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MagLev Train System References

Reading Material to Accompany Activity

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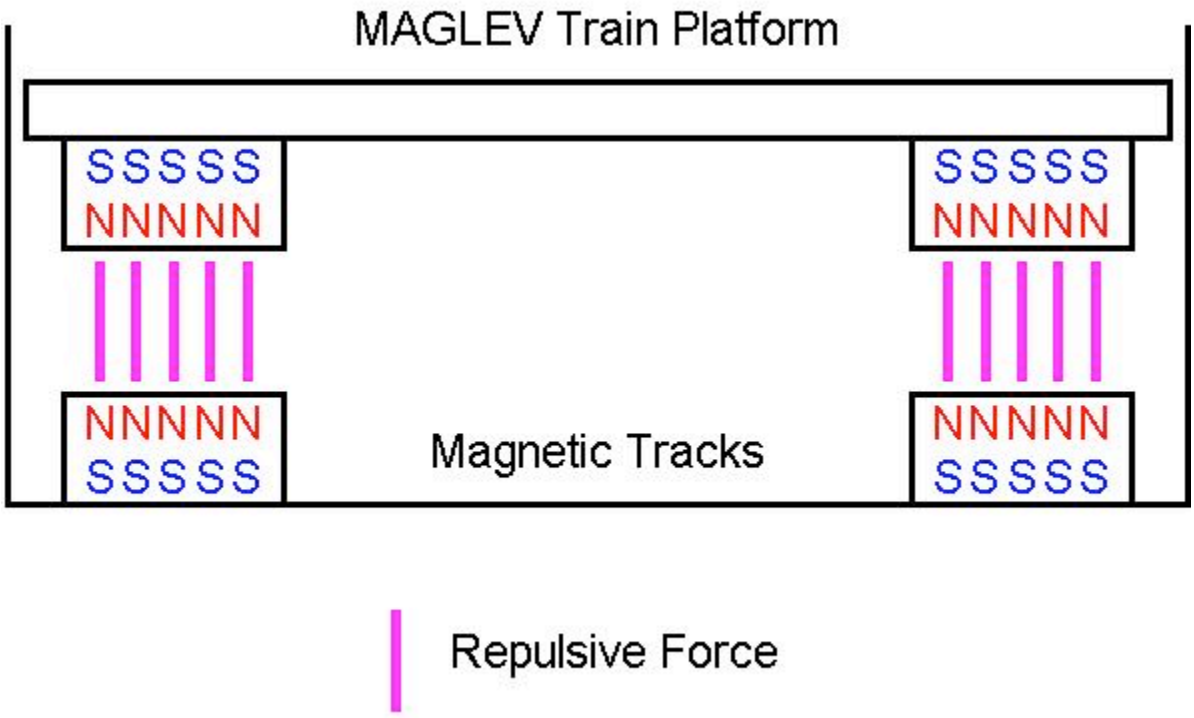
Magnetism

The website http://www.execpc.com/~rhoadley/magtrain.htm is the explanation for the levitating train.



Compared with the conventional electrical train and aircraft the Magnetbahn will be much quicker and cheaper. Some advantages are:

- Causes no environmental pollution at the course
- Uses less energy (25 % of aircraft, 50% of car)
- Makes almost no noise

The principle is comparable to a normal electric motor of which the static part is cut and flattened along the rail track. Because of the absence of mechanical friction, higher speeds can be reached because less energy will be lost. The rail is constructed at 4 meters above the earth surface, mounted on concrete pillars because the active part of the electrical drive is in the rails, not in the train.

The most exiting part of the study visit was, of course, making a test ride with the train. Such a test ride takes place at the circuit, which has a length of 32 km. To save energy, just a part of 500 meters, where the train is traveling at that moment, is activated. At the straight parts in the circuit the train can reach a top speed of 550 km/hour. During our trip we reached a speed of 450 km/hour, which was quite impressing. We made three laps on the circuit. The first lap was to get the passengers acquainted with the high acceleration possibilities and to let them travel with high speed. The other two laps were for research possibilities of MVP. The acceleration of the train was very impressive. In a few seconds the traveling speed was more than 100 km/hour. Within a minute we reached 400 km/hour. It was quite remarkable that we heard almost no noise. The circuit is situated in a nice landscape, but due to the high speed, we had to look very quickly. The interior of the train was very luxurious. The seats were all business class like the ones in an airplane. Due to the high speed, we finished the three laps within twenty minutes.

An additional website for the Maglev train system is http://www.dom.com/about/companies/vapower/maglev/how.jsp; This site gives an explanation into how the trains operate.

http://www.scoutingresources.org.uk/badges_scientist4.html

Rolling Tricks

Equipment: A plastic pen, felt or woollen material, table tennis ball, plastic straws
Method: Rub the plastic pen very hard with the felt or wool. Put the table tennis ball on a smooth table top and hold the pen close to the ball. The ball will seem to move at the command of your 'magic wand'. Which way does it roll, towards the pen or away from it? Now put two straws parallel to each other, with a third laying across them. Rub the pen with the felt or wool and hold the side of the pen close to the straw which is on top of the others. Can you work out why some things move towards the pen and others move away?
Expected Result: They will repel if they have the same charge, and attract each other if they have the same charge.

Separate Salt from Pepper

Equipment: Salt, pepper (finely ground), plastic comb or pen, felt or wool.
Method: Sprinkle a little salt and pepper on to a plate. Rub the pen or comb very hard with the felt or wool. Hold the pen or comb very close to the plate and move it slowly over the salt and pepper mixture. What happens?
Expected Result: The pepper will jump up to the pen or comb but the salt will stay behind.
Explanation: Both the salt and pepper are attracted by the static charges on the pen or comb, but the pepper rises first because it is lighter than the salt. If you hold the pen or comb too close to the plate you will pick up the salt as well.

Can you get Electricity from a Lemon?

Equipment: Lemon, copper coin, zinc piece.
Method: Make two slits in the skin of a lemon and push a copper coin into one slit and a piece of zinc into the other slit. Make sure the two metals are not touching each other inside the lemon. If you hold the coin and the zinc gently against your tongue, you should be able to feel a tingle of electricity.
Expected Result: The current flows because a chemical reaction takes place between the metals and an acid in the lemon juice. The lemon juice acts in the same way as Volta's salt water or the chemical paste in a battery.

Glowing Wool Trick

Equipment: A battery, two wires, some steel wool (the kind used for cleaning pots and pans)
Method: Pull out one long strand of steel wool and pin it to a board. Attach one wire to one end of the battery and the other wire to the other end. With the free ends of both wires, touch the strand of steel wool. What happens?
Expected Result: The steel should heat up and glow.
Explanation: The electrical current flows easily through the wires but has more difficulty passing through the thin strand of steel wool. This makes the steel heat up and glow red hot. With a powerful battery, it may even melt and break.
There are very thin wires in the fuses, which are fitted into the electrical machines, circuits and plugs in our homes. If something goes wrong with the wiring, the thin fuse wire quickly melts and makes a gap in the circuit. This cuts off the electricity supply and prevents a fire.

Make a Compass

Equipment:A large needle, small cork, magnet, saucer of water.
Method: First you need to turn the needle into a magnet.

This is called magnetising the needle. To do this, stroke one pole of the magnet gently along the whole length of the needle in the same direction 20 times. Inside the needle, the little particles (domains) which make up the metal are usually pointing in different directions. As you stroke the needle with the magnet, the particles all line up and point in the same direction. As long as the particles stay in line, the needle will act like a magnet.

Lay the magnetised needle on the cork and float it in a saucer of water.n the thin card, draw a right angled triangle. Make the other two angles 45° (
Expected Result: The needle will swing round to point in a North-South direction.
Explanation: The ends of the needle are attracted by the poles of the earth's magnetic field.

http://liftoff.msfc.nasa.gov/News/1999/News-maglev.asp

NASA's Maglev space shuttle experiment