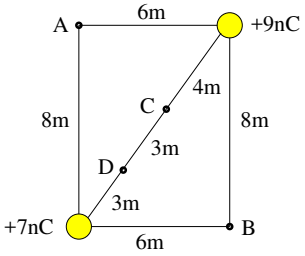
Unit Exam I: Problem #1 (Fall '16)

Consider two point charges positioned as shown.

(a) Find the magnitude of the electric field at point C [D].

(b) Draw the field direction at point C [D] by an arrow.

(c) Find the electric potential at point A [B].



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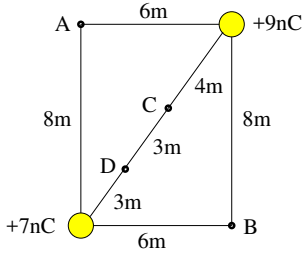

Solution:

- $E_C = k\dfrac{9\text{nC}}{(4\text{m})^2} - k\dfrac{7\text{nC}}{(6\text{m})^2} = 5.06\text{V/m} - 1.75\text{V/m} = 3.31\text{V/m}.$
  $[E_D = k\dfrac{7\text{nC}}{(3\text{m})^2} - k\dfrac{9\text{nC}}{(7\text{m})^2} = 7.00\text{V/m} - 1.65\text{V/m} = 5.35\text{V/m}].$

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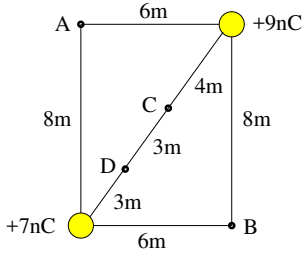

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- Down/left along diagonal [Up/right along diagonal].

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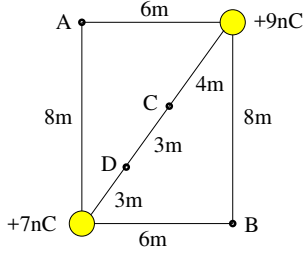

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- Down/left along diagonal [Up/right along diagonal].
- $V_A = k\dfrac{9\text{nC}}{6\text{m}} + k\dfrac{7\text{nC}}{8\text{m}} = 13.50\text{V} + 7.88\text{V} = 21.4\text{V}.$
  $[V_B = k\dfrac{9\text{nC}}{8\text{m}} + k\dfrac{7\text{nC}}{6\text{m}} = 10.1\text{V} + 10.5\text{V} = 20.6\text{V}].$