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**Synergy**  
Education

# Preliminary Physics

Module 4: Electricity and Magnetism

Homework 1:  
Electrostatic Charges

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## Summary of Key Words

### **Account**

Account for: state reasons for, report on. Give an account of: narrate a series of events or transactions

### **Analyse**

Identify components and the relationship between them; draw out and relate implications

### **Apply**

Use, utilise, employ in a particular situation

### **Assess**

Make a judgement of value, quality, outcomes, results or size

### **Calculate**

Ascertain/determine from given facts, figures or information

### **Clarify**

Make clear or plain

### **Classify**

Arrange or include in classes/categories

### **Compare**

Show how things are similar or different

### **Construct**

Make; build; put together items or arguments

### **Contrast**

Show how things are different or opposite

### **Deduce**

Draw conclusions

### **Define**

State meaning and identify essential qualities

### **Demonstrate**

Show by example

### **Describe**

Provide characteristics and features

### **Discuss**

Identify issues and provide points for and/or against

**Distinguish**

Recognise or note/indicate as being distinct or different from; to note differences between

**Evaluate**

Make a judgement based on criteria; determine the value of

**Examine**

Inquire into

**Explain**

Relate cause and effect; make the relationships between things evident; provide why and/or how

**Extract**

Choose relevant and/or appropriate details

**Extrapolate**

Infer from what is known

**Identify**

Recognise and name

**Interpret**

Draw meaning from

**Investigate**

Plan, inquire into and draw conclusions about

**Justify**

Support an argument or conclusion

**Outline**

Sketch in general terms; indicate the main features of

**Predict**

Suggest what may happen based on available information

**Propose**

Put forward (for example a point of view, idea, argument, suggestion) for consideration or action

**Recall**

Present remembered ideas, facts or experiences

**Recommend**

Provide reasons in favour

**PART A: MULTIPLE CHOICE**

**Question 1**

What causes an object to obtain a positive charge?

- a) Gain of electrons
- b) Gain of protons
- c) Loss of electrons
- d) Loss of protons

**Question 2**

When a glass rod is rubbed with silk, why does the rod takes on a positive charge?

- a) Electrons flow out of the glass to the ground
- b) Electrons move from the glass to the silk
- c) Protons move from the glass to the silk
- d) Protons move from the silk to the glass.

**Question 3**

A balloon becomes charged when it is rubbed on one's hair. Why does the balloon attract to a neutral wall?

- a) The balloon induces a charge separation in the wall
- b) The polar molecules of the wall charges a redistribution of charges
- c) The wall becomes charged
- d) Rubbing the balloon results in a charge separation in the balloon.

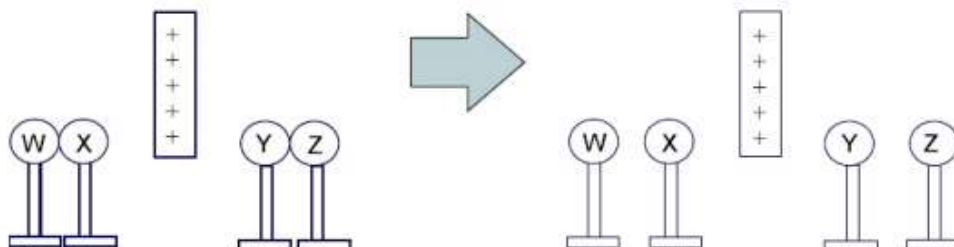
**Question 4**

A neutral electroscope becomes positively charged after it is briefly touched by a charged rod. Which explains the flow of charge?

- a) Electrons flow from the electroscope to the rod
- b) Electrons flow from the rod to the electroscope
- c) Protons flow from the electroscope to the rod
- d) Protons flow from the rod to the electroscope

**Question 5**

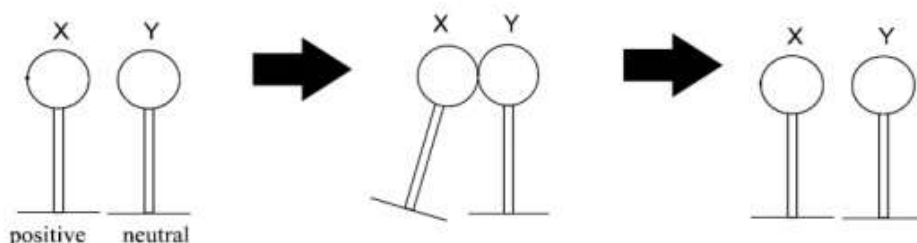
The diagram below shows four neutral spheres W, X, Y and Z on insulated stands with W touching X and Z touching Y. If a positive rod is placed between the spheres and then spheres W and Z are moved as shown, what are the resulting charges on spheres W and Z?



- a) W and Z are both negative
- b) W is negative, Z is positive
- c) W is positive, Z is positive
- d) W and Z are both positive

**Question 6**

Spheres X and Y are on insulated stands as shown below. Sphere X, which is positively charged, comes into brief contact with sphere Y, which is neutral. When X and Y are separated what will be the charge on each sphere?



- a) X and Y are both negative
- b) X is negative, Y is positive
- c) X is positive, Y is positive
- d) X and Y are both positive

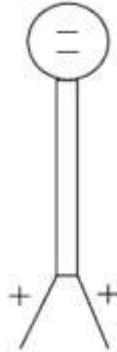
**Question 7**

What happens to a grounded object when it is charged by induction with a positively charged rod?

- a) Gains electrons from the rod
- b) Gains electrons from the ground
- c) Loses electrons from the rod
- d) Loses electrons from the ground

**Question 8**

Which best explains the charge distribution on the electroscope to the right?



- a) A negatively charged rod is close to, but not touching, the ball of the electroscope
- b) A negatively charged rod has touched the ball of the electroscope
- c) A positively charged rod is close to, but not touching, the ball of the electroscope
- d) A positively charged rod has touched the ball of the electroscope.

**Question 8**

How will two glass rods charged in the same way react to each other?

- a) They will repel one another
- b) They will attract one another
- c) They will neutralize one another
- d) They will not affect one another

**Question 9**

The picture below shows a positively charged rod attracting pieces of paper that are not charged. Which Law of Static Electricity best explains this?

- a) Like charges repel
- b) Opposite Charges attract
- c) Neutral objects are attracted to charged objects
- d) Neutral objects are attracted to neutral objects

**PART B: SHORT RESPONSE**

**Question 1**

Several items are listed below along with the circumstances that could have left them with a charge. For each example, state which item would have a positive or a negative charge because of a deficit or excess of electrons.

- a) A piece of rubber rubbed with silk. (1 mark)

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- b) An acetate sheet rubbed with cat's fur. (1 mark)

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- c) Glass rubbed with wool. (1 mark)

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**Question 2**

A negatively charged rod is placed near a ball suspended by a thread. The ball becomes attracted to the rod and they touch. However, after they touch the ball moves away from the rod.

- a) Identify whether the charge of the ball is negative, positive or neutral. (1 mark)

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- b) Explain why the ball moves away from the rod. (3 marks)

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**Question 3**

At a birthday party, a balloon is rubbed on someone's hair and brought close to a ribbon on a party decoration. The ribbon was repelled by the balloon. What type of charge is on the ribbon? (2 marks)

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**Question 4**

a) Using diagrams and brief explanations, describe how a negative charge on a metal leaf electroscope can be produced by induction. (3 marks)

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- b) A charged rod is brought near a negatively charged electroscope causing the leaves to collapse. Explain what charge is on the rod. (3 marks)

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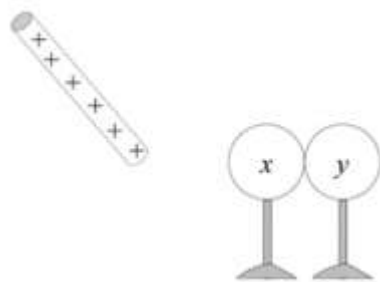
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- c) The diagram below shows a positively charged glass rod and two neutral metal spheres, x, and y, in contact and on insulating stands. Describe how one could cause one sphere to obtain a negative charge and the other a positive charge, without touching either sphere with the glass rod.



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