

electric potential - practice problems

1. A positive source charge creates electric potential at a nearby point. Is that potential positive, negative, or zero?
2. A $+2.0 \mu\text{C}$ charge and a $-3.0 \mu\text{C}$ charge are 0.20 m apart. What is the electric potential energy of the pair?
3. A balloon gains 150 nC of negative charge from a wall, leaving the nearby wall patch with $+150 \text{ nC}$. If their charge centers are 4.0 mm apart, how much energy would it take to separate them very far apart?
4. Two identical $+4.0 \mu\text{C}$ charges have 0.72 J of electric potential energy. How far apart are their centers?

5. What electric potential does a $+8.0 \text{ nC}$ source charge create at a point 12 cm away?

6. What electric potential does a -6.0 nC source charge create at a point 3.0 cm away?

7. A small charged sphere on an insulating stand creates a potential of $+4.5 \times 10^3 \text{ V}$ at a point 10 cm from its center. What is the sphere's charge?

8. A $+3.0 \text{ } \mu\text{C}$ bead is placed at a location where the electric potential is -1200 V . The bead is taped to a plastic holder, but its potential energy depends on charge and potential. What is the bead's electric potential energy there?

9. A $+2.0\ \mu\text{C}$ bead is placed $0.30\ \text{m}$ from a charged sphere. What is the bead's electric potential energy?

10. An electron is at a location where the electric potential is $+1500\ \text{V}$. What is the electron's electric potential energy?

11. A $+4.0\ \text{nC}$ charge is $20\ \text{cm}$ west of a point, and a $-2.0\ \text{nC}$ charge is $10\ \text{cm}$ east of the same point. What is the electric potential at the point?

12. A $+6.0\ \text{nC}$ charge is $30\ \text{cm}$ to the left of a point. A $-3.0\ \text{nC}$ charge is $10\ \text{cm}$ to the right of the point. What is the electric potential at the point?

13. A $+4.0 \text{ nC}$ charge is 20 cm west of a point, and a -2.0 nC charge is 10 cm east of the same point. The electric potential at the point is zero. What is the electric field at that point?

14. A $+2.0 \text{ }\mu\text{C}$ bead moves from a 50 V location to a 300 V location. What is the change in its electric potential energy?

15. An electron starts from rest and is accelerated through a 1200 V potential difference. Using the nonrelativistic kinetic energy equation, what speed could it reach?

16. Two protons move directly toward each other in a simplified head-on model. Each proton starts with speed $4.0 \times 10^5 \text{ m/s}$. What is the closest distance between their centers if all their kinetic energy becomes electric potential energy?