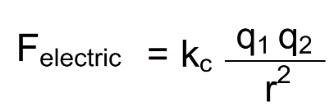
Electric Forces vs Gravitational Forces Fill in Notes 3/30/2020

5MinutePhysics Video  
[Electric and Gravitational Forces](https://www.youtube.com/watch?v=TRIrmKChySo)

1. They are both field forces.
2. Gravitational attraction: the Earth pulls on the Moon, and the Moon pulls on the Earth.
3. Electric forces: Can be positive or negative.
4. Gravitational force can only be positive.
5. Electrical force is significantly stronger than gravitational force.
6. Gravitational force is based on mass.
7. Electrical force is based on charge.

[Mikula’s video on Electric force and Gravitational Force formulas](https://www.youtube.com/watch?v=GtzIbtGv4BU)

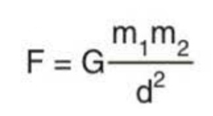
Electric Force formula:





Fe = electrostatic force (N)  
kc = coulomb’s constant (9x109 Nm2/C2)  
q1 = charge of the first particle (C)  
q2 = charge of second particle (C)  
d = distance between 2 particles (m)

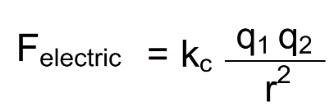
Gravitational Force formula:



F = gravitational force (N)  
G = gravitational constant (6.67x10-11 Nm2/kg2)  
m1 = mass of object 1 (kg)  
m2 = mass of object 2 (kg)  
d = distance between masses (m)

Coulomb’s Law Example:

A negative charge of -2.0 x 10-4 C and a positive charge of 8.0 x 10-4 C are separated by 0.30m. What is the force between the 2 charges?





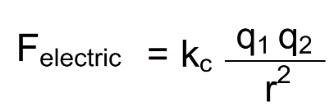
(9.0 x 109) (-2.0 x10-4) (8.0 x 10-4)

0.302

F = -16,000 N or - 1.6 x 104 N

Now you try one:

A negative charge of -6.0 x 10-6 interacts with a particle with a positive charge of 3.0 x 10-6. What is the force acting on the charges if they are 0.05 m away?





(9.0 x 109) (-6 x10-6) (3.0 x 10-6)

0.052

-64.8 N