

$$F = \frac{kq_1q_2}{r^2}$$

DO NOT WRITE ON THIS PAPER

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Coulomb's Law – relationships in the equation

Directions: on a separate sheet of paper, SHOW YOUR WORK BY writing the formula with the factors of change in it. Simplify, and write how the specified variable changes. If applicable, give the new value for that variable. Answers are given in bold so that you can check your work to understand the idea.

- 1) How would the force between 2 charges change if...
 - a) the charge of one of the particles is doubled? $F \times 2$ **(force increases by 2)**
 - b) the charge of both particles is doubled? $F \times 4$
 - c) the distance between is doubled? $F / 4$ **(force decreases by 4)**
 - d) the distance between is cut to a third? $F \times 9$
 - e) the charge of one particle is doubled and the distance is doubled? $F / 2$
 - f) the charge of each particle is doubled and the distance is doubled? $F = F$
 - g) one charge is doubled and the distance is halved? $F \times 8$
- 2) Two charges have an attractive force of 100 N. How would the force change if...
 - a) one charge were doubled? **200 N**
 - b) both charges were doubled? **400 N**
 - c) the distance doubled? **25 N**
 - d) one charge and the distance doubled? **50 N**
 - e) both charges and the distance doubled? **100 N**
 - f) one charge doubled, the other charge tripled, and the distance quadrupled? **37.5 N**
 - g) one charge quadrupled and the distance tripled? **44.44 N**
- 3) Two charged spheres 10 m apart attract each other with a force of 3.0×10^6 N. What force results from each of the following changes? (list original values and new values)
 - a) both charges are doubled and the distance remains the same $F \times 4 = 1.2 \times 10^7$ N
 - b) the separation is increased to 30 m $F / 9 = 333,333$ N
- 4) The force of electrostatic repulsion between 2 small positively charged objects, A and B, is 3.6×10^5 N when AB is 12 m. What is the force of repulsion of AB is increased to... (list the original values and new values)
 - a) 24 m **90,000 N**
 - b) 36 m **40,000 N**
- 5) Two charges have an attractive force of 20 N. How would the force change if...
 - a) one charge was half? **10 N**
 - b) both charges was half? **5 N**
 - c) the distance was half? **80 N**
 - d) one charge was half and the distance was half? **40 N**
 - e) one charge was half and the distance was a third? **90 N**
 - f) one charge was half and the distance was triple? **1.11 N**
 - g) one charge was double and the distance was a third? **360 N**
- 6) Two charged objects have a repulsive force of 0.24 N. If the charge of one object is doubled, what is the new force? **0.48 N**
- 7) Two charged objects have an attractive force of 0.24 N. If the charge of both object is doubled, what is the new force? **0.96 N**
- 8) Two charged objects have a repulsive force of 0.24 N. If the distance separating the objects is...
 - a) doubled, what is the new force? **0.06 N**
 - b) tripled, then what is the new force? **0.0267 N**
 - c) quadrupled, then what is the new force? **0.015 N**
 - d) halved, then what is the new force? **0.96 N**
 - e) one third, then what is the new force? **2.16 N**
 - f) one fourth, then what is the new force? **3.84 N**
- 9) Two charged objects have a repulsive force of 0.24 N. What is the new force if...
 - a) one charge is doubled and the distance is doubled? **0.12 N**
 - b) both charges are doubled and the distance is doubled? **0.24 N**
 - c) one charge is four times more and the distance is doubled? **0.24 N**
 - d) one charge is tripled and the distance is tripled? **0.08 N**