

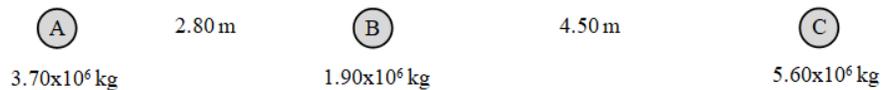
Name \_\_\_\_\_

Show your work, and circle your answers and use sig figs to receive full credit.

$$F_G = G \frac{m_1 m_2}{r^2} \quad F_E = k \frac{q_1 q_2}{r^2} \quad \text{- Inverse square force laws}$$

1. What is the force of attraction between a  $-10.1 \mu\text{C}$  charge and a  $+34.1 \mu\text{C}$  charge if their centers are  $67.0 \text{ cm}$  apart? Is it a force of attraction or repulsion?
  
  
  
  
  
  
  
  
  
  
2. At what distance is the force of repulsion between a  $2.00 \text{ C}$  charge and a  $3.00 \text{ C}$  charge equal to  $4.45 \text{ N}$  (1 pound of force, or 16 ounces of force)
  
  
  
  
  
  
  
  
  
  
3. What is the force of gravity between a  $23.0 \text{ kg}$  object on the surface of the moon. The moon has a mass of  $7.35 \times 10^{22} \text{ kg}$ , and a radius of  $1.738 \times 10^6 \text{ m}$ .
  
  
  
  
  
  
  
  
  
  
4.  $450. \text{ Kg}$  wrecking ball experiences a force of attraction of  $6.30 \times 10^{-10} \text{ N}$  to a metal sphere that is  $15.0 \text{ m}$  away. What is the mass of the sphere?
  
  
  
  
  
  
  
  
  
  
5. Two point masses have a force of attraction of  $2.30 \times 10^{-12} \text{ N}$  when they are separated by  $56.0 \text{ cm}$ . What is their separation if the force of attraction is  $5.80 \times 10^{-12} \text{ N}$ ?
  
  
  
  
  
  
  
  
  
  
6. Two point charges have a force of repulsion of  $45.3 \text{ N}$  when they are  $2.30 \text{ m}$  separated. What is the force of repulsion if they are separated by only  $1.25 \text{ m}$ ?
  
  
  
  
  
  
  
  
  
  
7. Two point charges attract each other with a force of  $1.40 \text{ N}$  when they are  $2.20 \text{ m}$  apart. How far apart are they if the force of attraction is  $5.60 \text{ N}$ ?

8. Find the net force and direction on masses A, B and C:

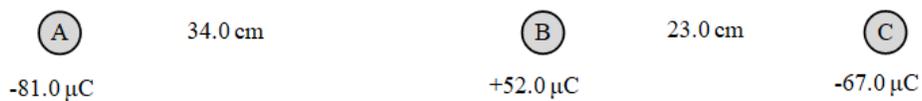


A = \_\_\_\_\_

B = \_\_\_\_\_

C = \_\_\_\_\_

9. Find the net force and direction on charges A, B and C:

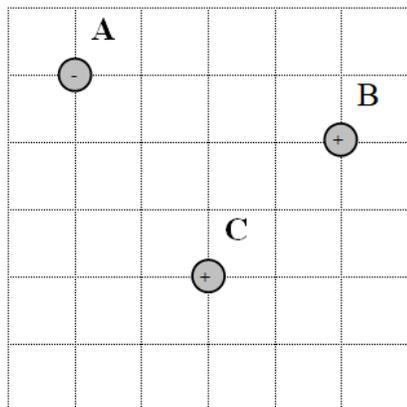


A = \_\_\_\_\_

B = \_\_\_\_\_

C = \_\_\_\_\_

10. Each grid line is a meter. Charge A is  $-430. \mu\text{C}$ , and charge B is  $+120. \mu\text{C}$ , and C is  $+780. \mu\text{C}$ . Calculate the force on charge C. Draw the force vector and label its magnitude and direction.



11. Each grid line is a meter. Mass A is  $1.20 \times 10^6 \text{ kg}$ , and mass B is  $3.10 \times 10^6 \text{ kg}$ , and C is  $6.80 \times 10^6 \text{ kg}$ . Calculate the force on mass A. Draw the force vector and label its magnitude and direction.

