**Physics 30 – Lesson 14**

**Coulomb’s Law**

Possible 99 / 93

**Practice problems**

1)



2)



3)



4)

A

+2.00 C

B

–3.00 C

0.10 m

•

•

0.075 m

•

C

–4.00 C

There are two forces acting on charge B: FC on B and FA on B.



The free body diagram is:

19.18 N

5.394 N



FNET

5)



**Assignment**

**Part A - Electrostatics**

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A negatively charged rod brought into contact with a conducting object results in negative charges being transferred to the object.

1)

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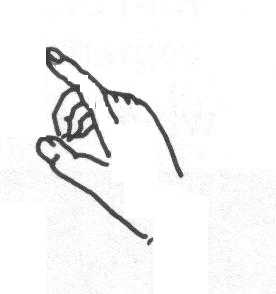
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A positively charged rod brought near a conducting object along with a ground results in negative charges being pulled into the object by induction.

+ + + + + + +



e- flow into electroscope

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/6

2) Static means not moving. Rubbing a conductor does not produce a static charge since the electrons are free to move away from one another in the conductor. A static charge is produced on an insulator since the electrons are not free to move and therefore they remain static in one spot.

/2

3)



/2

4)



/2

5)

+ +

- -

+ - - -

- + - -

- -

+ +

+ +

+ +

+ +

leaves come together

Negative charges in the knob of the electroscope are repelled by the charged rod. The negatives flow down to the leaves, neutralizing them, and causing the leaves to come together.

/3

e–

e–

+

+ +

+ +

+ +

6)

Electrons are attracted to the charged rod. Since the leaves are becoming less negative and they spread apart, the electroscope must have been positive!

/3

7)

The spheres are conductors which will allow the free flow of charges. The charges will repel one another and will therefore move to the outside of the sphere regardless of whether the sphere is hollow or solid.



8)





9)

1. Touch the glass rod to the electroscope (conduction)
2. Use the silk (negatively charged) to charge the electroscope by induction.
3. Yes, either by induction with the glass rod or by conduction using the silk cloth.

/3

**Part B – Coulomb’s Law**

1)

similar

* both obey inverse square law with distance
* both are linear with respect to mass / charge

different

* one depends on mass, the other on charge
*  is always present, exists between charged items only
* is always attractive,  can also be repulsive
*  is much smaller than 



/4

2)



/3



3)

/3

4)



/3

5)



/5

6)



/3

7)

a)



/10



b)

c)



d) Since Fg is insignificant compared to FE, FE is responsible for Fc



e)

8)



a)

/8

b)



9)



/4

10)



note: the horizontal components of are equal and opposite





11)



/7



12)



/5

13)



/5



14)



Bonus

/8