This print-out should have 14 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

001 (part 1 of 4) 4 points
A battery has an emf of 12 V and an internal resistance of 0.12 Ω. Its terminals are connected to a load resistance of 3 Ω.

Find the current in the circuit. Answer in units of A.

002 (part 2 of 4) 4 points
Calculate the terminal voltage of the battery. Answer in units of V.

003 (part 3 of 4) 4 points
Find the power dissipated in the load resistor. Answer in units of W.

004 (part 4 of 4) 3 points
Find the power dissipated in the battery. Answer in units of W.

005 (part 1 of 1) 3 points
The current in a circuit is tripled by connecting a 641 Ω resistor parallel with the resistance of the circuit.

Determine the resistance of the circuit in the absence of the 641 Ω resistor. Answer in units of Ω.

006 (part 1 of 3) 4 points
In this problem assume
1 the batteries have zero internal resistance,
2 the currents are flowing in the direction indicated by the arrows. A negative current denotes flow opposite to the direction of the arrow.
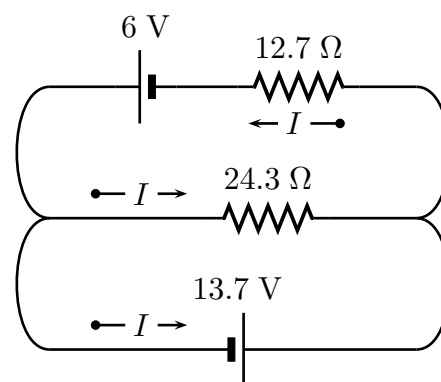
Find the current through the 12.7 Ω resistor and the 6 V battery at the top of the circuit. Answer in units of A.
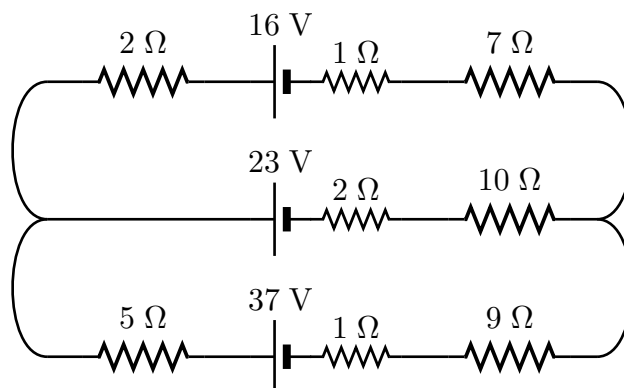
007 (part 2 of 3) 3 points
Find the current through the 24.3 Ω resistor in the center of the circuit. Answer in units of A.

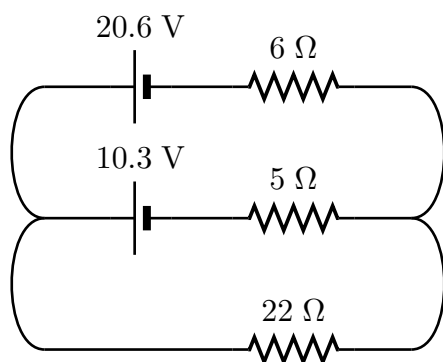**008** (part 3 of 3) 3 points
Find the current through the 13.7 V battery at the bottom of the circuit. Answer in units of A.

009 (part 1 of 1) 3 points

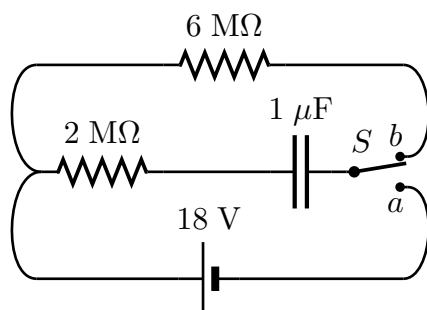Find the magnitude of the current in the 16 V cell. Answer in units of A.

010 (part 1 of 1) 3 points

20.6 V

6 Ω

10.3 V

5 Ω

22 Ω

Find the current through the 22 Ω lower-right resistor. Answer in units of A.

011 (part 1 of 2) 4 points
For a long period of time the switch S is in position "b". At $t = 0$ s, the switch S is moved from position "b" to position "a".

6 MΩ

1 μF

2 MΩ

S b

a

18 V
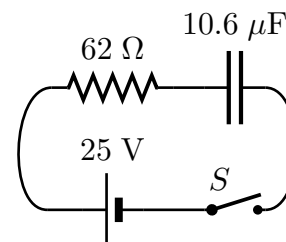
Find the voltage across the 2 MΩ center-left resistor at time $t_1 = 3$ s. Answer in units of V.

012 (part 2 of 2) 4 points
Much later, at some time $t_0' = 0$ s, the switch is moved from position "a" to position "b".

Find the voltage across the 2 MΩ center-left resistor at time $t' = 2.6$ s. Answer in units of V.

013 (part 1 of 2) 4 points

10.6 μF

62 Ω

25 V

S

How long after the switch is closed does the voltage across the resistor drop to $V_f = 16$ V? Answer in units of s.

014 (part 2 of 2) 4 points
What is the charge on the capacitor at this time? Answer in units of C.