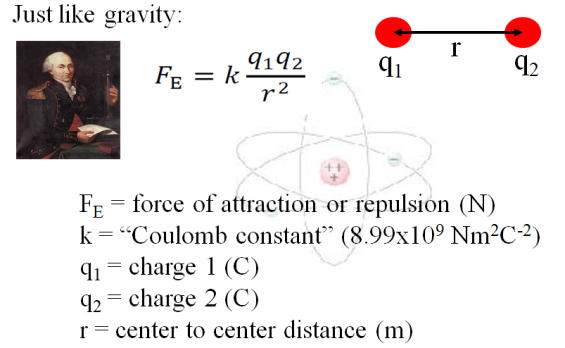
**Noteguide for Coulomb's Law - Videos 16AB Name**

* Charge is in Coulombs (C) (1C = 1 A·s)
  + Signed quantity (+/-)
  + e = 1.602x10-19 C
  + Protons are +, electrons are -
  + 1 C = 6.25x1018 electrons or protons
  + 1μC = 10-6 C
* Charge is conserved
* Likes repel, opposites attract

Example 1- What is the force of attraction between a helium electron and its nucleus if the electron is 1.7x10-10 m away? )

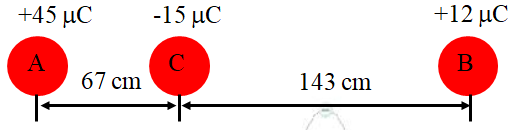
Example 2 – Two charged spheres have a force of repulsion of 5.40 N when their centers are 0.120 m apart. What is the force of repulsion when their centers are 0.360 m apart?

Whiteboards - Work these out - if you don't get the right answer, watch the video to see how to do it.

|  |  |
| --- | --- |
| 1. Jess Uwaite places a +3.0 µC charge 3.5 m from a +5.0 µC charge. What is the force of repulsion?  (1 µC = 10-6 C) (0.011N ) | 2. Noah Verkreinatlaad places a 5.0 C charge how far from a 3.0 C charge to make the force between them exactly 4.00 N? (1.8x105 m or 180 km ) |
| 3. Cally Seniks measures a force of attraction of 4.50 N between two charges when their centers are separated by 1.20 m. What is the force of attraction when their centers are separated by 0.950 m?  (7.18 N ) | 4. Rita Book measures a force of attraction of 12.0 N between two charges when their centers are separated by 2.50 m. At what separation is the force of attraction 7.00 N?  (3.27 m ) |

**Noteguide for Linear Arrays - Videos 16D1 Name**

**Find the net force on B:**



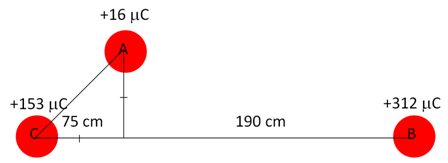
Write down the three steps:

Whiteboards - Work these out - if you don't get the right answer, watch the video to see how to do it.

|  |
| --- |
| **Find the force on A:** |
| **Find the force on B:**  (Use the force of gravity formula - , G = 6.67x10-11 N m2 kg-2 |

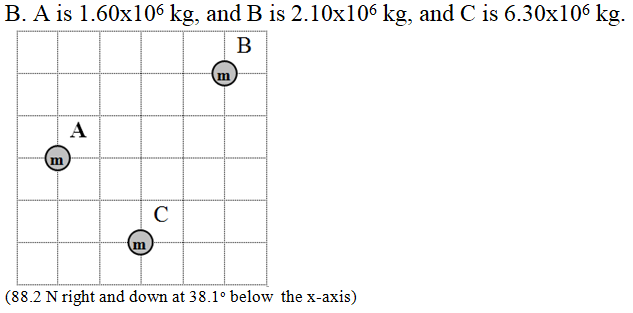
**Noteguide for Non-Linear Arrays - Videos 16D2 Name**

**Find the net force on A:**



Write down the three steps:

Try this one:

Use the force of gravity formula - 

G = 6.67x10-11 N m2 kg-2

**Noteguide for Field Theory - Videos 16E Name**

|  |  |
| --- | --- |
| **Gravitational** | **Electrical** |
|  |  |

|  |  |
| --- | --- |
| Field:  g - gravitational field strength (N/kg)  F - force exerted by field on the mass (N)  m - the mass (kg)    g - g near a point mass toward mass (N/kg)  G - 6.67x10-11 Nm2kg-2  M - the mass (kg)  r - distance from the point mass (m) | Field:  E - electric field strength (N/C)  F - force exerted by field on charge (N)  q - the charge (C)  (not in data packet)  E - E near a point charge away from charge (N/C)  k - 8.99x109 Nm2C-2  q - the charge (C)  r - distance from the point charge (m) |

Example 1 - A +125 μC charge experiences a force to the right of 0.0175 N. What is the Electric field, and its direction?

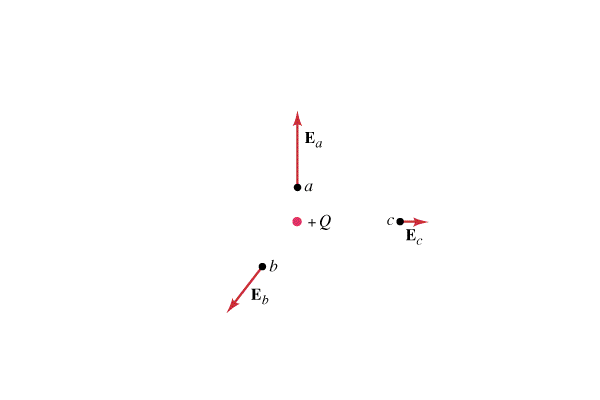
Example 2 - An electron travels through a region where there is a downward electric field of 325 N/C. What force in what direction acts on the electron, and what is its acceleration?

Whiteboards - Work these out - if you don't get the right answer, watch the video to see how to do it.

|  |  |
| --- | --- |
| 1.Ishunta Dunnit notices that a charge of -125 μC experiences a force of 0.15 N to the right. What is the electric field and its direction? (1200 N/C left) | 2. Doan Botherme places a +12 mC charge into an upward 160 N/C electric field. What force in what direction does it experience? (1.9 N up) |
| 3.Alfred O. Dadark is on a planet where a mass of 0.12 kg experiences a downward force of 7.80 N. What is the gravitational field on the surface of this planet? (65 N/kg down) | 4. Telly Vishun places an unknown charge into a known upward electric field of 612 N/C, and the charge experiences a downward force of .851 N. What is the charge? (-1.39 mC) |
| 5. Sal F. Hone levitates a 0.00125 kg ball with an upward electric field of 590 N/C. What is the charge on the ball?  (Hint gravity = electrical force) (+20.8 μC)  Eq = mg | |

**Noteguide for Point Charges and Masses - Videos 16F Name**

|  |  |
| --- | --- |
| Field:  g - g near a point mass toward mass (N/kg)  G - 6.67x10-11 Nm2kg-2  M - the mass (kg)  r - distance from the point mass (m) | Field:  (not in data packet)  E - E near a point charge away from charge (N/C)  k - 8.99x109 Nm2C-2  q - the charge (C)  r - distance from the point charge (m) |



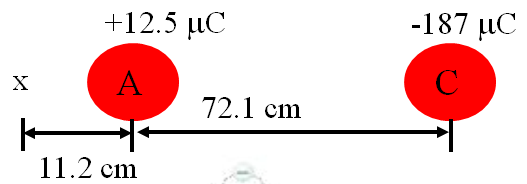
Example: What is the electric field 2.0 m to the right of a -21 μC charge?

Whiteboards - Work these out - if you don't get the right answer, watch the video to see how to do it.

|  |  |
| --- | --- |
| 1.Vera Similitude measures the electric field 13.5 m to the right of a -1.45 μC charge. What electric field in what direction?  (71.5 N/C to the left) | 2. Vesta Buhl measures an electric field of 2,120 N/C, 67 cm from a charge of unknown value. The electric field is away from the charge. What is the charge? (+0.11 μC) |
| 3.Amelia Rate measures a gravitational field of 3.4 N/kg. What distance is she from the center of the earth?  (Me = 5.98 x 1024 kg.) (1.1 x 107 m) | 4. Tara Bull measures an electric field of 10. N/C what distance from an electron? (12 μm) |

**Noteguide for Fields in Linear Arrays - Videos 16G1 Name**

|  |  |
| --- | --- |
| Field:  g - g near a point mass toward mass (N/kg)  G - 6.67x10-11 Nm2kg-2  M - the mass (kg)  r - distance from the point mass (m) | Field:  (not in data packet)  E - E near a point charge away from charge (N/C)  k - 8.99x109 Nm2C-2  q - the charge (C)  r - distance from the point charge (m) |



Example: What is the electric field at the x ?

Whiteboards - Work these out - if you don't get the right answer, watch the video to see how to do it.

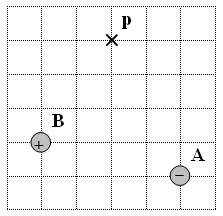
|  |
| --- |
| 1. Find the gravitational field at p: (49.0 N/kg to the left)  2.70x1024 kg  8.20x1024 kg  m  m  1.80x106 m  (p)  9.10x106 m |
| 2. Find the electrical field at p: (51.6 N/C to the right)  21.0 m  (p)  13.0 m  +  -  +9.10 µC  -2.30 µC |

**Noteguide for Fields in Non Linear Arrays - Videos 16G2 Name**

I think you will be OK if you pick only one of these. They are a lot like the vector force ones. If you do both that would be better - but I will leave that up to you.

Find the electric field at point p. Charge A is -3.20 µC, B is +4.40 µC, and each grid line is a meter.

(2640 N/C right and up at 28.1o with the x axis)



Find the gravitational field at point p. Mass A is 1.60x1012 kg, B is 3.9x1012 kg, and each grid line is a meter.

(21.5 N/kg right and down at 18.6o with the x axis)

