

Physics 1B Spring 2012, Dr. Michelsen. You may not bring in anything written. You will be given these formulas on Quiz 1:

$$G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2 \quad k_e = 8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2 \quad \text{proton charge} = +1.6 \times 10^{-19} \text{ C}$$

$$\text{surface area of a sphere} = 4\pi r^2 \quad \text{volume of a sphere} = \frac{4}{3}\pi r^3 \quad k_e = \frac{1}{4\pi\epsilon_0}$$

$$x_f = x_i + v_i t + at^2 / 2 \quad \mathbf{F}_e = k_e \frac{q_1 q_2}{r^2} \hat{\mathbf{r}}_{12} \quad \mathbf{E} = \mathbf{F}_e / q_0$$

$$\mathbf{E} = k_e \sum_i \frac{q_i}{r_i^2} \hat{\mathbf{r}}_i \quad \Phi_E = \mathbf{E} \cdot \mathbf{A} = 4\pi k_e q_{in} = \frac{q_{in}}{\epsilon_0}$$

Version 2: corrected units of k_e .