$$F = k\,q\,Q\,/\,r^2$$

$W = F\,r$	$E = k\,Q\,/\,r^2$	$F = E\,q$
$V = E\,r$	$W = k\,q\,Q\,/\,r$	$W = q\,V$
	$V = k\,Q\,/\,r$	

9. A negative charge of -200 µC and a positive charge of 800 µC are separated by 0.30m. What is the force between the two charges?

10. A negative charge of -6 µC exerts an attractive force of 65 N on a second charge that is 0.050 m away. What is the magnitude of the second charge?

12. Sphere A is located at the origin and has a charge of +2 µC. Sphere B is located at 0.60 m on the x-axis and has a charge of -3.6 µC. Sphere C is located at +0.80 m on the x-axis and has a charge of 4.0µC. Determine the net force on sphere A.

13. Determine the net force on sphere B in the previous problem.

44. Two electrons in an atom are separated by 1.5 x10^{-10} m, the typical size of an atom. What is the electric force between them?

45. A positive and a negative charge, each of magnitude 25 µC, are separated by a distance of 15 cm. Find the force on each of the particles.

46. A force of 240 N exists between a positive charge of 80 µC and a positive charge of 30 µC. What distance separates the charges?

47. Two identical positive charges exert a repulsive force of 6.4 x10^{-9} N when separated by a distance of 3.8 x10^{-10} m. Calculate the charge of each.

51 .Three particles are placed in a line. The left particle has a charge of -55 µC, the middle one has a charge of +45 µC, and the right one has a charge of -78 µC. The middle particle is 72 cm from each of the others, as shown.

a.Find the net force on the middle particle.

b.Find the net force on the right particle.

−55 µC   +45 µC   −78 µC

|——72 cm——|——72 cm——|
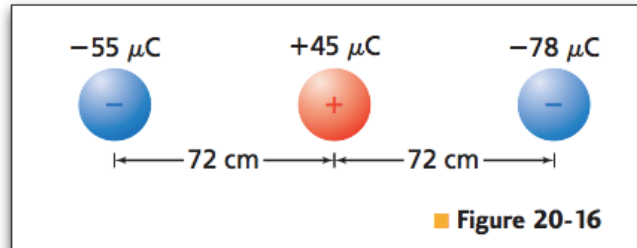
■ Figure 20-16

55.Two identically charged spheres placed 12 cm apart have an electric force of 0.28 N between them. What is the charge of each sphere?

60.Three charged spheres are located at the positions shown in Figure 20-17.Find the total force on sphere B.

+y
+4.5 µC
A   −8.2 µC
+x
←—— 4.0 cm ——→ B

3.0 cm

+6.0 µC
C

■ Figure 20-17

Example:

-q —— D —— -Q
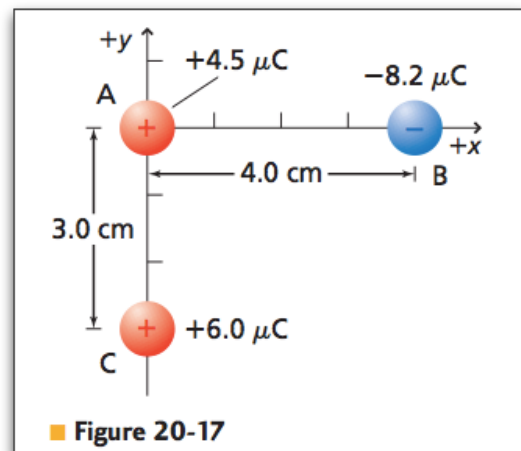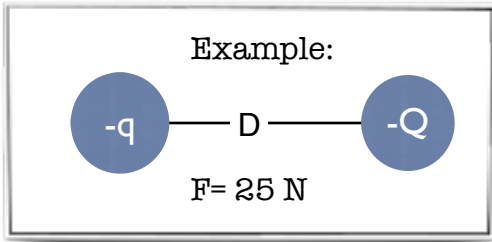
F= 25 N

In the example, the charge on the right feels a force of 25 N pushing it to the right (away from the other charge). What is the force on the right charge in each of the following trials?

F = _____

-4q —— D —— -0.5q

F = _____

-2q —— 2D —— 2Q

F = _____

8Q —— 2D —— -q

F = _____

0.5 D

-q   -Q

F = _____

-6q —— 3 D —— 3Q
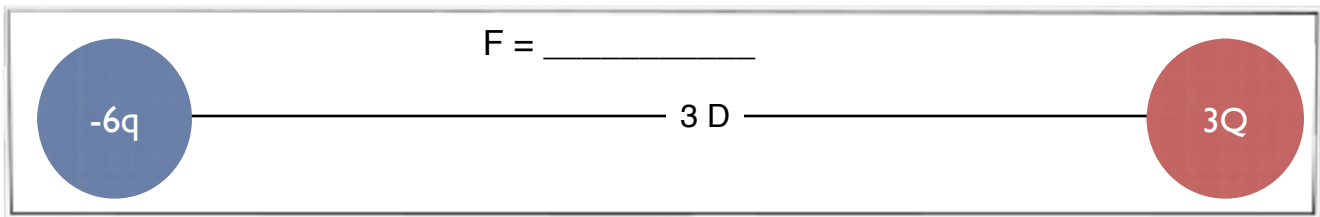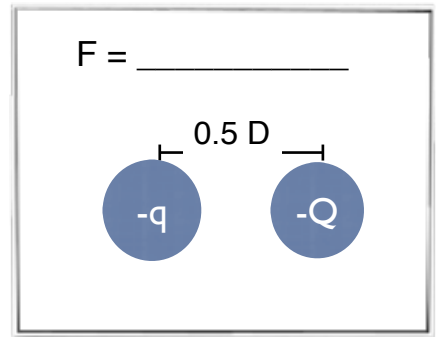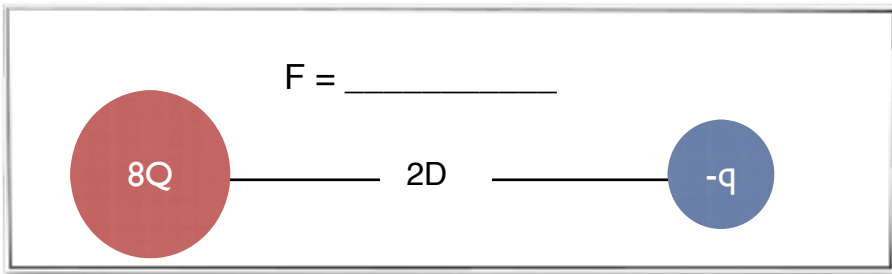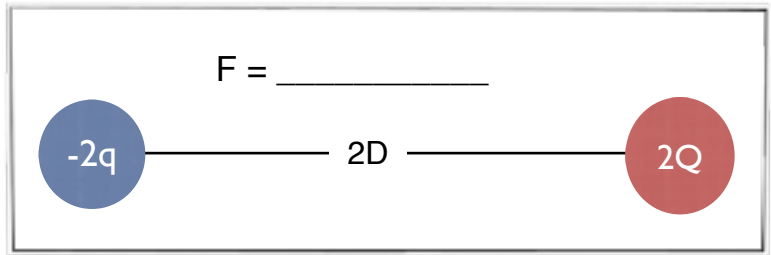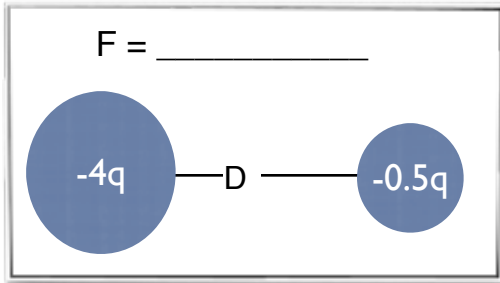
Find the electric force on the 8µC charge, and the electric field there (caused by the other two charges).

10µC —— 0.3 m —— -2µC —— 0.4 m —— q 8µC
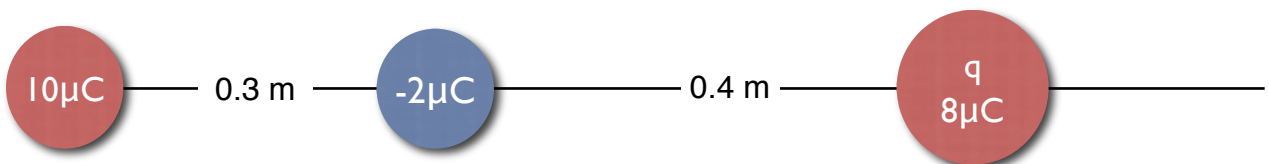
1. A positive test charge of 5 µC is in an electric field that exerts a force of 2.0×10^{-4} N on it. What is the magnitude of the electric field at the location of the test charge?

2. A negative charge of 2.0×10^{-8} C experiences a force of 0.060 N to the right in an electric field. What are the field's magnitude and direction at that location?

3. A positive charge of 0.3 µC is located in a field of 27 N/C directed toward the south. What is the force acting on the charge?

4. A pith ball weighing 2.1×10^{-3} N is placed in a downward electric field of 6.5×10^4 N/C. What charge (magnitude and sign) must be placed on the pith ball so that the electric force acting on it will suspend it against the force of gravity?

6. What is the magnitude of the electric field strength at a position that is 1.2 m from a point charge of 4.2 µC?

7. What is the magnitude of the electric field strength at a distance twice as far from the point charge in problem 6?

9. The electric field that is 0.25 m from a small sphere is 450 N/C toward the sphere. What is the charge on the sphere?

10. How far from a point charge of 2.4 µC must a test charge be placed to measure a field of 360 N/C?

16. The electric field intensity between two large, charged, parallel metal plates is 6000 N/C. The plates are 0.05 m apart. What is the electric potential difference between them?

18. What electric potential difference is applied to two metal plates that are 0.200 m apart if the electric field between them is 2.50×10^3 N/C?

19. When a potential difference of 125 V is applied to two parallel plates, the field between them is 4.25×10^3 N/C. How far apart are the plates?

20. A potential difference of 275 V is applied to two parallel plates that are 0.35 cm apart. What is the electric field between the plates?

21. What work is done when 3.0 C is moved through an electric potential difference of 1.5 V?

22. A 12-V car battery can store 1.44 x10^6 C when it is fully charged. How much work can be done by this battery before it needs recharging?

23. An electron in a television picture tube passes through a potential difference of 18,000 V. How much work is done on the electron as it passes through that potential difference?
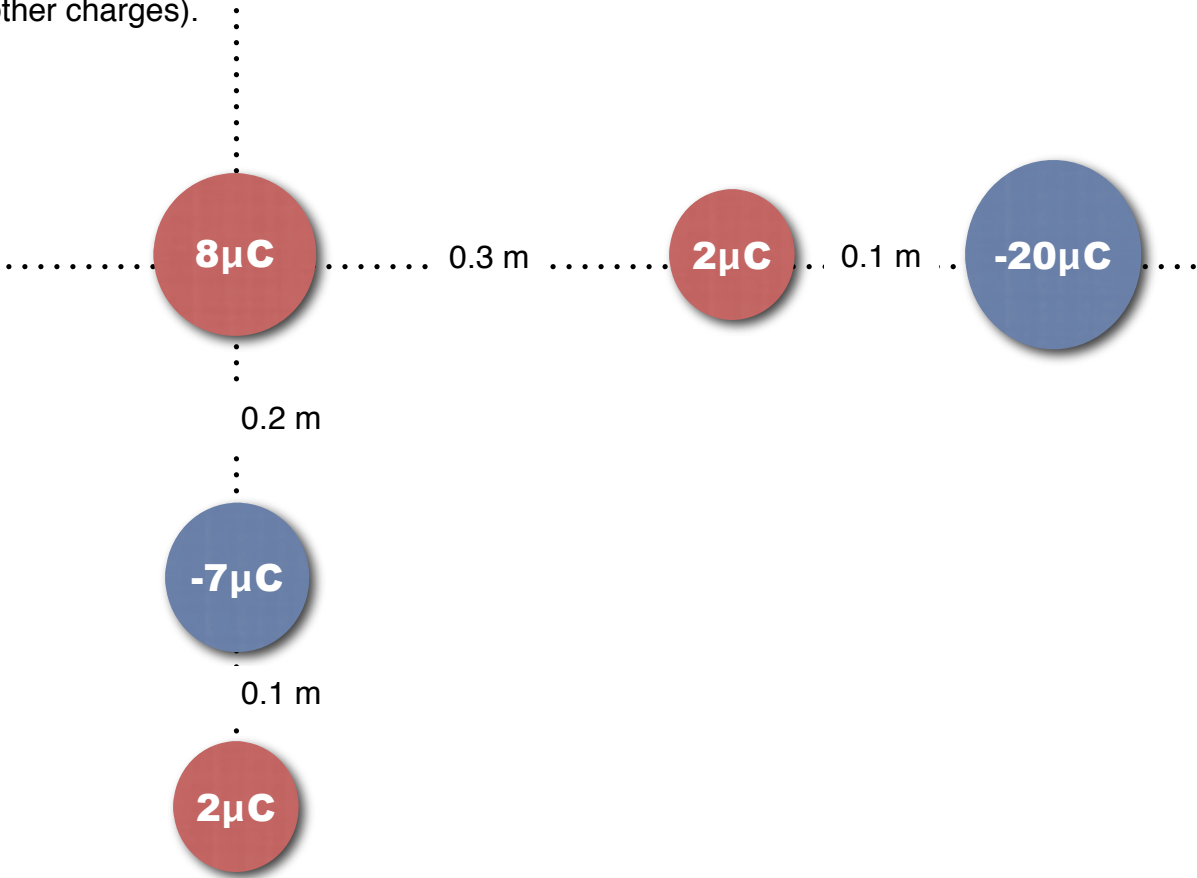

78. An electron is moved through an electric potential difference of 450 V. How much work is done on the electron?

86. A force of 0.065 N is required to move a charge of 37 µC a distance of 25 cm in a uniform electric field, as in Figure 21-23. What is the size of the electric potential difference between the two points?

37 µC

0.053 N

25 cm

Figure 21-23
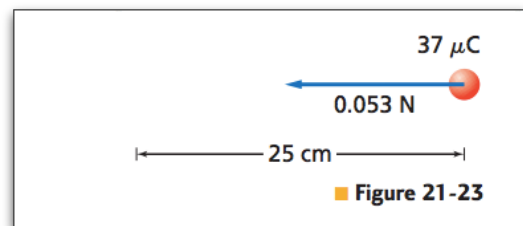
90. How much work does it take to move 0.25 µC between two parallel plates that are 0.40 cm apart if the field between the plates is 6400 N/C?

Find the electric force on the 8μC charge, and the electric field there (caused by the other charges).

8μC .... 0.3 m .... **2μC** ... 0.1 m ... **-20μC** ....

0.2 m

-7μC

0.1 m

2μC

FORCE	
E-FIELD	