

THE SCIENTIFIC METHOD IN ACTION

Remember that in constructing the snow goggles and experimenting with their FOV, we used the scientific method:

A scientist:

- 1) states a problem;
- 2) forms a hypothesis;
- 3) experiments;
- 4) observes the results of an experiment;
- 5) revises the hypothesis or concludes that it is acceptable.

A. Read the MESSENGER Information Sheet.

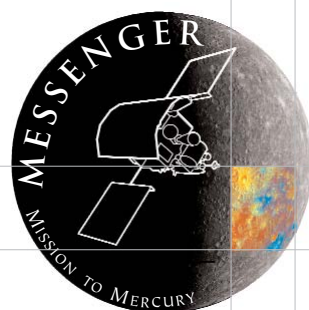
B. Now, let's imagine the following:

SITUATION ONE: The MESSENGER spacecraft flying to the planet Mercury uses solar cells to generate electricity. However, as the spacecraft gets closer to the Sun, it receives more sunlight than it can handle. Smaller solar cells are not the answer, since the Sun still heats up the cells. MESSENGER will be exposed to 22 times the sunlight that it would on the surface of Earth.

PROBLEM ONE: How can MESSENGER deal with all the excess sunlight it receives as it travels around Mercury, the closest planet to the Sun?

SITUATION TWO: The MESSENGER spacecraft studying the planet Mercury uses several different instruments to observe the planet. However, there is so much light coming from the Sun and from the surface of the planet that the instruments can receive more light than they can handle.

PROBLEM TWO: How can MESSENGER's instruments deal with all the excess light so that they get enough light to make the observations but not so much that it would damage them?



C. Use steps one and two of the scientific method to come up with ways to overcome these problems.

Write your notes below.

D. Sometimes we cannot do hands-on laboratory experiments to test our hypothesis. One way that scientists test hypotheses is by computer simulations. Another way is to think of all possible situations the suggested solution could encounter and see whether it would stand up to them. We use this last approach here in the next steps.

E. State your problem and hypothesis. Have other students comment and suggest alternatives. These simulated experiments now take the place of real-life experiments.

F. Once you have thought things through, consider: Do you want to revise your hypothesis? If so, write revisions below. Otherwise, accept your solution, and explain why.

The teacher will tell you the MESSENGER mission designers' solution to the problem.

How does their solution compare with yours?

