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QUESTION 1

Fill in the blank with the correct answer from the number bank below.

3.2×10^{19}	-3.2×10^{19}	1.3×10^{14}	1.3×10^{-14}	

A negatively charged ion is placed in a uniform electric field of magnitude $200\ \mathrm{N/C}$. The ion undergoes an electric force of magnitude $6.4 \times 10^{-17}\ \mathrm{N}$. The charge of the ion is -3.2×10^{-19} ✓ C.

Write your answer in scientific notation.

QUESTION 2

Choose the correct answer.

A particle is moving in a uniform electric field at right angles to the lines of the field. What can you deduce about the charge of this particle and why?

- The particle is positively charged because the electric force acting on the particle is perpendicular to the electric field lines.
- The particle is negatively charged because the electric force acting on the particle is perpendicular to the electric field lines.

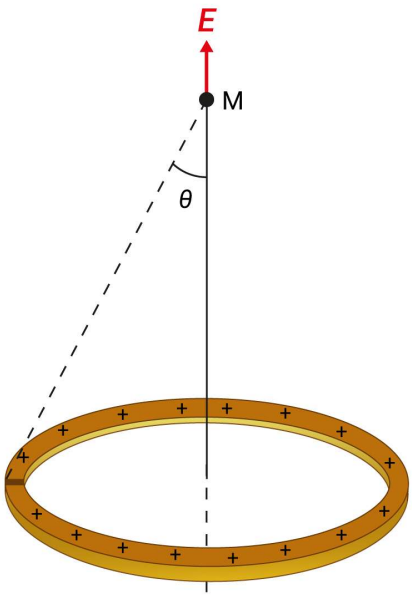
The particle is electrically neutral, otherwise its trajectory will be deflected due to the electric force. ✓

The particle is partially charged, and this is the cause behind the particle's motion.

QUESTION 3

Select the correct answer.

The electric field created by a charged ring at the point M is oriented vertically upward along the axis of the ring. A positively charged cork sphere of weight 1.0×10^{-2} N and placed at M remains suspended in air due to the electric force acting on it. The electric field at M has a magnitude of 2.0×10^{2} N / C .



Determine the magnitude of the electric force acting on the sphere and the charge carried by the sphere.

$F =$
1.0×10^{-2} N
and $q =$
-2.0×10^{4} C

$F =$
1.0×10^{-2} N
and $q =$
5.0×10^{-5} C

$F =$
1.0×10^{-2} N
and $q =$
-5.0×10^{-5} C

$F =$
1.0×10^{-2} N
and $q =$
2.0×10^{4} C

QUESTION 4

Choose the correct answer.

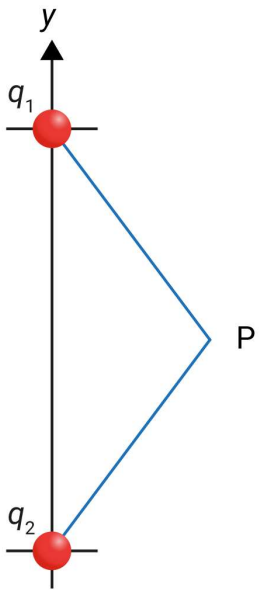
Two charges q_1 and q_2 create an electric field at point P of magnitude

1.0×10^5 N / C

oriented vertically upward. A point charge with

$q = 10$ nC

is placed at P. What are the magnitude and the direction of the electric force acting on the charge at P?

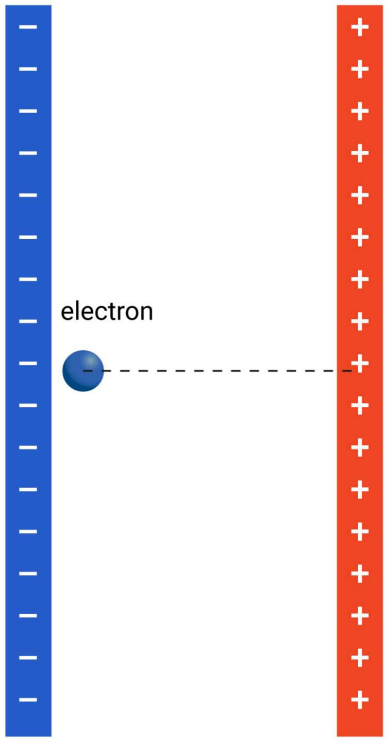


- $F = 1.0 \times 10^{-3}$ N, oriented vertically upward ✓
- $F = 1.0 \times 10^{-3}$ N, oriented vertically downward
- $F = 1.0 \times 10^{6}$ N, oriented vertically upward
- $F = 1.0 \times 10^{6}$ N, oriented vertically downward

QUESTION 5

Fill in the blanks using the values from the number bank below.

1.0×10^{3}	1.6×10^{16}	1.0×10^{-3}	1.6×10^{-16}	



A uniform electric field exists between two oppositely charged plates separated by 2.0 cm. An electron of charge

$q = 1.6 \times 10^{-19}$ C

and of mass

$m = 9.1 \times 10^{-31}$ kg

is released from rest at the surface of the negatively charged plate, accelerates in a straight line, and strikes the positively charged plate. The acceleration of the electron during this travel is

$a = 1.8 \times 10^{14}$ m / s^2

. The force of gravity is neglected.

The magnitude of the electric force acting on the electron is F = 1.6×10^{-16} ✓ N, and the magnitude of the electric field between the plates is E = 1.0×10^{3} ✓ N/C.

QUESTION 6

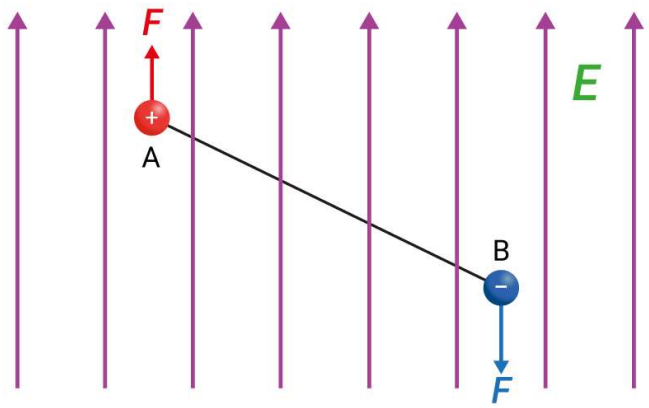
QUESTION 6

Choose the correct answer.

Two charged particles, A and B carrying charges of equal magnitude 1.0 μC each but of opposite signs, are placed at the extremities of an insulating rod which is held fixed in a uniform electric field of strength

1.0×10^{4}

N/ C as shown in the figure at the right. Indicate the sign of the charge of each particle and calculate the magnitude of the electric force acting on each particle.



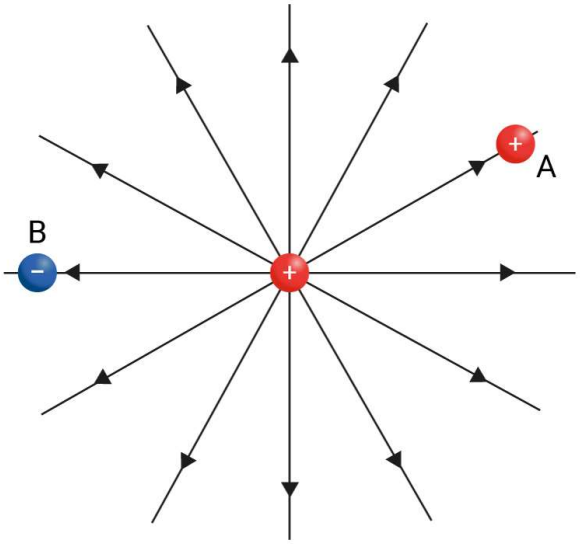
- A is charged negatively while B is charged positively and the magnitude of the electric force acting on each particle is 1.0×10^{-2} N .
- A is charged positively while B is charged negatively and the magnitude of the electric force acting on each particle is 2.0×10^{-2} N .
- A is charged negatively while B is charged positively and the magnitude of the electric force acting on each particle is 2.0×10^{-2} N .
- A is charged positively while B is charged negatively and the magnitude of the

electric force acting on each particle is 1.0×10^{-2} N .

QUESTION 7

Choose the correct answer.

Two charges are placed at A and B respectively in the electric field created by a point charge placed at O as shown on the adjacent figure. An electric force acts on both charges, causing them to move. In which direction does each charge move?

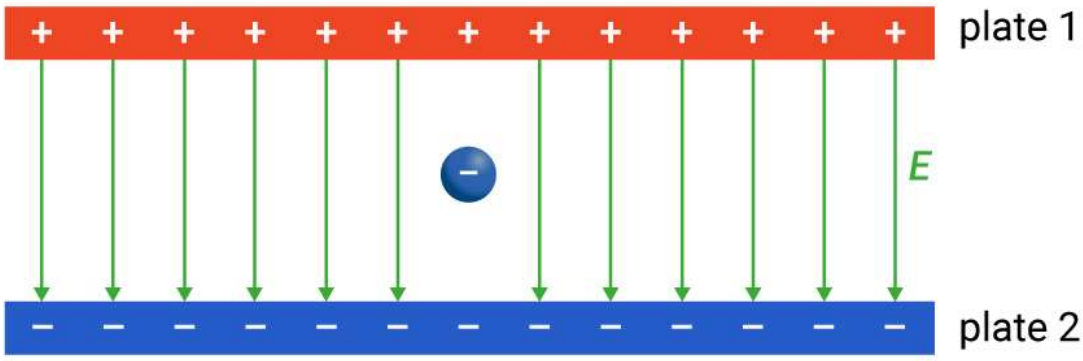


- [x] The charge at A moves radially away from O, while the charge at B moves radially toward O.
- [ ] The charge at A moves radially toward O, while the charge at B moves radially away from O.
- [ ] Both charges move radially toward O.
- [ ] Both charges move radially away from O.

QUESTION 8

Choose the correct answer.

A tiny



negatively charged particle of mass *m* is suspended in the air between two horizontal charged plates as shown in the adjacent figure. The electric field between the plates is oriented vertically downward. What is the direction of the electrostatic force acting on the suspended particle?

- [x] vertically upward
- [ ] vertically downward
- [ ] horizontally leftward
- [ ] horizontally rightward

QUESTION 9

Select the correct answers from the drop-down menus.

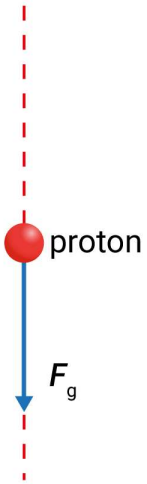
A proton of charge

$q = 1.6 \times 10^{-19}$ C

weighs

1.6×10^{-26} N

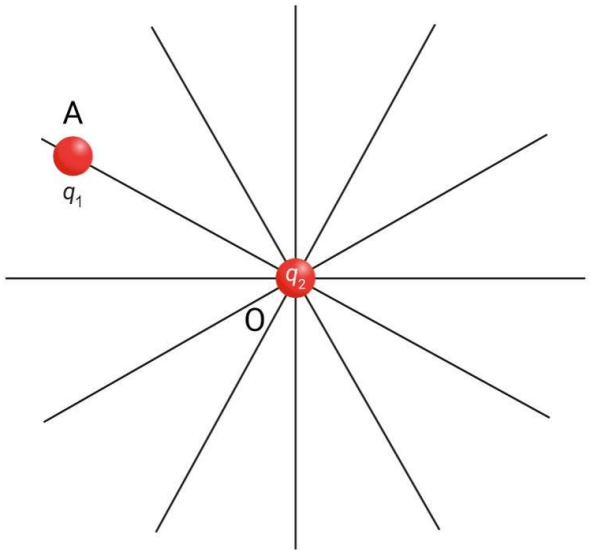
is placed in a uniform electric field *E*. The proton is suspended in the air. The magnitude of the electric field is 1.0×10^{-7} N / C ✓, and its direction is vertically upward ✓.



QUESTION 10

Choose the correct answer.

A positive charge q_1 is placed at a point A around a charge q_2 of an unknown charge placed at O. The charge is submitted to an electric force which displaces it radially away from O. Indicate the direction of the electric field created by the charge at O and deduce the sign of this charge.



- [x] E is radially outward, and $q_2 > 0$.
- [ ] E is radially inward, and $q_2 > 0$.
- [ ] E is radially outward, and $q_2 < 0$.
- [ ] E is radially inward, and $q_2 < 0$.

QUESTION 11

Fill in the blanks with the correct answers from the answer bank below.

Answer Bank					
positively	negatively	1.0×10^2	1.0×10^6	1.0	

A sphere with a mass of

$m = 177.0\ \text{g}$

and a negative charge of

$q = -1.0\ \mu\text{C}$

is suspended by a vertical insulating thread and placed in a uniform electric field between two charged plates. The charged plates have an unknown magnitude of charge but are opposite in charge. The sphere moves by 30° from the vertical due to the electric force from the charged plates. You are told that the horizontal component of the tension in the thread s

$T_x = 1.0\ \text{N}$

.

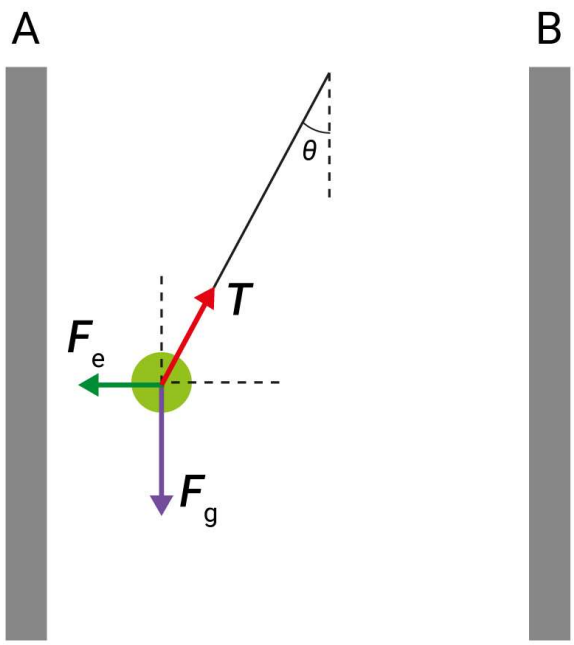


Plate A is positively ✓ charged while plate B is negatively ✓ charged.

The magnitude of the electric force is $F =$ 1.0 ✓ N, while the magnitude of the electric field is 1.0×10^6 ✓ N / C.

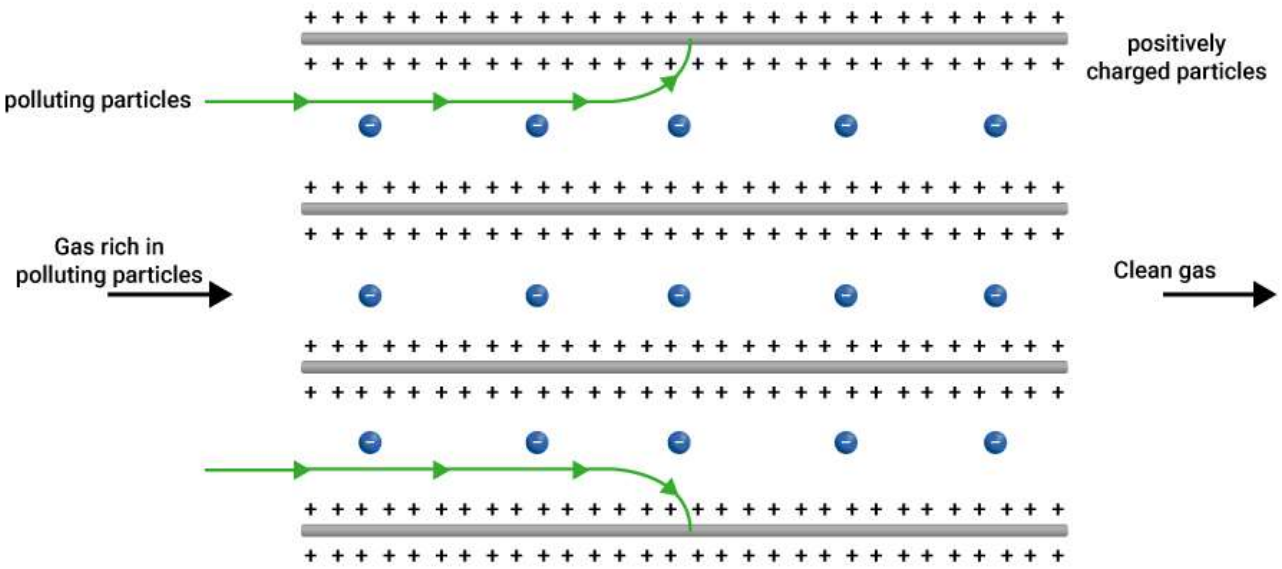
QUESTION 12

Select *the correct answer from the drop-down menu.*

The figure below shows how the electrostatic precipitator cleans the polluting gas emitted from burning fossil fuels. As the polluting gas enters the precipitator, a particle of polluting gains a charge

$q = -10\ \text{nC}$

.



The charge density of a plate is

$\sigma = 4.00 \times 10^{-6}\ \text{C/m}^2$

and

$\varepsilon_0 = 8.85 \times 10^{-12}\ \text{C}^2/\text{N m}^2$

. The magnitude of the electric force acting on a charged particle is

$F = 4.52 \times 10^{-3}\ \text{N}$ ✓ .

QUESTION 13

Choose the correct answer.

A charged particle is suspended in the air with charge

$2.0 \times 10^{-8}\ \text{C}$

is placed at a point where the magnitude of a uniform electric field, oriented horizontally to the left is

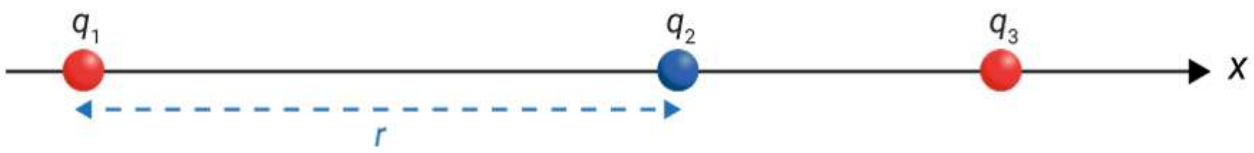
2.0×10^{4} N/ C

. Determine the magnitude and direction of the electric force acting on this particle.

- $F = 1.0 \times 10^{12}$ N , horizontal to the left.
- $F = 1.0 \times 10^{12}$ N , horizontal to the right.
- ✓ $F = 4.0 \times 10^{-4}$ N , horizontal to the left.
- $F = 4.0 \times 10^{-4}$ N , horizontal to the right.

QUESTION 14

Choose the correct answer.



Two equal charges $q_1 > 0$ and $q_2 < 0$, are separated by a distance r. A third positive charge q is brought to the right of q_2 as shown in the adjacent figure. What are the directions of the electric force F and the electric field E at the position where the charge q_3 is placed?

- [x] Both F and E are horizontal to the left.
- [ ] F is horizontal to the left while E is horizontal to the right.
- [ ] F is horizontal to the right while E is horizontal to the left.
- [ ] Both F and E are horizontal to the right.

QUESTION 15

Select the correct answer from the drop-down menu.

A positive charge is placed at M as shown on the adjacent figure. The electric field, E is directed

radially outward ✓ , and

the electrostatic force, F is

radially outward ✓ .

