

Electrostatics: Exam Revision Tracker



Attempt #1		Attempt #2		Attempt #3		Attempt #4		Attempt #5	
Total	Score	Total	Score	Total	Score	Total	Score	Total	Score
14		13		11		18		17	
Percentage =		Percentage =		Percentage =		Percentage =		Percentage =	

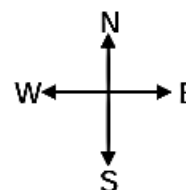
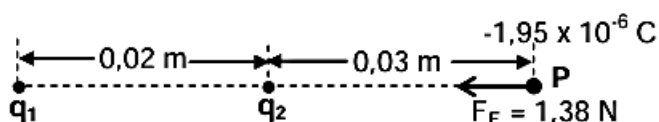
Electrostatics: Attempt #1



Total = 14 Marks

1. A small neutral sphere acquires a charge of $-1,95 \times 10^{-6} \text{ C}$.
 - 1.1 Were electrons ADDED TO or REMOVED FROM the sphere? (1)
 - 1.2 Calculate the number of electrons which were added or removed. (3)
 - 1.3 Define the term *electric field at a point*. (2)
 - 1.4 Calculate the magnitude of the electric field at a point 0,5 m from the centre of the charged sphere. (3)
2. Two point charges, q_1 and q_2 , are fixed 0,02 m apart. The magnitude of charges q_1 and q_2 is the same and q_1 is NEGATIVELY charged.

The small charged sphere with the charge of $-1,95 \times 10^{-6} \text{ C}$ is placed at point P, 0,03 m east of charge q_2 , as shown in the diagram below. The sphere at point P experiences a net electrostatic force of 1,38 N west.



Calculate the magnitude of the charge on q_2 . (5)

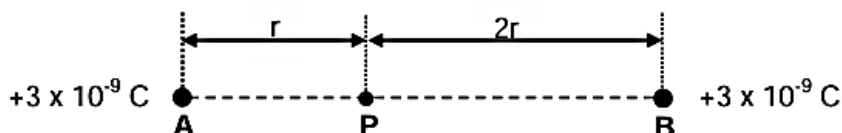
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Electrostatics: Attempt #2 ⚡

Total = 13 Marks

Two point charges, **A** and **B**, each with a charge of $+3 \times 10^{-9} \text{ C}$, are stationary on a horizontal surface. Point **P** is r metres from charge **A** and $2r$ metres from charge **B**, as shown in the diagram below.



1. Describe an *electric field*. (2)
2. Draw the resultant electric field pattern due to charges **A** and **B**. (3)

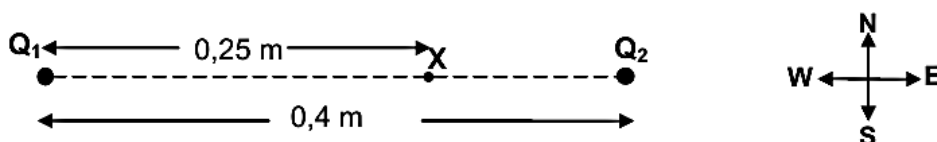
The magnitude of the net electric field at point **P** is $27 \text{ N} \cdot \text{C}^{-1}$.

3. Calculate the value of r . (5)
4. Calculate the magnitude of the net electrostatic force that an electron would experience if placed at point **P**. (3)

Electrostatics: Attempt #3 ⚡

Total = 11 Marks

Two charged particles, Q_1 and Q_2 , are placed $0,4 \text{ m}$ apart along a straight line. The charge on Q_1 is $+2 \times 10^{-5} \text{ C}$, and the charge on Q_2 is $-8 \times 10^{-6} \text{ C}$. Point **X** is $0,25 \text{ m}$ east of Q_1 , as shown in the diagram below.



Calculate the:

1. Net electric field at point **X** due to the two charges (6)
2. Electrostatic force that a $-2 \times 10^{-9} \text{ C}$ charge will experience at point **X** (4)

The $-2 \times 10^{-9} \text{ C}$ charge is replaced with a charge of $-4 \times 10^{-9} \text{ C}$ at point **X**.

3. **Without any further calculation**, determine the magnitude of the force that the $-4 \times 10^{-9} \text{ C}$ charge will experience at point **X**. (1)

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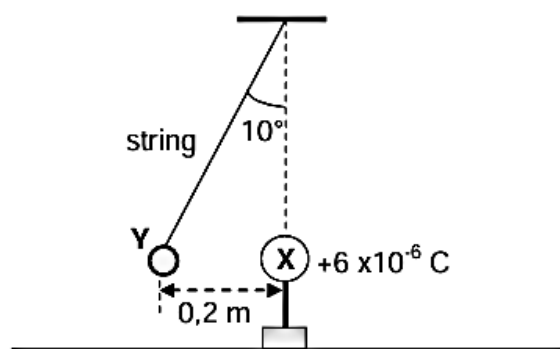


Electrostatics: Attempt #4 ⚡

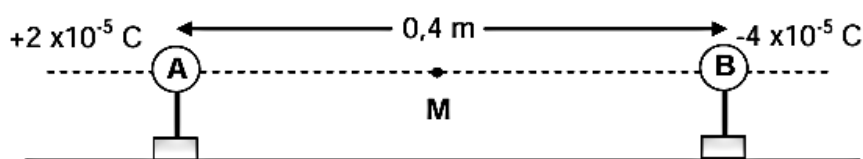
Total = 18 Marks

1. A small sphere, **Y**, carrying an unknown charge, is suspended at the end of a light inextensible string which is attached to a fixed point. Another sphere, **X**, carrying a charge of $+6 \times 10^{-6} \text{ C}$, on an insulated stand is brought close to sphere **Y**.

Sphere **Y** experiences an electrostatic force and comes to rest 0,2 m away from sphere **X**, with the string at an angle of 10° with the vertical, as shown in the diagram below.



- 1.1 What is the nature of the charge on sphere **Y**? Choose from POSITIVE or NEGATIVE. (1)
 - 1.2 Calculate the magnitude of the charge on sphere **Y** if the magnitude of the electrostatic force acting on it is 3,05 N. (3)
 - 1.3 Draw a labelled free-body diagram for sphere **Y**. (3)
 - 1.4 Calculate the magnitude of the tension in the string. (3)
2. Two small charged spheres, **A** and **B**, on insulated stands, with charges $+2 \times 10^{-5} \text{ C}$ and $-4 \times 10^{-5} \text{ C}$ respectively, are placed 0,4 m apart, as shown in the diagram below. **M** is the midpoint between spheres **A** and **B**.



- 2.1 Define the term *electric field at a point*. (2)
- 2.2 Calculate the net electric field at point **M**. (6)

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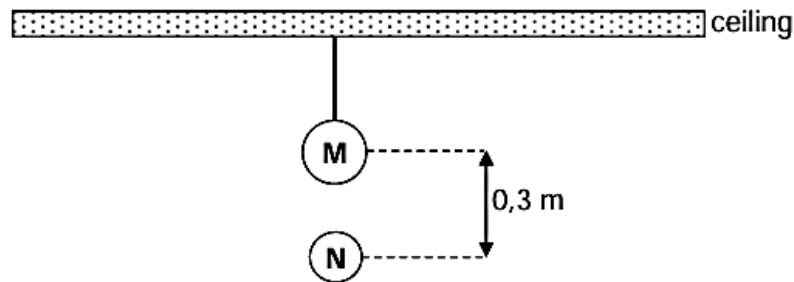


Electrostatics: Attempt #5 ⚡

Total = 17 Marks

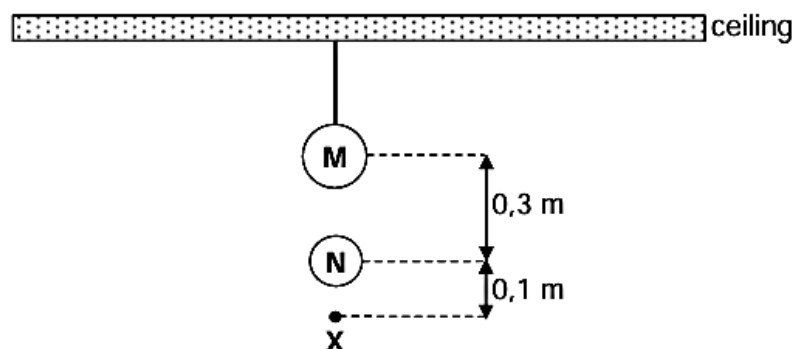
A charged sphere **M** is suspended from a ceiling by a light inextensible, insulated string.

Another charged sphere **N**, of mass $2,04 \times 10^{-3}$ kg and carrying a charge of $+ 8,6 \times 10^{-8}$ C, hangs STATIONARY vertically below sphere **M**. The centres of the spheres are 0,3 m apart, as shown in the diagram below.



1. State Coulomb's law in words. (2)
2. State whether the charge on sphere **M** is POSITIVE or NEGATIVE. (1)
3. Draw a labelled free-body diagram for sphere **N**. (2)
4. Calculate the magnitude of the charge on sphere **M**. (5)
5. How does the electrostatic force that sphere **M** exerts on sphere **N** compare to that exerted by sphere **N** on sphere **M** with respect to:
 - 5.1 Magnitude (1)
 - 5.2 Direction (1)

Point **X** is 0,1 m vertically below the centre of sphere **N**, as shown below.



6. Calculate the net electric field at point **X**. (5)

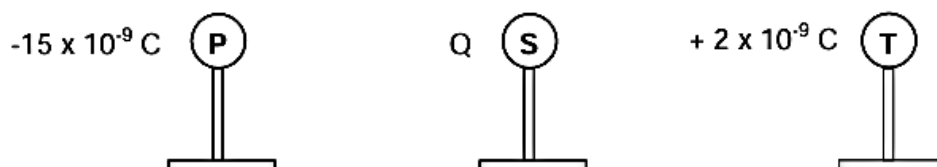
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Electrostatics: Bonus Attempt ⚡

Total = 18 Marks

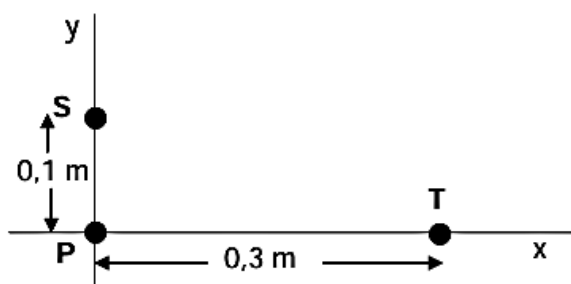
Three small identical metal spheres, **P**, **S** and **T**, on insulated stands, are **initially neutral**. They are then charged to carry charges of $-15 \times 10^{-9} \text{ C}$, Q and $+2 \times 10^{-9} \text{ C}$ respectively, as shown below.



The charged spheres are brought together so that all three spheres touch each other at the same time, and are then separated. The charge on each sphere, after separation, is $-3 \times 10^{-9} \text{ C}$.

1. Determine the value of charge Q . (2)
2. Draw the electric field pattern associated with the charged spheres, **S** and **T**, **after they are separated** and returned to their original positions. (3)

The spheres, each with the **new charge** of $-3 \times 10^{-9} \text{ C}$, are now placed at points on the x -axis and the y -axis, as shown in the diagram below, with sphere **P** at the origin.



3. State Coulomb's law in words. (2)

Calculate the magnitude of the:

4. Net electrostatic force acting on sphere **P** (5)
5. Net electric field at the origin due to charges **S** and **T** (3)
6. ONE of the charged spheres, **P** and **T**, experienced a very small increase in mass **after it was charged initially**.
 - 6.1 Which sphere, **P** or **T**, experienced this very small increase in mass? (1)
 - 6.2 Calculate the increase in mass by the sphere in QUESTION 7.6.1. (3)

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