Physics

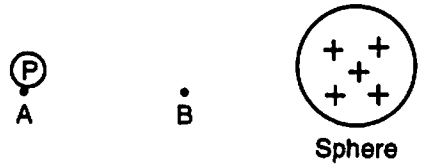
Name _____

Static Electricity #1 Review

1 A distance of 1.0×10^3 meters separates the charge at the bottom of a cloud and the ground. The electric field intensity between the bottom of the cloud and the ground is 2.0×10^4 newtons per coulomb. What is the potential difference between the bottom of the cloud and the ground?

(1) 1.3×10^{23} V
(2) 2.0×10^{1} V
(3) 2.0×10^{7} V
(4) 5.0×10^{-2} V

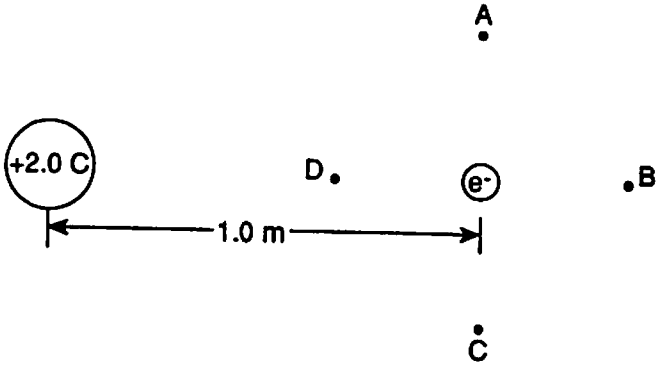
2 The diagram below shows proton *P* located at point *A* near a positively charged sphere.



If 6.4×10^{-19} joule of work is required to move the proton from point *A* to point *B*, the potential difference between *A* and *B* is

(1) 6.4×10^{-19} V
(2) 4.0×10^{-19} V
(3) 6.4 V
(4) 4.0 V

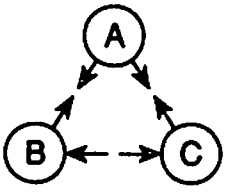
3 An electron is located 1.0 meter from a +2.0-coulomb charge, as shown in the diagram below.



The electrostatic force acting on the electron is directed toward point

(1) *A*
(2) *B*
(3) *C*
(4) *D*

4 The diagram below shows the arrangement of three charged hollow metal spheres, *A*, *B*, and *C*. The arrows indicate the direction of the electric forces acting between the spheres. At least two of the spheres are positively charged.



Which sphere, if any, could be negatively charged?

1 sphere *A*
2 sphere *B*
3 sphere *C*
4 no sphere

5 When a plastic rod is rubbed with wool, the wool acquires a positive charge because

1 electrons are transferred from the wool to the rod
2 protons are transferred from the wool to the rod
3 electrons are transferred from the rod to the wool
4 protons are transferred from the rod to the wool

6 Three identical metal spheres are mounted on insulating stands. Initially, sphere *A* has a net charge of *q* and spheres *B* and *C* are uncharged. Sphere *A* is touched to sphere *B* and removed. Then sphere *A* is touched to sphere *C* and removed. What is the final charge on sphere *A*?

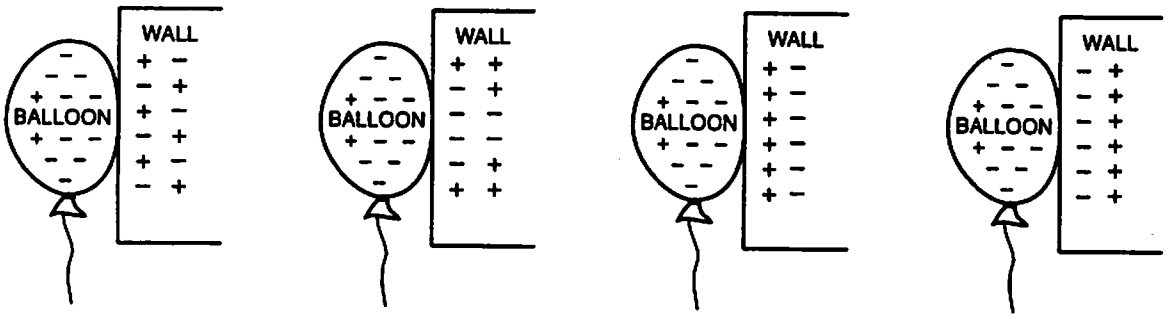
(1) q
(2) $\frac{q}{2}$
(3) $\frac{q}{3}$
(4) $\frac{q}{4}$

7 What is the magnitude of the electrostatic force experienced by one elementary charge at a point in an electric field where the electric field intensity is 3.0×10^3 newtons per coulomb?

(1) 1.0×10^3 N
(2) 1.6×10^{-19} N
(3) 3.0×10^3 N
(4) 4.8×10^{-16} N

Statics #6

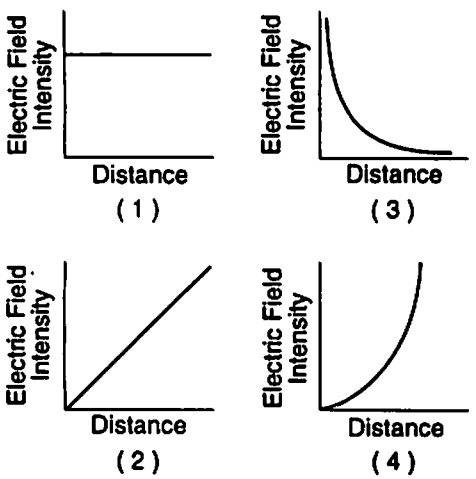
8 An inflated balloon which has been rubbed against a person's hair is touched to a neutral wall and remains attracted to it. Which diagram best represents the charge distribution on the balloon and wall?



9 Two metal spheres having charges of $+4.0 \times 10^{-6}$ coulomb and $+2.0 \times 10^{-5}$ coulomb, respectively, are brought into contact and then separated. After separation, the charge on each sphere is

(1) 8.0×10^{-11} C
(2) 8.0×10^{-6} C
(3) 2.1×10^{-6} C
(4) 1.2×10^{-5} C

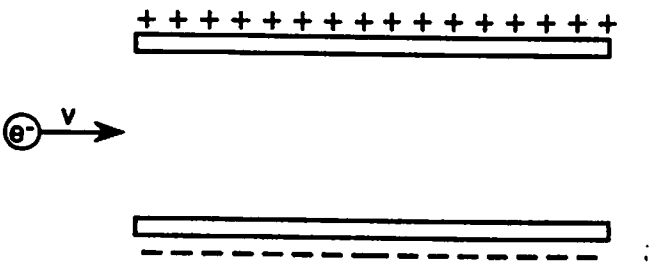
10 Which graph best represents the relationship between electric field intensity and distance from a point charge?



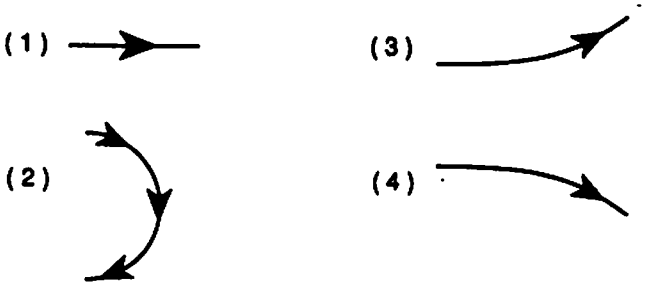
11 Moving +2.0 coulombs of charge from infinity to point P in an electric field requires 8.0 joules of work. What is the electric potential at point P?

(1) 0.25 V
(2) 8.0 V
(3) 16 V
(4) 4.0 V

12 In the diagram below, an electron moving with speed v enters the space between two oppositely charged parallel plates.



Which diagram best represents the path the electron follows as it passes between the plates?

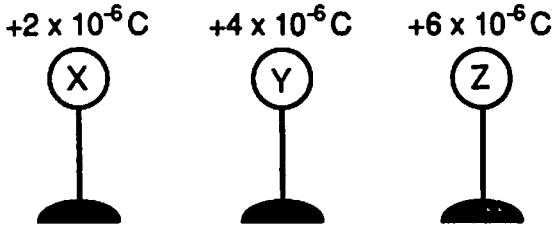


13 After Millikan performed his oil drop experiment, he concluded that

1 there is a minimum amount of charge that particles can acquire
2 oil drops exhibit gravitational attraction for other oil drops
3 oil drops are largely empty space
4 there is a minimum amount of mass that particles can acquire

Status 3

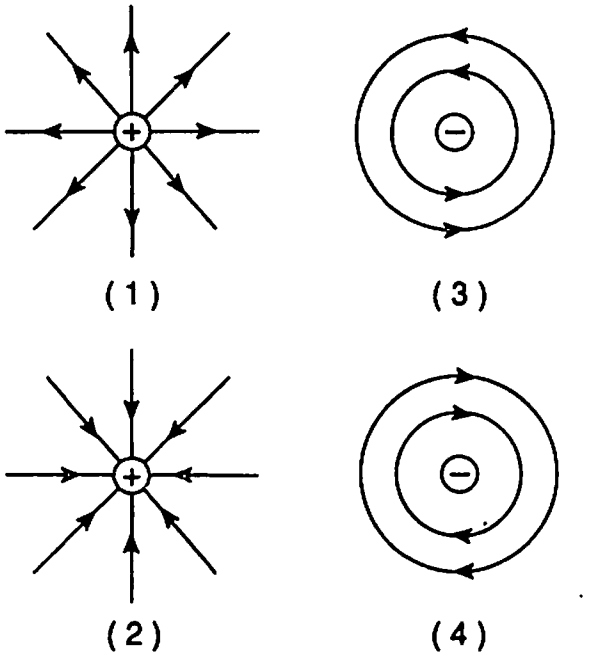
14 The diagram below shows the initial charge and position of three identical metal spheres, *X*, *Y*, and Z, which have been placed on insulating stands.



All three spheres are simultaneously brought into contact with each other and then returned to their original positions. Which statement best describes the charge of the spheres after this procedure is completed?

1 All the spheres are neutral.
2 Each sphere has a net charge of $+4 \times 10^{-6}$ coulomb.
3 Each sphere retains the same charge that it had originally.
4 Sphere *Y* has a greater charge than spheres *X* or Z.

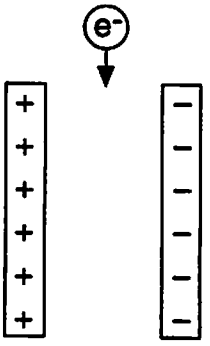
15 Which diagram best represents the electric field of a point charge?



16 If 20. joules of work is done in transferring 5.0 coulombs of charge between two points, the potential difference between these two points is

(1) 100 V
(2) 50. V
(3) 0.25 V
(4) 4.0 V

Base your answers to questions 17 and 18 on the diagram below which represents an electron being projected between two oppositely charged parallel plates.



17 In which direction will the electric field deflect the electron?

1 into the page
2 out of the page
3 to the right
4 to the left

Note that question 18 has only three choices.

18 As the electron moves through the electric field, the magnitude of the electric force on the electron

1 decreases
2 increases
3 remains the same

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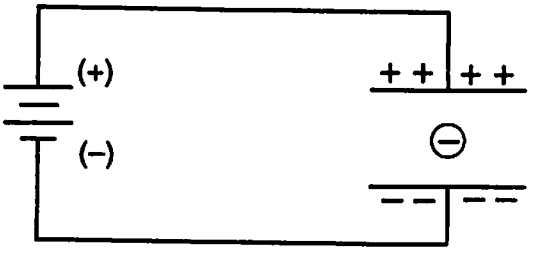
19 The diagram below represents a negatively charged oil drop between two oppositely charged parallel plates. The forces acting on the oil drop are in equilibrium.



The oil drop could have a charge of

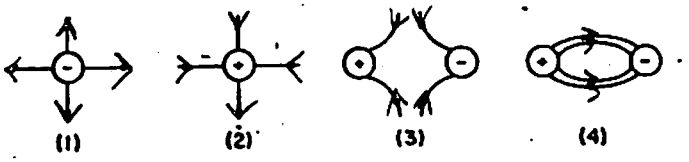
(1) 6.4×10^{-19} C
(2) 2.0×10^{-19} C
(3) 1.6×10^{-38} C
(4) 3.2×10^{-50} C

20 A repulsive electrostatic force of magnitude F exists between two metal spheres having identical charge q. The distance between their centers is r. Which combination of changes would produce *no* change in the electrostatic force between the spheres?

1 doubling q on one sphere while doubling r
2 doubling q on both spheres while doubling r
3 doubling q on one sphere while halving r
4 doubling q on both spheres while halving r

21 A charge of 100. elementary charges is equivalent to
(1) 1.60×10^{-21} coulomb
(2) 1.60×10^{-17} coulomb
(3) 6.25×10^{18} coulombs
(4) 6.25×10^{20} coulombs

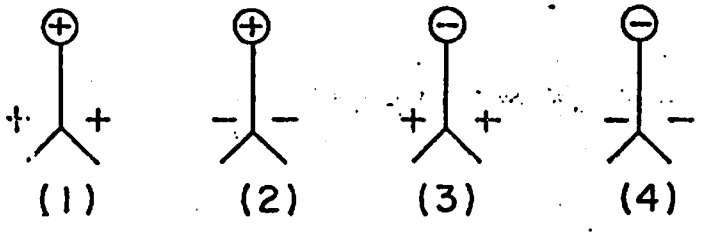
21a Which diagram best represents an electric field?



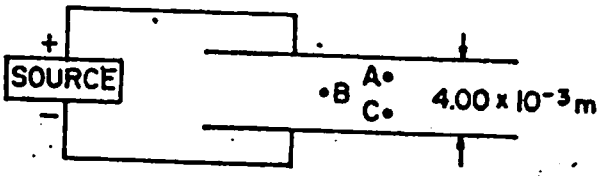
22 How much work is done in moving 6 electrons through a potential difference of 2.0 volts?
(1) 6.0 ev
(2) 2.0 ev
(3) 3.0 ev
(4) 12 ev

23 A wool cloth becomes positively charged as it
1 gains protons
2 gains electrons
3 loses protons
4 loses electrons

24 A negatively charged rod is held near the knob of an uncharged electroscope. Which diagram best represents the distribution of charge on the electroscope?



Base your answers to questions 25 through 29 on the diagram below which represents a source connected to two large, parallel metal plates. The electric field intensity between the plates is 3.75×10^4 newtons per coulomb.



25 What is the potential difference of the source?
(1) 9.38×10^5 volts
(2) 4.00×10^3 volts
(3) 3.75×10^2 volts
(4) 1.50×10^2 volts

26 What would be the magnitude of the electric force on a proton at point A?
(1) 1.60×10^{-19} newton
(2) 6.00×10^{-15} newton
(3) 0 newtons
(4) 3.75×10^4 newtons

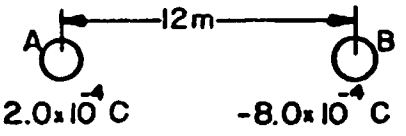
Note that questions 27 through 29 have only three choices.

27 Compared to the work done in moving an electron from point A to point B to point C, the work done in moving an electron directly from point A to point C is
1 less
2 greater
3 the same

28 If the source is replaced with one having twice the potential difference and the distance between the plates is halved, the electric field intensity between the plates will
1 decrease
2 increase
3 remain the same

29 As a proton moves from A to B to C, the electric force on the proton
1 decreases
2 increases
3 remains the same

Base your answers to questions 30 through 34 on the diagram below which represents a system consisting of two charged metal spheres with equal radii.



30 What is the magnitude of the electrostatic force exerted on sphere *A*?

(1) 1.1×10^{-9} N
(2) 1.3×10^{-8} N
(3) 120 N
(4) 10. N

31 Compared to the force exerted on sphere *B* at a separation of 12 meters, the force exerted on sphere *B* at a separation of 6.0 meters would be

(1) ½ as great
(2) 2 times as great
(3) ¼ as great
(4) 4 times as great

32 If the two spheres were touched together and then separated, the charge on sphere *A* would be

(1) -6.0×10^{-4} C
(2) 2.0×10^{-4} C
(3) -3.0×10^{-4} C
(4) -8.0×10^{-4} C

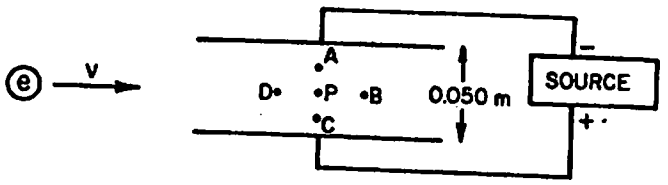
33 Compared to the electrical potential *energy* of the system at a separation of 12 meters, the electrical potential energy of the system at a separation of 6 meters is

1 less
2 greater
3 the same

34 If spheres *A* and *B*, as represented in the diagram, were touched together and then separated, the net charge on the two spheres would

1 decrease
2 increase
3 remain the same

Base your answers to questions 35 through 38 on diagram below which represents two large parallel conducting plates charged to a potential of 10. volts. The plates are separated by a distance of 0.050 meter.



35 The direction of the electric field at point *P* is toward point

(1) *A*
(2) *B*
(3) *C*
(4) *D*

36 The magnitude of the electric field intensity at point *P* is

(1) 20. N/C
(2) 2.0. N/C
(3) 2.0×10^3 N/C
(4) 2.0×10^2 N/C

37 If an electron were projected into the electric field with a velocity *v*, it would experience a deflection

1 into the page
2 out of the page
3 toward the top of the page
4 toward the bottom of the page

Note that question 38 has only three choices.

38 Compared to the magnitude of the electric field intensity at point *P*, the magnitude of the electric field intensity at point *A* is

1 less
2 greater
3 the same