ELECTROMAGNETISM

How does electricity affect magnetism?

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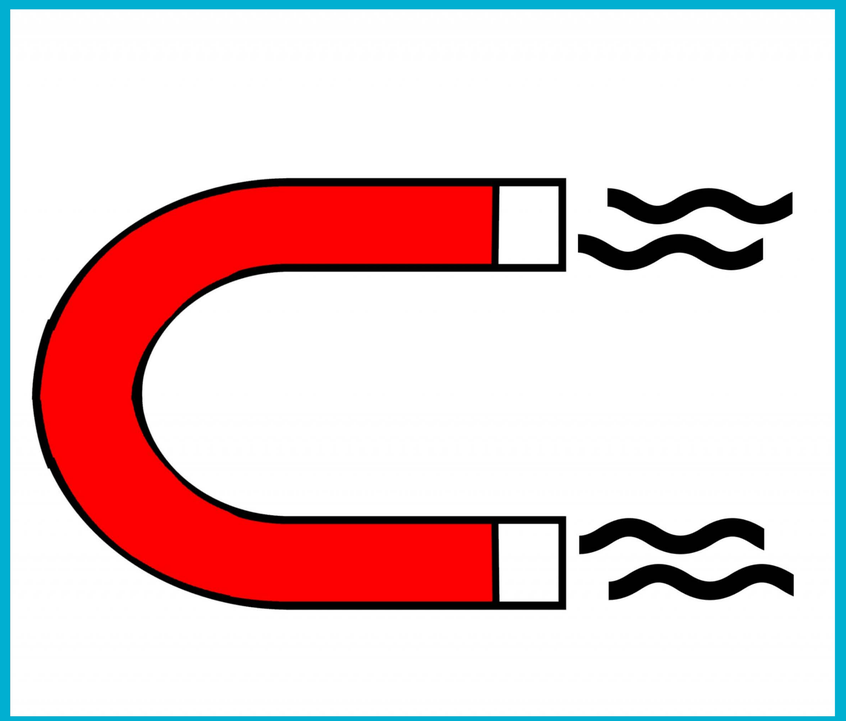
Hypothesis

If you increase the voltage or amount of electricity applied to a piece of metal wrapped in copper wiring you will increase the strength of the electromagnetic field. Therefore the more voltage applied, the stronger the magnet pull.



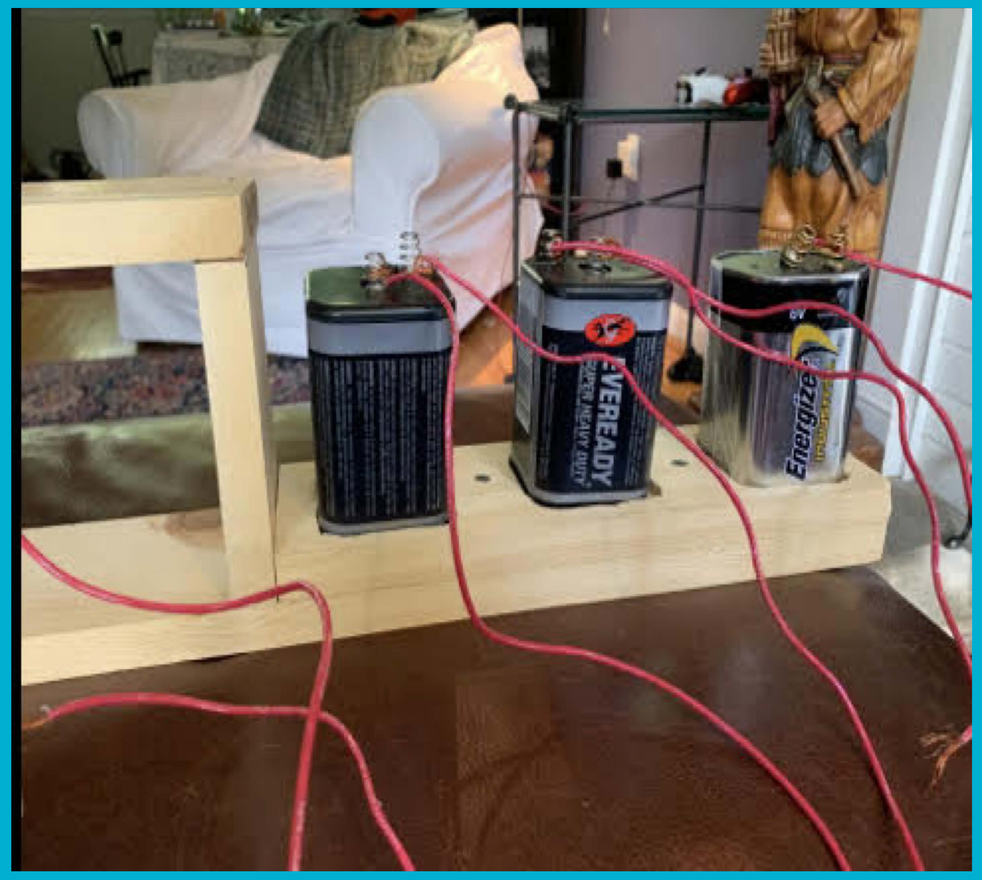
Procedure

1. Measure and cut wood to create a mounting stand for batteries. This meant cutting a 12 inch piece of the board and using the Dremel to create spaces for each of the three batteries. Next step was to drill a hole in the center of another 17 inch piece wood to mount the electromagnetic bolt.
2. Using a 5.5 inch metal bolt, I wrapped thin gauge insulated copper wire around the bolt more than 100 times. The two ends of the wires were connected to alligator clips to be able to easily attach the wires to the batteries.
3. Using medium gauge insulated wire I made connections to each battery's positive and negative connectors.
4. 50 paper clips were placed in the bottom of an bowl cut into the wood under the suspended bolt that hangs over the paperclips.
5. One battery was attached to the bolt creating the electromagnet and the total paperclips that attach to the bolt are counted.
6. Two batteries are then connected together and the process is repeated.
7. All three batteries are then attached and the process is repeated again.

Materials List

1.3 6 volt batteries
2.4 feet of insulated copper wire
3.10 feet of thin gauge insulated copper wire
4.Wood for mounting platform, 1 1x8 piece of wood
5.Box of 1.3 inch .33 mm paper clips each weighing .05 ounces
6.Alligator electrical clamps
7.Electric tape
8.Scissors
9.Circular saw
10.Dremel

Photos of Experiment



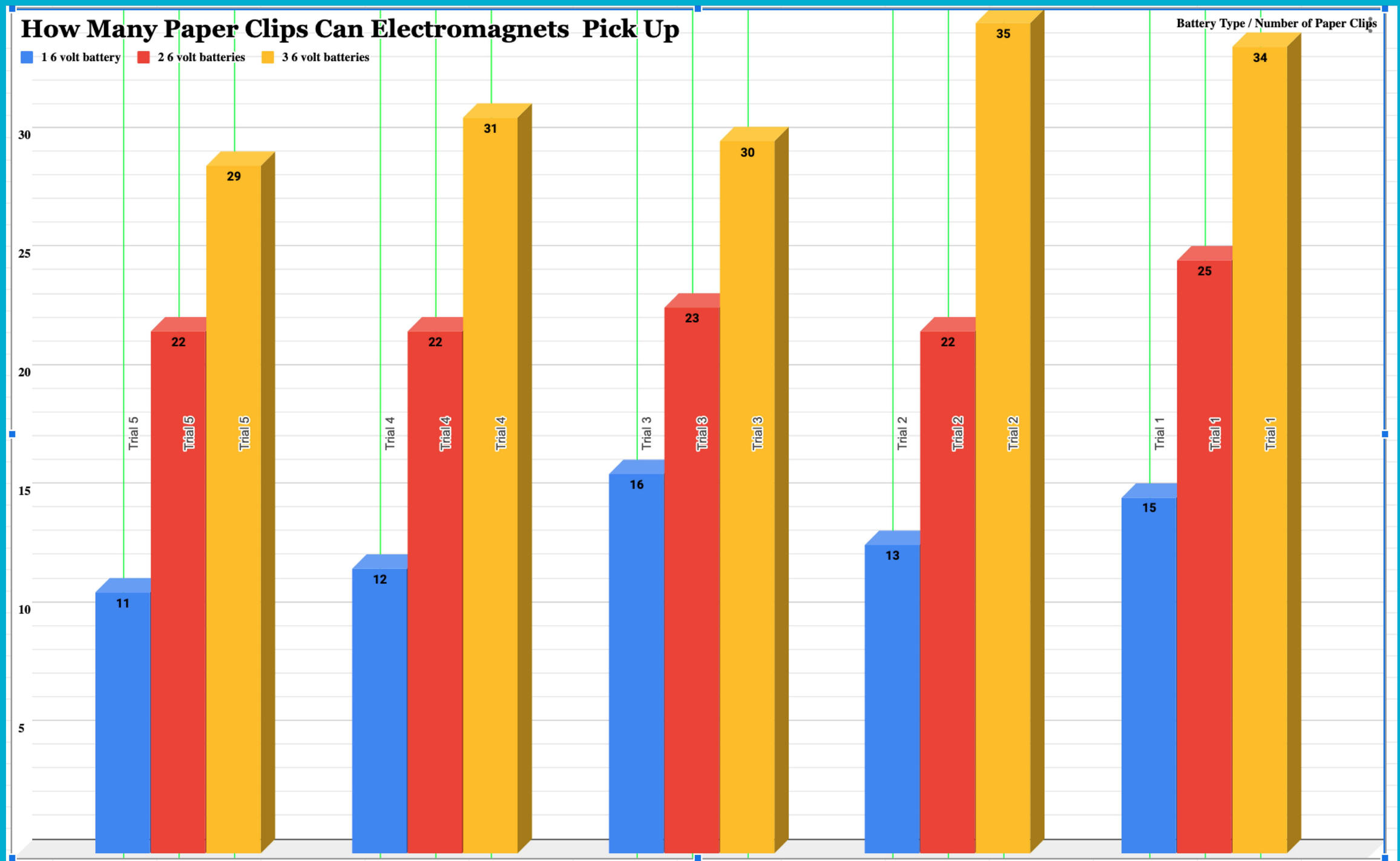
Data Table

Weight held by Magnet 30 paper clipsTrial 4

Weight held by Magnet	Number of paper clips that attach to electromagnet			
		1 6 volt battery	2 6 volt batteries	3 6 volt batteries
	Trial 1	15 paper clips	25 paper clips	34 paper clips
	Trial 2	13 paper clips	22 paper clips	35 paper clips
	Trial 3	16 paper clips	23 paper clips	30 paper clips
	Trial 4	12 paper clips	22 paper clips	31 paper clips
	Trial 5	11 paper clips	22 paper clips	29 paper clips

Graph

This was completed with your math teacher.



Data Analysis

- To determine the strength of the magnetic pull, each paper clip attached to the bolt was counted as each additional battery was connected to it.
- Each paper clip weighs .05 ounces, therefore multiplying that by the total number of paper clips demonstrates the strength of the magnetism.
- With each trial run, there was variation on the number of paper clips that attached to the bolt. This could be that the batteries were draining energy with each trial, or that the wire connections between the batteries and the bolt varied.

- **The experiment conducted proved the hypothesis that the increased amount of voltage applied does increase the amount of magnetism.**


THANK
YOU