

## Magnetic Magic

Today was a holiday. Everybody was at home. We had our lunch and then the afternoon siesta.

Just then Mom said, "let us clear the drawers today. Dad's and Mihir's drawer is so full of things that it can't even be opened properly..."

"And if at all one manages to open it, it cannot be closed. True, isn't it?" said Grandpa as he raised his eyebrows. Dad only smiled.

Actually Dad was in no mood to clear things. But Mom was feeling very enthusiastic about getting rid of clutter. Mom looked at Dad and realised that he was not feeling too keen.

She smiled and said, "First we will clear Mihir's drawer and then if we have time, we will clear Dad's drawer.

Disappointed Mihir said, "But Mom, my secret treasure is kept in my drawer. I have other things like a battery, a ball of wire, and



beads. And there is my magic ring too. But clearing my drawer means rearranging everything neatly, not throwing away anything.”

Mom patted Mihir. Mihir was happy!

Grandma pulled out Mihir’s drawer with some difficulty.

By then Mom had spread a newspaper on the floor. But Grandma was in a hurry. As she kept the drawer on the floor, a box of pins fell down. The pins ran all over the room.

Grandpa was exasperated and slapped his forehead.

Grandma saw this and was annoyed. She said to him, “Look here, and don’t be irritated. I will pick up all the pins without even touching them.”

Grandpa was surprised when he heard this.

Grandma said, “Now all of you sit on the sofa otherwise the pins might prick you. I will take some things from Mihir’s drawer and show you some magic.

All of us sat on the sofa and grandma started preparing for the magic.

Grandma selected some things from Mihir’s drawer—two battery cells, adhesive tape, a 7-8 cm long nail, plastic-coated copper wire.

Grandpa asked, “Do you want anything else?”



“Yes, your nutcracker.” Now everybody was watching Grandma with great curiosity.

Grandma removed the plastic covering at both ends of the copper wire with the help of the nutcracker.

She rolled the wire tightly around the nail and pulled out its two ends.

Then she stuck the two battery cells together with the adhesive tape.

A battery cell has two sides—one side has the ‘+’ and the other ‘-’. The cells were stuck in such a way that the signs would come one after the other.

One end of the wire rolled around the nail was stuck at the back of the battery cell with the help of the adhesive tape.

Now grandma moved ahead slowly.

She had the empty box of pins.

Grandma looked at Grandpa and then she put the nail among the scattered pins. Grandma looked at Grandpa and raised her eyebrows. But nothing happened.

Grandpa showed grandma the thumbs-down sign!

That very instant Grandma realised her mistake. She joined the other end of the wire to the front side of the battery cell...

And what a miracle!

All the scattered pins quickly moved towards the nail!



They quickly attached themselves to the nail!!

All of us shouted “wow!” as we saw this.

Grandma cautiously picked up the nail with the pins still stuck to it. Grandma put this ‘pinned’ nail into the box and detached one end of the wire from the battery cell.

All the pins fell into the box.

Surprised, we again shouted “Wow!”

Grandpa appreciated Grandma’s magic. “This is wonderful magic—lifting without touching!”

Grandma quickly put all the pins in the box.

Mihir jumped down from the sofa and asked, “Grandma, what will happen if I use more or less wire for the nail?”

Grandma laughed and answered “You already know the answer to this question, try it yourself and see what happens. But first understand this magic.

Wherever there is an electric current, an electromagnetic field is also present. This battery cell has electricity. When an electric current flows through the copper wire a magnetic field is created around the wire. The nail becomes a magnet as it is present in the magnetic field.



When I keep the nail in the box, I detach one end of the wire from the battery cell.

This stops the electric current from flowing through the wire and all the pins stuck to the nail fall into the box.....”

Mihir interrupted Grandma and said “I have understood now. If I increase the wire around the nail, then.....”

Grandpa stopped Mihir and said, “I know you will tell me that. But tell me, if we take three cells instead of two and take the same amount of wire, then.....”

You can answer this “magnetic” question just like Mihir.

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