The Scientific Method ("Organized common sense"-Claude Villee, biologist):

- **Observing and stating a problem**

    -a scientist makes an observation, which then leads to a question (or the question

    comes first, because science often begins with curiosity)

- **Forming a hypothesis**

    -a tentative explanation

    -allows for preliminary predictions pending experimentation (*If ___*, *then___*)

    -A *hypothesis* MUST BE TESTABLE!

- **Testing the hypothesis**

    -Design an experiment changing only one variable at a time. Include a *control*, which

    behaves predictably.

    -Gather data (observations, information, facts); ideally, data is collected objectively.

- **Recording and analyzing data**

    -Data may be recorded in tables, for example.

    -Graphs or charts are visual representations of data, showing patterns

    (if any); i.e., *results*.

- **Forming a conclusion**

    - A hypothesis may be rejected or supported (but, NEVER proven) by interpretation

    of results.

    -may introduce new questions→new hypotheses→new experiments, etc.

The preceding 5 bulleted items are steps taken in a critical, systematic approach to problem solving (hypothetico-deductive reasoning): e.g., An auto mechanic might take these steps to determine why a car is not working*.

SCIENCE has at least 2 additional requirements: 1)NOVELTY and 2) PUBLICATION.

- **Replication of work**

    - by the original experimenter, or by other researchers from the publication

    - Scientists should in fact try to falsify hypotheses, using the process-of-elimination to

    isolate the most useful models.

Consistent, carefully interpreted results may allow a scientist to describe results in a **natural law:** HOW nature behaves (examples: law of gravitation, laws of thermodynamics and, yes, evolution).
A **theory**, however, attempts to describe WHY nature behaves as it does by integrating (or unifying) multiple facts, and the laws that are based on them, into a working model (examples: string theory, theory of natural selection, and good old plate tectonics—which is not that old). This model is used to make dependable predictions. A theory can be proven wrong, and is always open to revision.

Science is historical and progressive. *Automotive engineering is indeed science.