ScienceCube

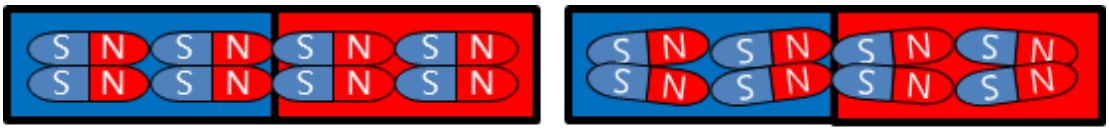
Magnetic Field of a Magnet According to Temperature

Measuring the magnetic field strength of a magnet according to temperature and explaining the relationship between temperature and the magnetic field.

Fundamental Concept

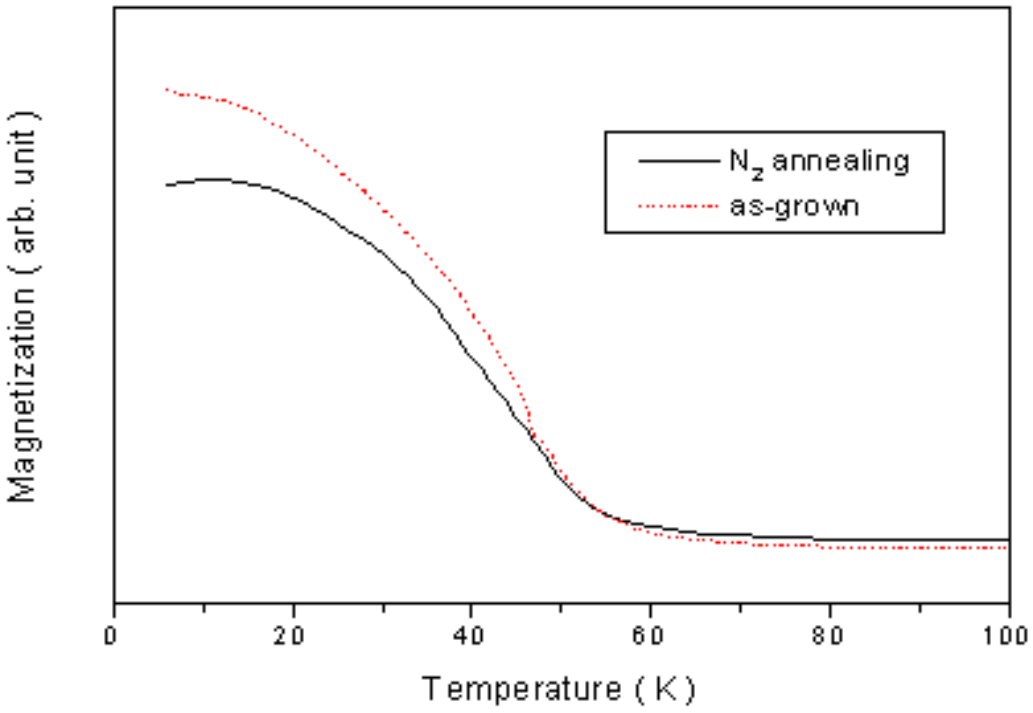
Magnetic Field Strength Changes with Temperature

When the temperature decreases, the magnetic field strength of a magnet increases. A magnet is a material where the atoms are forced to align in one direction through various methods. Therefore, as the temperature increases, the atoms become more free, causing the magnetic field to weaken and the magnetism to disappear.



Cold **Hot**

Conversely, when the temperature decreases, the magnetic field strength increases. A graph of the magnetic force according to the temperature of an actual magnet shows that as the temperature decreases, the area inside the curve, i.e., the energy the magnet can have, increases.



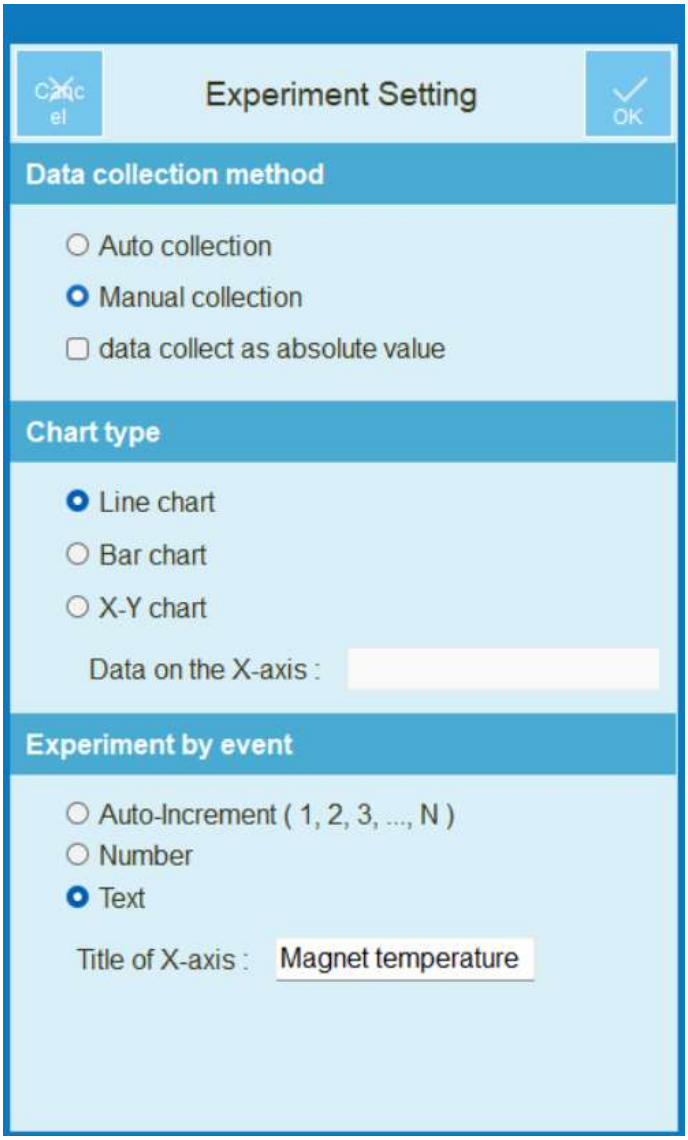
Experiment

Materials Needed

Interface, Science# program (smart device), Magnetic field sensor, Bar magnet, 500 mL beaker (2), Tweezers, Hot water, Cold water

Interface Setup

1. Run Science#.
2. Connect the magnetic field sensor to the interface.
3. Press the button to set up the experimental environment as shown below or press the button for automatic setup.

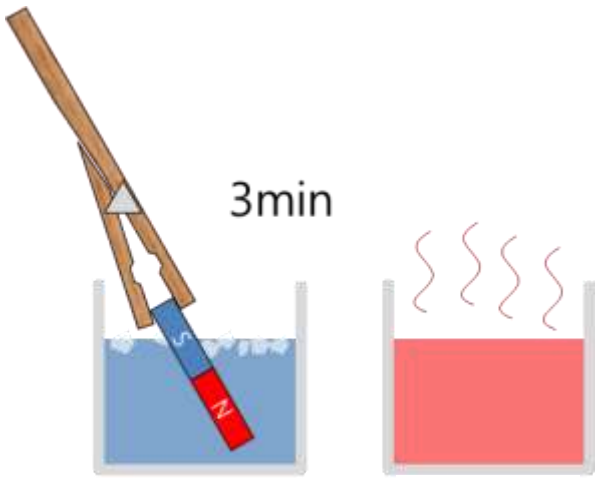


Data Collection

1. Press the button  to set it to bar graph mode.
2. Press the button  to start data collection.
3. Measure the maximum value by placing the end of the magnetic field sensor at the N pole of the magnet at room temperature..

4. When the value stabilizes, press the button  , and when the text input window appears, enter 'room temperature'.

5. Place the magnet in cold water for about 3 minutes and then remove it.



6. Place the end of the magnetic field sensor against the N pole of the cold bar magnet. When the value stabilizes, press the button  to measure the maximum value.
7. When the text input window appears, enter 'cold'.
8. Similarly, place the magnet in hot water for 3 minutes, then remove it and measure the magnetic field strength at the N pole of the hot magnet, entering 'hot' in the text input window.

Data Analysis

Recording Data

1. Measure the maximum magnetic field strength at the N pole of the magnet at different temperatures. Display and compare the results in a bar graph.

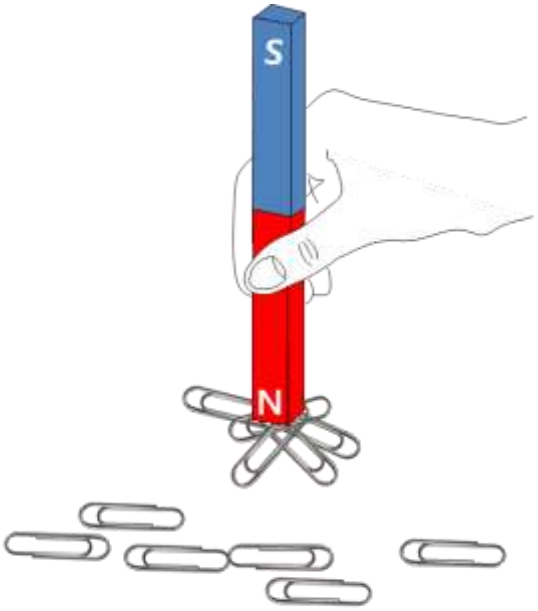
2. Record the measured data in the table below..

Temperature of Magnet	Room Temperature	Cold	Hot
Magnetic Field Strength (G)			

Data Application

1. Based on the experimental results, explain the relationship between the temperature of the bar magnet and the magnetic fie

2. If a bar magnet at room temperature can hold 5 paperclips, explain a temperature-related method to attach more paperclips..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Report
(For Teachers)
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