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Question

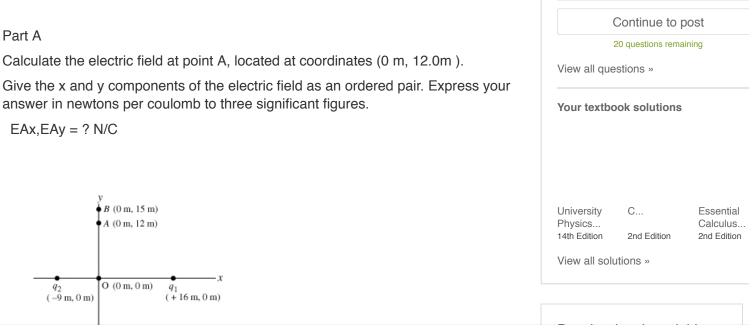
Two point charges are placed on the x axis. (Figure 1) The first charge, q1 =8.00nC, is placed a distance 16.0m from the origin along the positive x axis; the second charge, q2 = 6.00nC, is placed a distance 9.00m from the origin along the negative x axis.

Part A

MENU

Give the x and y components of the electric field as an ordered pair. Express your answer in newtons per coulomb to three significant figures.

EAx,EAy = ? N/C



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Answers



Corey Tucker answered this more than 1 day later

First answer!

Was this answer helpful?

The electric field from q1 is given by:

 $F1 = kq1 / r1^2$

r1 = sqrt(12^2+16^2)=20

F1 = 8.9875 * 10^9 * (8.00 * 10^-9) / 20^2

F1 = 0.18 N/C

Likewise, for q2:

 $F2 = kq2 / r2^2$

 $r2 = sqrt(12^2+9^2)=15$

E2 - 8 0875 * 10/0 * /6 00 * 10/-0\ / 15/2

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1 2 - 0.0010 10 0 (0.00 10 0)110 2

F2 = 0.24 N/C

To find the x and y components, just use trigonometry (note that the direction of the field is away from the charges, since the charges are positive, so q1 s x component will be negative, q2 s x component will be positive, and both y components will be positive:

F1, x = F1 * cos(?1)

F1, x = 0.18 * -cos(36.87)

F1, x = -0.144 N/C

F1, y = F1 * sin(?1)

F1, y = 0.18 * sin(36.87)

F1, y = 0.108 N/C

F2, x = F2 * cos(?2)

F2, x = 0.24 * cos(53.13)

F2, x = 0.144 N/C

F2, y = F2 * sin(?2)

F2, y = 0.24 * sin(53.13)

F2, y = 0.192 N/C

So the sum of the x components is 0 (+0.144 from q2, -0.144 from q1. The sum of the y components is 0.300(0.144 + 0.192):

0,0.300 N/C

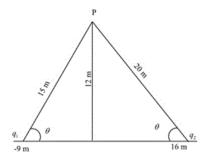
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answered this more than 1 day later Shaina 1,195 answers

Was this answer helpful?

In the following figure, the charges are placed at -9 m and 16 m. The electric field is calculated at 12 m from the origin. The distance of the charge q_1 and q_2 from the point P is calculated using geometry.



The electric field due to charge q_1 is given by,

$$E_1 = k \frac{q}{r^2} = \left(9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2\right) \left(\frac{6 \times 10^{-9} \text{ C}}{\sqrt{\left(9 \text{ m}\right)^2 + \left(12 \text{ m}\right)^2}}\right) = 0.24 \text{ N/C}$$

The electric field due to charge q_2 is given by,

$$E_2 = k \frac{q}{r^2} = (9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2) \left(\frac{8 \times 10^{-9} \text{ C}}{\sqrt{(16 \text{ m})^2 + (12 \text{ m})^2}} \right) = 0.18 \text{ N/C}$$

Resolve the electric field into x and y components.

$$E_{1x} = E_1 \cos \theta = (0.24 \text{ N/C}) \left(\frac{-9}{15}\right) = -0.144 \text{ N/C}$$

$$E_{1y} = E_1 \sin \theta = (0.24 \text{ N/C}) \left(\frac{12}{15}\right) = 0.192 \text{ N/C}$$



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$$E_{2x} = E_2 \cos \theta = (0.18 \text{ N/C}) \left(\frac{1}{20}\right) = 0.144 \text{ N/C}$$

$$E_{2y} = E_2 \sin \theta = (0.18 \text{ N/C}) \left(\frac{12}{20}\right) = 0.108 \text{ N/C}$$

Add the components of force. Thus, the electric field is, ((-0.144 N/C+0.144 N/C),(0.192 N/C+0.108 N/C)) = (0,0.30 N/C)

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