11. A resistor of unknown resistance and a 15-Ω resistor are connected across a 20-V emf in such a way that a 2.0 A current is observed in the emf. What is the value of the unknown resistance?

a. 75 Ω
b. 12 Ω
c. 7.5 Ω
d. 30 Ω
e. 5.0 Ω

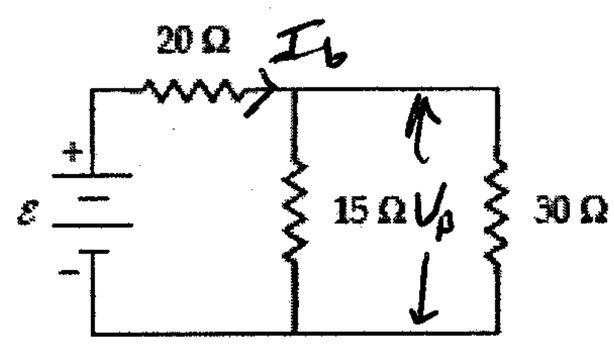
d

$R_{eq} = \frac{20V}{2.0A} = 10\Omega < 15\Omega$ so must be parallel

$\frac{1}{10\Omega} = \frac{1}{15\Omega} + \frac{1}{R_u}$ $\quad \frac{1}{R_u} = 0.033\ \frac{1}{\Omega}$

$R_u = 30\Omega$

12. What is the current in the 15-Ω resistor when $\varepsilon = 9.0$ V?



a

$R_{eq} = \left(\frac{1}{15} + \frac{1}{30}\right)^{-1}\Omega + 20\Omega = 30\Omega$

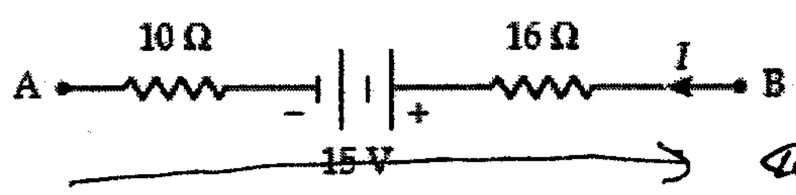
$I_b = \frac{\varepsilon}{R_{eq}} = 0.30A$

$V_p = \varepsilon - I_b(20\Omega) = 3.0V$

$I_{15} = \frac{V_p}{15\Omega} = 0.20A$

a. 0.20 A
b. 0.30 A
c. 0.10 A
d. 0.26 A
e. 0.60 A

13. What is the potential difference $V_B - V_A$ when $I = 0.50$ A in the circuit segment shown below?



add ΔVs this way

a

$\Delta V = (10\Omega)I + 15V + (16\Omega)I = 28V$

a. +28 V
b. +2.0 V
c. −28 V
d. −2.0 V
e. +18 V

14. A capacitor in a single-loop *RC* circuit is charged to 85% of its final potential difference in 2.4 s. What is the time constant for this circuit?

a. 1.5 s
b. 1.3 s
c. 1.7 s
d. 1.9 s
e. 2.9 s

b

$V = \frac{Q}{C} = V_f(1 - e^{-t/RC})$

$0.85 = 1 - e^{-t/RC}$ $\quad e^{-t/RC} = .15$

$-t/RC = \ln(.15)$ $\quad RC = \frac{-2.4s}{\ln(.15)} = 1.3s$

15. If 480 C pass through a 4.0-Ω resistor in 10 min, what is the potential difference across the resistor?

a. 3.6 V
b. 2.8 V
c. 2.4 V
d. 3.2 V
e. 5.0 V

d

$I = \frac{\Delta Q}{\Delta t} = \frac{480C}{(10min)(60s/min)} = 0.80A$

$V = IR = 3.2V$