

Static Electricity

You need: $1\text{C} = 6.25 \times 10^{18}$ electrons $1 \text{ electron} = 1.602 \times 10^{-19}\text{C}$ **Triboelectric series** (in your notes)

1. The spheres in the diagram have been charged. Determine how the spheres in the following combinations will react to one another (circle answer = repel or attract) (3)

a. Sphere A with sphere C

Repel

Attract

b. Sphere B with sphere D

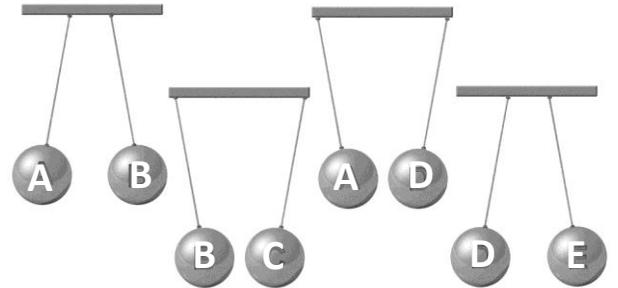
Repel

Attract

c. Sphere C with sphere E

Repel

Attract



2. You rub a glass rod with wool. You then rub a piece of polyethylene with silk. Finally, you rub a piece of acetate with cotton. Using your knowledge of the triboelectric series, what would happen if....(you do NOT need to explain).

Do they **repel** or **attract** each other? Please circle (2)

a) You bring the charged glass towards the charged silk **repel** **attract**

b) You bring the charged acetate towards the charged wool **repel** **attract**

3. Are the following objects charged by **friction**, **conduction** or **induction**? (2)

a) Hans brings a charged comb close to his hair without touching it, and his hair stands on end. _____

b) Electrons are transferred from one body to another, resulting in two bodies carrying the same charge. _____

c) When we walk about, our bodies may accumulate an electrical charge. _____

d) How does a dryer build up charge? _____

Please show your work for all mathematical problems below!

4. During a storm, impressive bolts of lightning form jagged lines across the sky. The lightning is caused by a brief but powerful electrical discharge. If the electrical discharge of a lightning bolt is equal to 15 C, how many electrons were involved? (2) (round to one decimal place)

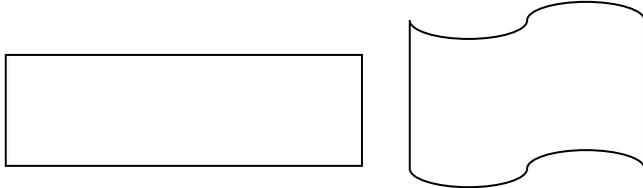
5. After charging a piece of fabric, Justin calculates that it has lost 2.5×10^{20} electrons. (3)

a) What is the magnitude (strength) of the charge in coulombs? (round to one decimal place)

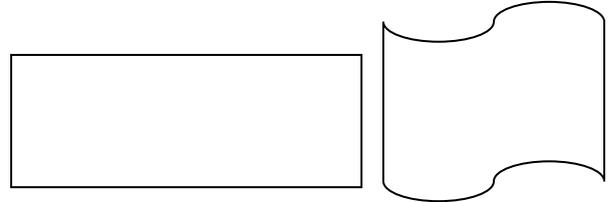
b) Is this charge positive or negative? Explain your answer.

6. Explain why a polyethylene ruler and a piece of cotton become oppositely charged when they are rubbed together. (5)

a) Draw four "+"s and four "-"s to show their distribution before the items are rubbed together:



b) Draw the same four "+"s and "-"s after the items are rubbed together:



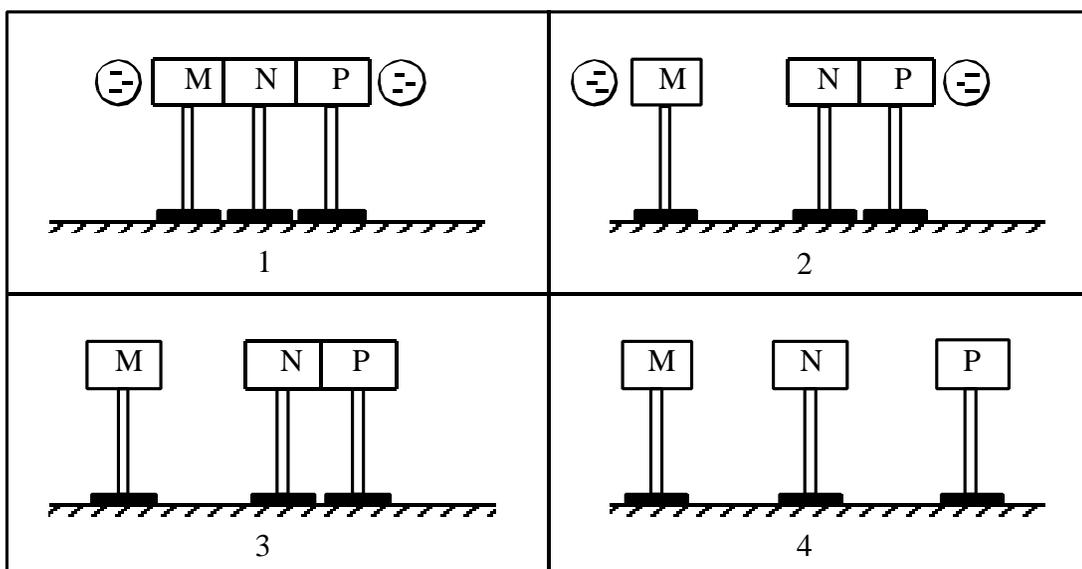
c) Explain the movement of the charges. (Explain: 1. What moves and where. 2. How do you know? 3. What is the resulting charge of each item?)

1. _____.
2. _____.
3. _____.

7. Three metal blocks, M, N and P, initially non-charged, are placed in a row touching each other on insulating supports. (4)

The following operations are done on them:

1. Blocks M & P are approached by negatively-charged spheres without being touched.
2. While holding the charged sphere next to block M, block M is moved far from the other blocks.
3. The charged spheres are moved away from the blocks.
4. Block P is separated from block N.



What are the charges on the spheres M, N and P after the operations?

- A) M is positive, N is neutral and P is negative.
- B) M is positive, N and P are negative.
- C) M is positive, N is negative and P is neutral
- D) M is negative, N and P are positive

Answer #7