

## Honors Physics – Ch 16 Practice Problems

1. Betelgeuse, one of the brightest stars in the constellation of Orion, has a diameter of  $7.0 \times 10^{11}$  m (500 times the diameter of the sun). Consider two compact clouds with opposite charge equal to  $1.0 \times 10^5$  C. If these clouds are located  $7.0 \times 10^{11}$  m apart, what is the magnitude of the electric force of attraction between them?
2. By 2005, the world's tallest building will be the International Finance Center in Taipei, Republic of China. Suppose a 1.00 C charge is placed at both the base and the top of the International Finance Center. If the magnitude of the electric force stretching the building is  $4.48 \times 10^4$  N, how tall is the International Finance Center?
3. Suppose four protons were at the corners of a square. The length of each side of the square is  $1.52 \times 10^{-9}$  m. If  $q_1$  is on the upper right corner, calculate the magnitude and direction of the resultant force on  $q_1$ .
4. Suppose three point charges are on the  $y$ -axis:  $q_1 = -2.34 \times 10^{-8}$  C is at the origin,  $q_2 = 4.65 \times 10^{-9}$  C is at  $y = 0.500$  m, and  $q_3 = -2.99 \times 10^{-10}$  C is at  $y = 1.00$  m. What is the magnitude and direction of the resultant force on  $q_1$ ?
5. A  $55 \mu\text{C}$  charge and a  $137 \mu\text{C}$  charge are separated by 87 m. Where must a  $14 \mu\text{C}$  charge be placed between these other two charges in order for the net electric force on it to be zero?
6. Hans Langseth's beard measured 5.33 m in 1927. Consider two charges,  $q_1 = 2.50$  nC and an unspecified charge,  $q_2$ , are separated 5.33m. A third charge of 1.0 nC is placed 1.90 m away from  $q_1$ . If the net electric force on this third charge is zero, what is  $q_2$ ?
7. Pontiac Silverdome Stadium, in Detroit, Michigan, is the largest air supported building in the world. Suppose a charge of  $18.0 \mu\text{C}$  is placed at one end of the stadium and a charge of  $-12.0 \mu\text{C}$  is placed at the other end of the stadium. If the electric field halfway between the charges is  $22.3$  N/C, directed toward the  $-12.0 \mu\text{C}$  charge, what is the length of the stadium?