Halliday/Resnick/Walker Fundamentals of Physics

Classroom Response System Questions

Chapter 24 Electric Potential

Interactive Lecture Questions

24.2.1. Two electrons are separated by a distance R. If the distance between the charges is increased to $2R$, what happens to the total electric potential energy of the system?

a) The total electric potential energy of the system would increase to four times its initial value.

b) The total electric potential energy of the system would increase to two times its initial value.

c) The total electric potential energy of the system would remain the same.

d) The total electric potential energy of the system would decrease to one half its initial value.

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24.2.3. Why is an electrostatic force considered a conservative force?

a) Charged particles do not experience friction, which is a non-conservative force.

b) The energy required to move a charged particle around a closed path is equal to zero joules.

c) The work required to move a charged particle from one point to another does not depend upon the path taken.

d) Answers (a) and (b) are both correct.

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24.3.2. A positive charge is located at the origin. What is the direction of the electric potential of the positive charge?

a) radially outward from the origin

b) radially inward from the origin

c) toward the positive *x*, *y*, and *z* directions

d) toward the negative *x*, *y*, and *z* directions

e) There is no direction since the electric potential is a scalar quantity.

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24.4.1. Which one of the following statements concerning electrostatic situations is false?

a) No work is required to move a charge along an equipotential surface.

b) If the electric potential with a region of space is zero volts, the electric field within that region must also be zero V/m.

c) If a charge is moved along an equipotential surface, there is no component of the force acting along the charge's path.

d) The electric field is always perpendicular to equipotential surfaces.

e) The electric field is zero V/m everywhere inside a conductor.

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e) The electric field is zero V/m everywhere inside a conductor.

24.4.4. Consider the equipotential lines shown in the box. The labeled cases indicate electric field line drawings. Which of these cases best matches the equipotential lines shown?

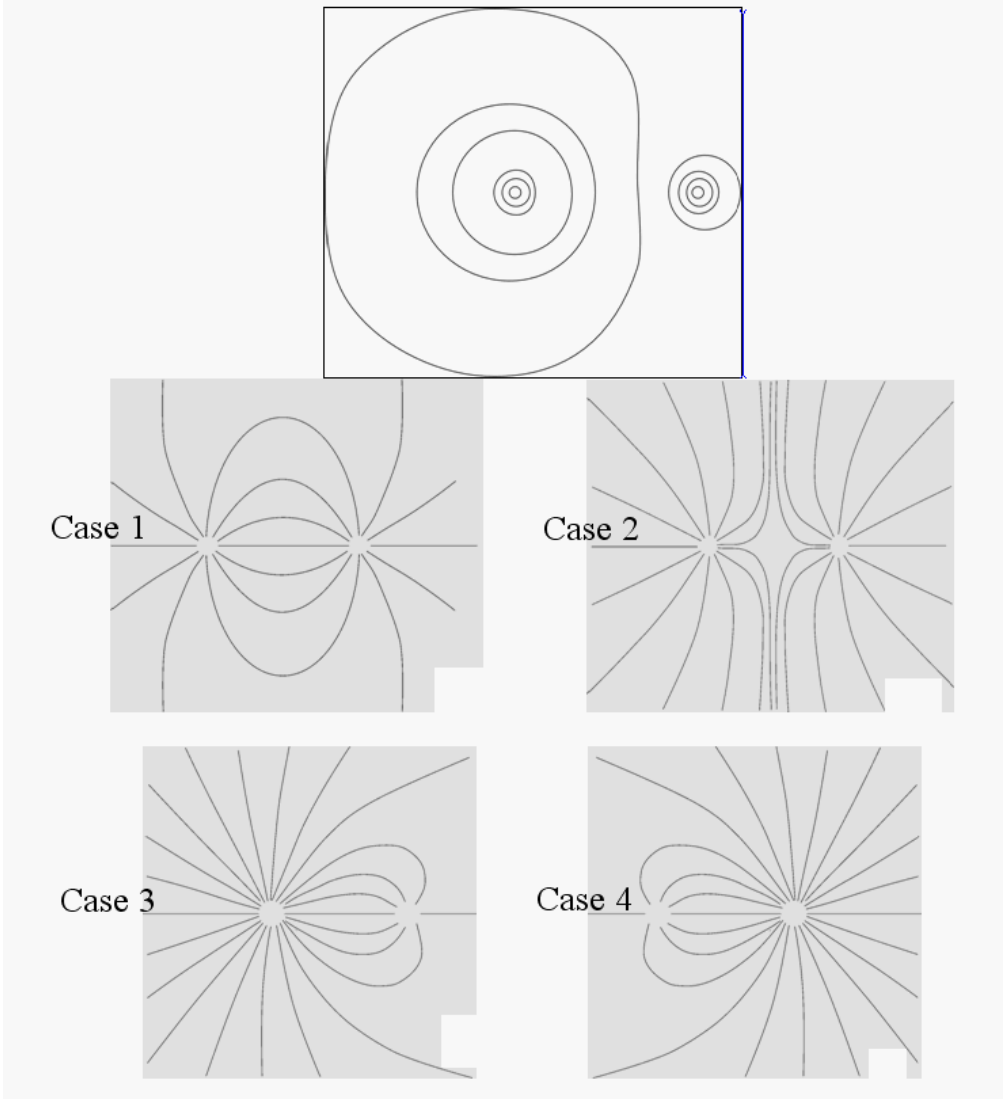
a) 1

b) 2

c) 3

d) 4

e) None of these cases match the equipotential lines shown.



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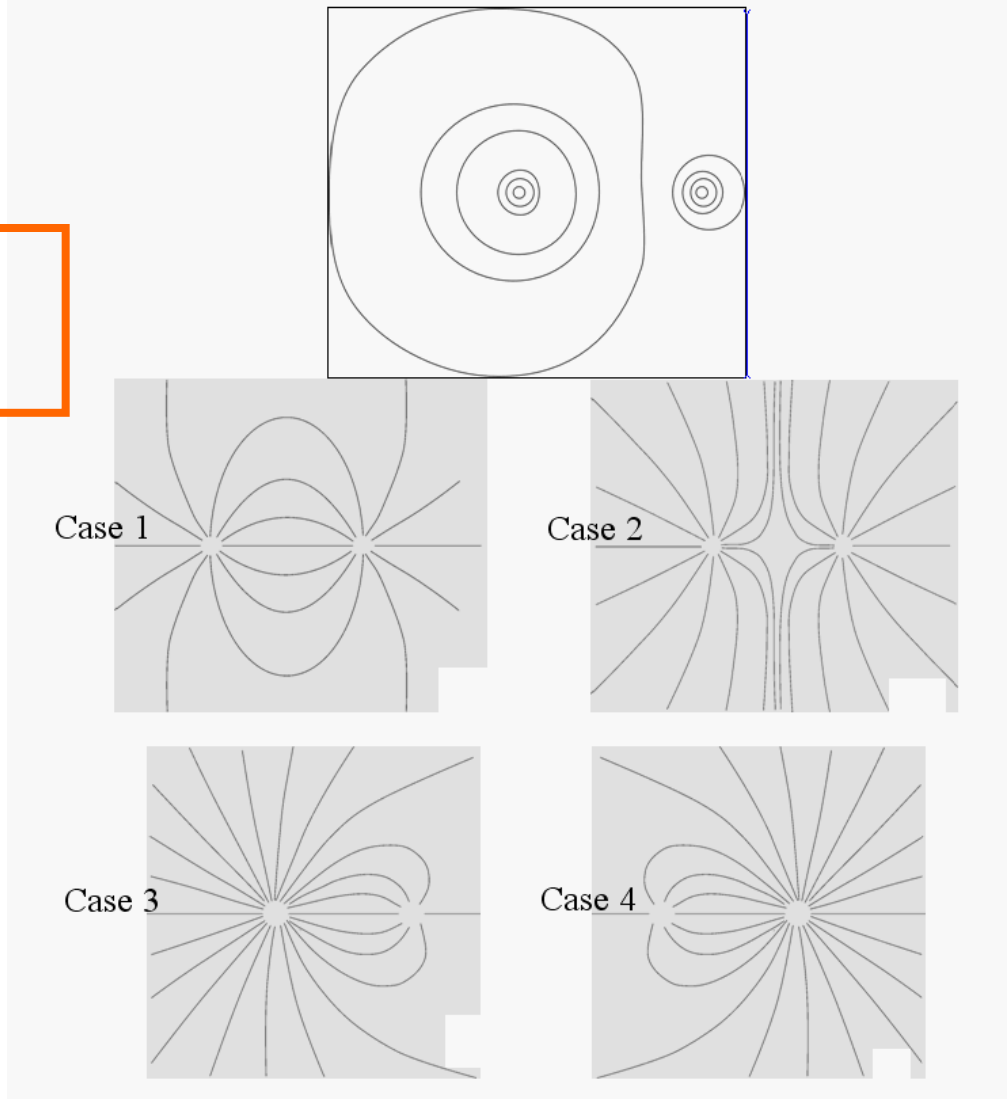


24.7.1. Consider the four arrangements of three point charges. Rank the values of the total electric potential at point P in each case in descending order (with the largest first).

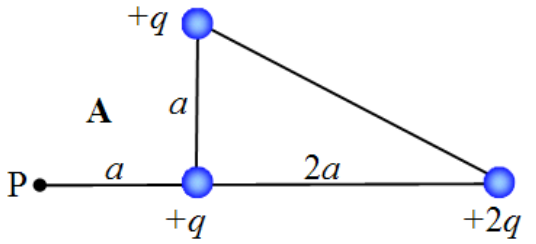
a) $V_A > V_D > V_C > V_B$

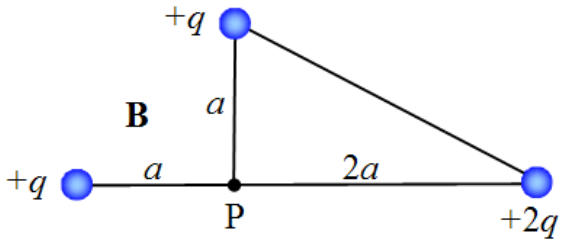
b) $V_C > V_B > V_D > V_A$

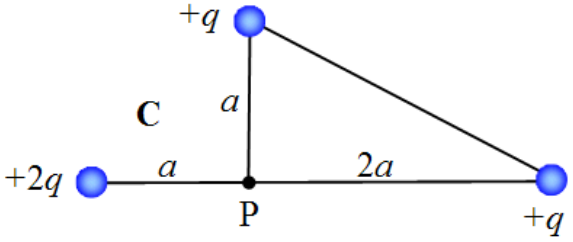
c) $V_C > V_D > V_A > V_B$

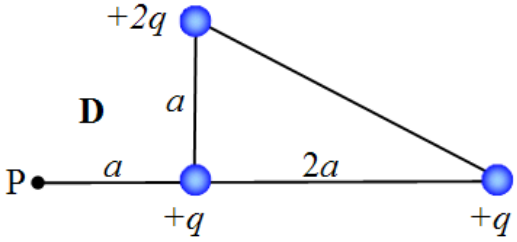
d) $V_B > V_C > V_B > V_A$

e) $V_D > V_B > V_A > V_C$









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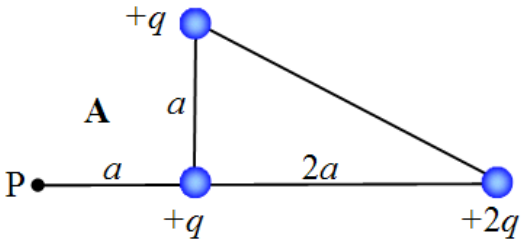
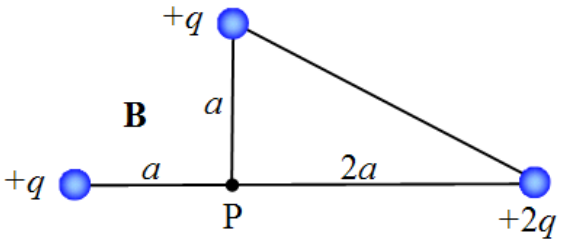
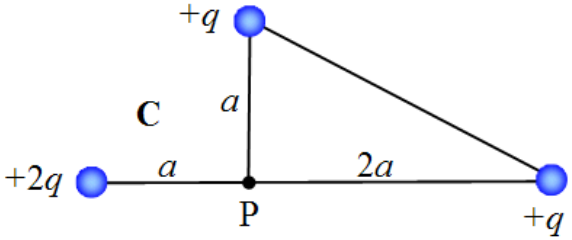
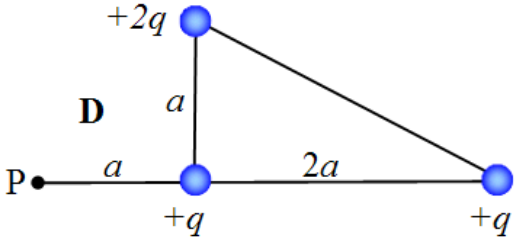








24.7.3. A proton is moved from point B to point A in an electric field as shown. As a result of its movement, its potential increases to *V*. If three protons are moved from point B to A, how much will the electric potential of the protons increase?

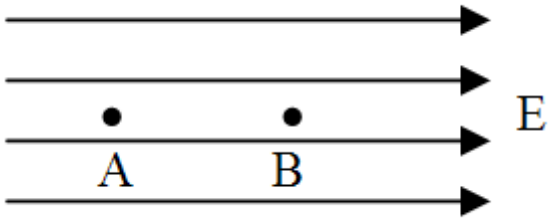
a) *V*/9

b) *V*/3

c) *V*

d) 3*V*

e) 9*V*



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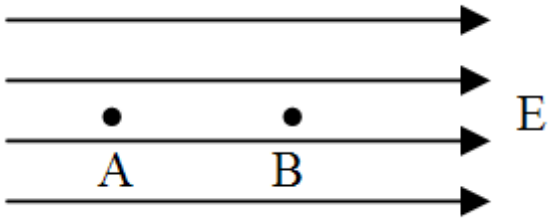

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24.8.1. The drawing shows four points surrounding an electric dipole. Which one of the following expressions best ranks the electric potential at these four locations?

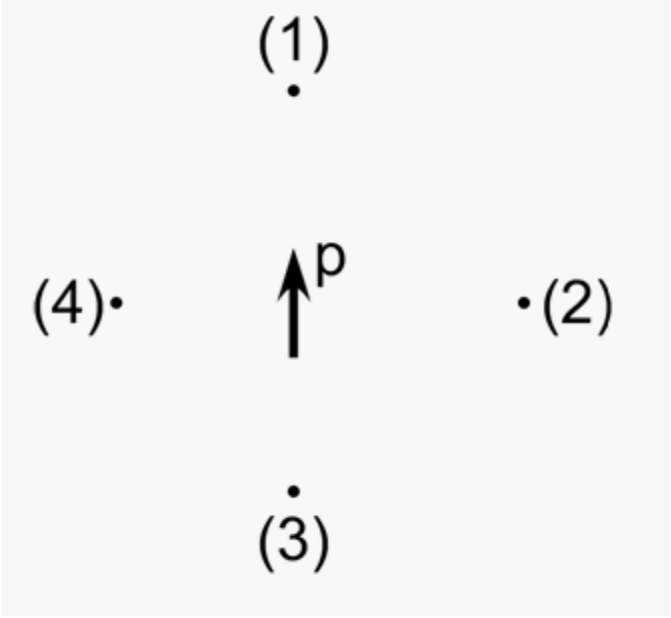
a) $1 > 2 > 3 > 4$

b) $1 > 2 = 4 > 3$

c) $3 > 2 > 4 > 1$

d) $3 > 2 = 4 > 1$

e) $2 = 4 > 1 = 3$



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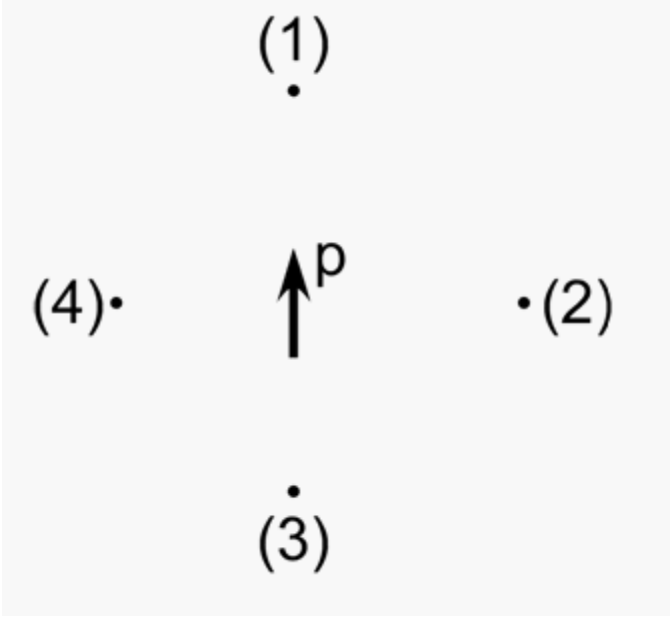

24.9.2. Consider two conducting spheres with one having a larger radius than the other. Both spheres carry the same amount of excess charge. Which one of the following statements concerning the electric potential of the two spheres is true?

a) The electric potential of the larger sphere is greater than that of the smaller sphere.

b) The electric potential of the larger sphere is the same as that of the smaller sphere.

c) The electric potential of the larger sphere is less than that of the smaller sphere.

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24.11.1. Consider the system shown in the drawing. A positive charge Q is placed at the center of a hollow conductor that was initially electrically neutral. The arrows are pointing to four locations: (1) a point in the conductor near the outer surface, (2) a point in the hollow space located halfway between the charge Q and the inner surface, (3) a point in the conductor halfway between the inner and outer surfaces, and (4) a point in the conductor near the inner surface. Which of the following choices best ranks the electric potentials at these four locations?

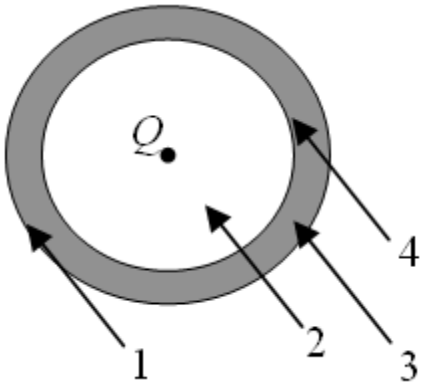
a) $1 = 2 = 3 = 4$

b) $2 > 1 = 3 = 4$

c) $1 = 3 = 4 > 2$

d) $1 > 4 > 3 > 2$

e) $2 > 3 > 4 > 1$



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