# Unit 5: Practice Test
## 2pt Multiple Choice

357. When a neutral metal sphere is charged by contact with a positively charged glass rod, the sphere

A) loses electrons  B) gains electrons
C) loses protons  D) gains protons

358. Which fundamental force is primarily responsible for the attraction between protons and electrons?

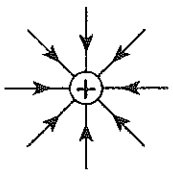
A) strong  B) weak
C) gravitational  D) electromagnetic

359. A negatively charged plastic comb is brought close to, but does not touch, a small piece of paper. If the comb and the paper are attracted to each other, the charge on the paper

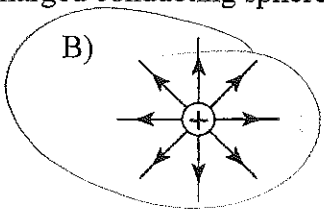
A) may be negative or neutral
B) may be positive or neutral
C) must be negative
D) must be positive

360. Which diagram best represents the electric field near a positively charged conducting sphere?

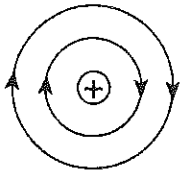
A)



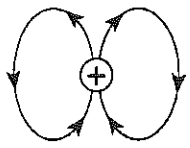
B)



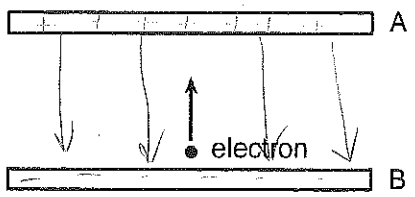
C)



D)



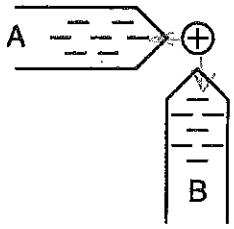
361. An electron placed between oppositely charged parallel plates *A* and *B* moves toward plate *A*, as represented in the diagram below




What is the direction of the electric field between the plates?

A) toward plate *A*  B) toward plate *B*
C) into the page  D) out of the page

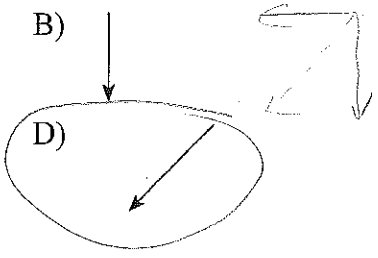
362. Two plastic rods, *A* and *B*. each possess a net negative charge of $1.0 \times 10^{-3}$ coulomb. The rods and a positively charged sphere are positioned as shown below.




Which vector best represents the resultant electrostatic force on the sphere?

A)

B)



C)



D)



363. Which electrical unit is equivalent to one joule?

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

364. Electrical insulators are used to resist the flow of

A) atoms B) molecules
C) neutrons D) electrons

365. The number of electrons that pass a certain point in a conductor in a given amount of time is defined as

A) potential difference
B) charge
C) resistance
D) electric current

q/t

366. In simple electrical circuits, connecting wires are assumed to have a resistance of

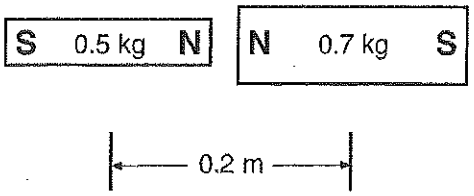
A) one ohm
B) greater than one ohm
C) less than zero ohms
D) zero ohms

367. One watt is equivalent to one

A) N•m B) N/m C) J•s D) J/s

P = W/t

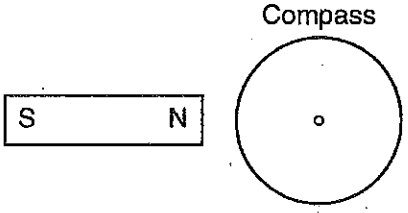
368. The diagram below represents a 0.5-kilogram bar magnet and a 0.7-kilogram bar magnet with a distance of 0.2 meter between their centers.



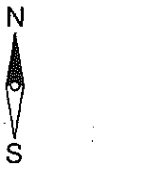

Which statement best describes the forces between the bar magnets?

A) Gravitational force and magnetic force are both repulsive.
B) Gravitational force is repulsive and magnetic force is attractive.
C) Gravitational force is attractive and magnetic force is repulsive.
D) Gravitational force and magnetic force are both attractive.

369. The diagram below shows a compass placed near the north pole, *N*. of a bar magnet.

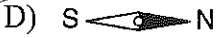



Which diagram best represents the position of the needle of the compass as it responds to the magnetic field of the bar magnet?

A) 


B) 


C) 


D) 


370. Which particle would produce a magnetic field?

A) a ~~neutral particle~~ moving in a straight line
B) ~~a neutral particle moving in a circle~~
C) ~~a stationary charged particle~~
D) a moving charged particle

371. The electronvolt is a unit of

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

W=qV

# Unit 5: Practice Test
## 2pt Multiple Choice

372. If the distance separating an electron and a proton is halved, the magnitude of the electrostatic force between these charged particles will be

A) unchanged B) doubled
C) quartered D) quadrupled

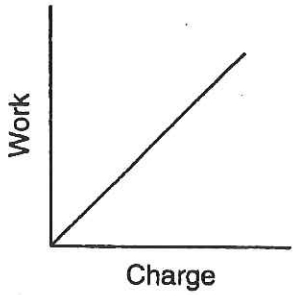
$F_e = \frac{kq_1q_2}{r^2}$ $r \div 2$ is $F_e \times 2^2$

373. If the magnitude of the charge on each of two positively charged objects is halved, the electrostatic force between the objects will

A) decrease to one-half
B) decrease to one-quarter
C) decrease to one-sixteenth
D) remain the same

direct
$q \div 2 \div 2$
$F_e \div 4$

374. 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.




$W/q = V$

What does the slope of this graph represent?

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

375. As the value of a variable resistor is increased, while voltage is held constant, the current flow in the resistor will

A) decrease B) increase
C) remain the same

R, V, I

$I = V/R$ Inverse

376. When the total resistance of a simple electrical circuit is decreased while keeping the voltage constant, the current in the electrical circuit will

A) decrease B) increase
C) remain the same

$I = V/R$ Inverse

377. A manufacturer recommends that the longer the extension cord used with an electric drill, the thicker (heavier gauge) the extension cord should be. This recommendation is made because the resistance of a wire varies

A) directly with length and inversely with cross-sectional area
B) inversely with length and directly with cross-sectional area
C) directly with both length and cross-sectional area
D) inversely with both length and cross-sectional area

378. A complete circuit is left on for several minutes, causing the connecting copper wire to become hot. As the temperature of the wire increases, the electrical resistance of the wire

A) decreases B) increases
C) remains the same

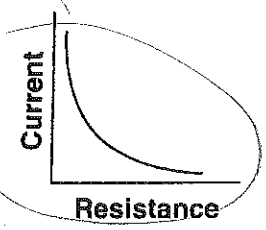
379. If the diameter of a wire were halved, its electrical resistance would

A) quarter B) quadruple
C) double D) halve

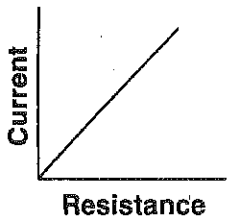
$R = \frac{\rho L}{\pi r^2}$ inverse square

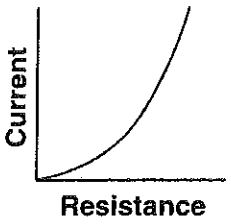
$r \div 2$ means $R \times 4$

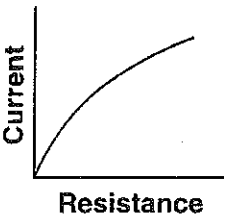
380. A constant potential difference is applied across a variable resistor held at constant temperature. Which graph best represents the relationship between the resistance of the variable resistor and the current through it?

A) 

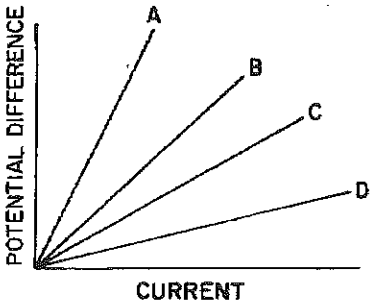

V, R, I
$I = V/R$
Inverse

B) 


C) 


D) 


381. The graph below shows the relationship between current and potential difference for four resistors *A*, *B*, *C*, and *D*.




$V/I = R$
slope

Which resistor has the greatest resistance?

A) *A* B) *B* C) *C* D) *D*

382. As the potential difference across a given resistor is increased, the power expended in moving charge through the resistor

A) decreases B) increases
C) remains the same

P, V, R $P = V^2/R$

383. Which quantity must be the same for each component in any series circuit?

A) voltage B) power
C) resistance D) current

384. If the potential difference applied to a fixed resistance is doubled, the power dissipated by that resistance

A) remains the same B) doubles
C) halves D) quadruples

$P = V^2/R$ : V x 2 means P x 4

385. If the power developed in an electric circuit is doubled, the energy used in one second is

A) halved B) doubled
C) quartered D) quadrupled

$P = W/t$ $W = Pt$

386. Two copper wires have the same length, but the cross-sectional area of wire *A* is twice that of wire *B*. Compared to the resistance of wire *B*. The resistance of wire *A* is

| A | B |
|---|---|
| L | L |
| 2A | A |

A) one-quarter as great
B) one-half as great
C) twice as great
D) four times as great

$R = \rho L/A$ Inverse

# Unit 5: Practice Test
## 3pt Multiple Choice

387. If an object has a net negative charge of 4.0 coulombs, the object possesses

A) $6.3 \times 10^{18}$ more electrons than protons
B) $2.5 \times 10^{19}$ more electrons than protons
C) $6.3 \times 10^{18}$ more protons than electrons
D) $2.5 \times 10^{19}$ more protons than electrons

$4C \times \frac{1e}{1.6\times10^{-19}} = 2.5\times10^{19}e$

388. Two electrons are separated by a distance of $3.00 \times 10^{-6}$ meter. What are the magnitude and direction of the electrostatic forces each exerts on the other?

A) $2.56 \times 10^{-17}$ N away from each other
B) $2.56 \times 10^{-17}$ N toward each other
C) $7.67 \times 10^{-23}$ N away from each other
D) $7.67 \times 10^{-23}$ N toward each other

$F_e = \frac{k q_1 q_2}{r^2} = \frac{8.99\times10^9 Nm^2/C^2 \times (1.6\times10^{-19}C)(1.6\times10^{-19}C)}{(3\times10^{-6}m)^2}$

$\frac{9-19-19}{-12} = \frac{-29}{-12} = -29 - -12 = -17$

389. A $3.00 \times 10^{-9}$-coulomb test charge is placed near a negatively charged metal sphere. The sphere exerts an electrostatic force of magnitude $6.00 \times 10^{-5}$ newton on the test charge. What is the magnitude and direction of the electric field strength at this location?

A) $2.00 \times 10^{4}$ N/C directed away from the sphere
B) $2.00 \times 10^{4}$ N/C directed toward the sphere
C) $5.00 \times 10^{-5}$ N/C directed away from the sphere
D) $5.00 \times 10^{-5}$ N/C directed toward the sphere

$F_e = 6\times10^{-5}N$
$q = 3\times10^{-9}C$
$E = \frac{F_e}{q} = \frac{6\times10^{-5}N}{3\times10^{-9}C} = 2\times10^{-5--9}$
$= 2\times10^{4}$ N/C

390. If 20 joules of work is used to transfer 20 coulombs of charge through a 20-ohm resistor, the potential difference across the resistor is

A) 1 V
B) 20 V
C) 0.05 V
D) 400 V

$W = 20J$
$q = 20C$
$R = 20\Omega$
$V = ?$
$V = W/q = \frac{20J}{20C} = 1V$

391. What is the current through a wire if 240 coulombs of charge pass through the wire in 2.0 minutes?

A) 120 A
B) 2.0 A
C) 0.50 A
D) 0.0083 A

$I = ?$
$q = 240C$
$t = 2min = 120s$
$I = q/t = \frac{240C}{120s} = 2A$

392. Charge flowing at the rate of $2.50 \times 10^{16}$ elementary charges per second is equivalent to a current of

A) $2.50 \times 10^{13}$ A
B) $6.25 \times 10^{5}$ A
C) $4.00 \times 10^{-3}$ A
D) $2.50 \times 10^{-3}$ A

$2.5\times10^{16}e \times \frac{1.6\times10^{-19}C}{1e} =$

393. A 0.686-meter-long wire has a cross-sectional area of $8.23 \times 10^{-6}$ meter$^2$ and a resistance of 0.125 ohm at 20° Celsius. This wire could be made of

A) aluminum
B) copper
C) nichrome
D) tungsten

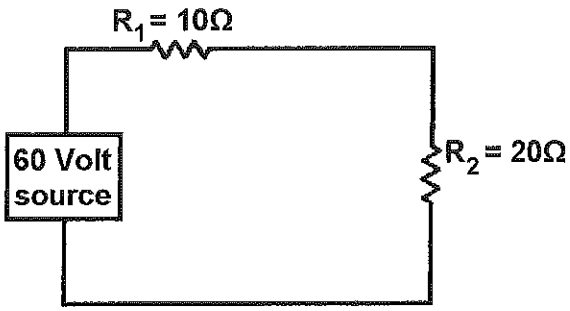
$L = .686m$
$A = 8.23\times10^{-6}m^2$
$R = .125\Omega$
$R = \frac{\rho L}{A}$
$.125\Omega = \frac{\rho(.686m)}{8.23\times10^{-6}m^2}$
$\rho = \frac{(.125\Omega)(8.23\times10^{-6}m^2)}{.686m} = 1.5\times10^{-6}$
$150\times10^{-8}$

394. A 330.-ohm resistor is connected to a 5.00-volt battery. The current through the resistor is

A) 0.152 mA B) 15.2 mA
C) 335 mA D) 1650 mA

$I = V/R = \frac{5V}{330\Omega} = .015A$
$= 15.2mA$

395. Base your answer to the following question on the diagram below.




What is the total resistance of the circuit?

A) 6.6 Ω B) 10 Ω
C) 20 Ω D) 30 Ω

396. A circuit consists of a 10.0-ohm resistor, a 15.0-ohm resistor, and a 20.0-ohm resistor connected in parallel across a 9.00-volt battery. What is the equivalent resistance of this circuit?

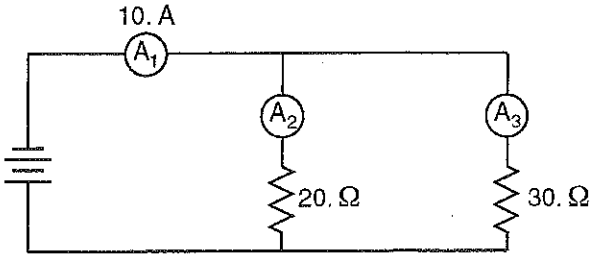
A) 0.200 Ω B) 1.95 Ω
C) 4.62 Ω D) 45.0 Ω

$\frac{1}{R_{eq}} = \frac{1}{10\Omega} + \frac{1}{15\Omega} + \frac{1}{20\Omega}$

$1/R_{eq} = \frac{6}{60\Omega} + \frac{4}{60\Omega} + \frac{3}{60\Omega}$

$1/R_{eq} = \frac{13}{60\Omega}$

397. In the circuit diagram shown below, ammeter $A_1$ reads 10. amperes.




What is the reading of ammeter $A_2$?

A) 6.0 A B) 10. A
C) 20. A D) 4.0 A

| V | I | R |
|---|---|---|
| 120V | 6A | 20Ω |
| 120V | 4A | 30Ω |
| 120V | 10A | 12Ω |

$\frac{1}{20} + \frac{1}{30} = \frac{3}{60} + \frac{2}{60} = \frac{5}{60}$
$R = 60/5$

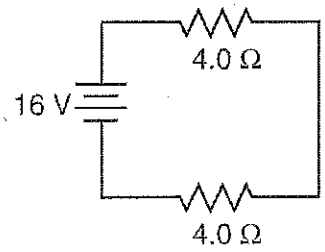
398. A 3.6-volt battery is used to operate a cell phone for 5.0 minutes. If the cell phone dissipates 0.064 watt of power during its operation, the current that passes through the phone is

A) 0.018 A B) 5.3 A
C) 19 A D) 56 A

$V = 3.6V$
$t = 300s$
$P = .064W$
$I = ?$

$P = VI$
$I = P/V = \frac{.064W}{3.6V} = .018A$

399. In the circuit diagram below, two 4.0-ohm resistors are connected to a 16-volt battery as shown.




The rate at which electrical energy is expended in this circuit is

A) 8.0 W B) 16 W
C) 32 W D) 64 W

$P = \frac{V^2}{R} = \frac{(16V)^2}{8\Omega}$

400. A helium ion with +2 elementary charges is accelerated by a potential difference of $5.0 \times 10^3$ volts. What is the kinetic energy acquired by the ion?

A) $32 \times 10^{-19}$ eV
B) 2.0 eV
C) $5.0 \times 10^3$ eV
D) $1.0 \times 10^4$ eV

$KE = W = Vq = (5 \times 10^3 V)(2e)$

$= 10 \times 10^3 eV = 1 \times 10^4 eV$