

**What do you know?****Introduction to Physics II - Electricity and Magnetism****Modified True/False**

Indicate whether the sentence or statement is true or false. If false, change the identified word or phrase to make the sentence or statement true.

## Testing Concepts

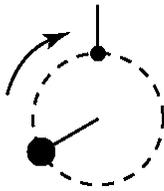
- \_\_\_\_\_ 1. The central core of an atom is called the *hub*. \_\_\_\_\_
- \_\_\_\_\_ 2. The mass of an *electron* is about equal to the mass of a proton. \_\_\_\_\_
- \_\_\_\_\_ 3. The region around the nucleus occupied by the electrons is called the *negative zone*.  
\_\_\_\_\_
- \_\_\_\_\_ 4. The maximum number of electrons in the second energy level of an atom is 4.  
\_\_\_\_\_
- \_\_\_\_\_ 5. *Nonmetals* are poor conductors of heat and electricity. \_\_\_\_\_
- \_\_\_\_\_ 6. Seven electrons in the outermost energy level is characteristic of a *metal*.  
\_\_\_\_\_
- \_\_\_\_\_ 7. The number of protons in an atom is called the *atomic mass*. \_\_\_\_\_
- \_\_\_\_\_ 8. Elements having three or fewer electrons in the outer energy level are classified as *nonmetals*.  
\_\_\_\_\_
- \_\_\_\_\_ 9. The identity of an element is determined by the number of *protons*. \_\_\_\_\_
- \_\_\_\_\_ 10. According to present atomic theory, the location of an *electron* in an atom is best represented by a probability cloud. \_\_\_\_\_
- \_\_\_\_\_ 11. Because a water molecule has a slight positive charge at one end and a slight negative charge at the other end, it is a *nonpolar* molecule. \_\_\_\_\_
- \_\_\_\_\_ 12. Molecules are neutral. \_\_\_\_\_
- \_\_\_\_\_ 13. When atoms gain or lose electrons, the charged particles that result are called *molecules*.  
\_\_\_\_\_
- \_\_\_\_\_ 14. A rock at the edge of a cliff has *kinetic* energy because of its position.  
\_\_\_\_\_
- \_\_\_\_\_ 15. Energy that is stored is *kinetic* energy. \_\_\_\_\_
- \_\_\_\_\_ 16. *Mass* is measured in joules. \_\_\_\_\_
- \_\_\_\_\_ 17. Almost all of the light that strikes a mirror is *reflected* by the mirror. \_\_\_\_\_
- \_\_\_\_\_ 18. The angle at which light leaves a surface is called the angle of *reflection*.  
\_\_\_\_\_



- \_\_\_\_\_ 32. Elements that lie along the stair-step line of the periodic table are \_\_\_\_\_.  
a. liquids  
b. metals  
c. metalloids  
d. radioactive
- \_\_\_\_\_ 33. A chemical bond that occurs when atoms share electrons is a(n) \_\_\_\_\_ bond.  
a. ionic  
b. covalent  
c. polyatomic  
d. magnetic
- \_\_\_\_\_ 34. The name given to the number of electrons an atom gains, loses, or shares is the \_\_\_\_\_.  
a. ionic number  
b. atomic number  
c. oxidation number  
d. atomic mass
- \_\_\_\_\_ 35. How many electrons are needed in the outer energy levels of most atoms for the atom to be chemically stable?  
a. 2  
b. 4  
c. 6  
d. 8
- \_\_\_\_\_ 36. What kind of chemical bond is formed when electrons are transferred from atom to atom?  
a. ionic  
b. covalent  
c. magnetic  
d. hydrate
- \_\_\_\_\_ 37. The sum of the oxidation numbers in a neutral compound is always \_\_\_\_\_.  
a. one  
b. zero  
c. a positive number  
d. a negative number
- \_\_\_\_\_ 38. Why do the noble gases NOT form compounds readily?  
a. They have no electrons.  
b. They have empty outer energy levels.  
c. They have seven electrons in their outer energy levels.  
d. Their outer energy levels are completely filled with electrons.
- \_\_\_\_\_ 39. The oxidation number of an atom is shown with a \_\_\_\_\_.  
a. subscript  
b. positive number  
c. superscript  
d. negative number
- \_\_\_\_\_ 40. A substance that does not conduct an electric current when it forms a solution is a(n) \_\_\_\_\_.  
a. electrolyte  
b. nonelectrolyte  
c. polar substance  
d. salt
- \_\_\_\_\_ 41. When an object moves in a circular path, it accelerates toward the center of the circle as a result of \_\_\_\_\_.  
a. terminal velocity  
b. momentum  
c. centripetal force  
d. friction
- \_\_\_\_\_ 42. The amount of gravitational force between objects depends on their \_\_\_\_\_.  
a. frictional forces  
b. speed and direction  
c. inertia  
d. masses and the distances between them
- \_\_\_\_\_ 43. The path of a projectile is \_\_\_\_\_.  
a. straight  
b. always vertical  
c. always horizontal  
d. curved
- \_\_\_\_\_ 44. Acceleration due to gravity is \_\_\_\_\_.  
a.  $98 \text{ m/s}^2$   
b.  $9.8 \text{ m/s}^2$   
c.  $9.8 \text{ m/s}$   
d.  $0.98 \text{ m/s}$

- \_\_\_\_\_ 45. An object attached to a string that is being swung in a clockwise circular path is shown. Assume the string breaks at point A. In which direction will the object be traveling an instant later?

**Point A**



- \_\_\_\_\_ 46. According to Newton's second law of motion, \_\_\_\_\_.
- |             |             |
|-------------|-------------|
| a. $F = mv$ | c. $F = pv$ |
| b. $F = ma$ | d. $F = pa$ |
- \_\_\_\_\_ 47. Gravity is one of \_\_\_\_\_ basic forces.
- |          |         |
|----------|---------|
| a. two   | c. four |
| b. three | d. five |
- \_\_\_\_\_ 48. A car rounding a curve is subject to \_\_\_\_\_ force.
- |            |                  |
|------------|------------------|
| a. rolling | c. centripetal   |
| b. static  | d. gravitational |
- \_\_\_\_\_ 49. The rate at which work is done is \_\_\_\_\_.
- |                |          |
|----------------|----------|
| a. efficiency  | c. power |
| b. effort time | d. force |
- \_\_\_\_\_ 50. \_\_\_\_\_ is transferred to an object when work is done.
- |           |             |
|-----------|-------------|
| a. Energy | c. Motion   |
| b. Force  | d. Friction |
- \_\_\_\_\_ 51. The unit of power is the \_\_\_\_\_.
- |          |           |
|----------|-----------|
| a. joule | c. watt   |
| b. MA    | d. second |
- \_\_\_\_\_ 52. If light waves change speed when they pass from one medium into another, the light will be \_\_\_\_\_.
- |              |               |
|--------------|---------------|
| a. reflected | c. diffracted |
| b. refracted | d. separated  |
- \_\_\_\_\_ 53. \_\_\_\_\_ are thick in the middle and thin at the edges.
- |                  |                   |
|------------------|-------------------|
| a. Convex lenses | c. Concave lenses |
| b. Plane mirrors | d. Convex mirrors |
- \_\_\_\_\_ 54. The image formed by a plane mirror is \_\_\_\_\_.
- |                         |                         |
|-------------------------|-------------------------|
| a. real and upright     | c. upright and reversed |
| b. virtual and inverted | d. real and reversed    |



- \_\_\_\_\_ 69. The function of an electric motor is to \_\_\_\_\_.  
a. change electrical energy to chemical energy  
b. change chemical energy to electrical energy  
c. change mechanical energy to electrical energy  
d. change electrical energy to mechanical energy
- \_\_\_\_\_ 70. The function of a generator is to \_\_\_\_\_.  
a. change electrical energy to chemical energy  
b. change chemical energy to electrical energy  
c. change mechanical energy to electrical energy  
d. change electrical energy to mechanical energy
- \_\_\_\_\_ 71. A \_\_\_\_\_ attracts iron objects.  
a. magnet  
b. commutator  
c. motor  
d. generator
- \_\_\_\_\_ 72. \_\_\_\_\_ is the process of producing an electric current by moving a loop of wire through a magnetic field.  
a. Generation  
b. Electromagnetic induction  
c. Electromagnetic deduction  
d. Magnetic charging
- \_\_\_\_\_ 73. The atoms in a magnet are \_\_\_\_\_.  
a. arranged randomly  
b. aligned according to their magnetic poles  
c. positively charged  
d. negatively charged
- \_\_\_\_\_ 74. A galvanometer measures \_\_\_\_\_.  
a. voltage  
b. magnetism  
c. resistance  
d. electric current
- \_\_\_\_\_ 75. A transformer that increases voltage is a \_\_\_\_\_.  
a. step-up transformer  
b. step-down transformer  
c. resistance transformer  
d. voltage motor
- \_\_\_\_\_ 76. Alternating current is transmitted across large distances at high voltage to minimize \_\_\_\_\_.  
a. energy loss as heat  
b. danger  
c. the need for transformers  
d. wire usage
- \_\_\_\_\_ 77. Groups of atoms with aligned magnetic poles are called \_\_\_\_\_.  
a. magnetic current  
b. magnetic poles  
c. magnetic domains  
d. magnetic fields
- \_\_\_\_\_ 78. The strength of magnetic force in an electromagnet is \_\_\_\_\_ by increasing the current through the coil.  
a. decreased  
b. increased  
c. unaffected  
d. eliminated
- \_\_\_\_\_ 79. The wise and careful use of energy resources is called \_\_\_\_\_.  
a. utilization  
b. conservation  
c. fuel economy  
d. recycling
- \_\_\_\_\_ 80. Petroleum, natural gas, and coal are the three kinds of \_\_\_\_\_.  
a. nuclear wastes  
b. synthetic fuels  
c. fossil fuels  
d. nuclear fuels
- \_\_\_\_\_ 81. The type of fossil fuel that forms only from the remains of plants is \_\_\_\_\_.  
a. crude oil  
b. coal  
c. natural gas  
d. uranium



- \_\_\_\_\_ 96. In a nuclear reactor, electricity is produced from \_\_\_\_\_.  
 a. heavy hydrogen and helium                      c. thermonuclear fusion  
 b. uranium-235 nuclei                                d. controlled fusion chain reactions
- \_\_\_\_\_ 97. A disadvantage of using tidal energy is \_\_\_\_\_.  
 a. equipment corrosion                                c. it is inexpensive  
 b. it is nonrenewable                                 d. it causes air pollution
- \_\_\_\_\_ 98. One reason alternative energy sources are needed is because \_\_\_\_\_.  
 a. there is no limit to the supply of fossil fuels  
 b. the supply of fossil fuels is diminishing  
 c. the energy needs of the world are decreasing  
 d. the population of the world is decreasing

## Skill: Using Tables

Use the following table to answer the questions(s) below.

Element/polyatomic ion	Symbol	Oxidation number
Potassium	K	1+
Magnesium	Mg	2+
Oxygen	O	2-
Nitrate	NO <sub>3</sub>	1-
Sulfate	SO <sub>4</sub>	2-
Phosphate	PO <sub>4</sub>	3-

- \_\_\_\_\_ 99. What is the charge of phosphate in K<sub>3</sub>PO<sub>4</sub>?  
 a. 3-    c. 5+  
 b. 1+    d. 7-
- \_\_\_\_\_ 100. Which of the following is not used to calculate kinetic energy?  
 a. mass    c. height  
 b. weight     d. speed
- \_\_\_\_\_ 101. Which of the following is not used to calculate potential energy?  
 a. mass    c. height  
 b. gravitational acceleration                        d. speed
- \_\_\_\_\_ 102. The kinetic energy of an object increases as its \_\_\_\_ increases.  
 a. height above Earth                                c. potential energy  
 b. speed    d. volume
- \_\_\_\_\_ 103. The law of \_\_\_\_ states that energy in a system can change forms but can never be created or destroyed.  
 a. conversion of energy                                c. conservation of energy  
 b. consecration of energy                             d. construction of energy
- \_\_\_\_\_ 104. A circuit that has two or more separate branches for current is a \_\_\_\_\_.  
 a. parallel circuit                                        c. circuit diagram  
 b. series circuit                                         d. electron circuit
- \_\_\_\_\_ 105. The statement, current is equal to the voltage difference divided by the resistance, is known as \_\_\_\_\_.  
 a. Ohm's law     c. Einstein's equation  
 b. Newton's law                                         d. Faraday's law

- \_\_\_\_\_ 106. A static discharge differs from an electric current in that a static discharge \_\_\_\_\_.  
a. is a flow of electrons  
b. lasts for only a fraction of a second  
c. results because a force is exerted on the electrons  
d. involves the movement of ions as well as electrons
- \_\_\_\_\_ 107. Electric charge that has accumulated on an object is referred to as \_\_\_\_\_.  
a. current electricity  
b. circuit electricity  
c. static electricity  
d. current circuit
- \_\_\_\_\_ 108. Resistance is measured in a unit called the \_\_\_\_\_.  
a. ampere  
b. ohm  
c. volt  
d. coulomb
- \_\_\_\_\_ 109. The rate at which an electrical device converts energy from one form to another is called \_\_\_\_\_.  
a. electrical energy  
b. electrical resistance  
c. electrical power  
d. voltage regulation
- \_\_\_\_\_ 110. A path that allows only one route for a current is called a \_\_\_\_\_.  
a. series current  
b. parallel current  
c. parallel circuit  
d. series circuit
- \_\_\_\_\_ 111. Which of the following is the correct relationship among power, current, and voltage?  
a.  $P = I/V$   
b.  $V = P \times I$   
c.  $P = I \times V$   
d.  $\Omega = P \times I$
- \_\_\_\_\_ 112. A television that requires an average of 0.40 ampere of current is operated on a 120-volt service for 5.0 hours. How much energy is used?  
a. 1.5 kWh  
b. 0.15 kWh  
c. 0.24 kWh  
d. 0.67 kWh
- \_\_\_\_\_ 113. One source of constant electric current is a \_\_\_\_\_.  
a. switch  
b. transformer  
c. dry cell  
d. coulomb
- \_\_\_\_\_ 114. A material through which electrons do not move easily is a(n) \_\_\_\_\_.  
a. transformer  
b. insulator  
c. conductor  
d. fuse
- \_\_\_\_\_ 115. Lightning is \_\_\_\_\_.  
a. a very large discharge of static electricity  
b. a buildup of neutrons  
c. a low voltage electric current  
d. harmless
- \_\_\_\_\_ 116. The voltage \_\_\_\_\_ as current moves through a circuit.  
a. remains the same  
b. varies  
c. doubles  
d. increases
- \_\_\_\_\_ 117. Which of the following is a device designed to open an overloaded circuit and prevent overheating?  
a. transformer  
b. magnet  
c. resistor  
d. circuit breaker

## Understanding Concepts

## Skill: Concept Mapping

- \_\_\_\_\_ 118. In a concept map describing magnetic domain the atoms in a permanent magnet should be described as \_\_\_\_\_.  
a. aligned  
b. randomly arranged  
c. the magnetic poles  
d. the magnetic force
- \_\_\_\_\_ 119. In a concept map concerning the strength of the magnetic field of an electromagnet, the strength can be shown as able to be increased by \_\_\_\_\_.  
a. removing coils of wire  
b. increasing the amount of current  
c. making two north poles  
d. changing the direction of the current

## Numeric Response

## Applying Concepts

120. a. If the reading on an electric meter in December was 2345 kilowatt-hours and the reading in January was 3456 kilowatt-hours, how much electrical energy was used in the one-month period between the December and January readings?
- b. If the family who owns this house used 999 kilowatt-hours of electrical energy in the period between the November and December readings, how much more energy did they use in the following one-month period?
- c. If electricity costs \$0.10 per kilowatt-hour, how much was the electric bill in January?
121. If a current flowing through a lightbulb is 0.75 ampere and the voltage difference across the lightbulb is 120 volts, how much resistance does the light bulb have?
122. If an air conditioner uses 1800 watts of power when plugged into a wall socket that operates at a voltage of 210 volts, what is the current flowing through the air conditioner?

## Completion

Complete each sentence or statement.

## Vocabulary Review

Write the term that correctly completes each statement. Use each term once.

metals	isotopes	average atomic mass	electron cloud
groups	metalloids	transition elements	atomic number
electrons	nucleus	mass number	periods
chemical symbol	quarks	periodic table	

123. The center of an atom where protons and neutrons are located is the \_\_\_\_\_.
124. Elements that have some properties of both metals and nonmetals are \_\_\_\_\_.
125. The particles that move about the nucleus and have a negative charge are \_\_\_\_\_.

126. Another name for Newton's first law of motion is the law of \_\_\_\_\_.
127. An object slowing down has a \_\_\_\_\_ acceleration.
128. The velocity of an object must have both a \_\_\_\_\_ and a \_\_\_\_\_.

### Testing Concepts

Fill in the blanks using the terms listed below. Some terms may not be used.

Wave	rarefaction	reflection	medium	compression
Refraction	transverse wave	amplitude	diffraction	compressional wave
wavelength	interference	seismic wave	frequency	standing wave
Crest	Wave speed	node	Trough	resonance

129. Adding energy at the natural frequency of an object is called \_\_\_\_\_.
130. The number of ocean waves that pass a buoy in one second is the \_\_\_\_\_ of the wave.
131. To find the \_\_\_\_\_ of a wave, measure the distance from one trough to the next trough.
132. The \_\_\_\_\_ of a wave is a measure of the energy it carries.
133. A \_\_\_\_\_ is a repeating disturbance that transfers energy through matter or space.
134. Waves bending because of a change in speed is called \_\_\_\_\_.
135. The medium vibrates perpendicular to the direction the wave travels in a \_\_\_\_\_.

Select the word in parentheses that makes each statement correct.

136. In a given medium, as the frequency of a wave increases, its speed (increases, decreases, remains the same) \_\_\_\_\_.

### Concept Review

Select the term that best completes the sentence.

137. As the wavelength of an electromagnetic wave decreases, its frequency (increases, decreases, remains the same) \_\_\_\_\_.
138. As the frequency of an electromagnetic wave decreases, its energy (increases, decreases, remains the same) \_\_\_\_\_.
139. Electromagnetic waves carry (force, energy, sound) \_\_\_\_\_.
140. When electric charges vibrate, they produce (photons, electromagnetic waves, radiant energy) \_\_\_\_\_.

## Vocabulary Review

Complete the following sentences using the terms listed below.

Magnetism	magnetic poles	magnetic domains	turbine
electromagnet	repel	commutator	generator
electromagnetic induction		alternating current	direct current
galvanometer	transformer	electric motor	

141. The regions on a magnet where the magnetic force is strongest are called \_\_\_\_\_.
142. The south pole of a magnet will \_\_\_\_\_ the south pole of another magnet.
143. A device that uses an electromagnet to measure electric current is a(n) \_\_\_\_\_.
144. A device used to increase or decrease the voltage of current in a power line is a(n) \_\_\_\_\_.
145. A switch that regularly reverses the current in some motors is a(n) \_\_\_\_\_.
146. Current that flows in only one direction through a wire is called \_\_\_\_\_.
147. A large wheel that rotates when pushed by water, wind, or steam. \_\_\_\_\_
148. When current in a circuit reverses its direction in a regular pattern, it is called \_\_\_\_\_.
149. The properties and interactions of magnets are referred to as \_\_\_\_\_.
150. Groups of aligned atoms in a magnet are called \_\_\_\_\_.
151. A(n) \_\_\_\_\_ is formed by placing a piece of iron inside a current-carrying coil of wire.
152. A machine that changes electrical energy to mechanical energy is a(n) \_\_\_\_\_ used to do work, such as turning a fan.
153. A device that produces an electric current by rotating a coil of wire in a magnetic field is a(n) \_\_\_\_\_.
154. The process by which moving a wire through a magnetic field produces an electric current is \_\_\_\_\_.

**Matching**

*Match the units to the quantities they measure.*

- a. meter
- b. meters/second
- c. hertz

- \_\_\_\_\_ 155. wavelength
- \_\_\_\_\_ 156. frequency
- \_\_\_\_\_ 157. wave speed

*Match each term with the correct description below.*

- |                       |                     |
|-----------------------|---------------------|
| a. wet cell           | j. conductor        |
| b. voltage difference | k. electric field   |
| c. parallel circuit   | l. electric power   |
| d. resistance         | m. kilowatt hour    |
| e. lightning rod      | n. electric power   |
| f. circuit            | o. electric current |
| g. static electricity | p. insulator        |
| h. dry cell           | q. series           |
| i. Ohm's law          |                     |

- \_\_\_ 158. allows electrons to move through it easily
- \_\_\_ 159. closed path through which electrons flow
- \_\_\_ 160. accumulation of electric charges on an object
- \_\_\_ 161. circuit with more than one path
- \_\_\_ 162. tendency of a material to oppose electron flow
- \_\_\_ 163. does not allow electricity to move through it easily
- \_\_\_ 164. push that causes charges to move
- \_\_\_ 165. Surrounds electric charge and exerts force on other charges.
- \_\_\_ 166. rate at which electrical energy is changed to another energy form
- \_\_\_ 167. flow of electrons through a conductor
- \_\_\_ 168. circuit with only one path
- \_\_\_ 169. unit of electrical energy
- \_\_\_ 170. Current is equal to the voltage difference of a circuit divided by its resistance.
- \_\_\_ 171. car battery
- \_\_\_ 172. metal rod that directs lightning to Earth
- \_\_\_ 173. device that detects electric charges
- \_\_\_ 174. flashlight

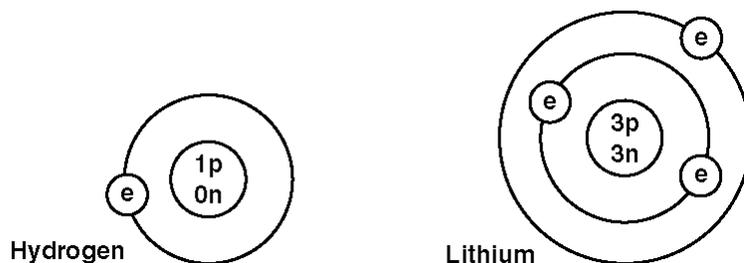
*Match each meaning with the correct term when used in a circuit diagram.*

- |   |
|---|
| a. how much power an appliance uses open circuit          |
| b. individual batteries                                   |
| c. a small piece of wire that melts                       |
| d. a piece of metal that bends                            |
| e. tendency of a material to oppose the flow of electrons |
| f. no current flows in this circuit                       |
- \_\_\_ 175. how much power an appliance uses
- \_\_\_ 176. fuse
- \_\_\_ 177. resistance
- \_\_\_ 178. circuit breaker
- \_\_\_ 179. dry cell

**Short Answer**

Skill: Interpreting Scientific Illustrations

Use the diagrams to answer the questions below.



180. How are the hydrogen atom and the lithium atom similar?
181. What is the atomic number of hydrogen? Of lithium?
182. Why is hydrogen placed in the same group as the alkali metals?
183. How does hydrogen differ from the other elements in Group 1 of the periodic table?
184. Skill: Concept Mapping  
Identify, by writing in the appropriate column in the table, which of the terms listed below could be linked in a concept map to ionic bonds and which could be linked to covalent bonds.

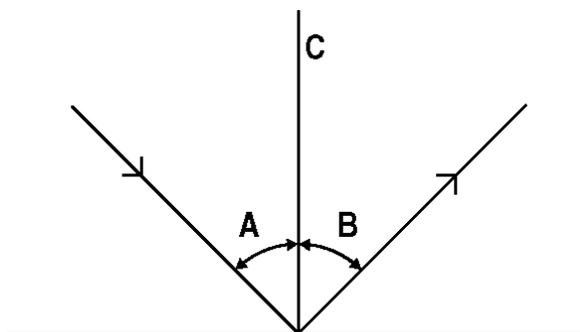
**ions**            **positive ions**    **molecules**  
**nonpolar**    **negative ions**    **polar**

Ionic Bonds	Covalent bonds

Understanding Concepts

Skill: Interpreting a Scientific Diagram

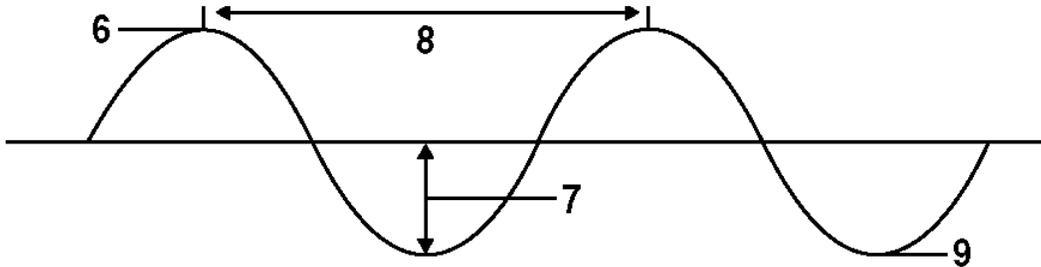
Use the diagram to answer the following question(s).



185. In the diagram, identify each part by filling in the blanks below.
- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

186. What is the relationship between A and B in the diagram?

Identify the parts of a transverse wave indicated.



187. 6. \_\_\_\_\_

188. 7. \_\_\_\_\_

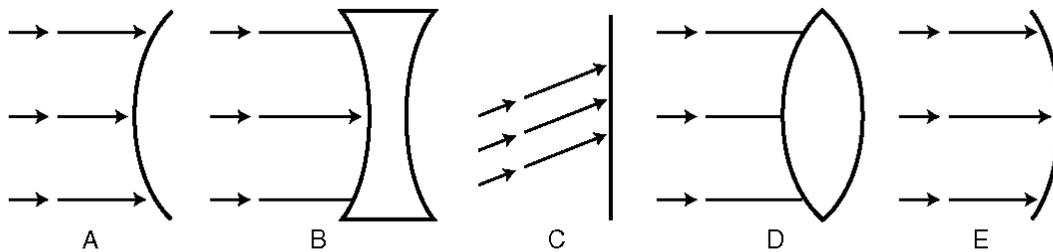
189. 8. \_\_\_\_\_

190. 9. \_\_\_\_\_

Understanding Concepts

191. Skill: Sequencing

On the diagrams below, the lines and arrows represent light rays. Continue the lines and arrows to show what happens to the light after it strikes each mirror or lens.



192. Skill: Sequencing

Write the letter of the lens or mirror above that matches each description below.

- \_\_\_\_\_ a. convex mirror
- \_\_\_\_\_ b. convex lens
- \_\_\_\_\_ c. concave lens
- \_\_\_\_\_ d. plane mirror
- \_\_\_\_\_ e. concave mirror

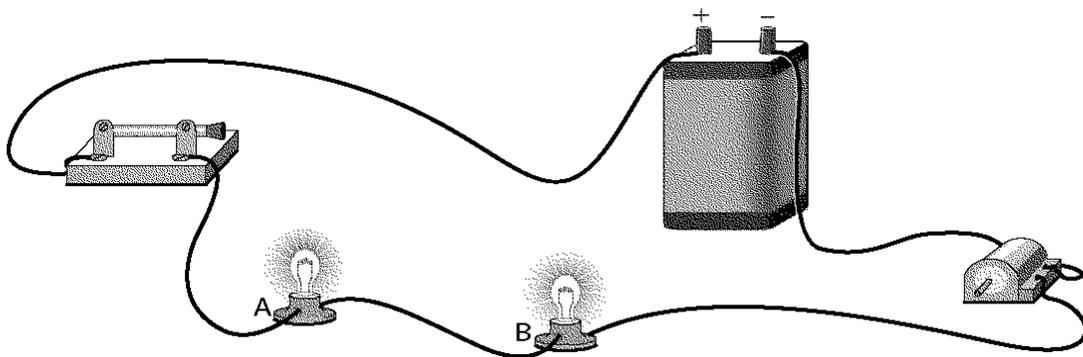
## 193. Skill: Making and Using Tables

Complete the table below by supplying the missing information.

Measurement	Unit	Symbol
	ohm	
		kWh
electrical power		
voltage difference		
	amperes	

## Concept Review

Use the diagram below to complete the following.

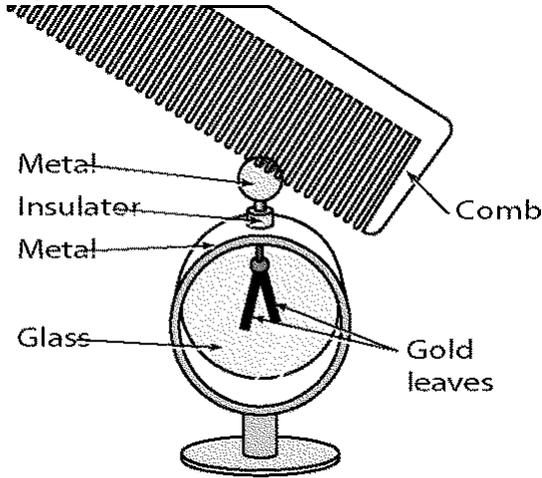


194. Will the voltage in this circuit be greater at A or B? Why?
195. What causes current to flow from one terminal of the battery to the other?
196. If the battery is a 9-volt battery and the resistance in the circuit is 18 ohms, how much current is flowing through the circuit?
197. What is the function of circuit breakers and fuses?
198. What is lightning?

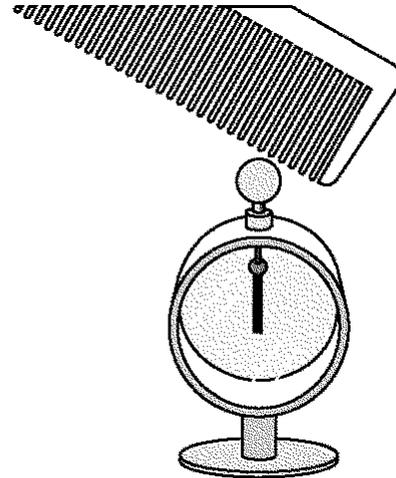
Skill: Observing and Inferring

Use the diagrams to answer the following questions.

**Figure 1**



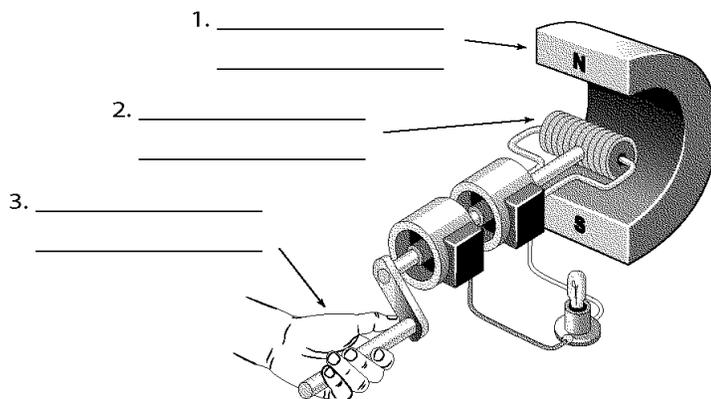
**Figure 2**



199. What is the name of the instrument shown in the diagrams?
200. Describe the appearance of the leaves in Figure 1.
201. Describe the appearance of the leaves in Figure 2.
202. What inference can you make about the electrical conditions of the combs in Figures 1 and 2?
203. Skill: Hypothesizing  
Use what you know about charges and the way an electroscope works to write a hypothesis stating how the leaves of the electroscope in Figure 1 could be made to be like the leaves of the electroscope in Figure 2.

**Concept Review**

Label the parts of the diagram below. Use the labels *permanent magnet*, *source of mechanical energy*, and *electromagnet*.



204. 1. \_\_\_\_\_
205. 2. \_\_\_\_\_

206. 3. \_\_\_\_\_

Identify the function of each device listed below.

- 207. galvanometer
- 208. step-up transformer
- 209. electric motor
- 210. generator
- 211. electromagnet
- 212. step-down transformer
- 213. commutator

214. Skill: Hypothesizing

Tom went to Holland with his parents for a summer vacation. Electrical outlets in Holland are 220 volts instead of the 110 volts that Tom has always used in The United States. What would Tom need to do before he could use the electric alarm clock he uses at home?

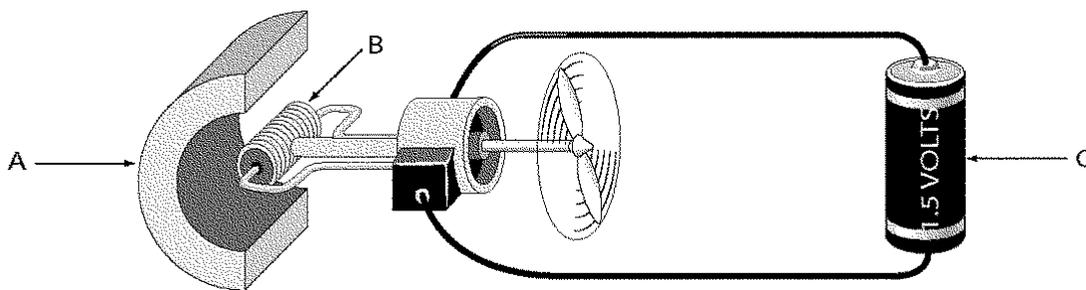
215. Skill: Comparing and Contrasting

Complete the following chart comparing step-up and step-down transformers.

Transformers		
Characteristics	Step-up	Step-down
Influence on voltage		
Coil with most turns (primary or secondary)		

**Applying Concepts**

Use the diagram below to answer the question(s) below.



- 216. What serves as the energy source? What kind of energy does it provide?
- 217. What kind of energy is being produced?
- 218. What is structure B? What happens to it when energy flows?
- 219. Does the figure represent an electric motor or a generator? Explain your answer.
- 220. What happens to the rotation of the coil if the current flowing through it is increased?

Name: \_\_\_\_\_

ID: A

## Essay

### Writing Skills

221. What is required for work to be done?
222. How are work, power, and time related?
223. What do you think some potential problems might be with using windmills as the source of energy for generators?
224. How does alternating current differ from direct current?

**What do you know?**  
**Introduction to Physics II - Electricity and Magnetism**  
**Answer Section**

**MODIFIED TRUE/FALSE**

1. ANS: F, nucleus
2. ANS: F, neutron
3. ANS: F, electron cloud
4. ANS: F, 8
5. ANS: T
6. ANS: F, nonmetal
7. ANS: F, atomic number
8. ANS: F, metals
9. ANS: T
10. ANS: T
11. ANS: F, polar
12. ANS: T
13. ANS: F, ions
14. ANS: F, potential
15. ANS: F, potential
16. ANS: F, Energy
17. ANS: T
18. ANS: T
19. ANS: F, like
20. ANS: F, nonpolar
21. ANS: F, equal
22. ANS: T

**MULTIPLE CHOICE**

23. ANS: D
24. ANS: D
25. ANS: A
26. ANS: B
27. ANS: A
28. ANS: C
29. ANS: D
30. ANS: C
31. ANS: B
32. ANS: C
33. ANS: B
34. ANS: C

- 35. ANS: D
- 36. ANS: A
- 37. ANS: B
- 38. ANS: D
- 39. ANS: C
- 40. ANS: B
- 41. ANS: C
- 42. ANS: D
- 43. ANS: D
- 44. ANS: B
- 45. ANS: D
- 46. ANS: B
- 47. ANS: C
- 48. ANS: C
- 49. ANS: C
- 50. ANS: A
- 51. ANS: C
- 52. ANS: B
- 53. ANS: A
- 54. ANS: C
- 55. ANS: A
- 56. ANS: C
- 57. ANS: C
- 58. ANS: B
- 59. ANS: A
- 60. ANS: A
- 61. ANS: C
- 62. ANS: B
- 63. ANS: A
- 64. ANS: A
- 65. ANS: D
- 66. ANS: C
- 67. ANS: A
- 68. ANS: B
- 69. ANS: D
- 70. ANS: C
- 71. ANS: A
- 72. ANS: B
- 73. ANS: B
- 74. ANS: D
- 75. ANS: A
- 76. ANS: A
- 77. ANS: C

- 78. ANS: B
- 79. ANS: B
- 80. ANS: C
- 81. ANS: B
- 82. ANS: A
- 83. ANS: D
- 84. ANS: B
- 85. ANS: A
- 86. ANS: A
- 87. ANS: B
- 88. ANS: C
- 89. ANS: A
- 90. ANS: C
- 91. ANS: A
- 92. ANS: A
- 93. ANS: C
- 94. ANS: D
- 95. ANS: A
- 96. ANS: B
- 97. ANS: A
- 98. ANS: B
- 99. ANS: A
- 100. ANS: C
- 101. ANS: D
- 102. ANS: B
- 103. ANS: C
- 104. ANS: A
- 105. ANS: A
- 106. ANS: B
- 107. ANS: C
- 108. ANS: B
- 109. ANS: C
- 110. ANS: D
- 111. ANS: C
- 112. ANS: C
- 113. ANS: C
- 114. ANS: B
- 115. ANS: A
- 116. ANS: B
- 117. ANS: D
- 118. ANS: A
- 119. ANS: B

**NUMERIC RESPONSE**

120. ANS:

- a.  $3456 \text{ kWh} - 2345 \text{ kWh} = 111 \text{ kWh}$
- b.  $1111 \text{ kWh} - 999 \text{ kWh} = 112 \text{ kWh}$
- c.  $1111 \text{ kWh} \times \$0.10/\text{kWh} = \$111.10$

121. ANS:

$$I = V/R, R = 120 \text{ V}/0.75 \text{ A} = 160 \ \Omega, 0.75 \text{ A} = 120 \text{ V}/R$$

122. ANS:

$$P = I \times V, I = 1800 \text{ W}/210 \text{ V} = 8.57 \text{ A}, 1800 \text{ W} = I \times 210 \text{ V}$$

**COMPLETION**

- 123. ANS: nucleus
- 124. ANS: metalloids
- 125. ANS: electrons
- 126. ANS: inertia
- 127. ANS: negative
- 128. ANS: speed, direction
- 129. ANS: resonance
- 130. ANS: frequency
- 131. ANS: wavelength
- 132. ANS: amplitude
- 133. ANS: wave
- 134. ANS: refraction
- 135. ANS: transverse wave
- 136. ANS: remains the same
- 137. ANS: increases
- 138. ANS: decreases
- 139. ANS: energy
- 140. ANS: electromagnetic waves
- 141. ANS: magnetic poles
- 142. ANS: repel
- 143. ANS: galvanometer
- 144. ANS: transformer
- 145. ANS: commutator
- 146. ANS: direct current
- 147. ANS: turbine
- 148. ANS: alternating current
- 149. ANS: magnetism
- 150. ANS: magnetic domains

151. ANS: electromagnet  
152. ANS: electric motor  
153. ANS: generator  
154. ANS: electromagnetic induction

**MATCHING**

155. ANS: A  
156. ANS: C  
157. ANS: B  
  
158. ANS: J  
159. ANS: F  
160. ANS: G  
161. ANS: C  
162. ANS: D  
163. ANS: P  
164. ANS: B  
165. ANS: K  
166. ANS: N  
167. ANS: O  
168. ANS: Q  
169. ANS: M  
170. ANS: I  
171. ANS: A  
172. ANS: E  
173. ANS: L  
174. ANS: H  
  
175. ANS: F  
176. ANS: C  
177. ANS: E  
178. ANS: D  
179. ANS: B

**SHORT ANSWER**

180. ANS:  
The hydrogen and lithium atoms each contain one electron in its outer energy level.
181. ANS:  
1; 3
182. ANS:  
Hydrogen has one electron in its outer energy level as the alkali metals do. So hydrogen it is chemically similar to the alkali metals.

183. ANS:  
Hydrogen is a gaseous nonmetal. The alkali metals, which are the elements in Group 1, are all solid metals.

184. ANS:

Ionic Bonds	Covalent bonds
positive ions, negative ions, ions	Polar, nonpolar, molecules

185. ANS:

- a. angle of incidence
- b. angle of reflection
- c. normal

186. ANS:  
They are equal

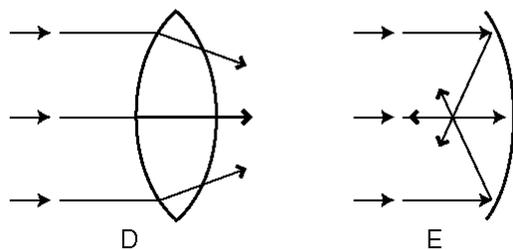
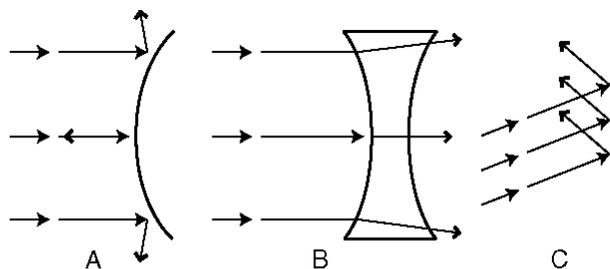
187. ANS:  
crest

188. ANS:  
amplitude

189. ANS:  
wavelength

190. ANS:  
trough

191. ANS:



192. ANS:

- A. a
- B. d
- C. b
- D. c
- E. e

193. ANS:

Measurement	Unit	Symbol
<b>resistance</b>	ohm	<b><math>\Omega</math></b>
<b>electrical energy</b>	<b>kilowatt-hour</b>	kWh
electrical power	<b>watt or kilowatt</b>	<b>W or kW</b>
voltage difference	<b>volts</b>	<b>V</b>
<b>Electric current</b>	amperes	<b>A</b>

194. ANS:

It will be greater at A because the electrons lose some of their potential energy as they light lamps or pass through other appliances.

195. ANS:

The voltage difference between the terminals of the battery acts as an electron pump.

196. ANS:

$$I = V/R = 9V/18 \Omega = 0.5A$$

197. ANS:

Fuses and circuit breakers are safety devices that help to prevent electrical fires by stopping current flow through a wire (circuit) that is becoming too hot.

198. ANS:

a large discharge of static electricity

199. ANS:

an electroscope

200. ANS:

The leaves are spread apart.

201. ANS:

The leaves are hanging straight down.

202. ANS:

The comb in Figure 1 has an electrical charge. The comb in Figure 2 is neutral.

203. ANS:

The electroscope in Figure 1 could be touched with an oppositely charged object. This would cancel the charges in the leaves and make them resemble the leaves in Figure 2.

204. ANS:

permanent magnet

205. ANS:

electromagnet

206. ANS:

source of mechanical energy

207. ANS:

uses an electromagnet to measure electric current

208. ANS:  
increases the voltage of an alternating current
209. ANS:  
changes electrical energy into mechanical energy
210. ANS:  
changes mechanical energy into electrical energy
211. ANS:  
converts electrical energy into mechanical energy to do work
212. ANS:  
decreases the voltage of an alternating current
213. ANS:  
reverses the current in a coil
214. ANS:  
First, Tom would need to use a step-down transformer with twice as many turns in the primary coil as in the secondary coil.
215. ANS:

Transformers		
Characteristics	Step-up	Step-down
Influence on voltage	increases voltage	decreases voltage
Coil with most turns (primary or secondary)	secondary	primary

216. ANS:  
The battery serves as a source of electrical energy
217. ANS:  
mechanical energy
218. ANS:  
Structure B is the electromagnet. When current flows, the electromagnet rotates in the permanent magnet, and the electromagnet becomes a temporary magnet.
219. ANS:  
The figure represents an electric motor. The battery provides electrical energy, and the motor converts the electrical energy to mechanical energy.
220. ANS:  
The coil rotates faster if the current through it is increased. This happens because the magnetic force between the coil and the permanent magnet increases.

## ESSAY

221. ANS:  
The object has to move and the movement has to be in the direction of the force being applied.
222. ANS:  
Power is a measure of the amount of work done in a given period of time.
223. ANS:  
The wind that powers the windmill does not blow at a regular and reliable rate. The energy generated by a windmill depends on how hard the wind is blowing.

224. ANS:

Alternating current reverses its direction of flow in a regular pattern. Direct current flows in only one direction.

**What do you know?****ID: A****Introduction to Physics II - Electricity and Magnetism [Answer Strip]**

		<u>  C  </u> 32.	<u>  D  </u> 45.	<u>  A  </u> 55.	<u>  D  </u> 69.
	<u>  F  </u> 19.	<u>  B  </u> 33.		<u>  C  </u> 56.	
	<u>  F  </u> 20.				<u>  C  </u> 70.
	<u>  F  </u> 21.	<u>  C  </u> 34.		<u>  C  </u> 57.	
<u>  F  </u> 1.	<u>  T  </u> 22.	<u>  D  </u> 35.		<u>  B  </u> 58.	<u>  A  </u> 71.
<u>  F  </u> 2.					
<u>  F  </u> 3.				<u>  A  </u> 59.	<u>  B  </u> 72.
<u>  F  </u> 4.		<u>  A  </u> 36.		<u>  A  </u> 60.	
<u>  T  </u> 5.	<u>  D  </u> 23.	<u>  B  </u> 37.			<u>  B  </u> 73.
<u>  F  </u> 6.			<u>  B  </u> 46.	<u>  C  </u> 61.	
	<u>  D  </u> 24.	<u>  D  </u> 38.			
<u>  F  </u> 7.			<u>  C  </u> 47.	<u>  B  </u> 62.	<u>  D  </u> 74.
<u>  F  </u> 8.	<u>  A  </u> 25.				
<u>  T  </u> 9.		<u>  C  </u> 39.	<u>  C  </u> 48.	<u>  A  </u> 63.	<u>  A  </u> 75.
<u>  T  </u> 10.	<u>  B  </u> 26.				
		<u>  B  </u> 40.	<u>  C  </u> 49.	<u>  A  </u> 64.	<u>  A  </u> 76.
<u>  F  </u> 11.	<u>  A  </u> 27.				
<u>  T  </u> 12.		<u>  C  </u> 41.	<u>  A  </u> 50.	<u>  D  </u> 65.	<u>  C  </u> 77.
<u>  F  </u> 13.	<u>  C  </u> 28.				
		<u>  D  </u> 42.	<u>  C  </u> 51.	<u>  C  </u> 66.	<u>  B  </u> 78.
<u>  F  </u> 14.	<u>  D  </u> 29.				
<u>  F  </u> 15.			<u>  B  </u> 52.		<u>  B  </u> 79.
<u>  F  </u> 16.	<u>  C  </u> 30.			<u>  A  </u> 67.	
<u>  T  </u> 17.		<u>  D  </u> 43.	<u>  A  </u> 53.		<u>  C  </u> 80.
<u>  T  </u> 18.	<u>  B  </u> 31.			<u>  B  </u> 68.	
		<u>  B  </u> 44.	<u>  C  </u> 54.		<u>  B  </u> 81.

**What do you know?**

**ID: A**

**Introduction to Physics II - Electricity and Magnetism [Answer Strip]**

- A   82.        B   96.        B   106.
- D   83.        A   97.                        A   118.
- B   84.        B   98.                        C   107.
- A   85.                                        B   108.        B   119.
- A   86.                                        C   109.                                        J   158.
- B   87.                                        D   110.                                        F   159.
- C   88.                                        C   111.                                        G   160.
- A   89.                                        C   112.                                        C   161.
- C   90.                                        A   99.                                        D   162.
- A   91.                                        C   100.                                        P   163.
- C   92.                                        D   101.                                        B   164.
- A   93.                                        B   102.                                        K   165.
- A   94.                                        A   103.                                        N   166.
- C   95.                                        C   104.                                        O   167.
- D   96.                                        D   105.                                        Q   168.
- A   97.                                        B   106.                                        M   169.
- B   98.                                        A   107.                                        I   170.
- C   99.                                        C   108.                                        A   171.
- D   100.                                        D   109.                                        E   172.
- A   101.                                        B   110.                                        L   173.
- B   102.                                        C   111.                                        H   174.
- C   103.                                        D   112.                                        F   175.
- D   104.                                        A   113.                                        C   176.
- A   105.                                        B   114.                                        E   177.
- B   106.                                        A   115.                                        D   178.
- C   107.                                        C   116.                                        B   179.
- D   108.                                        D   117.                                        A   155.
- A   109.                                        A   118.                                        C   156.
- B   110.                                        B   119.                                        B   157.
- C   111.                                        C   120.                                        D   158.
- D   112.                                        D   121.                                        A   159.
- A   113.                                        A   122.                                        B   160.
- B   114.                                        B   123.                                        C   161.
- C   115.                                        C   124.                                        D   162.
- D   116.                                        D   125.                                        A   163.
- A   117.                                        A   126.                                        B   164.
- B   118.                                        B   127.                                        C   165.
- C   119.                                        C   128.                                        D   166.
- D   120.                                        D   129.                                        A   167.
- A   121.                                        A   130.                                        B   168.
- B   122.                                        B   131.                                        C   169.
- C   123.                                        C   132.                                        D   170.
- D   124.                                        D   133.                                        A   171.
- A   125.                                        A   134.                                        B   172.
- B   126.                                        B   135.                                        C   173.
- C   127.                                        C   136.                                        D   174.
- D   128.                                        D   137.                                        A   175.
- A   129.                                        A   138.                                        B   176.
- B   130.                                        B   139.                                        C   177.
- C   131.                                        C   140.                                        D   178.
- D   132.                                        D   141.                                        A   179.
- A   133.                                        A   142.                                        B   180.
- B   134.                                        B   143.                                        C   181.
- C   135.                                        C   144.                                        D   182.
- D   136.                                        D   145.                                        A   183.
- A   137.                                        A   146.                                        B   184.
- B   138.                                        B   147.                                        C   185.
- C   139.                                        C   148.                                        D   186.
- D   140.                                        D   149.                                        A   187.
- A   141.                                        A   150.                                        B   188.
- B   142.                                        B   151.                                        C   189.
- C   143.                                        C   152.                                        D   190.
- D   144.                                        D   153.                                        A   191.
- A   145.                                        A   154.                                        B   192.
- B   146.                                        B   155.                                        C   193.
- C   147.                                        C   156.                                        D   194.
- D   148.                                        D   157.                                        A   195.
- A   149.                                        A   158.                                        B   196.
- B   150.                                        B   159.                                        C   197.
- C   151.                                        C   160.                                        D   198.
- D   152.                                        D   161.                                        A   199.
- A   153.                                        A   162.                                        B   200.
- B   154.                                        B   163.                                        C   201.
- C   155.                                        C   164.                                        D   202.
- D   156.                                        D   165.                                        A   203.
- A   157.                                        A   166.                                        B   204.
- B   158.                                        B   167.                                        C   205.
- C   159.                                        C   168.                                        D   206.
- D   160.                                        D   169.                                        A   207.
- A   161.                                        A   170.                                        B   208.
- B   162.                                        B   171.                                        C   209.
- C   163.                                        C   172.                                        D   210.
- D   164.                                        D   173.                                        A   211.
- A   165.                                        A   174.                                        B   212.
- B   166.                                        B   175.                                        C   213.
- C   167.                                        C   176.                                        D   214.
- D   168.                                        D   177.                                        A   215.
- A   169.                                        A   178.                                        B   216.
- B   170.                                        B   179.                                        C   217.
- C   171.                                        C   180.                                        D   218.
- D   172.                                        D   181.                                        A   219.
- A   173.                                        A   182.                                        B   220.
- B   174.                                        B   183.                                        C   221.
- C   175.                                        C   184.                                        D   222.
- D   176.                                        D   185.                                        A   223.
- A   177.                                        A   186.                                        B   224.
- B   178.                                        B   187.                                        C   225.
- C   179.                                        C   188.                                        D   226.
- D   180.                                        D   189.                                        A   227.
- A   181.                                        A   190.                                        B   228.
- B   182.                                        B   191.                                        C   229.
- C   183.                                        C   192.                                        D   230.
- D   184.                                        D   193.                                        A   231.
- A   185.                                        A   194.                                        B   232.
- B   186.                                        B   195.                                        C   233.
- C   187.                                        C   196.                                        D   234.
- D   188.                                        D   197.                                        A   235.
- A   189.                                        A   198.                                        B   236.
- B   190.                                        B   199.                                        C   237.
- C   191.                                        C   200.                                        D   238.
- D   192.                                        D   201.                                        A   239.
- A   193.                                        A   202.                                        B   240.
- B   194.                                        B   203.                                        C   241.
- C   195.                                        C   204.                                        D   242.
- D   196.                                        D   205.                                        A   243.
- A   197.                                        A   206.                                        B   244.
- B   198.                                        B   207.                                        C   245.
- C   199.                                        C   208.                                        D   246.
- D   200.                                        D   209.                                        A   247.
- A   201.                                        A   210.                                        B   248.
- B   202.                                        B   211.                                        C   249.
- C   203.                                        C   212.                                        D   250.
- D   204.                                        D   213.                                        A   251.
- A   205.                                        A   214.                                        B   252.
- B   206.                                        B   215.                                        C   253.
- C   207.                                        C   216.                                        D   254.
- D   208.                                        D   217.                                        A   255.
- A   209.                                        A   218.                                        B   256.
- B   210.                                        B   219.                                        C   257.
- C   211.                                        C   220.                                        D   258.
- D   212.                                        D   221.                                        A   259.
- A   213.                                        A   222.                                        B   260.
- B   214.                                        B   223.                                        C   261.
- C   215.                                        C   224.                                        D   262.
- D   216.                                        D   225.                                        A   263.
- A   217.                                        A   226.                                        B   264.
- B   218.                                        B   227.                                        C   265.
- C   219.                                        C   228.                                        D   266.
- D   220.                                        D   229.                                        A   267.
- A   221.                                        A   230.                                        B   268.
- B   222.                                        B   231.                                        C   269.
- C   223.                                        C   232.                                        D   270.
- D   224.                                        D   233.                                        A   271.
- A   225.                                        A   234.                                        B   272.
- B   226.                                        B   235.                                        C   273.
- C   227.                                        C   236.                                        D   274.
- D   228.                                        D   237.                                        A   275.
- A   229.                                        A   238.                                        B   276.
- B   230.                                        B   239.                                        C   277.
- C   231.                                        C   240.                                        D   278.
- D   232.                                        D   241.                                        A   279.
- A   233.                                        A   242.                                        B   280.
- B   234.                                        B   243.                                        C   281.
- C   235.                                        C   244.                                        D   282.
- D   236.                                        D   245.                                        A   283.
- A   237.                                        A   246.                                        B   284.
- B   238.                                        B   247.                                        C   285.
- C   239.                                        C   248.                                        D   286.
- D   240.                                        D   249.                                        A   287.
- A   241.                                        A   250.                                        B   288.
- B   242.                                        B   251.                                        C   289.
- C   243.                                        C   252.                                        D   290.
- D   244.                                        D   253.                                        A   291.
- A   245.                                        A   254.                                        B   292.
- B   246.                                        B   255.                                        C   293.
- C   247.                                        C   256.                                        D   294.
- D   248.                                        D   257.                                        A   295.
- A   249.                                        A   258.                                        B   296.
- B   250.                                        B   259.                                        C   297.
- C   251.                                        C   260.                                        D   298.
- D   252.                                        D   261.                                        A   299.
- A   253.                                        A   262.                                        B   300.
- B   254.                                        B   263.                                        C   301.
- C   255.                                        C   264.                                        D   302.
- D   256.                                        D   265.                                        A   303.
- A   257.                                        A   266.                                        B   304.
- B   258.                                        B   267.                                        C   305.
- C   259.                                        C   268.                                        D   306.
- D   260.                                        D   269.                                        A   307.
- A   261.                                        A   270.                                        B   308.
- B   262.                                        B   271.                                        C   309.
- C   263.                                        C   272.                                        D   310.
- D   264.                                        D   273.                                        A   311.
- A   265.                                        A   274.                                        B   312.
- B   266.                                        B   275.                                        C   313.
- C   267.                                        C   276.                                        D   314.
- D   268.                                        D   277.                                        A   315.
- A   269.                                        A   278.                                        B   316.
- B   270.                                        B   279.                                        C   317.
- C   271.                                        C   280.                                        D   318.
- D   272.                                        D   281.                                        A   319.
- A   273.                                        A   282.                                        B   320.
- B   274.                                        B   283.                                        C   321.
- C   275.                                        C   284.                                        D   322.
- D   276.                                        D   285.                                        A

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

ID: A

**MULTIPLE CHOICE**

- 23. (A) (B) (C) (D) (E)
- 24. (A) (B) (C) (D) (E)
- 25. (A) (B) (C) (D) (E)
- 26. (A) (B) (C) (D) (E)
- 27. (A) (B) (C) (D) (E)
- 28. (A) (B) (C) (D) (E)
- 29. (A) (B) (C) (D) (E)
- 30. (A) (B) (C) (D) (E)
- 31. (A) (B) (C) (D) (E)
- 32. (A) (B) (C) (D) (E)
- 33. (A) (B) (C) (D) (E)
- 34. (A) (B) (C) (D) (E)
- 35. (A) (B) (C) (D) (E)
- 36. (A) (B) (C) (D) (E)
- 37. (A) (B) (C) (D) (E)
- 38. (A) (B) (C) (D) (E)
- 39. (A) (B) (C) (D) (E)
- 40. (A) (B) (C) (D) (E)
- 41. (A) (B) (C) (D) (E)
- 42. (A) (B) (C) (D) (E)
- 43. (A) (B) (C) (D) (E)
- 44. (A) (B) (C) (D) (E)
- 45. (A) (B) (C) (D) (E)
- 46. (A) (B) (C) (D) (E)
- 47. (A) (B) (C) (D) (E)
- 48. (A) (B) (C) (D) (E)
- 49. (A) (B) (C) (D) (E)
- 50. (A) (B) (C) (D) (E)
- 51. (A) (B) (C) (D) (E)
- 52. (A) (B) (C) (D) (E)
- 53. (A) (B) (C) (D) (E)
- 54. (A) (B) (C) (D) (E)
- 55. (A) (B) (C) (D) (E)
- 56. (A) (B) (C) (D) (E)
- 57. (A) (B) (C) (D) (E)
- 58. (A) (B) (C) (D) (E)
- 59. (A) (B) (C) (D) (E)
- 60. (A) (B) (C) (D) (E)
- 61. (A) (B) (C) (D) (E)
- 62. (A) (B) (C) (D) (E)
- 63. (A) (B) (C) (D) (E)
- 64. (A) (B) (C) (D) (E)
- 65. (A) (B) (C) (D) (E)
- 66. (A) (B) (C) (D) (E)

- 67. (A) (B) (C) (D) (E)
- 68. (A) (B) (C) (D) (E)
- 69. (A) (B) (C) (D) (E)
- 70. (A) (B) (C) (D) (E)
- 71. (A) (B) (C) (D) (E)
- 72. (A) (B) (C) (D) (E)
- 73. (A) (B) (C) (D) (E)
- 74. (A) (B) (C) (D) (E)
- 75. (A) (B) (C) (D) (E)
- 76. (A) (B) (C) (D) (E)
- 77. (A) (B) (C) (D) (E)
- 78. (A) (B) (C) (D) (E)
- 79. (A) (B) (C) (D) (E)
- 80. (A) (B) (C) (D) (E)
- 81. (A) (B) (C) (D) (E)
- 82. (A) (B) (C) (D) (E)
- 83. (A) (B) (C) (D) (E)
- 84. (A) (B) (C) (D) (E)
- 85. (A) (B) (C) (D) (E)
- 86. (A) (B) (C) (D) (E)
- 87. (A) (B) (C) (D) (E)
- 88. (A) (B) (C) (D) (E)
- 89. (A) (B) (C) (D) (E)
- 90. (A) (B) (C) (D) (E)
- 91. (A) (B) (C) (D) (E)
- 92. (A) (B) (C) (D) (E)
- 93. (A) (B) (C) (D) (E)
- 94. (A) (B) (C) (D) (E)
- 95. (A) (B) (C) (D) (E)
- 96. (A) (B) (C) (D) (E)
- 97. (A) (B) (C) (D) (E)
- 98. (A) (B) (C) (D) (E)
- 99. (A) (B) (C) (D) (E)
- 100. (A) (B) (C) (D) (E)
- 101. (A) (B) (C) (D) (E)
- 102. (A) (B) (C) (D) (E)
- 103. (A) (B) (C) (D) (E)
- 104. (A) (B) (C) (D) (E)
- 105. (A) (B) (C) (D) (E)
- 106. (A) (B) (C) (D) (E)
- 107. (A) (B) (C) (D) (E)
- 108. (A) (B) (C) (D) (E)
- 109. (A) (B) (C) (D) (E)
- 110. (A) (B) (C) (D) (E)

- 111. (A) (B) (C) (D) (E)
- 112. (A) (B) (C) (D) (E)
- 113. (A) (B) (C) (D) (E)
- 114. (A) (B) (C) (D) (E)
- 115. (A) (B) (C) (D) (E)
- 116. (A) (B) (C) (D) (E)
- 117. (A) (B) (C) (D) (E)
- 118. (A) (B) (C) (D) (E)
- 119. (A) (B) (C) (D) (E)