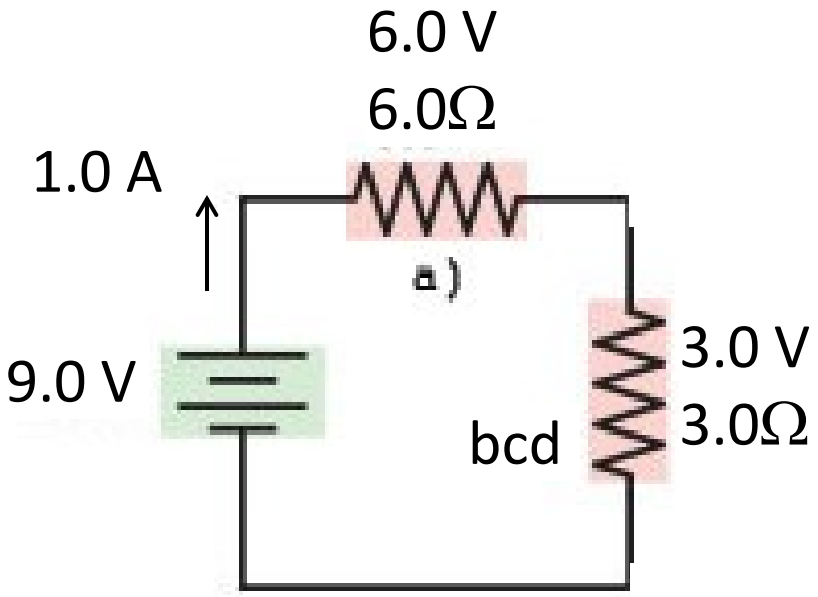

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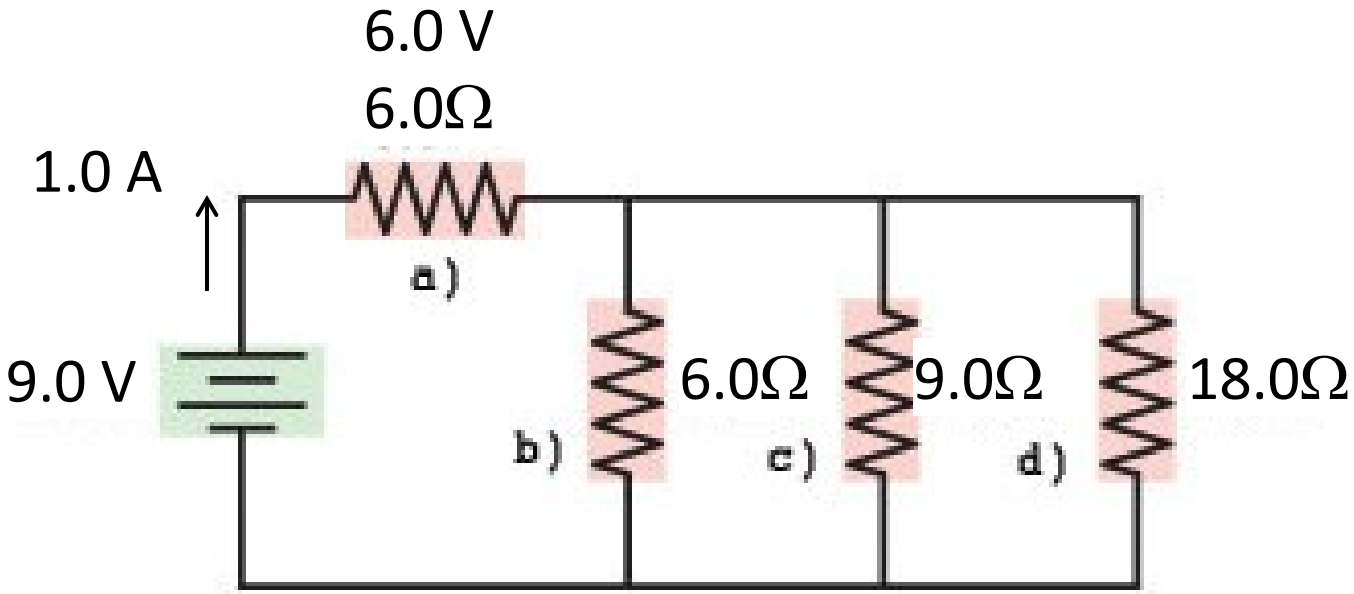
Label the circuit!

- Now what do we know?
- Voltage or Current for b, c and/or d?

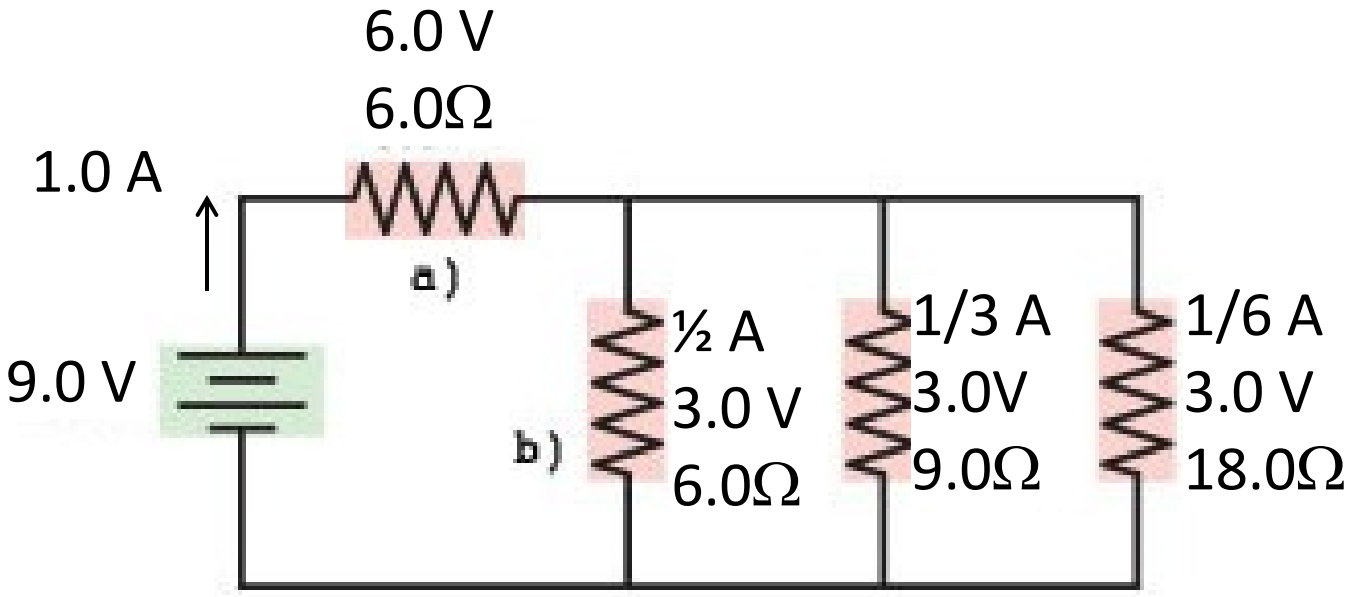


$P_a = 6$ W

$P_b = 1.5$ W

$P_c = 1.0$ W

$P_d = 0.5$ W



2012 Exam problem

1. The bottom of a blender has a tag that says all sorts of things and the only lines with numbers read: “Service no. 4094”, “500 Watts max”, “120 Vac 50/60Hz”.
   A. What is the power used by this blender?
   B. How much current does this blender draw?
   C. What is the potential difference across the blender?
   D. If electricity is $0.12/ kWh, how much will it cost to run the blender for 1/6 of an hour?

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1. The bottom of a blender has a tag that says all sorts of things and the only lines with numbers read: "Service no. 4094", "500 Watts max", "120 Vac 50/60Hz".
   A. What is the power used by this blender? **500 Watts**
   B. How much current does this blender draw?

   $P = I\Delta V$ so $I = 500\ \mathrm{W}/120\mathrm{V} =$ **4.17 A**

   A. What is the potential difference across the blender? **120 V**
   B. If electricity is \$0.12/ kWh, how much will it cost to run the blender for 1/6 of an hour? $500\ \mathrm{W} = 0.5\ \mathrm{kW} * 1/6\ \mathrm{hr} = 0.083\mathrm{kWh}$ $0.083\mathrm{kWh} * \$0.12/\mathrm{kWh}$ **= \$0.01**