

Objective: Observe electric force and qualitatively derive Coulomb's Law.

Materials

- Levitation Wand (https://www.amazon.com/Flying-Wand-Magic-Levitation-Shapes/dp/B005G4WRLU/ref=sr_1_5?dchild=1&keywords=levitation+wand&qid=1569512584&sr=8-5)
- Pith ball on string

Observe

1. Make sure the wand has the cardboard tube on the end and has good batteries.
2. Press the button on the wand. It should sound like a small electric motor.
3. While pressing the button on the wand, bring it near your arm hairs (or head hairs). What happens? _____
4. While pressing the button on the wand, dangle the pith ball onto the cardboard tube of the wand and wait. What happens? _____

Hypothesis

5. The levitation wand creates a static charge on the cardboard tube.
6. You will look closely at how the pith ball reacts to the wand. Write a hypothesis about how the wand will affect the pith ball at different distances. _____
7. Write another hypothesis about how the size of the static charge will affect the pith ball. _____

Test

8. Start by testing the hypothesis about the how the wand affects the pith ball at different distances.
 - a. While pressing the button on the wand, dangle a pith ball onto the cardboard tube of the wand and wait until it is repelled.
 - b. Release the button and use the wand to keep the pith ball from hanging straight down while observing the reaction of the pith ball based on distance to the wand (but don't touch the wand!)
 - c. Observe how much force is on the pith ball as it gets closer to the wand. When is the force the most? _____ When is the force the least? _____
9. Now test the hypothesis about the size of the static charge.
 - a. Touch the wand to discharge it.
 - b. While pressing the button on the wand, dangle a pith ball onto the cardboard tube of the wand and wait until it is repelled.
 - c. Release the button.
 - d. Did the pith ball repel right away or did it take time? _____
 - e. If the wand makes static charge, do you suppose the amount of charge on the pith ball is changing before it levitates? _____
 - f. From the above two questions, is the force higher or lower with more charge? _____

Conclusion

10. From step 8, is the force directly or inversely proportional to the distance between the wand and pith ball?

11. From step 9, is the force directly or inversely proportional to the charge between the wand and pith ball?

12. Look up Coulomb's Law in your book (or online). _____
 - a. What does k represent? _____
 - b. What does q represent? _____
 - c. What does r represent? _____
13. Explain how your answers for 10 and 11 agree with Coulomb's Law.
