In-class problems, Tue Feb 11, 2020

21.1 Coulomb's law

1. (a) Office hours M Tu 1:30-3:00. Ok or not ok?

   (b) Day weekly problem sets due? Time due: 11:59pm. Circle what's good

   Tuesday Wednesday Thursday

2. Two ions, Ca^{2+} and Cl^{-}, are 0.50nm apart. The "2+" means that calcium has a charge of $+2e$, the "−" means that chlorine has a charge of $-e$. The masses of the two ions are similar.

   What is true about the magnitude of the electrostatic forces on the ions?

   i. force on Cl < force on Ca
   ii. force on Cl > force on Ca
   iii. force on Cl = force on Ca

3. Two ions, Ca^{2+} and I^{-}, are 0.50nm apart. The mass of iodine is 3x larger than calcium. What is true about the magnitude of the electrostatic forces on the ions?

   i. force on I < force on Ca
   ii. force on I > force on Ca
   iii. force on I = force on Ca

4. Two positive charges Q and q are held near one another. Charge q is released.

   Mark each of the following as true or false.

   i. As it moves farther from Q, q's speed decreases.
   ii. As it moves farther from Q, q's speed keeps increasing.
   iii. As it moves farther from Q, q's acceleration decreases
   iv. q's speed will be greatest just after its release
   v. q's acceleration is zero just after its release

5. Consider the following charge configuration

   (a) Draw a force diagram for the O^{-} ion. Include a coordinate system (identify which direction is positive), and take care with the length of the arrows.

   (b) Calculate the net force on the O^{-} ion.

   (c) Is your calculated net force positive or negative? What does that mean about the direction?

   (final answer: pulled towards the H-N)

6. Consider the following situations. Identify the regions, if any, where a charge q_0 would experience no net force.

Due Wed Feb 12, 2020, beginning of class

21.1 Coulomb's law

1. (Review) Write a straightforward vector addition problem in two dimensions. Use two vectors that point in different directions and different magnitudes. Make this a problem that uses asks for graphical addition of vectors.

   Include the problem statement. Include the solution.

2. (Review) Write a straightforward vector addition problem in two dimensions. Use two vectors that point in different directions and different magnitudes. Make this a problem that asks for an algebraic solution and needs to have at least one of the vectors separated into x-y components.

   Include the problem statement. Include the solution.

These doesn't have to involve physics. It can be pure math. You may copy it from a text. If you do, cite your source and make sure you understand each step.