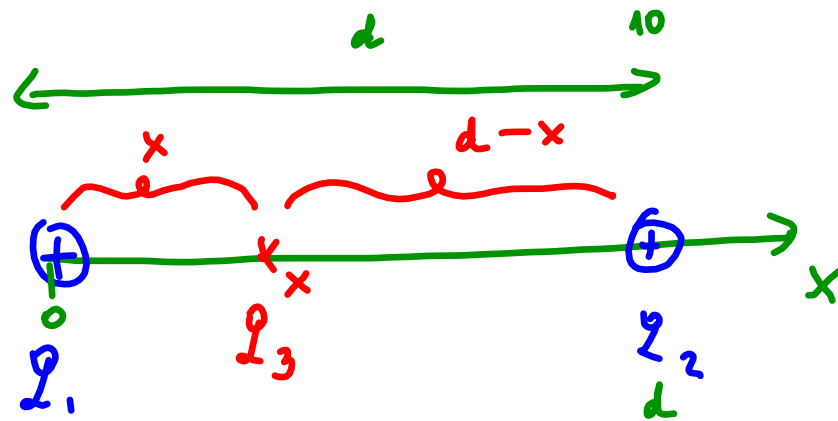


Example

2 positively charged particles $q_1 = q_2 = 3q$,
are 10 cm apart on the x-axis. Where
can we place q_3 to experience no net
force. (Hint: q_3 is on x axis)



$$q_1 = q_1$$

$$q_2 = 3q_1$$

$$d = 10 \text{ cm}$$

$$F_{32} = k \frac{|q_3| |q_2|}{r^2}$$

$$F_{31} = k \frac{|q_3| |q_1|}{x^2}$$

$$F_{32} = k \frac{|q_3| |q_2|}{(d-x)^2}$$

=
have to be equal

$$|\vec{F}_{31}| = |\vec{F}_{32}|$$

$$k \frac{q_3 q_1}{x^2} = k \frac{q_3 q_2}{(d-x)^2}$$

~~$$k \frac{q_3 q_1}{x^2} = k \frac{q_3 \cdot 3q_1}{(d-x)^2}$$~~

$$\frac{1}{x^2} = \frac{3}{(d-x)^2}$$

$$(d-x)^2 = 3x^2$$

$$3x^2 - (d-x)^2 = 0$$

$$3x^2 - (d-x)^2 = 0$$

1) $3x^2 - (d^2 - 2dx + x^2) = 0$

$$3x^2 - d^2 + 2dx - x^2 = 0$$

$$2x^2 + 2dx - d^2 = 0$$

$$d = 10 \text{ cm}$$

$$(ax^2 + bx + c = 0)$$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2) \quad 3x^2 - (d-x)^2 = 0 \quad a^2 - b^2 = (a-b)(a+b)$$

$$\underbrace{[3x - (d-x)]}_{=0} \underbrace{[3x + (d-x)]}_0 = 0$$

$$= 0$$

$$x_1 =$$

$$0$$

$$x_2 =$$

$$x_1 = 3.7 \text{ cm}$$

$$x_2 = -13.7 \text{ cm}$$

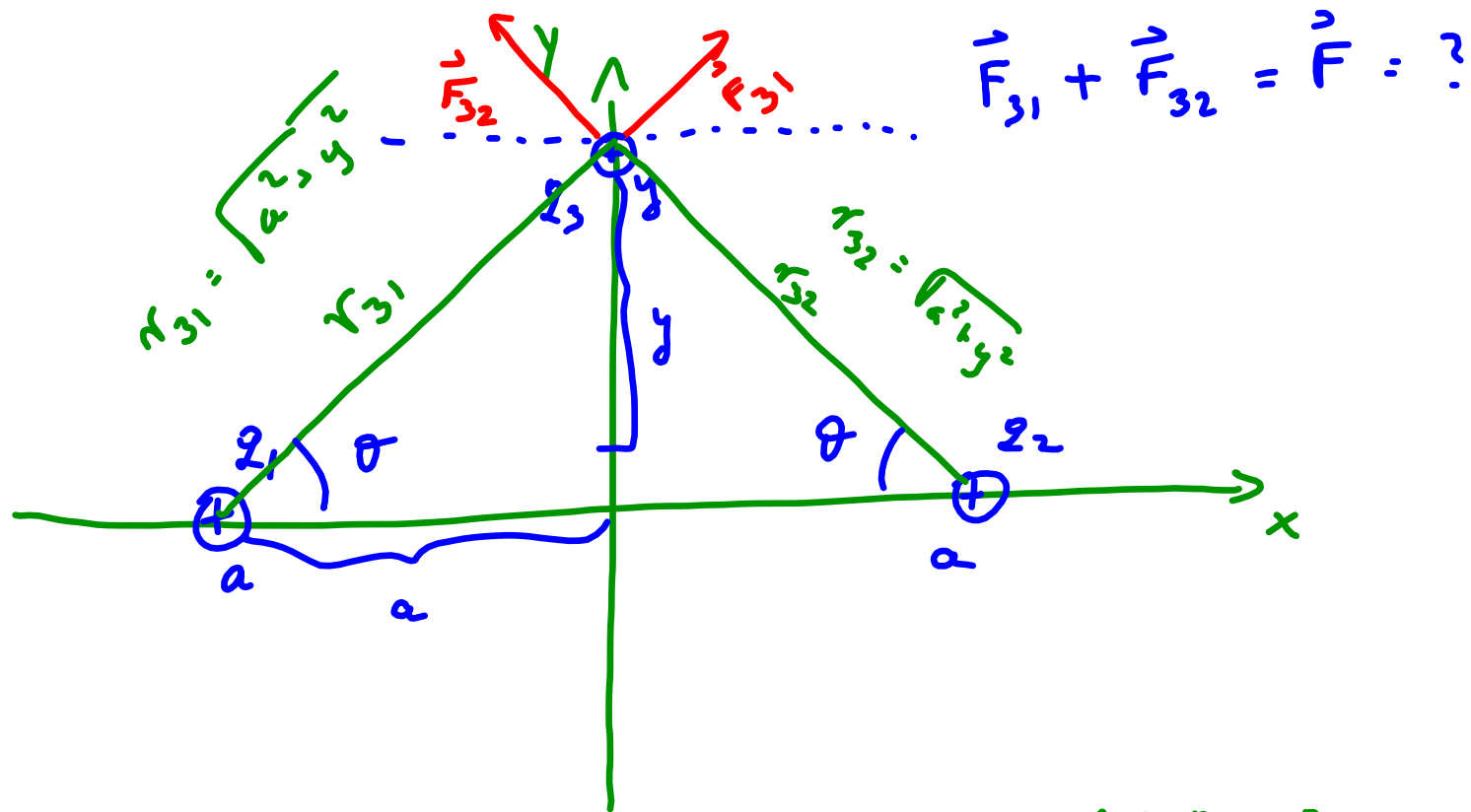
from picture

Ex.

Charged raindrops: Suppose 2 drops with equal charge q are on the x axis at $x = \pm a$.

Find the electric force on a third drop with charge Q at any arbitrary point on y axis.

Suppose that all charges are positive.



$$q_1 = q_2 = q$$

$$q_3 = Q$$