http://www.scientificmethod.com/principles.html
. . . The Master Method of Knowledge

Characteristics of The Scientific Method:

Name	Denotes stages, procedural theories and the system of science.
Purpose & Objective	To obtain, refine, extend and apply knowledge through problem origination, prevention, solution and challenge of solution. Curiosity, a healthy skepticism, etc. finds the problem.
Division of Method	The master method of all human knowledge methods.
Stages	The general pattern of the major types of mental activity usually aided by physical actions.
Sequential	There are 11 major stages that are sequential and progressive. These stages are arranged in order of usual use but may be followed with flexibly.
Repeatable	Stages are so basic and repeatable that they are not likely to change.
Range	Universal to all nature and human activity.
Reliability Factor	Most reliable of all knowledge methods.
Application	Usually follow techniques, procedural principles and theories, high personal attributes and thinking skills of the research communities. Flexibility or “anything goes” is often essential.

The Value of Method

In the *Concept of Method*, Justus Buchler (1985) refers to the common expression “the power of a method.” Every day you constantly use methods and this report will help you better use the power of a method to improve your problem solving ability.

Without method, we are left with chance. Chance is the opposite of method and we would have a very disorganized world without methods and techniques. But, what is “Method”? Unfortunately method is a very ambiguous word. It’s so ambiguous that it has been widely misused and misinterpreted in the fields of science and knowledge.

There is no better example of the power of a method than the results produced by the scientific method throughout the development of modern civilization. I did a search of the literature on the value of method. This is what various authors emphasize:

The Advantages of Method

Clarifies our thoughts	*Uses human potential*

Ends aimless wandering	*Aids in transfer of learning*
Guides us to new knowledge	*Trains for change and innovation*
Helps ideas gather shape	*Is a repeatable procedure*
Organizes our thoughts	*Encourages thinking*

The Opposite of Method is Chance

Wasted time	*Quick fixes*
Wrong analysis	*Wasted energy*
Haphazard guesses	*Wandering aimlessly*
No Solutions	*Mistakes and errors*
Confusion	*Misdirection*

. . . A Universal Method for All Domains

It is the master method from which sprang many other methods that were given other names but the stages of these methods are the same.

These other methods may have special characteristics, such as being aimed at a certain domain or special purpose. They also may use special, creative, non-logical, logical and technical methods as well as the general ones, but the stages to reliable knowledge are the same.

Some authors may name different terms for the stages and present a shorter formula.

Learn SM-14 and you learn the formula for all of the methods listed below

Problem solving	*Decision making*	*Inquiry*
Creative problem solving	*Invention*	*Research*
Scientific management	*Design & Engineering*	*Planning*
Investigation	*Change*	*Scholars*
Medical diagnostics	*Technological design*	*Operation research*

This is the Golden Age of Knowledge

Estimated years it took for knowledge to double*

1750 - 1900: 150 yrs

1900 - 1950: 50 years

1950 - 1960: 10 years

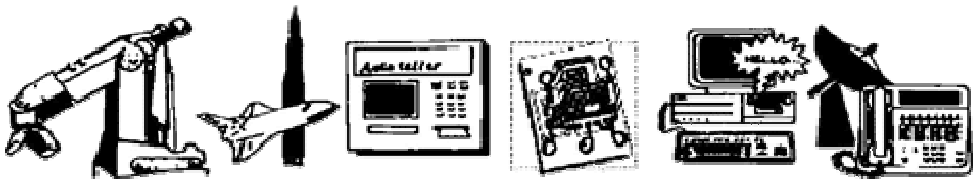
Since 1960: Every 5 years

Projection! By the Year 2020
Knowledge Will Double Every 73 Days!

We need to study and standardize on the basic method by which we obtain, refine, extend and apply knowledge . . . which is, SM-14.

**Reported at the Teacher Education for 21st Century Conference (1992)*

This Is An Age of Technology Growth



Robots **Space** **Automated Tellers**

Miniaturization **Talking Computers** **Multimedia Communication**

High-paying unskilled jobs are disappearing—skilled, innovative, creative, problem solving, adaptable workers are needed!

. . The Greatest Idea of All Times!

From Bacon and Descartes in the 17th century, and from numerous other great minds of the 18th, 19th, and 20th centuries, The Scientific Method Today brings you the most reliable knowledge of the scientific method ever summarized in one publication.

Praise of SM-14 Formula . . .

"Your proposal to teach SM-14 not only to young scientists but also as part of general education is excellent, and I wish you success."

-- Dr. W.I.B. Beveridge, author of the famous, and often cited, books, *The Art of Scientific Investigation* (1957) and *Seeds of Discovery* (1980)

Praise Earned by The Scientific Method . . .

"It has often been said that the greatest discovery in science was the discovery of the scientific method of discovery."
-- Dr. James K. Feibleman, author of Scientific Method (1972)

"The greatest invention of the nineteenth century was the invention of the method of invention."
-- A.N. Whitehead (1926)

. . . A Complete Act of Thought

With knowledge doubling at a faster rate than ever, it would greatly help everyone if they were taught clear and simple guide for a complete act of thought.

From my research, I believe that such a guide is most commonly called "The Scientific Method" (also called the general pattern of the scientific method). It was developed by many, but most accurately by scientists (an example is SM-14).

The literature contains many formulas for problem solving, creative problem solving, decision making, and other similar terms. While these are "acts of thought," they usually are not complete acts of thought, because the formulas do not usually cover problem origination, challenge of solution, or suspend judgment. They all contain just parts of SM-14.

> Wallas, in *Art of Thought* (1926), gives a formula for the "Art of Thought:"
>
> 1. preparation
> 2. incubation
> 3. illumination
> 4. verification
>
> This has been widely quoted but is too short for a complete act-of-thought formula for teaching purposes.

Dewey's guide to his "analysis of a complete act of thought" has been widely cited. Professor T.L. Kelley of Harvard, in Scientific Method: Its Function in Research and in Education (1932), abstracts Dewey's guide in a little different way than most authors,

listing the “steps” shown below (he added #8, feeling it was needed). Also shown is a comparison of these “steps” to the stages of SM-14.

Dewey’s Complete Act of Thought *as abstracted by Kelley*	Compare To The SM-14 Formula
1. A felt difficulty. **2.** A definition of the difficulty. **3.** A tentative solution. **4.** A mental elaboration of the solution, leading to additional tentative solutions and elaboration, if felt necessary, finally leading to #5. **5.** The belief that the solution is all right **6.** An experimental verification **7.** An appraisal of the experimental findings leading to acceptance of mental solution and a decision for immediate conductor to rejection and a reinstatement of a felt difficulty, The process is continued until a verified solution which is immediately serviceable is obtained. **8.** A forward look to, or mental picturing of, future situations to which the present solution is pertinent	**1.** Curious Observation **2.** The Problem **3.** Goals, Planning **4.** Search—Explore **5.** Alternate Solutions **6.** Evaluate Evidence **7.** Guess—Hypothesis **8.** Challenge Hypothesis **9.** Reach Conclusion **10.** Take Action **11.** Action Methods **13.** Procedural Principles **14.** .Attributes—Thinking

Note: *“A Tentative Solution” was not included as a separate stage in SM-14 as it may occur at #1, in between 1 & 2, at 2 or 3, and normally one or more at 4 & 5.*

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