

Basic Relationships

$$F_q = \frac{kq_1q_2}{d^2} \quad k = 9.0 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$$

Part I

The force between two charged particles is 0.16 Newtons.

- 1) What will be the new force between the two charged particles if one of the charges is tripled?

factor changed	new force
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- 2) What will be the new force between the two charged particles if both of the charges is tripled?

factor changed	new force
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- 3) What will be the new force between the two charged particles if one of the charges is halved and the other is tripled?

factor changed	new force
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- 4) What will be the new force between the two charged particles if distance between the charges is increased by a factor two?

factor changed	new force
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- 5) What will be the new force between the two charged particles if the distance between the charges is decreased by a factor of three?

factor changed	new force
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- 6) What will be the new force between the two charged particles if one of the charges is tripled and the distance is increased by four times?

factor changed	new force
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- 7) What will be the new force between the two charged particles if one of the charges is tripled, one of the charges is decreased by 5 times, and the distance is cut in half?

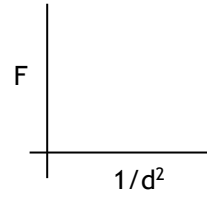
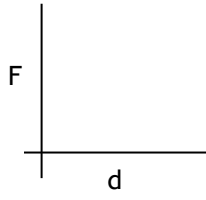
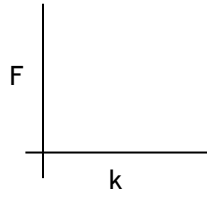
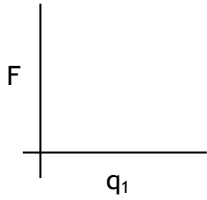
factor changed	new force
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- 8) If the force between the two particles was somehow increased by 16 times, give three scenarios that could have resulted in this increase?

Scenario One	Scenario Two	Scenario Three

Part II

9) Graph the following relationships.



Part III

$$F_q = \frac{kq_1q_2}{d^2} \quad k = 9.0 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$$

Fill in the missing information.

	F (N)	k(Nm ² /C ²)	q ₁ (C)	q ₂ (C)	d(m)
10)	0.4	9.0 × 10 ⁹	4.5 × 10 ⁻⁶		0.3
11)	24	9.0 × 10 ⁹		2.6 × 10 ⁻⁶	0.056
12)	1.7 × 10 ⁻³	9.0 × 10 ⁹	6.5 × 10 ⁻⁹	8.0 × 10 ⁻⁹	
13)			4.5 × 10 ⁻³	4.5 × 10 ⁻²	9.4 × 10 ⁻²
14)		9.0 × 10 ⁹	7.0 × 10 ⁻¹²	8.9 × 10 ⁻¹²	0.11

Part IV

15) What is the distance between two 1.2 × 10⁻⁶ C charges that exert a 4.5 × 10⁻² N on each other?

16) What is the force between two pieces of hair that are 30 cm apart? One hair has a charge of 1.4 × 10⁻³ C and the other has a charge 7.8 × 10⁻⁴ C.

17) Two small pieces of Styrofoam are placed 0.8 m from each other. If the force on each of them is 4.1 × 10⁻³ N and one of the charges is 3.4 × 10⁻⁹ C, what is the charge of the other piece of Styrofoam?

18) What is the force between a charge of 6.8 μC and a charge of 8.8 μC placed 3.0mm apart?