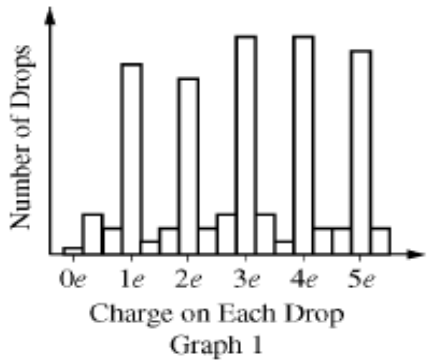
AP Physics 1 Multiple Choice Questions - Chapter 11

1 Two protons are held a distance d apart. The electrostatic force and the gravitational force that one protons exerts on the other are F_e and F_g, respectively. Which of the following correctly compares the magnitude and direction of these forces?

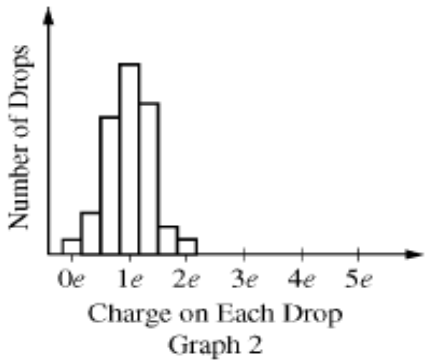
11.1

	Magnitude	Direction
a	$F_e > F_g$	Opposite
b	$F_e > F_g$	Same
c	$F_e < F_g$	Opposite
d	$F_e < F_g$	Same

11.1



Graph 1



Graph 2

2 Tiny drops of oil that have different amounts of electric charge produced by a random process are sprayed into a region between a positively and a negatively charged plate. The charge on each drop is determined by analyzing the effect of the electric force on the drop's motion. Two graphs of the number of drops as a function of the charge on each drop, where e is the charge of an electron, are shown above. Which graph shows the most likely result after repeating the experiment many times, and why?

a Graph 1, because it shows peaks with approximately the sampe amplitude
b Graph 1, because it shows that within experimental ereror charge only exists in multiples of e
c Graph 2, because it shows a peak value at the charge of an electron
d Graph 2, because it shows a narrower range of measurement error.

3 What happens when a charged insulator is placed near an uncharged metallic object?

11.1

a They repel each other

b They attract each other

c They may attract or repel each other, depending on whether the charge on the insulator is positive or negative

d They exert no electrostatic force on each other

e The charged insulator always spontaneously discharges

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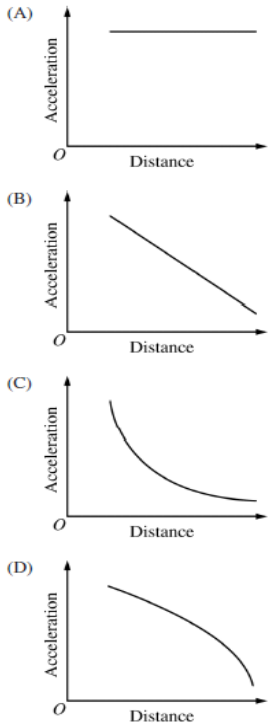
1 When object X with charge +2 μC is 1 m from object Y with charge -3 μC, the magnitude of force between them is F. Object Y is removed, and object Z with charge -2 μC is placed 2 m from object X. What is the magnitude of the force between object X and Z.

11.2

a $F/2$ **b** $F/3$
c $F/4$ **d** $F/6$

11.2

2 A small object with positive charge Q is fixed in place. A small bead with positive charge q is released from rest from the position shown above. In the absence of forces other than the electric force, which of the following graphs best represents the bead's acceleration as a function of its distance from the fixed object?



3 The magnitude of the electric force between two protons is 2.3×10^{-26} N. How far apart are they?

a 0.10 m
b 0.022 m
c 3.1 m
d 0.0057 m
e 0.48 m

11.2

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1 What is the strength of the electric field around an 8 uC point charge at a distance of 0.80 m away?

11.3

a 135.2 N/C
b 82.5 N/C
c 234.5 N/C
d 112.5 N/C

2 Estimate the magnitude of the electric field strength due to the proton in a hydrogen atom at a distance of 5.29×10^{-11} m, the Bohr radius.

11.3

a 10^{-11} N/C
b 10^{8} N/C
c 10^{14} N/C
d 10^{6} N/C
e 10^{12} N/C

3 A very small ball has a mass of 5.0×10^{-3} kg and a charge of 4.0 microcoulombs. What magnitude electric field directed upward will balance the weight of the ball?

11.3

a 8.2×10^{2} N/C
b 1.2×10^{4} N/C
c 2.0×10^{-2} N/C
d 5.1×10^{6} N/C
e 3.7×10^{3} N/C

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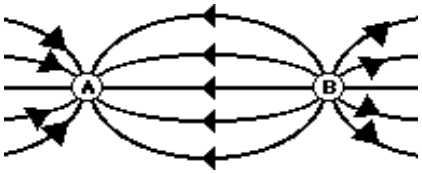
1 

11.4

Using the diagram above and considering the electric field lines, it is clear that charge A is _____ and charge B is _____.

a Negative, Negative
b Positive, Negative
c Negative, Positive
d Positive, Positive

2 A metallic coin is given a positive electric charge. Does its mass

11.4

a Increase measurably
b Increase by an amount too small to measure directly
c Stay unchanged
d Decrease by an amount too small to measure directly
e Decrease measurably

3 What prevents gravity from pulling you through the ground to the center of the Earth?

11.4

a The density of matter is too great
b The positive nuclei of your body's atoms repel the positive nuclei of the atoms in the ground
c The density of the ground is greater than the density of your body
d Atoms are bound together by chemical bonds
e Electrons on the ground's surface and the surface of your feet repel one another