Home work: without hand in

Q21.1 If you peel two strips of transparent tape off the same roll and immediately let them hang near each other, they will repel each other. If you then stick the sticky side of one to the shiny side of the other and rip them apart, they will attract each other. Give a plausible explanation, involving transfer of electrons between the strips of tape, for this sequence of events.

Q21.6 BIO Estimate how many electrons there are in your body. Make any assumptions you feel are necessary, but clearly state what they are. (*Hint:* Most of the atoms in your body have equal numbers of electrons, protons, and neutrons.) What is the combined charge of all these electrons?

Q21.8 Good conductors of electricity, such as metals, are typically good conductors of heat; insulators, such as wood, are typically poor conductors of heat. Explain why there is a relationship between conduction of electricity and conduction of heat in these materials.

Q21.21 Sufficiently strong electric fields can cause atoms to become positively ionized—that is, to lose one or more electrons. Explain how this can happen. What determines how strong the field must be to make this happen?

Home work: hand in required

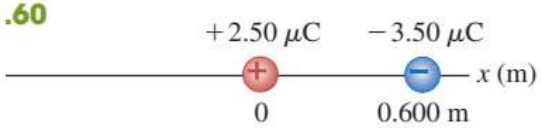
21.1 •• Excess electrons are placed on a small lead sphere with mass 8.00 g so that its net charge is -3.20×10^{-9} C. (a) Find the number of excess electrons on the sphere. (b) How many excess electrons are there per lead atom? The atomic number of lead is 82, and its atomic mass is 207 g/mol.

21.7 •• An average human weighs about 650 N. If each of two average humans could carry 1.0 C of excess charge, one positive and one negative, how far apart would they have to be for the electric attraction between them to equal their 650-N weight?

21.59 ••• Four identical charges Q are placed at the corners of a square of side L. (a) In a free-body diagram, show all of the forces that act on one of the charges. (b) Find the magnitude and direction of the total force exerted on one charge by the other three charges.

21.60 ••• Two charges are placed on the x-axis: one, of 2.50 μC, at the origin and the other, of $-3.50\ \mu$C, at $x = 0.600$ m (**Fig. P21.60**). Find the position on the x-axis where the net force on a small charge $+q$ would be zero.

Figure **P21.60**



Home work: hand in required

If the electric field follows the follow rule, instead of the inverse square law.

$$\vec{E} = k\frac{Q}{r^3}\hat{r}$$

1. Please calculate the surface integral of the field on a sphere of radius R_1.
2. How about R2?
3. Can you please draw the filed line? According to the rules of field line, it should be along the direction of the field, and the density of the lines should be proportional to the magnitude of the field.
4. What will the field line look if the field follows the following equation.

$$\vec{E} = k\frac{Q}{r}\hat{r}$$