Worksheet 6.1 – Coulomb’s Law **μ = 10-6**

1. Calculate the electric force between two point charges of 4.00 μC and 3.00 μC when they are 2.00 cm apart.
2. Two points of equal charge produce an electric force on each other of 3.40x10-2 N when placed 0.100 m apart. What is the charge on each point?
3. How far apart are two point charges of 2.0x10-6 C and 4.0x10-6 C if they produce an electric force of 0.56 N?
4. Two point charged objects produce an electric force on each other of 6.20x10-2 N. What will the force between them be if the distance between increases three-fold?
5. Two point charges produce a force between on each other of 4.5x10-3 N. What is the force between them if the charge on each triples and the distance between them doubles?

2.0x10-6 C

2.0x10-6 C

3.0x10-6 C

0.40 m

0.40 m

Three charged objects are placed in a line as shown. Calculate the force on the middle object due to the other charges.

1. The electric force between two charged particles is 5.2x10-4 N when the objects are 0.311 m apart. What is the force between these objects if the distance changed to 0.404 m?

3.0x10-6 C

4.0x10-6 C

4.0x10-6 C

0.60 m

0.60 m

X

1. Three point charges are placed at the corner of a right angle triangle as shown. Calculate the magnitude of the net electric force on the object marked X due to the other two charges.

1. Two small spheres, each with a mass of 2.00x10-5 kg are placed 3.50x10-1 m apart. One sphere has a charge of -2.00 μC and is fixed in position. The other sphere has a charge of -3.00 μC but is free to move without friction. What is the initial acceleration of the free object?

**Use the following diagram to answer questions 10-12**

A

C

B

4.0x10-6 C

8.0x10-6 C

-6.0x10-6 C

0.50 m

0.50 m

1. What is the net force on A?
2. What is the net force on B?
3. What is the net force on C?

*CHALLENGE*!

Three tiny spheres with identical charges of +5.0 μC are situated at the corners of an equilateral triangle with sides 0.20 m long. What is the net force on any one of the charged spheres?

Answers:

1. (270 N) 2. (1.94x10-7 C) 3. (0.36 m) 4. (6.89x10-3 N) 5. (1.0x10-2 N)
2. (1.1x10-1 N left) 7. (3.1x10-4) 8. (5.0x10-1 N) 9. (2.20x104 m/s2) 10. 0.94 N to the left
3. 2.9 N to the right 12. 1.9 N to the left

Challenge! 9.80 N 

Worksheet 6.2 – Electric Field on a Single on a Single Charge

1. What is the electric field strength 0.750 m from an 8.00 μC charged object?
2. Calculate the gravitational field strength on the surface of Mars. Mars has a radius of 3.43x106 m and a mass of 6.37x1023 kg.
3. At a point a short distance from a 4.60x10-6 C charged object, there is an electric field strength of 2.75x105 N/C. What is the distance to the charged object producing this field?
4. If an alpha particle experiences an electric force of 0.250 N at a point in space, what electric force would a proton experience at the same point?
5. What is the electric field strength at a point in space where a 5.20x10-6 C charged object experiences an electric force of 7.11x10-3 N?
6. What is the initial acceleration of an alpha particle when it is placed at a point in space where the electric field strength is 7.60x104 N/C?
7. What is the electric field strength at a point in space where an electron experiences an initial acceleration of 7.50x1012 m/s2?
8. The electric field strength at a distance of 3.00x10-1 m from a charged object is 3.60x105 N/C. What is the electric field strength at a distance of 45 cm from the same object?

Answers:

1. (1.28x105 N/C)
2. (3.61 N/kg)
3. (0.388 m)
4. (0.125 N)
5. (1370 N/C)
6. (3.66x1012 m/s2)
7. (42.7 N/C)
8. 1.6 x10 5 N/C