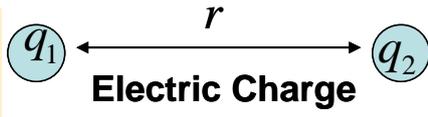
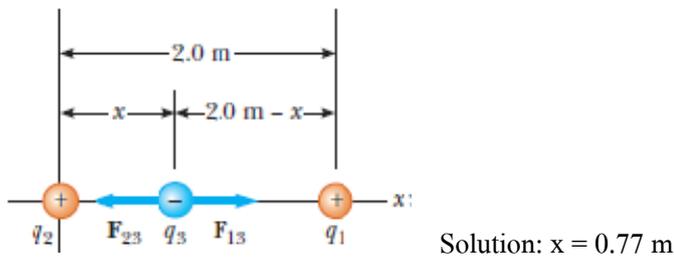


$$F = k_e \frac{|q_1||q_2|}{r^2}$$


**Problem** Three charges lie along the  $x$ -axis as in Figure 15.7. The positive charge  $q_1 = 15 \mu\text{C}$  is at  $x = 2.0 \text{ m}$ , and the positive charge  $q_2 = 6.0 \mu\text{C}$  is at the origin. Where must a *negative* charge  $q_3$  be placed on the  $x$ -axis so that the resultant electric force on it is zero?



13. Three point charges are located at the corners of an equilateral triangle as in Figure P15.13. Calculate the net electric force on the  $7.00\text{-}\mu\text{C}$  charge.

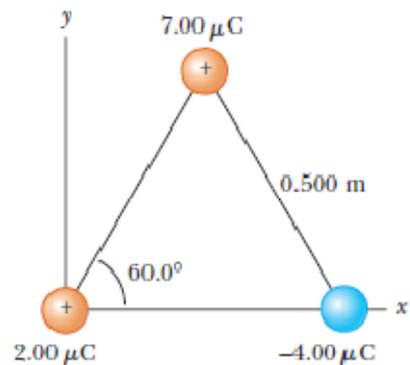
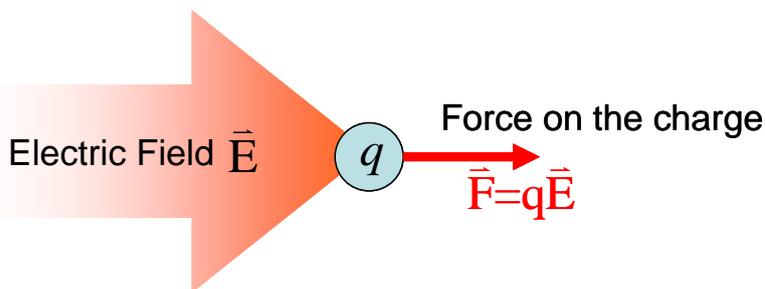


Figure P15.13

Solution:  $0.872 \text{ N}$  at  $30$  degrees below positive  $x$ -axis



57. **Physics Now™** Two  $2.0\text{-g}$  spheres are suspended by  $10.0\text{-cm}$ -long light strings (Fig. P15.57). A uniform electric field is applied in the  $x$ -direction. If the spheres have charges of  $-5.0 \times 10^{-8} \text{ C}$  and  $+5.0 \times 10^{-8} \text{ C}$ , determine the electric field intensity that enables the spheres to be in equilibrium at  $\theta = 10^\circ$ .

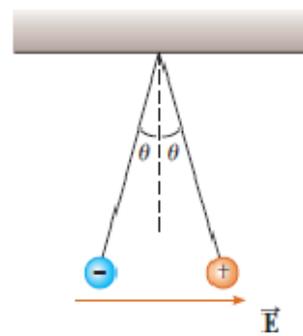


Figure P15.57

Solution:  $4.4 \times 10^5 \text{ N/C}$

5. **Physics Now™** (a) Find the equivalent resistance between points  $a$  and  $b$  in Figure P18.5. (b) Calculate the current in each resistor if a potential difference of  $34.0\text{ V}$  is applied between points  $a$  and  $b$ .

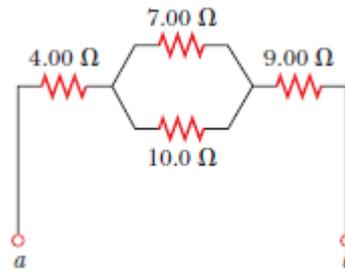


Figure P18.5

Solution: (a)  $17.1\text{ Ohms}$  (b)  $1.99\text{ A}$  for 4-Ohm and 9-Ohm resistor,  $1.17\text{ A}$  for 7-Ohm resistor, and  $0.818\text{ A}$  for 10-Ohm resistor

9. Consider the circuit shown in Figure P18.9. Find (a) the current in the  $20.0\text{-}\Omega$  resistor and (b) the potential difference between points  $a$  and  $b$ .

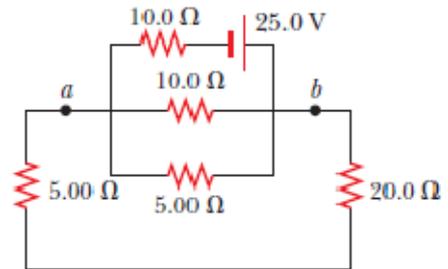


Figure P18.9

Solution: (a)  $0.227\text{ A}$  (b)  $5.68\text{ Volts}$

7. What is the equivalent resistance of the combination of resistors between points  $a$  and  $b$  in Figure P18.7? Note that one end of the vertical resistor is left free.

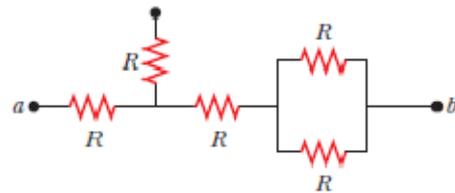


Figure P18.7

Solution:  $2.5\text{ R}$