

## Sc9 Ch 9 Static Electricity: Practice Test

### Modified True/False

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

- \_\_\_\_\_ 1. Static charge means charges at rest. \_\_\_\_\_
- \_\_\_\_\_ 2. A positive charge is the result of *gaining* electrons. \_\_\_\_\_
- \_\_\_\_\_ 3. A *negative* charge has equal numbers of protons and electrons. \_\_\_\_\_
- \_\_\_\_\_ 4. Some materials are more likely than others to gain or lose *protons*. \_\_\_\_\_
- \_\_\_\_\_ 5. If one object *gains* electrons, another object loses electrons. \_\_\_\_\_
- \_\_\_\_\_ 6. Aluminum is a *semiconductor*. \_\_\_\_\_

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. What will happen when two oppositely charged balloons are brought close together?
  - A. They will move toward each other.
  - B. They will move away from each other.
  - C. They will move together, then apart.
  - D. They will be unaffected by each other.
- \_\_\_\_\_ 2. What must happen to a positively charged object in order to become neutral?
  - A. It must lose one or more electrons.
  - B. It must lose one or more protons.
  - C. It must gain one or more electrons.
  - D. It must gain one or more protons.
- \_\_\_\_\_ 3. Which of the following is an insulator?
  - A. aluminum
  - B. copper
  - C. pure water
  - D. salt water
- \_\_\_\_\_ 4. Which of the following can be described as a transfer of charge to produce a charged object?
  - A. charging by friction
  - B. charging by conduction
  - C. charging by induced charge separation
  - D. both (a) and (b)
- \_\_\_\_\_ 5. Which of the following is a good insulator?
  - A. copper
  - B. gold
  - C. nickel
  - D. glass

- \_\_\_ 6. What is the difference between charging by conduction and charging by friction?
- A. charging by friction requires one object to be charged
  - B. charging by conduction involves two neutral objects
  - C. charging by conduction requires one object to be charged
  - D. charging by friction involves induction
- \_\_\_ 7. What is the difference between charging by friction and charging by induction?
- A. charging by induction does not require a charged object
  - B. charging by friction does not require a charged object
  - C. charging by friction does not involve transfer of charge
  - D. charging by friction is the same as charging by induction
- \_\_\_ 8. What is the difference between charging by conduction and charging by induction?
- A. charging by conduction involves transfer of charge
  - B. charging by induction involves transfer of charge
  - C. charging by conduction does not involve transfer of charge
  - D. charging by conduction is the same as charging by induction
- \_\_\_ 9. Which of the following is an example of induced charge separation?
- A. charged balloon stuck to the wall
  - B. cat's fur becoming charged when rubbed
  - C. balloon becoming charged when rubbed on hair
  - D. two charged objects moving apart
- \_\_\_ 10. Which of the following is an example of charging by conduction?
- A. charged balloon stuck to the wall
  - B. cat's fur becoming charged when a person pets it
  - C. a balloon becoming charged when rubbed on hair
  - D. an electroscope becoming charged when touched with a charged rod

### Completion

Complete each statement.

1. Eventually, all static charge is \_\_\_\_\_, or lost, to other objects or the air.
2. A negative charge is obtained by \_\_\_\_\_ electrons.
3. A negative ion is an atom which has \_\_\_\_\_ electrons.
4. When ebonite is rubbed with wool, the wool tends to lose electrons so that the ebonite becomes \_\_\_\_\_ charged.
5. When two objects are rubbed together and one object gains electrons, the other object \_\_\_\_\_ electrons.
6. When there is an induced charge separation in a neutral object, the resulting charge of the object is \_\_\_\_\_.
7. A proton has about 2000 times the mass of a(n) \_\_\_\_\_.

8. When an object is charged without contact, this is called charging by \_\_\_\_\_.
9. A(n) \_\_\_\_\_ is a substance in which electrons are allowed to move freely.
10. When considering electricity, pure water is a(n) \_\_\_\_\_, but salt water is not.

### Matching

*Match the terms below with the following definitions.*

- |                                      |  |
|--------------------------------------|--|
| A. does not allow movement of charge | D. separation of protons and electrons |
| B. allows movement of charge         | E. lightning                           |
| C. safe from unwanted charge         |  |

- \_\_\_\_ 1. insulator  
\_\_\_\_ 2. induced charge  
\_\_\_\_ 3. grounded

*Match the parts of the atom with their description*

- |             |          |
|-------------|----------|
| A. positive | D. large |
| B. negative | E. small |
| C. neutral  |          |

- \_\_\_\_ 4. neutron  
\_\_\_\_ 5. proton

### Short Answer

1. (a) Describe what can happen when you shuffle your socked feet back and forth on the carpet and then reach for a metal doorknob.  
(b) Account for the result described in (a) by describing the movement of charges.
2. Why does an ebonite rod become negatively charged when rubbed with wool? Use your knowledge of the electrostatic series chart to explain your answer.
3. Why does a piece of vinyl attract small pieces of paper after being rubbed with silk? Use your knowledge of the electrostatic series chart to explain your answer.
4. Why is the actual flash of lightning not considered static electricity?

### Explaining

1. Use your knowledge of static electricity to explain lightning.

## Sc9 Ch 9 Static Electricity Answer Section

### MODIFIED TRUE/FALSE

- ANS: T  
OBJ: 9.1  
LOC: Unit C - PLC5  
PTS: 1  
REF: K  
TOP: Unit C - Ch. 09 KI1
- ANS: F, losing  
PTS: 1  
REF: K  
OBJ: 9.1  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1
- ANS: F, neutral  
PTS: 1  
REF: K  
OBJ: 9.1  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1
- ANS: F, electrons  
PTS: 1  
REF: K  
OBJ: 9.1  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1
- ANS: T  
OBJ: 9.1  
LOC: Unit C - PLC5  
PTS: 1  
REF: K  
TOP: Unit C - Ch. 09 KI1
- ANS: F, conductor  
PTS: 1  
REF: K  
OBJ: 9.3  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

### MULTIPLE CHOICE

- ANS: A  
Opposite charges attract.  
PTS: 1  
REF: K  
OBJ: 9.1  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI3
- ANS: C  
Positively charged objects have a deficit of electrons, therefore must gain electrons to become neutral.  
PTS: 1  
REF: K  
OBJ: 9.1  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1
- ANS: C  
Pure water DOES NOT conduct electricity well. Only when there are impurities does water conduct electricity well.  
PTS: 1  
REF: K  
OBJ: 9.3  
LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2
- ANS: D  
Friction causes a transfer of charge (rubbing from one to another) as does charging by conduction (charge transferred from a charged object to an uncharged, or less charged object).

PTS: 1 REF: K OBJ: 9.2 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

5. ANS: D  
Glass is an excellent insulator.

PTS: 1 REF: K OBJ: 9.3 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

6. ANS: C  
Conduction requires one charged object as a source of charge to be transferred to another object which may or may not be neutral. Friction typically involves two neutral objects, one of which attracts electrons more strongly than the other.

PTS: 1 REF: U/A OBJ: 9.2 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

7. ANS: B  
Induction requires one charged object as a source of charge to attract or repel electrons in another object. Charging by friction involves the transfer of electrons from one neutral object to another.

PTS: 1 REF: U/A OBJ: 9.2 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

8. ANS: A  
Conduction requires one charged object as a source of charge to be transferred to another object which may or may not be neutral. Induction causes separation of charge within a neutral object without touching the object.

PTS: 1 REF: U/A OBJ: 9.2 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

9. ANS: A  
A balloon sticks to the wall because of an induced charge separation in the wall due to the charge on the balloon.

PTS: 1 REF: U/A OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

10. ANS: D  
Conduction involves using a charged rod to share its charge with a neutral object when they come in contact.

PTS: 1 REF: U/A OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

## COMPLETION

1. ANS: discharged

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

2. ANS: gaining

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

3. ANS:  
gained  
excess

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

4. ANS: negatively

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

5. ANS: loses

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1

6. ANS: neutral

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

7. ANS: electron

PTS: 1 REF: K OBJ: 9.1 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

8. ANS: induction

PTS: 1 REF: K OBJ: 9.2 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

9. ANS: conductor

PTS: 1 REF: K OBJ: 9.3 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

10. ANS: insulator

PTS: 1 REF: K OBJ: 9.3 LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

## MATCHING

1. ANS: A PTS: 1 REF: K OBJ: 9.3  
LOC: Unit C - PLC5 TOP: Unit C - Ch. 09 KI2

2. ANS: D PTS: 1 REF: K OBJ: 9.2  
LOC: Unit C - PLC5 TOP: Unit C - Ch. 09 KI2

3. ANS: C PTS: 1 REF: K OBJ: 9.3  
LOC: Unit C - PLC5 TOP: Unit C - Ch. 09 KI2

4. ANS: C PTS: 1 REF: K OBJ: 9.1  
LOC: Unit C - PLC5 TOP: Unit C - Ch. 09 KI1

5. ANS: A PTS: 1 REF: K OBJ: 9.1  
LOC: Unit C - PLC5 TOP: Unit C - Ch. 09 KI1

## SHORT ANSWER

1. ANS:

(a) You would receive a shock when you touched the doorknob.

(b) As you shuffled your socked feet against the carpet, electrons would move either to your feet, or to the carpet due to friction “rubbing” off the electrons. Your socks (and you) would become charged. When you reached toward the doorknob, negative charges would leave the doorknob (if you had lost electrons to the carpet) and flow into your finger in an attempt to neutralize you. If electrons had been transferred to you from the carpet, then the extra electrons on you would transfer to the doorknob to neutralize you.

PTS: 2                    REF: U/A                    OBJ: 9.1                    LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI1 | Unit C - Ch. 09 KI2

2. ANS:

Ebonite is higher up on the electrostatic series chart, making it more likely to gain electrons from the wool. The ebonite would then become negative, the wool positive.

PTS: 1                    REF: U/A                    OBJ: 9.1                    LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

3. ANS:

Vinyl is higher up on the electrostatic series chart, making it more likely to gain electrons from the silk. The vinyl would then become negative, the silk positive. The charged piece of silk will cause an induced charge separation in the paper, causing the paper to be attracted to the vinyl.

PTS: 1                    REF: U/A                    OBJ: 9.1                    LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI2

4. ANS:

The flash is due to the rapid movement of charge from the clouds to the ground; moving charges are not static electricity.

PTS: 1                    REF: U/A                    OBJ: 9.5                    LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI4

## ESSAY

1. ANS:

As particles in the air and clouds pass by one another, electrons are transferred from the rising particles to the falling particles, creating a separation of charge in the clouds. The large number of electrons in the lower part of the cloud create an induced charge in the nearest object on the ground below (perhaps in a tree, or a lightning rod) by causing electrons to be moved away from the surface. The excess electrons then discharge to that object, creating a flash of light in the air.

PTS: 3                    REF: U/A                    OBJ: 9.5                    LOC: Unit C - PLC5  
TOP: Unit C - Ch. 09 KI4