# Skill 37 - Work and Potential Difference

65. What is the total amount of work required to move a proton through a potential difference of 100. volts?

A) $1.60 \times 10^{-21}$ J  B) $1.60 \times 10^{-17}$ J
C) $1.00 \times 10^{2}$ J  D) $6.25 \times 10^{20}$ J

$W = ?$, $q = 1.6 \times 10^{-19}$ C, $V = 100$ V
$W = qV = (1.6 \times 10^{-19}\text{C})(100\text{V}) = 1.6 \times 10^{-17}$ J

66. Which electrical unit is equivalent to one joule?

A) volt per meter
B) ampere•volt
C) volt per coulomb
D) coulomb•volt

$W = qV$ = (Coulomb)(Volt)

67. A 12-volt automobile battery has $8.4 \times 10^{3}$ coulombs of electric charge. The amount of electrical energy stored in the battery is approximately

A) $1.0 \times 10^{5}$ J  B) $8.4 \times 10^{3}$ J
C) $7.0 \times 10^{2}$ J  D) $1.4 \times 10^{-3}$ J

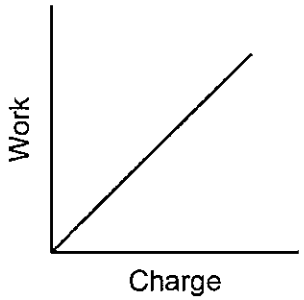
$W = ?$, $V = 12$ V, $q = 8.4 \times 10^{3}$ C
$W = qV = 100.8 \times 10^{3}$ VC $= 1 \times 10^{5}$ J

68. How much work is done in moving 5.0 coulombs of charge against a potential difference of 12 volts?

A) 2.4 J  B) 12 J  C) 30. J  D) 60. J

$q = 5$C, $V = 12$V, $W = qV$
$W = 5\text{C}(12\text{V}) = 60$J

69. The graph below shows the relationship between the work done on a charged body in an electric field and the net charge on the body.




What does the slope of this graph represent?

A) power
B) potential difference
C) force
D) electric field intensity

$V = W/q$

70. If 15 joules of work is required to move 3.0 coulombs of charge between two points, the potential difference between these two points is

A) 45 V  B) 15 V
C) 3.0 V  D) 5.0 V

$W = 15$J, $q = 3$C, $V = ?$
$V = W/q = 15\text{J}/3\text{C} = 5$V

71. The work needed to move a 10-coulomb charge between two charged plates is 500 joules. The voltage between the plates is

A) 5 volts  B) 0.02 volt.
C) 50 volts  D) 5,000 volts

$q = 10$C, $W = 500$J, $V = ?$
$V = W/q = \frac{500\text{J}}{10\text{C}} = 50$V

72. An electrical potential of one joule per coulomb is equal to

A) one coulomb  B) one ampere
C) one ohm  D) one volt

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73. It takes 15 joules of work to bring 3.0 coulombs of positive charge from infinity to a point. What is the electric potential at this point in an electric field?

A) 45 V  B) 5.0 V
C) 0.20 V  D) 0 V

$W = 15\text{J}$, $q = 3\text{C}$, $V = ?$

$V = W/q = 15\text{J}/3\text{C} = 5\text{V}$

74. The electronvolt is a unit of

A) energy
B) charge
C) electric field strength
D) electric potential difference

$1\text{eV} = 1.6\times10^{-19}\text{J}$

75. Which object will have the greatest change in electrical energy?

A) an electron moved through a potential difference of 2.0 V $2\text{eV} = 3.2\times10^{-19}\text{J}$
B) a metal sphere with a charge of $1.0 \times 10^{-9}$ C moved through a potential difference of 2.0 V $2\times10^{-9}\text{J}$
C) an electron moved through a potential difference of 4.0 V $4\text{eV} = 6.4\times16^{-19}\text{J}$
D) a metal sphere with a charge of $1.0 \times 10^{-9}$ C moved through a potential difference of 4.0 V $4\times10^{-9}\text{J}$

76. If a 1.5-volt cell is to be completely recharged, each electron must be supplied with a minimum energy of

A) 1.5 eV  B) 1.5 J
C) $9.5 \times 10^{18}$ eV  D) $9.5 \times 10^{18}$ J

$W = qV$
$= (1e)(1.5\text{V}) = 1.5\text{eV}$

77. An electron is accelerated from rest through a potential difference of 200. volts. The work done on the electron is

A) $8.00 \times 10^{-3}$ eV  B) $3.20 \times 10^{-17}$ eV
C) 320. eV  D) 200. eV

78. How much energy is required to move $3.2 \times 10^{-19}$ coulomb of charge through a potential difference of 5 volts?

A) 5 eV  B) 2 eV
C) 10 eV  D) 20 eV

79. An energy of 13.6 electron-volts is equivalent to

A) $1.60 \times 10^{-19}$ J  B) $2.18 \times 10^{-18}$ J
C) $6.25 \times 10^{-19}$ J  D) $6.63 \times 10^{-18}$ J

$13.6\text{ eV} \times \frac{1.6\times10^{-19}\text{J}}{1\text{eV}}$

$= 2.176\times10^{-18}\text{J}$