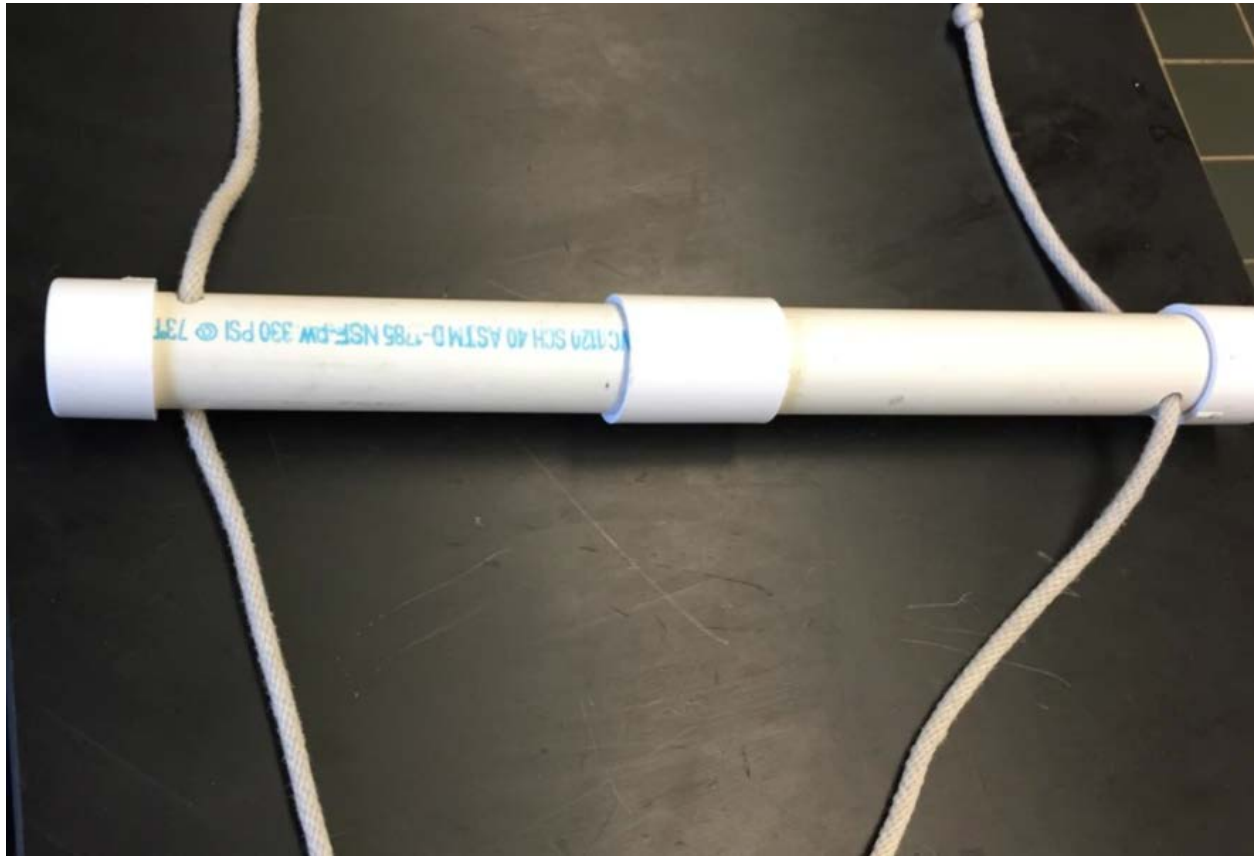


# Scientific Method Stick

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I. Introduction

The main purpose of this study was to observe the Scientific Method Stick and create a model of its inner workings. The purpose of this study was to prepare students for using the scientific method in more complex situations as well as very simple models. It teaches them to be able to use observation skills and background knowledge to create a model of workings they cannot see, and may never be able to, and to make that model as accurate as possible. This study involved using a small selection of simple tools as well as simple senses to hypothesize how all four ropes protruding from the Scientific Method Stick were able to move when a single rope was pulled. The initial hypothesis created stated that two strings crossed upon one another and threaded through the opposite side of the two holes in the pipe on each end.

## II. Design

Based on a simple, swift examination of the Scientific Method Stick, the initial model of the inside consisted of two ropes strung across each other and threaded through the opposite sides (as two fingers from opposite hands could demonstrate), but there was still a clanging about inside when shaken. The first step that would need to be taken would be to label the four ropes with tape to track which ropes were connected. The next step would be to count how many and how large the pieces of metal inside were with the large magnet. One of the later steps would be to have the Method Stick broken (if it could be at all) to help create a clearer image of what was connected by what.

## III. Procedure

- Pull one rope at a time slowly.

- Observe what other ropes moved in response.
- Observe what sounds emitted from inside the PC pipe.
- Write these observations down on the worksheet.
- Hypothesise and draw a model of the inner workings of the Scientific Method Stick.
- Using the magnet, make further observations about what could be inside, and record them on the worksheet.
- Label each of the ropes with tape and differentiate with sharpie. This allows the four ropes to be kept track of and helps confirm which ropes are indeed connected.
- Record these observations.
- Pull two ropes simultaneously.
- Record your observations.
- When your Scientific Method Stick breaks (the ropes appear to not be connected any longer from pulling too swiftly, or pulling multiple ropes at a time, run the magnet along the sides, and record your observations.
- Create a revised model of the inner workings of the Scientific Method Stick.

#### IV. Materials

| Item | Qty. | Function |
|------|------|----------|
|------|------|----------|

|                         |        |                            |
|-------------------------|--------|----------------------------|
| Scientific Method Stick | 1      | Experimental model         |
| Large Magnet            | 1      | Measure metal piece        |
| Masking tape            | 1 roll | Disposable label for ropes |
| Sharpie                 | 1      | Label the tape             |

## V. Results

The Scientific Method Stick consisted of a PC pipe with two rope ends protruding from each end. When one rope was pulled, the rope on same side would be pulled in, but when it could not go any further, the two ropes on the opposite side would be pulled in simultaneously.

When the stick was broken from pulling one rope when all other ropes were in as far as they could go, a magnet was used to find two separate pieces of metal about two inches long that changed position inside the Scientific Method Stick when the ropes on that side were pulled. No longer would one pair of ropes correlate to the movements of the opposite pair.

## VI. Analysis

The first hypothesized model explained how the four ropes were connected and why all four of them moved when one was pulled, but it failed to explain how the Method Stick could be broken, or the role of the metal objects.

The second model consisted of two metal loops (such as key chains or washers) with small openings in the sides to allow for the Scientific Method Stick to break if the opening in each loop lined up and was pulled upon. Through each metal loop was strung one rope with each end passing through one of the holes on the same end of the pipe. This model did explain the metal pieces, and the ability to move all four ropes, but did not explain how the stick could be

broken with a strong pull to a rope at any time. The metal loops would have needed to be perfectly lined up first.

## VII. Conclusion

This study, to create an accurate model of the inner workings of the Scientific Method Stick was carried out. The hypothesis created stated that two ropes crossed over each other and the two ends of each rope were strung once through the opposite holes in the Method Stick. The data showed that there were two metal pieces that could be pulled apart from one another and were critical for the motion of all four ropes at once. This disproved our hypothesis, for in it there was no metal piece acknowledged, and therefore could not have been accurate.

This study demonstrates the significance of collecting data by use of a variety of tools. The simple magnet disproved the hypothesis, and the labeled tape proved that the two pairs of ropes on each end were in reality, the same rope.

There should have been more studies to more deeply understand it and more accurately hypothesize. First of all, the four ropes should have been labeled to track them and gage what ropes were connected. There could have been multiple tests on how liable the ropes were to disconnect, as the stick studied was only broken one time. This one test could not accurately capture enough data to make a definitive conclusion.