Solar System Static – Student Activities

So far, our best explanation of the origin of the Universe is "The Big Bang Theory". This suggests that a mighty explosion about 13 billion years ago sent hot dense particles streaming outwards from a central point. This material came together to form giant stars that later exploded and again sent material flying out into space. One such explosion created a nebula (cloud) of stardust that travelled out to the western spiral arm of the Milky Way and came together to form our solar system. Force from the explosion caused the dust to spin creating an enormous spinning proto-planetary disc from which our solar system began to form. Our bodies, the food we eat, the air we breathe and the rocks we stand on are all made from that dust.

Forces cause other objects to move or change the direction of their movement. Two forces (static electricity and gravity) pulled the stardust together to clump into larger pieces. Unlike a push or a pull, these forces do not have to touch the object but can act at a distance.

The first is a weak force called **static electricity**

When one piece of dust rubbed up against another, outer negatively charged electrons would be lost from one particle and passed onto the other. This would mean one piece of dust would have a differing electrical charge than the other and they would be attracted together like little magnets

Activity - Static electricity – a weak force pulling objects together over a short distance

Part 1 Comb & Paper

Materials per student or group

- A plastic comb
- Chads (paper circles) from a hole punch. These need to be separated into individual pieces of paper.
- A willing student with a good head of hair

NOTE *Static electricity does not flow like the current electricity we use in houses. It discharges instantly. The comb needs to be rubbed again if it is to be used again.*

Method

1. Separate paper chads and spread in a thin layer on the desk.
2. Comb hair vigorously for about 20 seconds.
3. Hold the comb just above the paper pieces. They should not touch.
4. Observe any changes.
5. Repeat but use the whole sheet of paper.
6. Observe any changes.

Prediction (what do you think will happen?)

_____

_____

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Observations

_____

_____

Conclusion

Did a force cause a change in the chads of paper? _____

Did the force act close up or at a distance? _____

Is static electricity a strong force or a weak force? _____

Part 2 Balloon & Metal Can

Materials per student or group

- An inflated balloon
- An empty aluminium can
- A willing student with a good head of hair

Method

1. Lay the aluminium can on its side on the desk surface.
2. Rub the balloon on the student's hair vigorously.
3. Place the balloon close to the can (about 2cm) and then move it slowly away.
4. Observe what happens to the balloon.
5. Move the can to 4cm from the balloon and repeat.
6. Observe what happens to the can.

Prediction (what do you think will happen?)

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_____

Observation

What happened when the balloon was slowly moved away from the can? _____

_____

_____

Conclusion

Did a force cause a change in the can? Explain your answer. _____

_____

What force caused the can to be attracted to the balloon and the paper to be attracted to the comb?

_____

Repeat these experiments and find out how close the two objects have to be for the force to work. What did you find out?

Discussion

Could static electricity bind together very small particles of different kinds of material? _____

Could static electricity bind together the planets and the Sun in our solar system? Explain your answer.

_____

The first step towards building the solar system had been taken when static electricity bound together the fine dust of the proto-planetary disc and created more massive clumps.