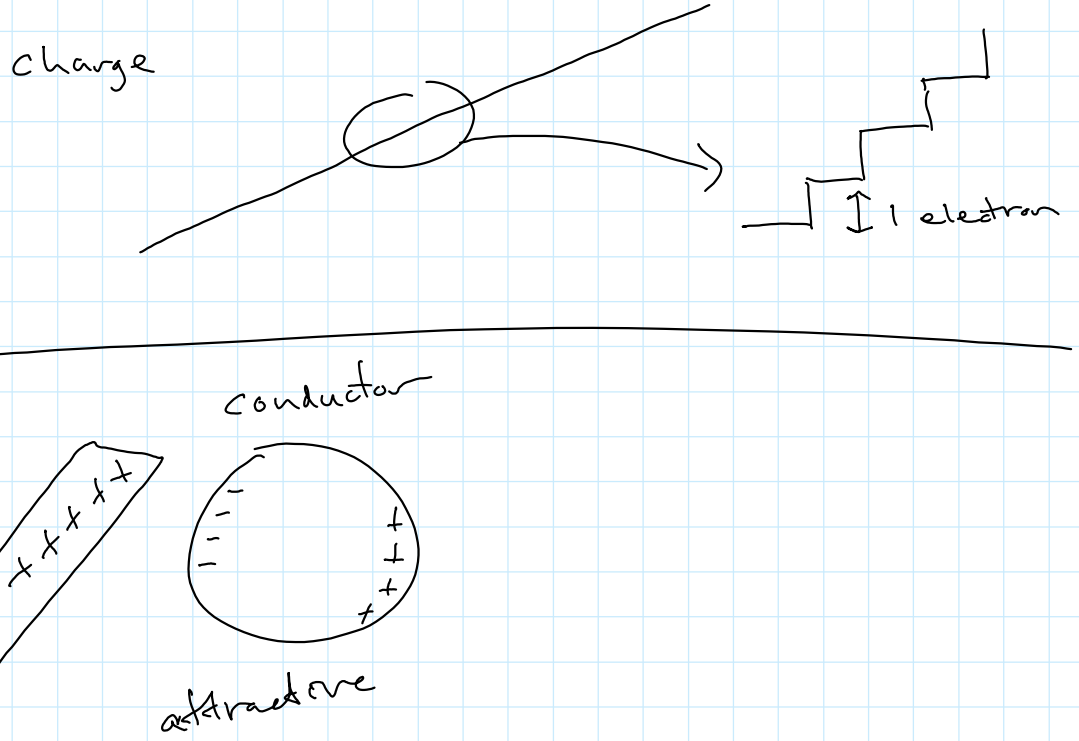
Phy 2B 1/7

Wednesday, January 7, 2015 9:57 AM

2 types of charges: $\{ +, - $

like charges repel

opposites attract

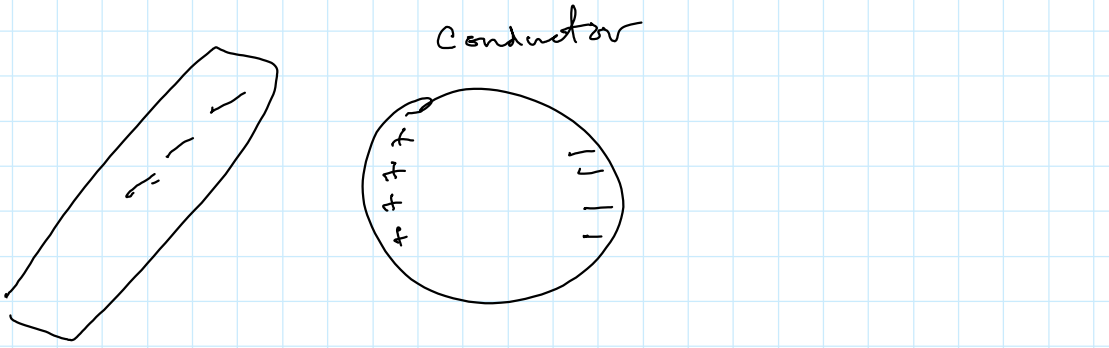


Electric Force between 2 charged objects : $F_E \propto \frac{q_1 q_2}{r^2}$

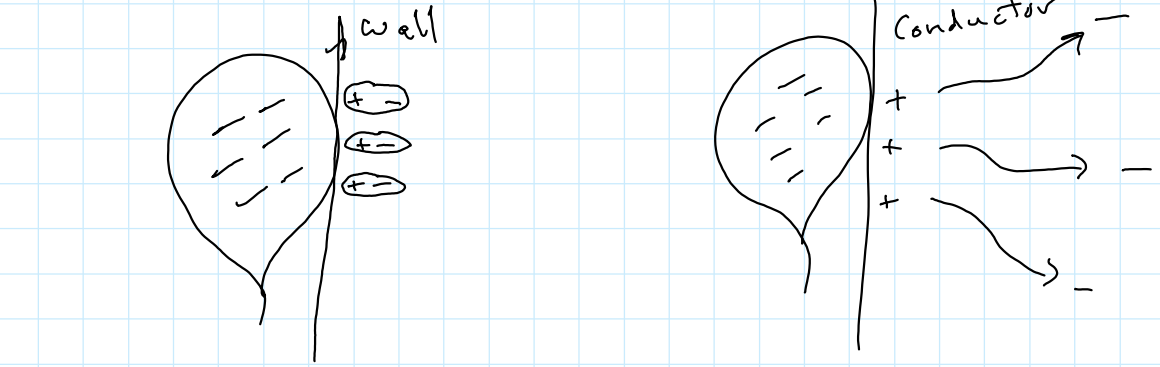
$$|\vec{F}| = \frac{k|q_1||q_2|}{r^2}$$

$$k = 8.99 \times 10^9 \frac{N m^2}{C^2}$$

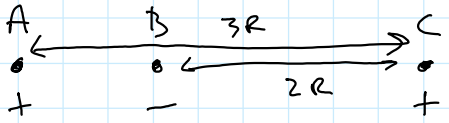
q is charge units are coulombs



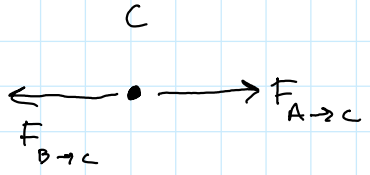
attractive



Worksheet
Q. 14



	True	False	Can't Determine
1			X
2	X		
3			X
4			X
5		X	
6			X
7		X	
8			X
9			X
10		X	
11			X



$$\left|\vec{F}_{B\to C}\right| = \left|\vec{F}_{A\to C}\right|$$

$$\frac{K q_B q_C}{r_{BC}^2} = \frac{K q_A q_C}{r_{AC}^2}$$

10		X	
11			X
12			X

r_{BC}^2 r_{AC}^2

$$\frac{q_B}{r_{BC}^2} = \frac{q_A}{r_{AC}^2}$$

$$\frac{q_B}{(2R)^2} = \frac{q_A}{(3R)^2}$$

$$\frac{9}{4} q_B = q_A$$

$$q_A > q_B$$

B

$F_{A\to B}$ $F_{C\to B}$

$q_C > q_A$

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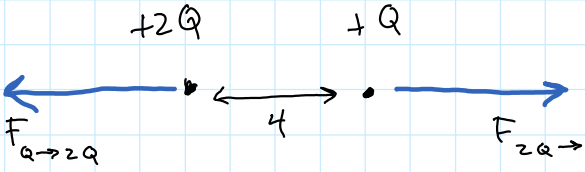
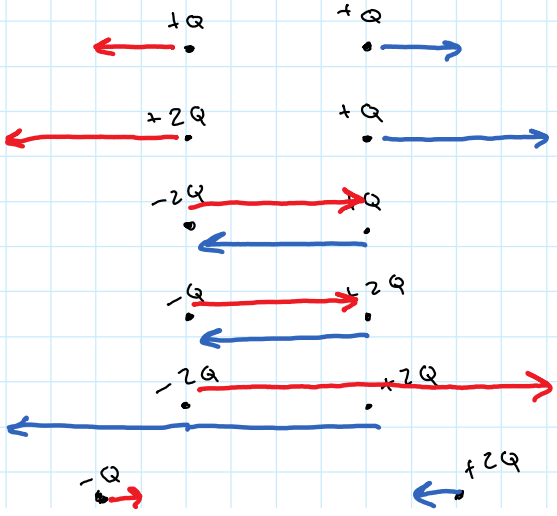


$$F_{Q\to 2Q} = \frac{k(Q)(2Q)}{4^2} = \frac{2kQ^2}{16}$$

$$F_{2Q\to Q} = \frac{k(2Q)(Q)}{4^2} = \frac{2kQ^2}{16}$$

F_x:

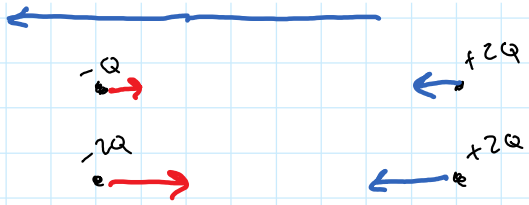


$$F_d = \frac{k(2Q)(2Q)}{4^2}$$

$$F = k(Q)(2Q)$$

e

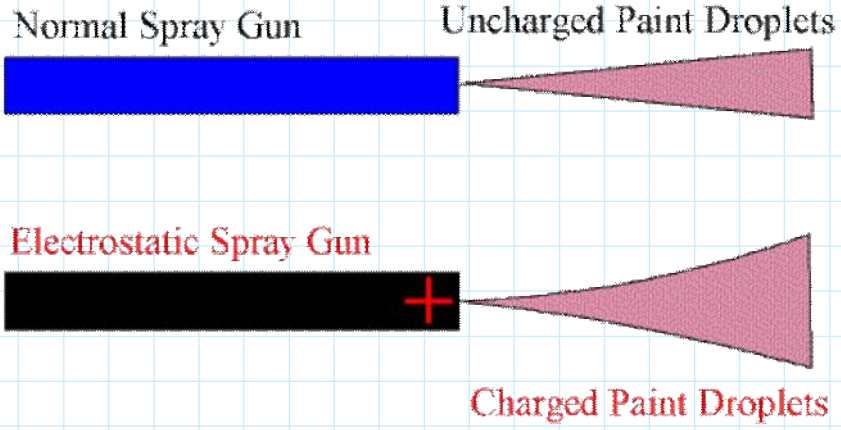
f



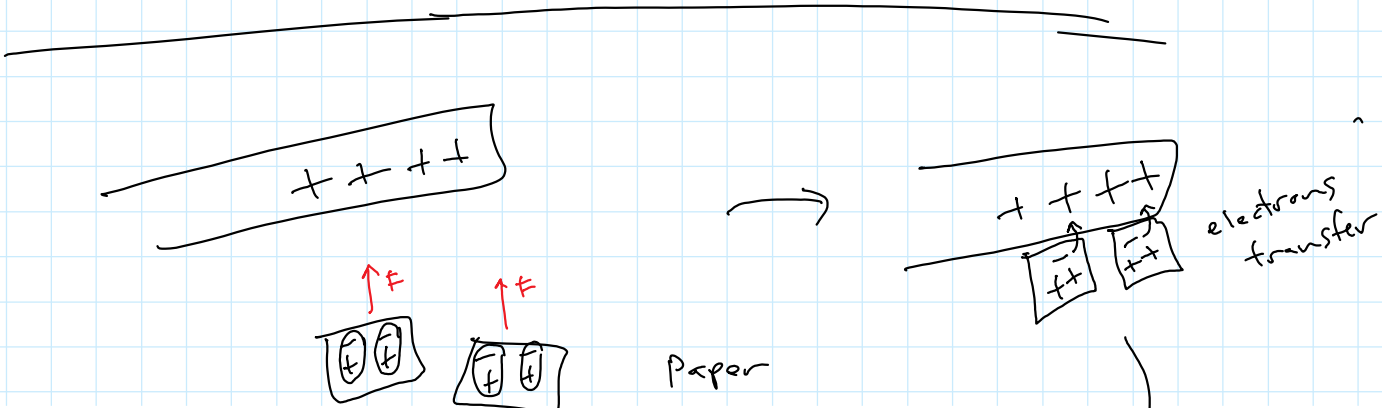
$$F_e = \frac{k(Q)(2Q)}{s^2}$$

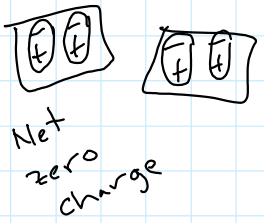
Application of the day: Spray painting

The paint spray goes past a high voltage positive needle as it leaves the spray gun and the tiny droplets of paint pick up a positive charge. They do this by losing negative electrons. It is only the electrons which can move.
The car body is then given a high voltage negative charge which attracts the positively charged paint droplets.
This improves efficiency in two ways.
1. The paint droplets spread out more as they leave the gun. This happens because they all get the same positive charge and so they all repel each other. This is better than coming straight out of the gun as the paint will cover a wider area more evenly as shown in the picture below.
The same thing happens with insecticide crop spraying.

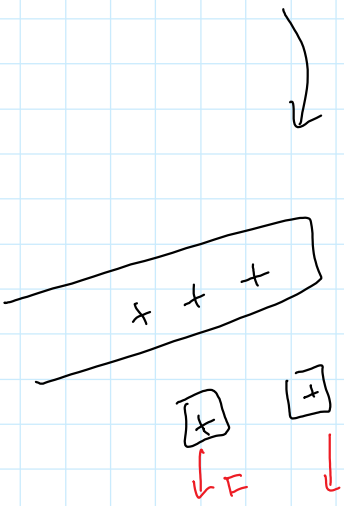


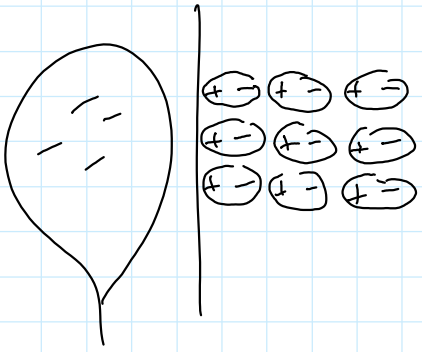
2. The paint droplets are attracted to the negative metal car body, and so less paint will be wasted by landing on the floor or the walls of the paint shop.



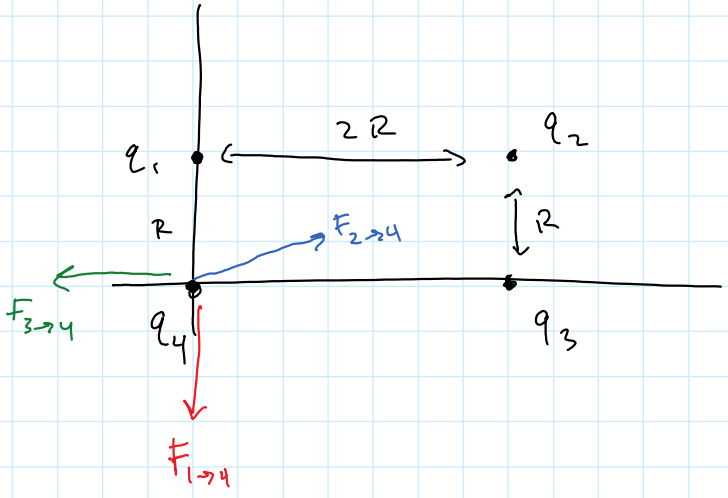


Paper





Find the force on q_4 due to q_1, q_2, and q_3:



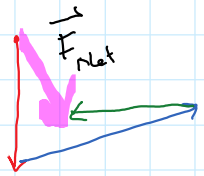
$q_1 = +Q$

$q_2 = -2Q$

$q_3 = +3Q$

$q_4 = +4Q$

Net force on 4 due to 1, 2, & 3 is the vector sum:



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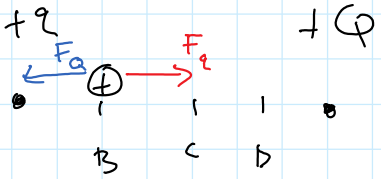
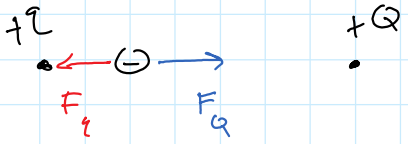
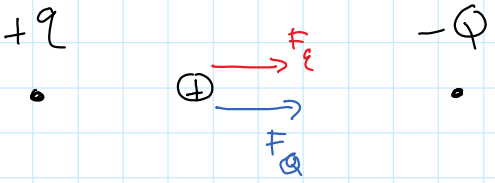
1)



Location B



2)



must be outside and closer to q

so, location A

3) A

4) B