Name: _____ Period: _____

Electrostatics-Potential

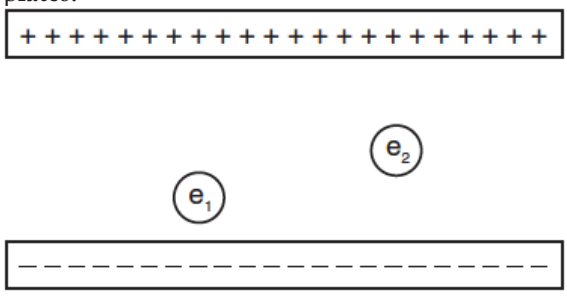
1. If 1.0 joule of work is required to move 1.0 coulomb of charge between two points in an electric field, the potential difference between the two points is
   1. 1.0×10^{0} V
   2. 9.0×10^{9} V
   3. 6.3×10^{18} V
   4. 1.6×10^{-19} V

2. The diagram below represents a positively charged particle about to enter the electric field between two oppositely charged parallel plates.

   The electric field will deflect the particle
   1. into the page
   2. out of the page
   3. toward the top of the page
   4. toward the bottom of the page

3. What is the total amount of work required to move a proton through a potential difference of 100 volts?
   1. 1.60×10^{-21} J
   2. 1.60×10^{-17} J
   3. 1.00×10^{2} J
   4. 6.25×10^{20} J

4. The diagram below represents two electrons, e_1 and e_2, located between two oppositely charged parallel plates.

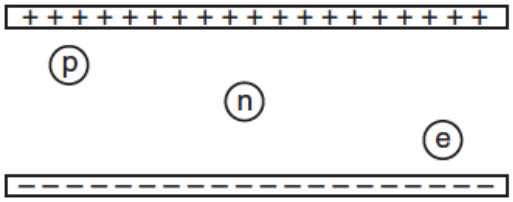


   Compare the magnitude of the force exerted by the electric field on e_1 to the magnitude of the force exerted by the electric field on e_2.

5. Which electrical unit is equivalent to one joule?
   1. volt per meter
   2. ampere·volt
   3. volt per coulomb
   4. coulomb·volt

6. If 60 joules of work is required to move 5.0 coulombs of charge between two points in an electric field, what is the potential difference between these points?
   1. 5.0 V
   2. 12 V
   3. 60 V
   4. 300 V

7. In the diagram below, proton p, neutron n, and electron e are located as shown between two oppositely charged plates.



   The magnitude of acceleration will be greatest for the
   1. neutron, because it has the greatest mass
   2. neutron, because it is neutral
   3. electron, because it has the smallest mass
   4. proton, because it is farthest from the negative plate

8. An electron is accelerated through a potential difference of 2.5×10^{4} volts in the cathode ray tube of a computer monitor. Calculate the work, in joules, done on the electron. [Show all work, including the equation and substitution with units.]

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Electrostatics-Potential

9. Moving 2.5×10^{-6} coulomb of charge from point A to point B in an electric field requires 6.3×10^{-4} joule of work. The potential difference between points A and B is approximately
   1. 1.6×10^{-9} V
   2. 4.0×10^{-3} V
   3. 2.5×10^{2} V
   4. 1.0×10^{14} V

10. The diagram below represents a source of potential difference connected to two large, parallel metal plates separated by a distance of 4.0×10^{-3} meter.

Which statement best describes the electric field strength between the plates?
   1. It is zero at point B
   2. It is a maximum at point B
   3. It is a maximum at point C
   4. It is the same at points A, B, and C.

11. In an electric field, 0.90 joule of work is required to bring 0.45 coulomb of charge from point A to point B. What is the electric potential difference between points A and B?
   1. 5.0 V
   2. 2.0 V
   3. 0.50 V
   4. 0.41 V

12. A potential difference of 10 volts exists between two points, A and B, within an electric field. What is the magnitude of charge that requires 2.0×10^{-2} joule of work to move it from A to B?
   1. 5.0×10^{2} C
   2. 2.0×10^{-1} C
   3. 5.0×10^{-2} C
   4. 2.0×10^{-3} C

13. If 4.8×10^{-17} joule of work is required to move an electron between two points in an electric field, what is the electric potential difference between these points?
   1. 1.6×10^{-19} V
   2. 4.8×10^{-17} V
   3. 3.0×10^{2} V
   4. 4.8×10^{2} V

Base your answers to questions 14 and 15 on the information below.

A proton starts from rest and gains 8.35×10^{-14} joule of kinetic energy as it accelerates between points A and B in an electric field.

14. What is the final speed of the proton?
   1. 7.07×10^{6} m/s
   2. 1.00×10^{7} m/s
   3. 4.28×10^{8} m/s
   4. 5.00×10^{13} m/s

15. Calculate the potential difference between points A and B in the electric field. [Show all work, including the equation and substitution with units.]

16. Which is a vector quantity?
   1. electric charge
   2. electric field strength
   3. electric potential difference
   4. electric resistance

17. Which object will have the greatest change in electrical energy?
   1. an electron moved through a potential of 2.0 V
   2. a metal sphere with a charge of 1.0×10^{-9} C moved through a potential difference of 2.0 V
   3. an electron moved through a potential of 4.0 V
   4. a metal sphere with a charge of 1.0×10^{-9} C moved through a potential difference of 4.0 V

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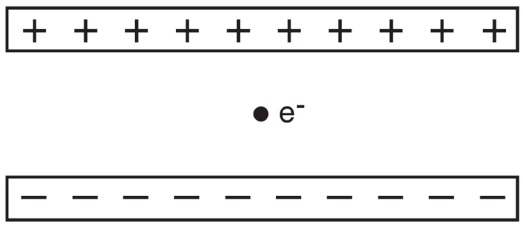
Base your answers to questions 18 through 21 on the information and diagram below and on your knowledge of physics.

Two conducting parallel plates 5.0×10^{-3} m apart are charged with a 12-volt potential difference. An electron is located midway between the plates. The magnitude of the electrostatic force on the electron is 3.8×10^{-16} newton.



18. On the diagram above, draw at least three field lines to represent the direction of the electric field in the space between the charged plates.

19. Identify the direction of the electrostatic force that the electric field exerts on the electron.

20. Calculate the magnitude of the electric field strength between the plates, in newtons per coulomb. [Show all work including the equation and substitution with units.]

21. Describe what happens to the magnitude of the net electrostatic force on the electron as the electron is moved toward the positive plate.

22. The electronvolt is a unit of
    1. energy
    2. charge
    3. electric field strength
    4. electric potential difference

23. How much work is required to move 3.0 coulombs of electric charge a distance of 0.010 meter through a potential difference of 9.0 volts?
    1. 2.7×10^{3} J
    2. 27 J
    3. 3.0 J
    4. 3.0×10^{-2} J

24. Which combination of units can be used to express electrical energy?
    1. volt/coulomb
    2. coulomb/volt
    3. volt•coulomb
    4. volt•coulomb•second

25. How much work is required to move an electron through a potential difference of 3.00 volts?
    1. 5.33×10^{-20} J
    2. 4.80×10^{-19} J
    3. 3.00 J
    4. 1.88×10^{19} J