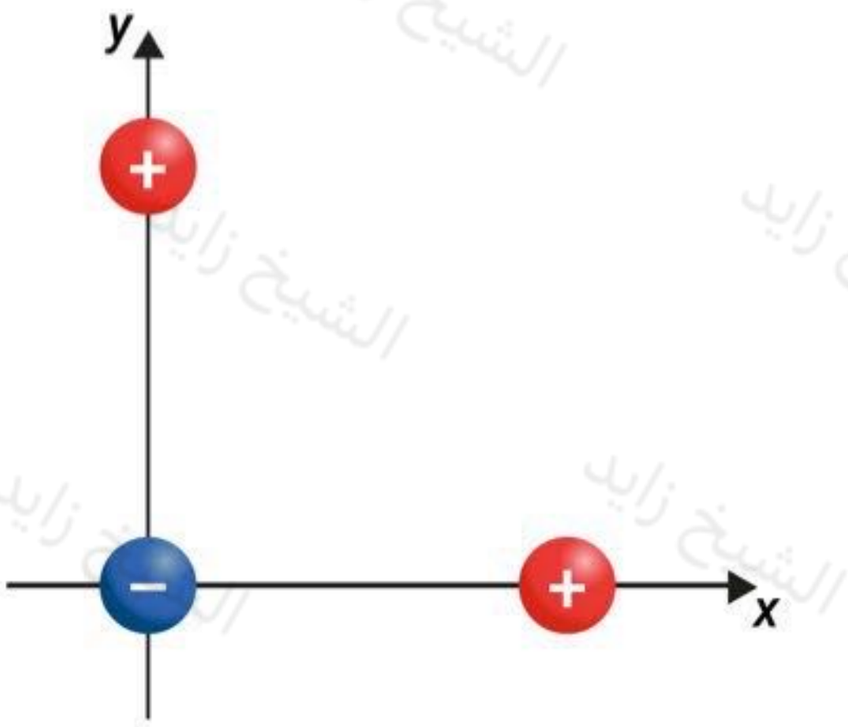
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QUESTION 1

Select the correct choice.

Three charged particles are placed in a coordinate system. An electron is placed at the origin, a proton is placed at (0, 2) cm, and another proton is placed at (2, 0) cm. What is the direction of the electrostatic force exerted on the electron at the origin?



- at an angle of 135 ° from the positive *x*-axis
- ✓ at an angle of 45 ° from the positive *x*-axis
- in the direction of the positive *x*-axis
- at an angle of 180 ° from the positive *x*-axis

QUESTION 2

Select the best answers.

Three charged balls are placed on a table in an arrangement where the charged balls are not in a straight line. Sultan calculated the force vector on one of the balls. His answer was

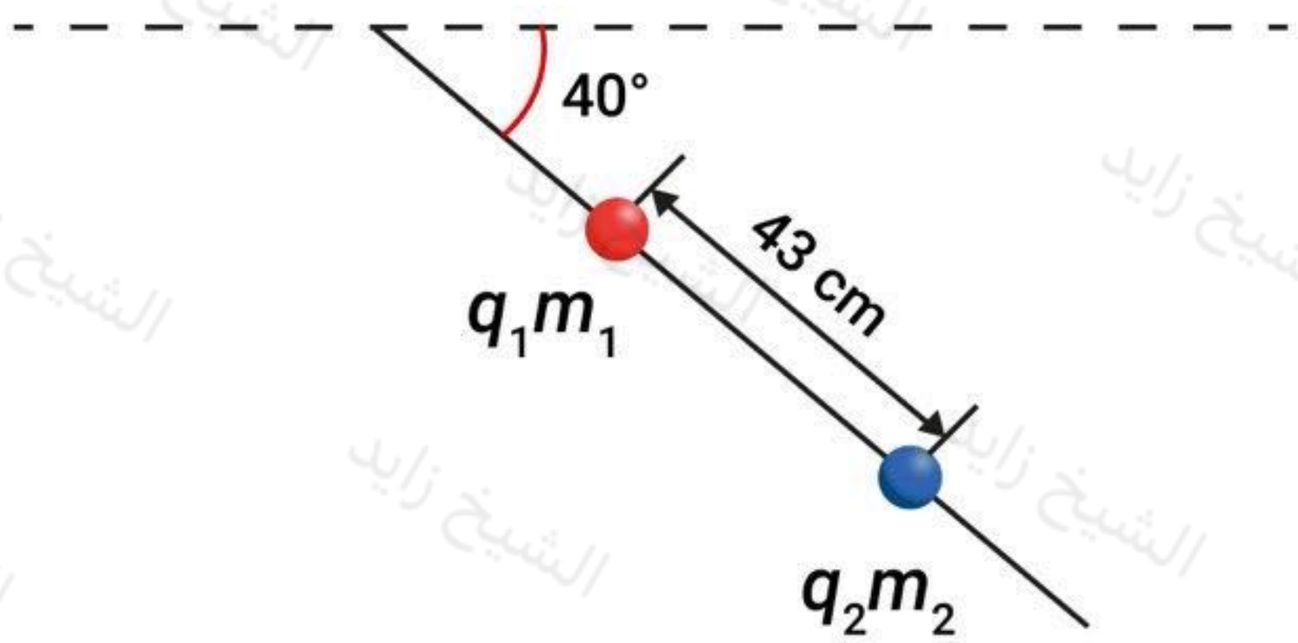
$$F(r_A) = (-1.0,\ 2.0)\ \text{N}$$

. Which of the following statements are true?

- [ ] The x-component of the force applied on ball A is $2.0\ \text{N}$.
- [x] The x-component of the force applied on ball A is $-1.0\ \text{N}$. ✓
- [ ] The y-component of the force applied on ball B is $2.0\ \text{N}$.
- [ ] The y-component of the force applied on ball B is $-1.0\ \text{N}$.
- [x] The y-component of the force applied on ball A is $2.0\ \text{N}$. ✓
- [ ] The y-component of the force applied on ball A is $-1.0\ \text{N}$.

QUESTION 3

Select the correct choice.



Two beads, $q_1 = +3.2\ \mu C$ and q_2, are placed on an inclined wire, as shown in the image on the right. The second charge, q_2, has a mass of 83 g and is placed on the wire near its equilibrium position. The second charge can slide along the insulating wire without friction. When the distance between the two beads is 43 cm, the second bed reaches equilibrium.

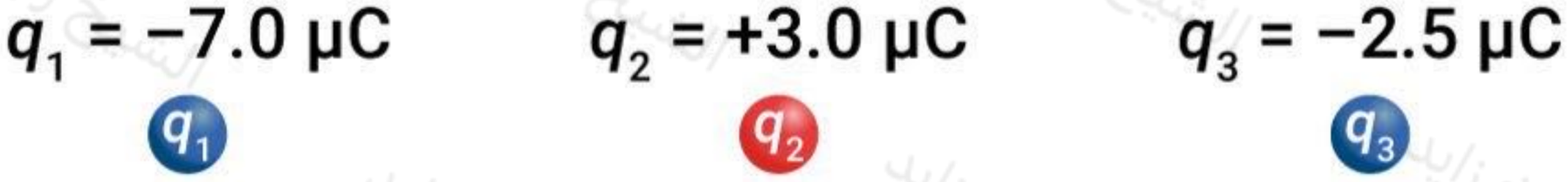
What is the charge of the second bead?

- $-4.5\ \mu C$
- $-3.4\ \mu C$ ✓
- $-1.2\ \mu C$
- $-8.5\ \mu C$

QUESTION 4

Select the correct choice.

A charged particle q_2 is exactly in the middle between two charged particles q_1 and q_3. The charge of each particle is shown in the image on the right. In which direction will the positively charged particle q_2 move?



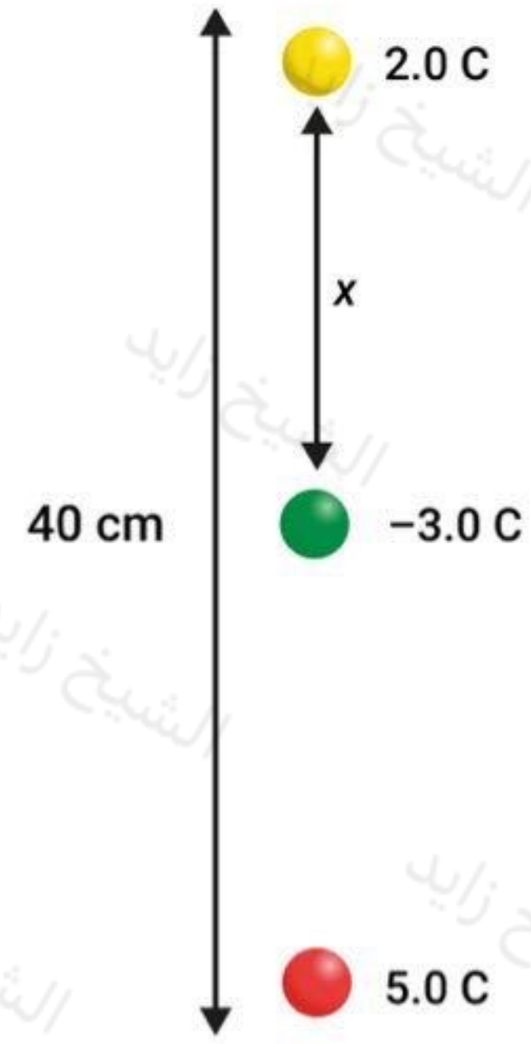
- ○ to the right
- ◉ to the left ✓
- ○ downward
- ○ upward

QUESTION 5

Select the correct choice.

Three charged particles lie along the *y*-axis, as shown in the image on the right. The charge of each particle is as follows:

- $q_{\text{yellow}} = 2.0\ \text{C}$
- $q_{\text{green}} = -3.0\ \text{C}$
- $q_{\text{red}} = 5.0\ \text{C}$



You are told the green particle is at equilibrium. What is the separation distance, in centimeters, between the yellow particle and green particle?

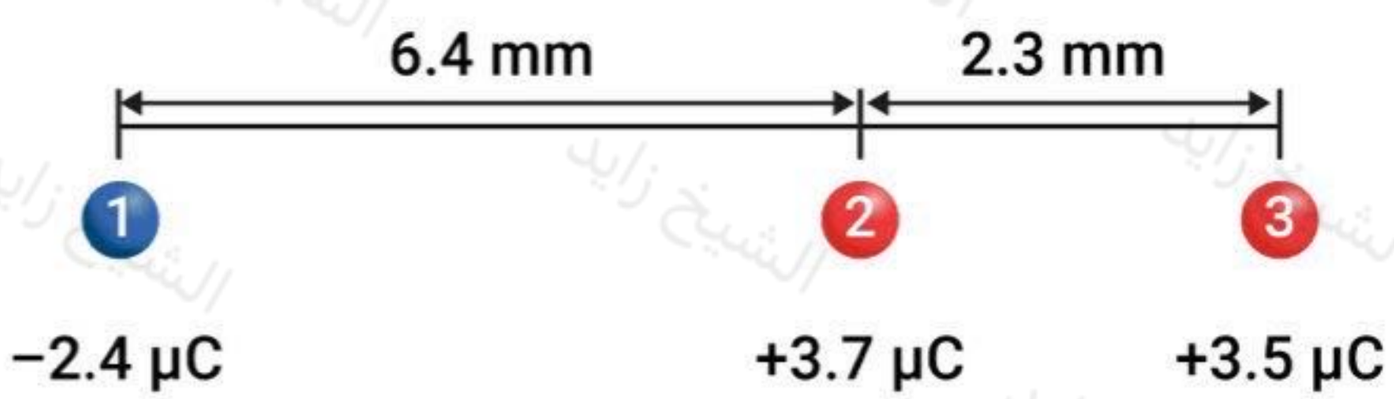
You can assume that the mass of each particle is very small so you can neglect any gravitational forces.

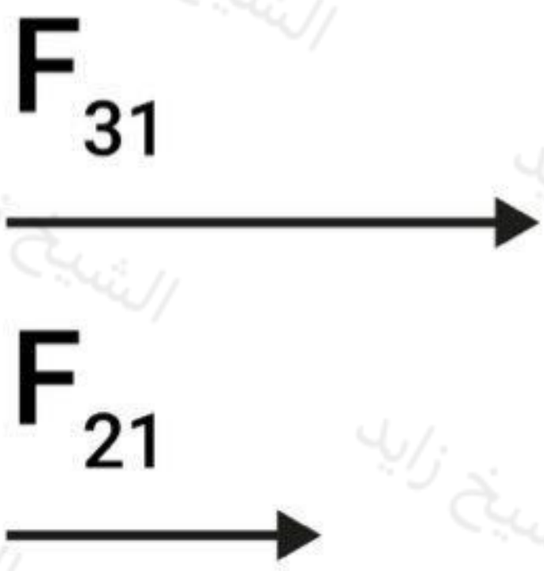
- ○ 25 cm
- ○ 31 cm
- ○ 11 cm
- ◉ 15 cm ✓

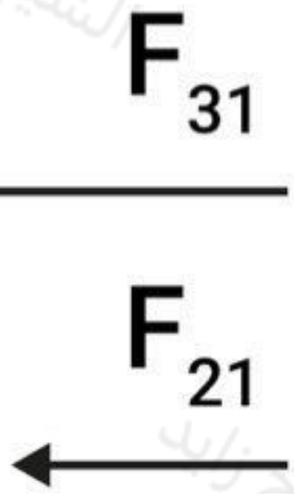
QUESTION 6

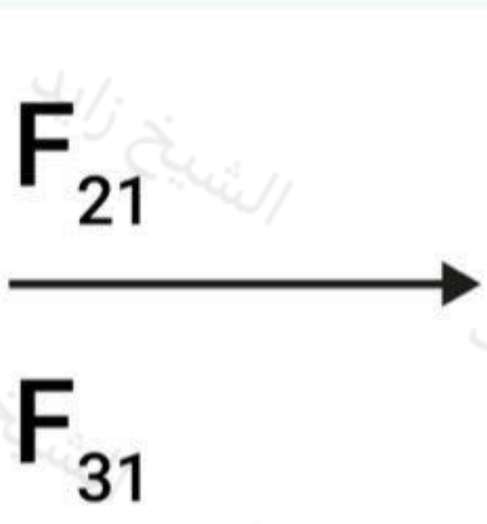
Select the best choice.

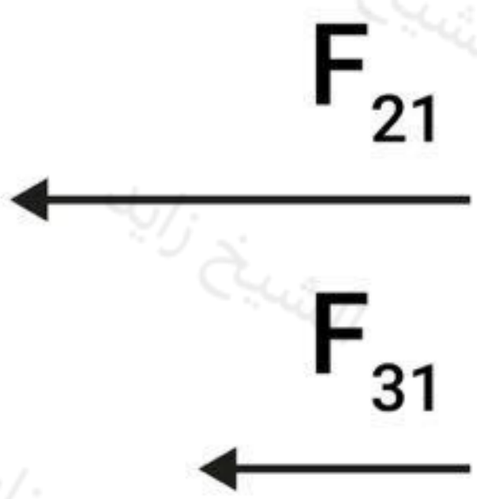
Three charged particles lie on the *x*-axis, as shown in the image on the right. Which of the following vector representations best represents the magnitude and direction of the electrostatic forces exerted on charge 1?





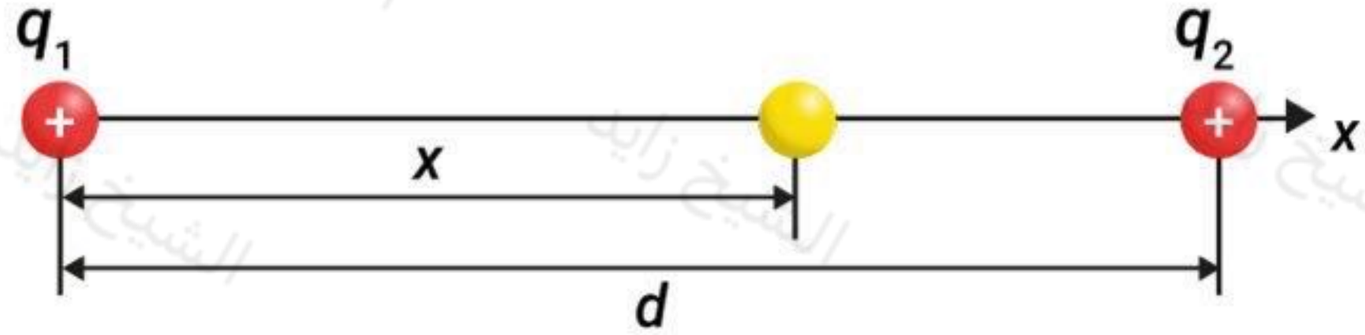






QUESTION 7

Select the correct choice.



Three charged particles lie on the *x*-axis, as shown in the image on the right. The charge of the yellow particle is
unknown. The other two are positively charged. The yellow particle moves to the left. What type of charge does the yellow particle have?

- neutral
- the yellow particle has no charge
- positive ✓

negative

QUESTION 8

Select the correct choice.

In which of the following cases is the superposition principle applicable?

The superposition principle is applicable when you have two-point charges at different positions.

The superposition principle is applicable when you have more than two-point charges at different positions. ✓

The superposition principle is applicable when you have a one-point charge.

The superposition principle is not applicable in electrostatics.

QUESTION 9

Select the correct choice.

Hydrogen has one electron and one proton. Consider that the electron of a hydrogen atom moves in a circular orbit around the proton. What would be the speed of the electron?

The distance between the electron and proton of a hydrogen atom is

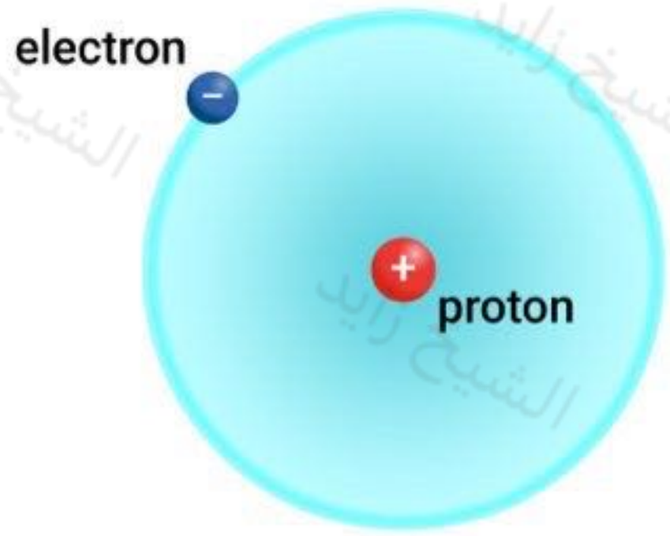
5.3×10^{-10} m

.

The mass of the electron is

9.11×10^{-31} kg

.

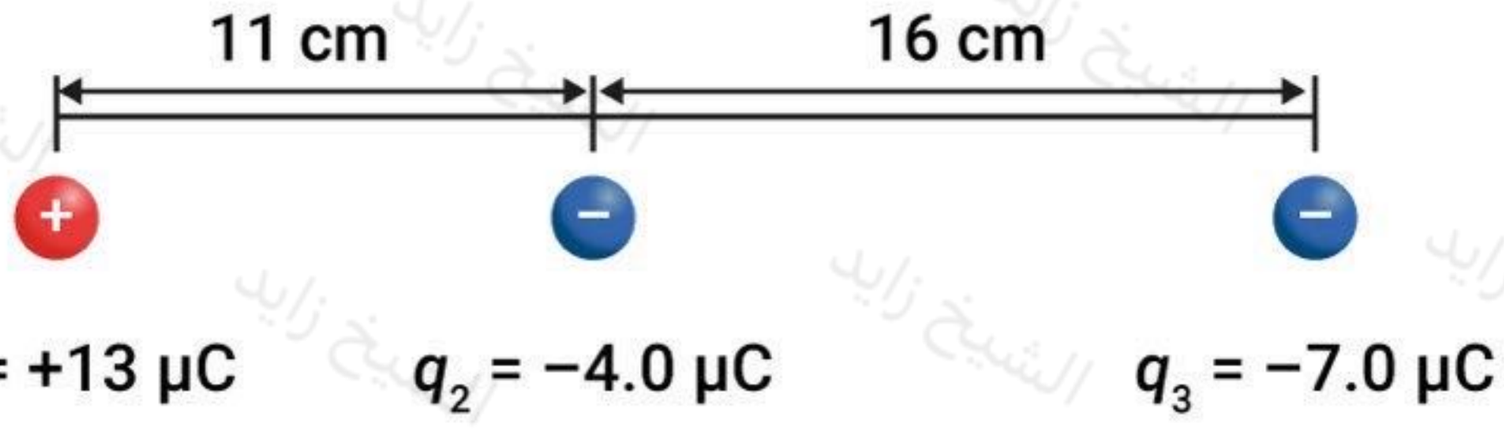


- 7.42×10^{5} m / s
- 8.99×10^{5} m / s
- 6.91×10^{5} m / s ✓
- 1.54×10^{5} m / s

QUESTION 10

Select the best answer from the drop-down menu.

Two negatively charged particles are placed beside a positively

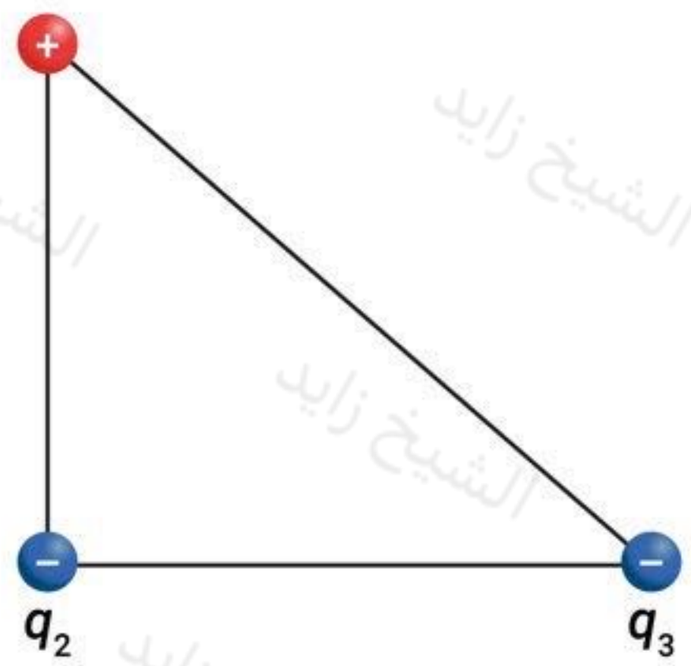


charged particle as shown at the right. The magnitude of the electrostatic force that is exerted on the positively charged particle is 50 N ✓ .

QUESTION 11

Select the correct choice.

Three charges are arranged on the corners of a right triangle, as shown in the image on the right. Which of the equations below best describes the distance $|r - r_i|$?

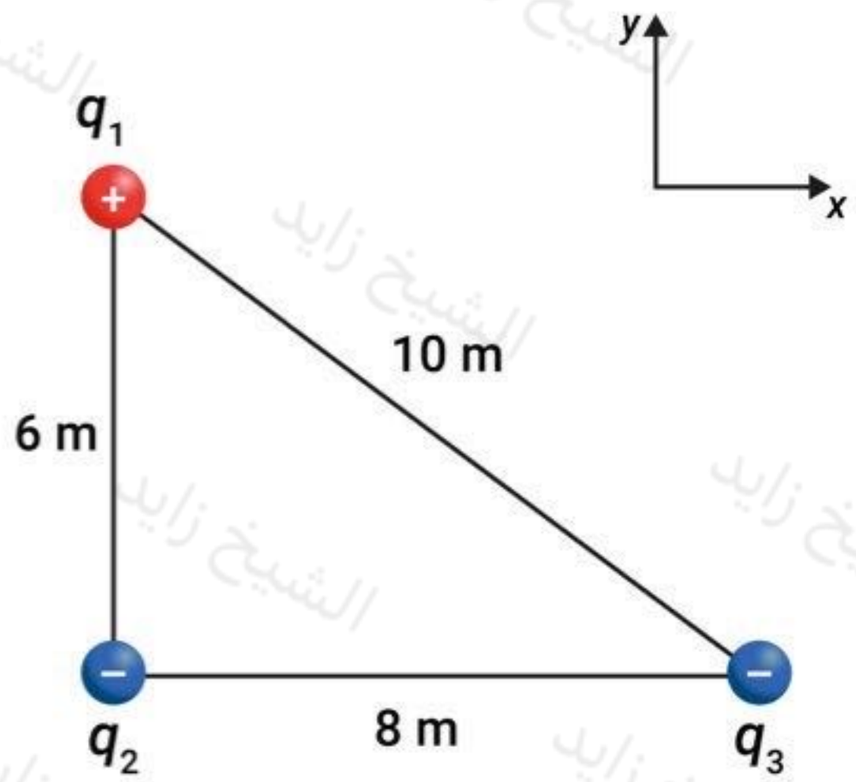


- ◉ $|r - r_i| = \sqrt{|x - x_i|^2 + |y - y_i|^2}$ ✓
- ○ $|r - r_i| = \sqrt{|x - x_i|^2 + |y - y_i|}$
- ○ $|r - r_i| = \sqrt{|x - x_i|^2 - |y - y_i|^2}$
- ○ $|r - r_i| = \sqrt{|x - x_i| + |y - y_i|}$

QUESTION 12

Choose the correct choice.

Three charged particles are arranged at the corners of a right triangle such that $q_1 = 2.0\ \text{C}$, $q_2 = -2.0\ \text{C}$, and $q_3 = -2.0\ \text{C}$.



What is the net electrostatic force acting on q_2?

- ○ $-2.3\times10^{8}\ \text{N}\,\hat{x} + 3.2\times10^{9}\ \text{N}\,\hat{y}$
- ○ $5.6\times10^{8}\ \text{N}\,\hat{x} - 1.0\times10^{9}\ \text{N}\,\hat{y}$
- ○ $-1.0\times10^{9}\ \text{N}\,\hat{x} + 5.6\times10^{8}\ \text{N}\,\hat{y}$
- ◉ $-5.6\times10^{8}\ \text{N}\,\hat{x} + 1.0\times10^{9}\ \text{N}\,\hat{y}$ ✓

QUESTION 13

Drag and drop the best equation in the blank below.

Afra is writing all the formulas needed in her electrostatics exam. She forgot one formula about the superposition principle. Help Afra to complete the formulas.

The superposition principle for electrostatic forces is $F = kq\sum_{i=1}^{n} q_i \frac{r - r_i}{|r - r_i|^3}$ ✓.

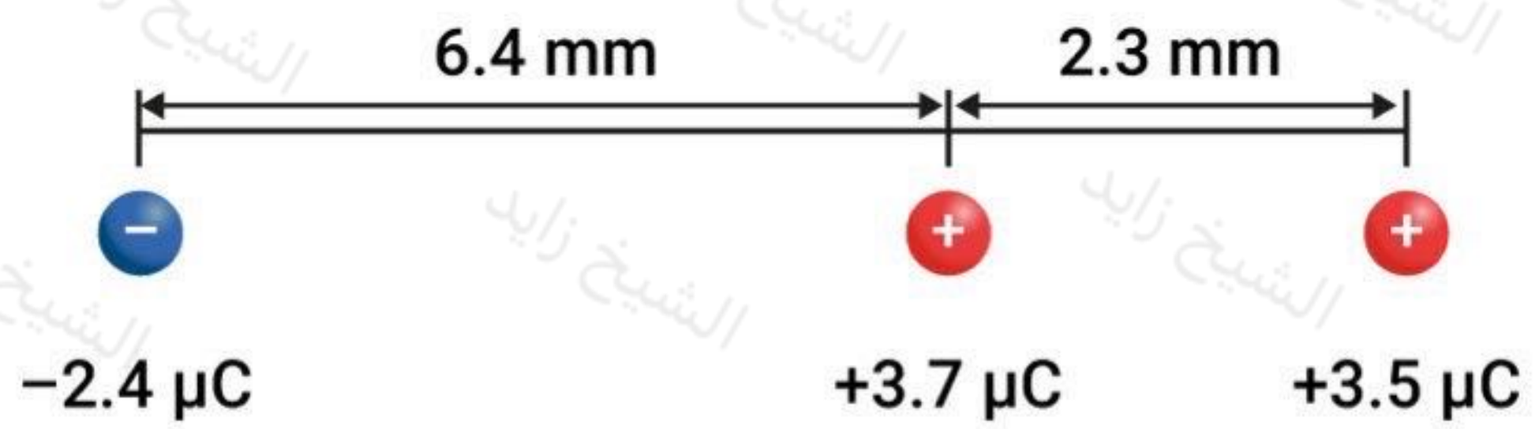
$F = kq\sum_{i=1}^{n} q_i \frac{r - r_i}{|r - r_i|^2}$

$F = kq\sum_{i=1}^{n} q_i \frac{r - r_i}{|r - r_i|}$

$F = k\sum_{i=1}^{n} q_i \frac{r - r_i}{|r - r_i|^3}$

QUESTION 14

Drag and drop the best answer in the blank below.



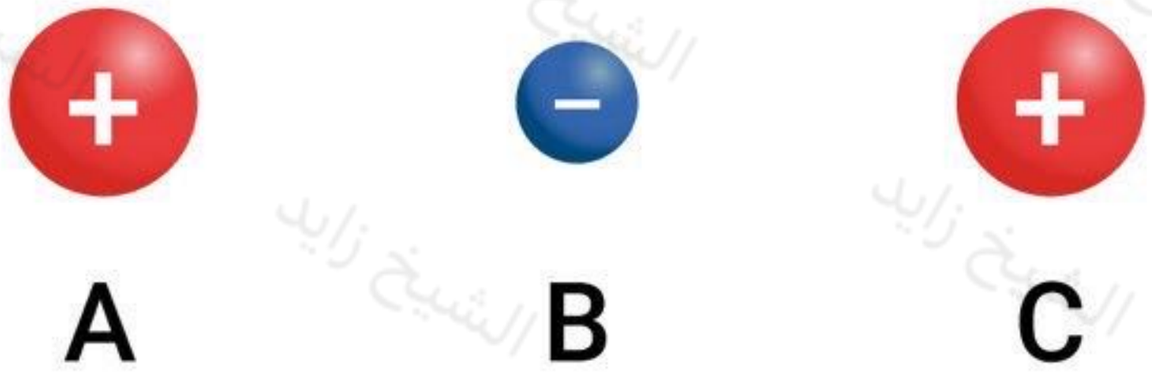
The direction of the net electrostatic force applied on the $+3.7\ C$ charge is towards the left ✓.

downwards | upwards | towards the right

QUESTION 15

Select the correct choice.

Three charged particles are placed in a line, as shown in the image on the right. You are told that the charge of both particles A and C are the same and that B is placed exactly in the middle between particles A and C.



Will particle B move? If yes, in which direction?

- ○ Particle B will move to the left.
- ○ Particle B will move upward.
- ◉ Particle B will stay at rest. ✓
- ○ Particle B will move to the right.