H2 Electric Field near Point Charges

$^{8}/_{10}$

H2.1 Calculate the magnitude of the force of attraction on a $+1.0$ nC charge placed 1.0 m away from a -1.0 nC charge.

H2.2 Calculate the electric field strength 1.0 mm away from a $+1.0$ pC charge.

H2.3 Calculate the magnitude of the repulsive force between two electrons separated by 10^{-10} m.

H2.4 Calculate the magnitude of the attractive force between a proton and an electron separated by 5.0×10^{-11} m.

H2.5 Two $+1.0$ nC charges are placed 1.0 mm apart. Calculate the electric field strength at the point half way between the charges.

H2.6 1 in 10^{20} of my electrons are removed and given to my wife. This leaves me with a charge of $+0.31$ C, while my wife has a charge of -0.31 C. Calculate the distance between us when the force of attraction is 2.0×10^{5} N (the weight of a bus).

H2.7 I have two mystery charges. When placed 10^{-7} m apart, they experience a repulsive force of 5.0×10^{-4} N. What will be the force between them when they are 4.0×10^{-7} m apart?

H2.8 The electric field 1.0 cm away from a small, strongly charged object is 4.5×10^{8} N C^{-1}. What is the charge on the object?

H2.9 At one time, people thought that the electrons in an atom 'orbited' the nucleus like the planets orbiting the Sun. Given that the force needed to keep an electron in its orbit around a proton is 9.2×10^{-8} N, work out the radius of the orbit.

H2.10 Two charges are stuck to a metre stick: a $+1.0$ pC charge at the 0 cm mark, and a -1.0 pC charge at the 10 cm mark. What is the strength of the electric field at the 20 cm mark? Assume that the wooden metre ruler is strong enough to hold the charges in place, but does not affect the electric field.