

Physics 112
Quiz #9
September 27, 1999

Name: _____

$$e = 1.60 \times 10^{-19} \text{ C}$$

$$k = 9 \times 10^9 \text{ N m}^2/\text{C}^2$$

$$\text{mass of proton} = 1.7 \times 10^{-27} \text{ kg}$$

$$G = 6.7 \times 10^{-11} \text{ N m}^2/\text{kg}^2$$

1. Two protons are separated by two meters. Compared to the magnitude of the gravitational force between the two protons, the magnitude of the electrical force is:
 - A. more than a trillion times bigger
 - B. about a thousand times bigger
 - C. about the same magnitude
 - D. about a thousand times smaller
 - E. more than a trillion times smaller

2. Two parallel metal plates are charged by connecting them to a battery; the plates are 6 m apart. The *left-side* plate is connected to the positive terminal. The following charges are held at rest at the positions indicated, and then released. Which one will have the largest kinetic energy when it strikes the right-hand plate?
 - A. a 1-C charge 3 m from the left-side plate
 - B. a 1-C charge 4 m from the left-side plate
 - C. a 2-C charge 4 m from the left-side plate
 - D. a 3-C charge 4 m from the left-side plate
 - E. a 3-C charge 5 m from the left side plate
 - F. a 5-C charge 5 m from the left-side plate

3. A 27-C charge is fixed at the origin. When a 3-C charge is placed at point P, it has a *potential energy* of 9 J. If the 3-C charge is now removed, what will be the electric *potential* experienced by a 6-C charge placed at point P?
 - A. 2.25 V
 - B. 3.0 V
 - C. 4.5 V
 - D. 6.0 V
 - E. 9.0 V
 - F. 18.0 V
 - G. 36.0 V

4. A two-microcoulomb charge is fixed at the origin. How much external work is required to push a five-microcoulomb charge in (at constant velocity) from a distance of nine centimeters from the origin, to a distance of three centimeters?
 - A. zero joules
 - B. one joule
 - C. two joules
 - D. three joules
 - E. five joules
 - F. six joules
 - G. ten joules
 - H. twelve joules
 - I. fifteen joules