Suggested problems

Chapter 27

The quiz questions will be same or very similar to the following text-book problems. Refer to the course website for the latest version of this document. You are encouraged to seek the help of your instructor during his office hours.

15. The current in a single-loop circuit with one resistance R is 5.0 A. When an additional resistance of 2.0 Ω is inserted in series with R, the current drops to 4.0 A.What is R?

**Answer:** 8.0 Ω.

17. In Fig. 27-33, battery 1 has emf $ε\_{1}=$12.0 V and internal resistance $r\_{1}=$ 0.016 Ω and battery 2 has emf$ ε\_{2}=$12.0 V and internal resistance $r\_{2}=$ 0.012 Ω. The batteries are connected in series with an external resistance R. (a) What R value makes the terminal- to-terminal potential difference of one of the batteries zero? (b) Which battery is that?

**Answer:** (a) 0.004 Ω ; (b) Battery 1.

19. A total resistance of 3.00 Ω is to be produced by connecting an unknown resistance to a 12.0 Ω resistance. (a) What must be the value of the unknown resistance, and (b) should it be connected in series or in parallel?

**Answer:** (a) 4.0 Ω ; (b) In parallel.

20. When resistors 1 and 2 are connected in series, the equivalent resistance is 16.0 Ω. When they are connected in parallel, the equivalent resistance is 3.0 Ω.What are (a) the smaller resistance and (b) the larger resistance of these two resistors?

 **Answer:** (a) 4.0 Ω ; (b) 12.0 Ω.

22. Figure 27-34 shows five 5.00 Ω resistors. Find the equivalent resistance between points (a) F and H and (b) F and G. (Hint: For each pair of points, imagine that a battery is connected across the pair.)?

**Answer: :** (a) 2.50 Ω ; (b) 3.13 Ω.

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30. In Fig. 27-41, the ideal batteries have emfs $ε\_{1}=$10.0 V and$ ε\_{2}=$ 0.500$ ε\_{1}$, and the resistances are each 4.00 Ω.What is the current in (a) resistance 2 and (b) resistance 3?

 **Answer: :** (a) *i*2 = 0 ; (b) *i*3 = 1.25 A.



33. In Fig. 27-44, the current in resistance 6 is i6 = 1.40 A and the resistances are R1 = R2 = R3 = 2.00 Ω, R4 = 16.0 Ω, R5 = 8.00 Ω, and R6 = 4.00 Ω. What is the emf of the ideal battery?

**Answer:** 48.3 V



35. In Fig. 27-46,$ ε$ = 12.0 V, R1 = 2000 Ω, R2 = 3000 Ω, and R3 = 4000 Ω. What are the potential differences (a) $V\_{A}-V\_{B}$ (b) $V\_{B}-V\_{C}$, (c) $V\_{C}-V\_{D}$, and (d) $V\_{A}-V\_{C}$?

**Answer:** (a) 5.25 V ; (b) 1.50 V ; (c) 5.25 V ; (d) 7.25 V.



63. In the circuit of Fig. 27-65, $ε=$ 1.2 kV, C = 6.5 μF,R1 = R2 = R3 = 0.73 M Ω. With C completely uncharged, switch S is suddenly closed (at t = 0). At t = 0, what are (a) current i1 in resistor 1, (b) current i2 in resistor 2, and (c) current i3 in resistor 3? At t = ∞ (that is, after many time constants), what are (d) i1, (e) i2, and (f) i3? What is the potential difference V2 across resistor 2 at (g) t = 0 and (h) t = ∞?

**Answer:** (a) 1.1 mA ; (b) 0.55 mA ; (c) 0.55 mA ; (d) 0.82 mA ; (e) 0.82 mA ; (f) 0 ; (g) 400 V ; (h) 600 V.