

## In Class Practice Problems Electric Fields and Electric Potential SL Physics

Be sure to show work including formulas, substitutions. Ensure your answers have appropriate units! For all of these problems, the effects of any gravitational forces can be considered negligible.

- All the charges in Figure Q20.25 have the same magnitude. The spacing between the charges and between the charges and the dots is equidistant.
  - State the electric field equation for a point charge. What does each letter in the equation stand for?
  - Rank the four scenarios in order of magnitude of the net electric field strength at the dot (Largest to smallest). You must provide an explanation to go along with your ranking.

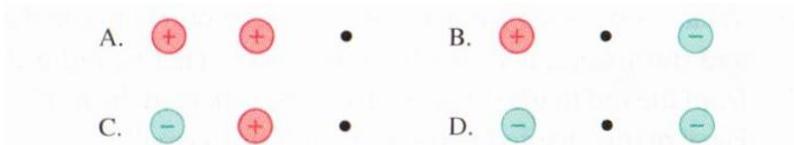


FIGURE Q20.25

- In each scenario below, a single point charge creates an electric field in a region in space. Use your understanding of electric fields to complete the following table. Show your work including the original equation.

	Charge creating the electric field [source charge] (C)	Charge used to test the E field (C)	Force experienced by test charge (N)	Electric Field Intensity at location of test charge (N/C)	Separation distance between source and test charge.
(a)	+20.0 nC	3.00 $\mu\text{C}$	$6.00 \times 10^{-4}$ N		
(b)	12.0 $\mu\text{C}$	4.00 nC		$7.20 \times 10^4$ N/C	
(c)	$2.0 \times 10^{-7}$ C	1 electron			3.80 m
(d)	-3.20 $\mu\text{C}$	1 proton			0.800 m

- Convert the following energy quantities from electron volts (eV) to Joules (J). Use factor label method.
  - 22.0 eV
  - 35.7 MeV
  - 125 GeV
- Convert the following energy quantities from Joules (J) to electron volts (eV). Use factor label method.
  - $3.2 \times 10^{-18}$  J
  - $9.6 \times 10^{-15}$  J
- At one point in space, the electric potential energy of a +12 nC charge is 48  $\mu\text{J}$ .
  - What is the electric potential at that point?
  - If a +6 nC charge were placed at this point, what would its electric potential energy be?
- A +28 nC charge is moved from a point where  $V = +130$  V to a point where  $V = +20$  V. What is the magnitude of work done by the force that moves the charge?
- An electron has been accelerated from rest through a potential difference of -44.0 V. The mass of an electron is  $9.11 \times 10^{-31}$  kg.
  - What is its kinetic energy, in electron volts?
  - What is its kinetic energy, in Joules?
  - What is its speed?