Charge Interactions

1. **Review:** Fill in the following blanks with the words **electrons** or **protons**.

    _____ are negatively charged and _____ are positively charged. As an object begins to gain or lose electrons from its atoms, it becomes positively or negatively charged. A negatively charged object has more _____ than _____ . A positively charged object has more _____ than _____ .

2. Charged objects interact with one another. One can observe the interactions and infer information about the type of charge present on an object. Complete the following statements to illustrate your understanding of the three types of charge interactions:
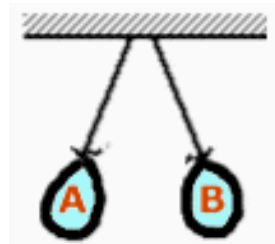
    a. Oppositely-charged objects _____.

    b. Like-charged objects _____.

    c. A charged object and a neutral object will _____.

3. Your physics teacher has prepared the room for the class's entry by suspending several inflated balloons from the ceiling. Upon entering the physics room, you observe two balloons being drawn towards each other as shown at the right. The attraction of these balloons for one another provides evidence that _____.
    a. both balloons are charged with the same type of charge
    b. both balloons are charged with the opposite type of charge
    c. both balloons are charged - either with the same type or opposite type of charge
    d. only one of the balloons is charged; the other is neutral
   e. at least one of the balloons is charged; the other is either charged or neutral

4. As you look around the room, you observe two other balloons being pushed away from each other as shown at the right. The repulsion of these balloons from one another provides evidence that _____.
    a. both balloons are charged with the same type of charge
    b. both balloons are charged with the opposite type of charge
    c. both balloons are charged - either with the same type or opposite type of charge
    d. only one of the balloons is charged; the other is neutral
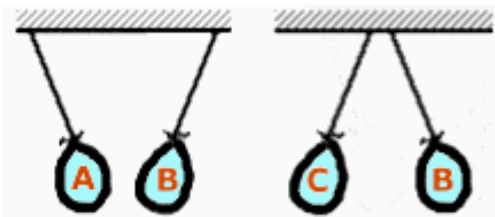   e. at least one of the balloons is charged; the other is either charged or neutral

5. In one part of the room, there are two balloons - one hanging straight down and the other being attracted to it. This is evidence that _____.
    a. balloon A is charged and balloon B is neutral
    b. balloon B is charged and balloon A is neutral
    c. balloon A is neutral and balloon B is negative
    d. balloon A is neutral and balloon B is positive
    e. … nonsense! This would never happen if the balloons are identical and simply suspended by strings. They will attract each other and both be deflected from a vertical orientation.
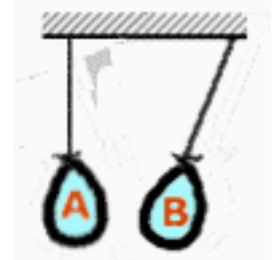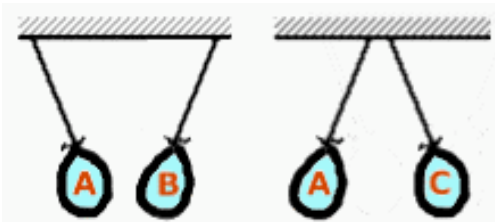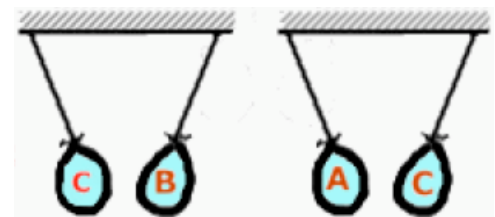
Static Electricity

6. Anna Litical is performing a physics lab in which she charges a variety of materials and tests to determine their charge by bringing them near a negatively charged balloon and near some neutral paper bits at rest on the table. Help Anna draw conclusions from her observations by entering +, -, neutral (or a combination of these if absolute conclusiveness is not possible).
   a. Object A is observed to attract the paper bits; object A must be _____.
   b. Object B is observed to attract the balloon; object B must be _____.
   c. Object C is observed to repel the balloon; object C must be _____.
   d. Object D is observed to attract both the paper bits and the balloon; object D must be _____.
   e. Object E is observed to attract the paper bits and repel the balloon; object E must be _____.

7. On three occasions, the following charge interactions between balloons A, B and C are observed. In each case, it is known that balloon B is charged negatively. Based on these observations, what can you conclusively confirm about the charge on balloon A and C for each situation.

Balloon	Conclusive evidence to conclude that the charge is +, -, neutral
A	
B	negative
C	

Balloon	Conclusive evidence to conclude that the charge is +, -, neutral
A	
B	negative
C	

Balloon	Conclusive evidence to conclude that the charge is +, -, neutral
A	
B	negative
C	

8. Jean Yuss is investigating the charge on several objects and makes the following findings.

Object C	Object D	Object E	Object F
attracts B	repels C	attracts D	attracts A
		repels F	

Jean knows that object A is negatively charged and object B is electrically neutral. What can Jean Yuss definitively conclude about the charge on objects C, D, E, and F? Explain.