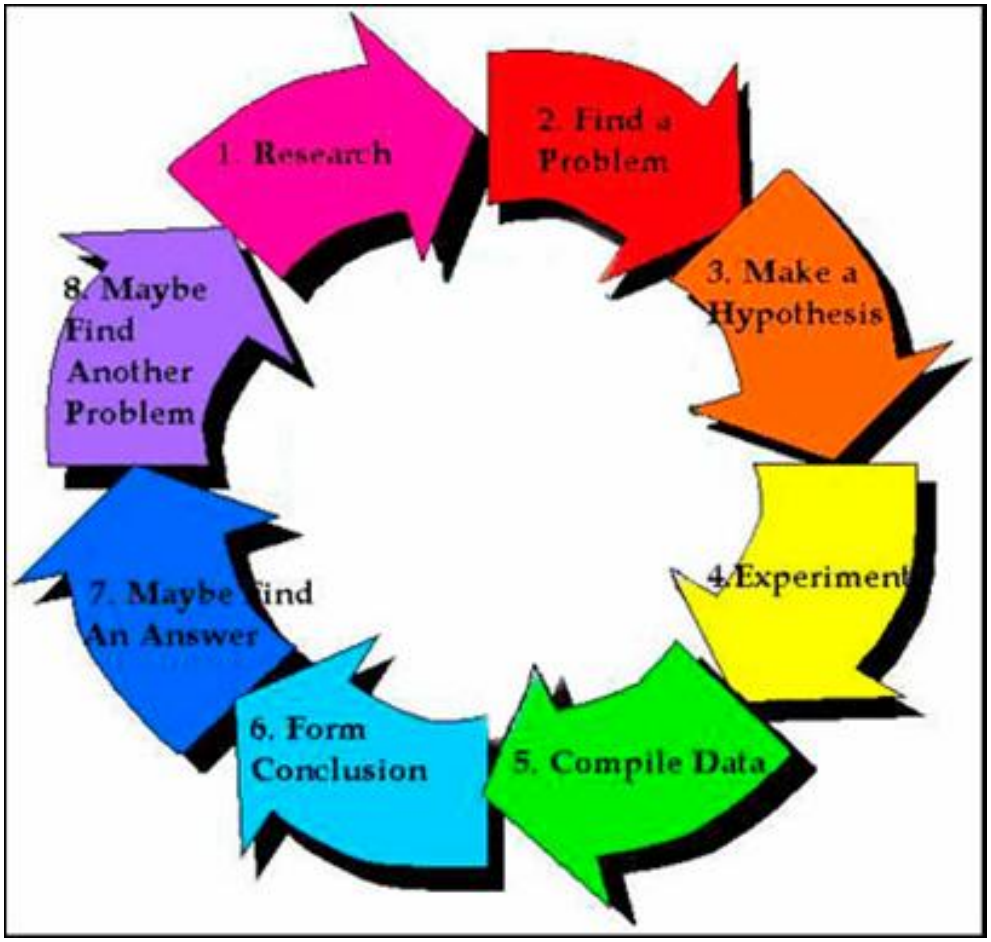
THE SCIENTIFIC METHOD



Steps in an Experiment	An Example
Research: Look into something that you are interested in.	A ball player wonders what factors affect how far a baseball goes when hit. The books talk about how to hit a ball, but don't talk about what makes it go different distances.
Find a Problem: Think about something that needs to be changed or could be improved, or even why something happens.	Do fly balls go different distances on different temperature days?
Make a Hypothesis: a prediction B an educated guess. Based on what you already know, you are making on assumption about what you believe should happen.	Hypothesis: Since cold baseballs would be harder, they will go a longer way after being hit.
Experiment: Design an experiment to test if your hypothesis is correct. Change one thing (a variable) at a time to see what changes and what the effect of that change is. Make sure that you test each change many times to be sure that it wasn't just luck (good or bad) that caused the change.	-To make it easy to control how strongly the balls are hit, instead of hitting them, I'll drop them all from 50 cm. Since smaller balls are easier to cool or heat, I'll use superballs instead of baseballs. -To eliminate luck, I'll drop each temperature of ball 10 times. -To see how temperature affects the bounce, I'll try 5 different temperatures for the balls: -5º C, 5º C, 15º C, 25º C, and 35º C.

Collect Data: Carefully measure and record the changes and even record non-changes. Tables, spreadsheets, databases, and journals are all good helpers in recording your results. If the results can be graphed, that can help. Photographs are also a good way of recording results.	At -5º C the ball bounced 11, 12, 11, 9, 9, 11, 10, 12, 10 and 9 cm. Ave=10.4 cm. _____ At 5º C the ball bounced 13, 11, 13, 12, 14, 9, 11, 13, 13, and 14 cm. Ave=12.3 cm _____ At 15º C the ball bounced 16, 15, 16, 14, 15, 17, 16, 14, 15, and 14 cm. Ave=15.2 cm _____ At 25º C the ball bounced 19, 18, 20, 21, 20, 18, 19, 19, 20, and19 cm. Ave=19.3 cm. _____ At 35º C the ball bounced 22, 21, 24, 25, 21, 22, 23, 20, 22, and 23 cm. Ave=22.3 cm.
Form a Conclusion: What can you decide about your topic? Did your results match your hypothesis? Why or why not? Usually, a conclusion is short and simple: a clear statement of what you found.	Conclusion: The warmer the temperature the more the ball bounced. This did not match my hypothesis that the cooler balls would bounce more. Maybe because the plastic of the balls becomes more flexible and springy as it softens with heat. Since the hypothesis was wrong, I need to test a different idea (see below).
Maybe Find An Answer or Another Problem: Sometimes your hypothesis was correct and you have your answer. Other times your experiment just shows you another problem or something else to think about. That's actually good, since you can carry on with your experiment. That's what usually happens in science and why the scientific method diagram continues in a circle. If you do see another problem, do some research, think about a new hypothesis for the new problem and continue with the circle above.	To test if the balls become more elastic (spring back to shape) I'll make another experiment. I'll re-use the same balls at the same temperatures, but this time I'll put a set weight onto each and see how much they compress (squash). Then I'll take the weight off and see how much they come back to their original shape in 10 seconds. My new hypothesis is that the warmer the temperature of the balls, the faster they will spring back to shape.