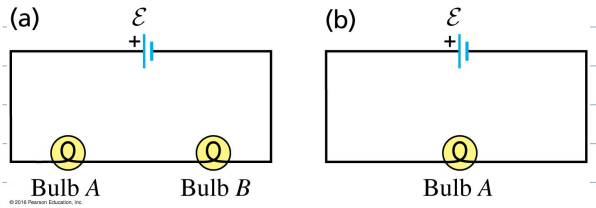
ch9 / concept Q #6



In circuit a, bulbs A and B are identical. How does the brightness of bulb B compare to that of A?

A. brighter
B. dimmer
C. equally bright

same I, same R ⇒ same $P = I^2R$

How does the brightness of bulb A in circuit b compare to that of bulb A in circuit a?

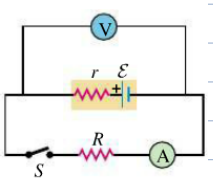
A. brighter
B. dimmer
C. equally bright

circuit b has half the $R_{equivalent}$ ⇒ Twice the current

Group problem ch9 #25.29

25.29 • When switch S in Fig. E25.29 is open, the voltmeter V reads 3.08 V. When the switch is closed, the voltmeter reading drops to 2.97 V, and the ammeter A reads 1.65 A. Find the emf, the internal resistance of the battery, and the circuit resistance R. Assume that the two meters are ideal, so they don't affect the circuit.

Figure E25.29



Givens

① $I_{closed} = \frac{\mathcal{E}}{r+R} = 1.65\,A$

② $\Delta V_{closed} = \mathcal{E} - I_{closed} r = 2.97\,V$

③ $\Delta V_{open} = \mathcal{E} - I_{open} r = 3.08\,V$

④ $I_{open} = 0\,A$

③ & ④ ⇒ $\Delta V_{open} = \mathcal{E} = 3.08\,V$

② ⇒ $r = \frac{\mathcal{E} - \Delta V_{closed}}{I_{closed}} = 0.0667\,\Omega$

① ⇒ $R = \frac{\mathcal{E}}{I_{closed}} - r = 1.80\,\Omega$

25.38 • A battery-powered global positioning system (GPS) receiver operating on 9.0 V draws a current of 0.13 A. How much electrical energy does it consume during 30 minutes?

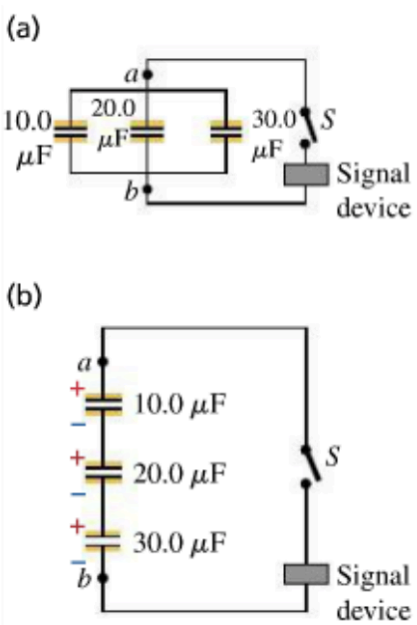
energy = $\frac{\text{energy}}{\text{time}} \cdot \text{time}$ and $\frac{\text{energy}}{\text{time}} = P = IV$

$\Rightarrow$ energy $= IV \cdot t = (0.13\ A)(9.0\ V)(1800\ s) = 2.1\ kJ$

24.60 • Each combination of capacitors between points *a* and *b* in **Fig. P24.60** is first connected across a 120-V battery, charging the combination to 120 V. These combinations are then connected to make the circuits shown. When the switch *S* is thrown, a surge of charge for the discharging capacitors flows to trigger the signal device. How much charge flows through the signal device in each case?

24.61 • A parallel-plate capacitor with only air between the plates is charged by connecting it to a battery. The capacitor is

Figure **P24.60**



a) $C_{eq} = C_{123} = C_1 + C_2 + C_3$

$Q_{tot} = C_{eq}\,\Delta V$

$= (60\ \mu F)(120\ V)$

$= 7200\ \mu C$

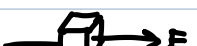
b) $C_{eq} = \left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}\right)^{-1}$

$Q = CV = 654\ \mu C$

Practice exam practice

#1 $\hat{k}$ (a)

#2 $F = \frac{k q_1 q_2}{r_2} \rightarrow \frac{2q_1 2q_2}{(2r)^2} \rightarrow$ same (c)

#3  flux is zero for both types of cubes

(c)

#4 (d)

#5 $\Delta K_{li} = \Delta K_\alpha \Rightarrow \Delta U_{li} = \Delta U_\alpha \Rightarrow q_{li}\Delta V_{li} = q_\alpha \Delta V_\alpha$

(b) $\Rightarrow \Delta V_{li} = \frac{q_\alpha}{q_{li}} \Delta V_\alpha$

#6 (a)

#7 © (but would be @ if battery were disconnected)