Scientific Attitude Quotient (SAQ)

Participant Details

Gender *

Date of Birth *

Name of the Participant *

First

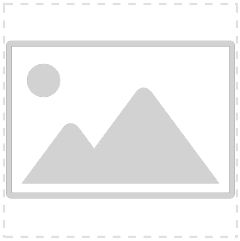
Last

Upload a high resolution photograph of yours

sample.png

Scientific Attitude Quotient (SAQ)

Upload the image of an Official Identity Card



sample.png

Mobile Phone *

Email *

Digital Footprints

Twitter Handle (If Any)

LinkedIN Profile (If Any)

Facebook Profile (If Any)

Institution of Study *

Website of Institution of Study *

Class of Study *

Faculty Coordinator Details

Your School would have deputed a Faculty Coordinator for this Activity. S/he would be involved as a part of the Assessment Process.

Scientific Attitude Quotient (SAQ)

Faculty Coordinator's Name *

First Last

EVS Teacher's Email ID *

Faculty Coordinator's Phone *

Mother's Details

Mother's Name *

First Last

Mother's Email ID *

Mother's Phone *

Organization

Jot Down the Key Elements of SCIENTIFIC ATTITUDE Ingrained in You by your MOTHER

Designation

Father's Details

Father's Name *

First Last

Scientific Attitude Quotient (SAQ)

Father's Email ID *

Father's Phone *

Organization

Designation

Jot Down the Key Elements of SCIENTIFIC ATTITUDE Ingrained in You by your FATHER

Guardian's Details

In case the Guardian is other than Mother/Father

Guardian's Name

First Last

(If someone other than Mother/Father is the Guardian)

Relationship with the Guardian

Guardian's Email ID

Guardian's Phone

Registration Fee

A nominal registration fee of Rs 1008 has been kept to cover for the administrative & coordination expenses of this initiative....

#saq2023 *

₹ 1008.00

Scientific Attitude Quotient (SAQ)

Scientific Attitudes 101

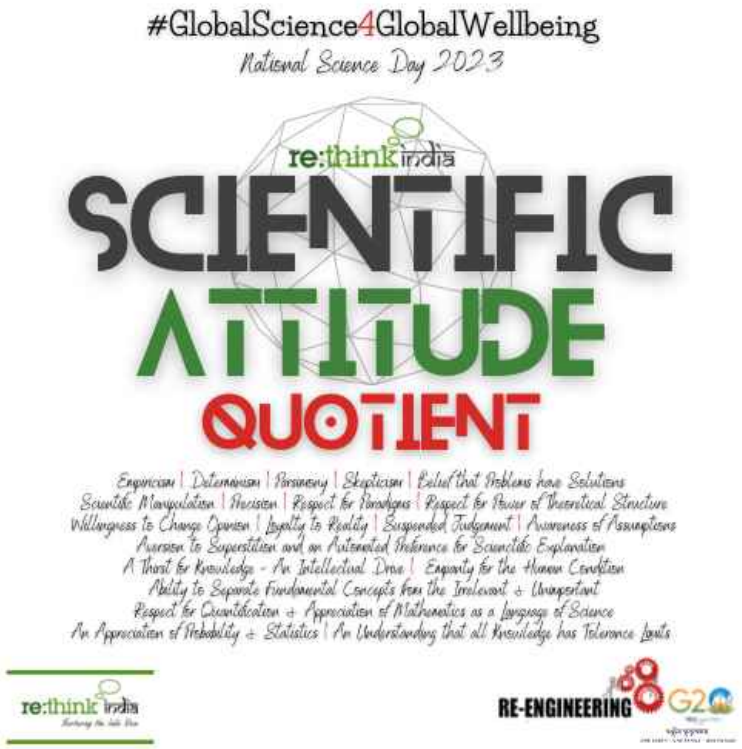
Modified from Bronowski (1978), Diederich (1967) and Whaley & Surratt (1967). Taken from The Kansas School Naturalist, Vol. 35, No. 4, April 1989.

Study them in-Depth before attempting the Next Sections...

Scientific Attitude Quotient (SAQ)

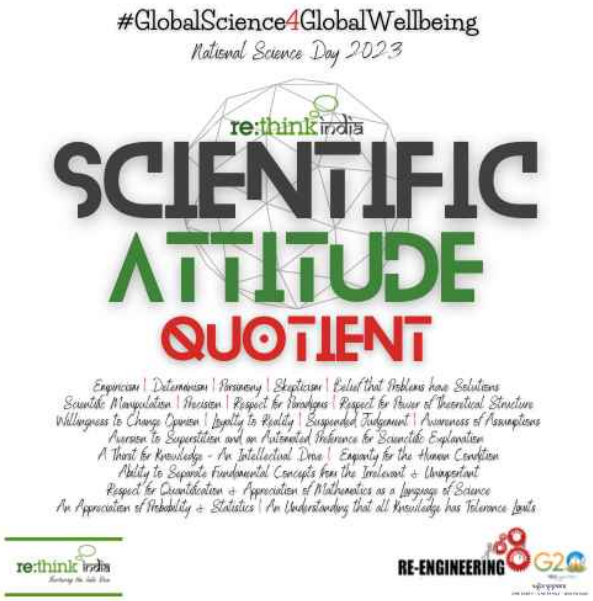
1. **Empiricism**.
   Simply said, a scientist prefers to "look and see." You do not argue about whether it is raining outside--just stick a hand out the window. Underlying this is the belief that there is one real world following constant rules in nature, and that we can probe that real world and build our understanding--it will not change on us. Nor does the real world depend upon our understanding--we do not "vote" on science.
2. **Determinism**.
   "Cause-and-effect" underlie everything. In simple mechanisms, an action causes a reaction, and effects do not occur without causes. This does not mean that some processes are not random or chaotic. But a causative agent does not alone produce one effect today and another tomorrow.
3. **A Belief that Problems have Solutions**.
   Major problems have been tackled in the past, from the Manhattan Project to sending a man to the moon. Other problems such as pollution, war, poverty, and ignorance are seen as having real causes and are therefore solvable--perhaps not easily, but possible.
4. **Parsimony**.
   Prefer the simple explanation to the complex: when both the complex earth-centered system with epicycles and the simple Copernican sun-centered system explain apparent planetary motion, we choose the simpler.
5. **Scientific Manipulation**.
   Any idea, even though it may be simple and conform to apparent observations, must usually be confirmed by work that teases out the possibility that the effects are caused by other factors.
6. **Skepticism**.
   Nearly all statements make assumptions of prior conditions. A scientist often reaches a dead end in research and has to go back and determine if all the assumptions made are true to how the world operates.
7. **Precision.**
   Scientists are impatient with vague statements: A virus causes disease? How many viruses are needed to infect? Are any hosts immune to the virus? Scientists are very exact and very "picky".
8. **Respect for Paradigms.**
   A paradigm is our overall understanding about how the world works. Does a concept "fit" with our overall understanding or does it fail to weave in with our broad knowledge of the world? If it doesn't fit, it is "bothersome" and the scientist goes to work to find out if the new concept is flawed or if the paradigm must be altered.
9. **A Respect for Power of Theoretical Structure.**
   Diederich describes how a scientist is unlikely to adopt the attitude: "That is all right in theory but it won't work in practice." He notes that theory is "all right" only if it does work in practice. Indeed the rightness of the theory is in the end what the scientist is working toward; no science facts are accumulated at random. (This is an understanding that many science fair students must learn!)
10. **Willingness to Change Opinion**.
    When Harold Urey, author of one textbook theory on the origin of the moon's surface, examined the moon rocks brought back from the Apollo mission, he immediately recognized this theory did not fit the hard facts laying before him. "I've been wrong!" he proclaimed without any thought of defending the theory he had supported for decades.
11. **Loyalty to Reality.**
    Dr. Urey above did not convert to just any new idea, but accepted a model that matched reality better. He would never have considered holding to an opinion just because it was associated with his name.
12. **Aversion to Superstition and an Automatic Preference for Scientific Explanation.**
    No scientist can know all of the experimental evidence underlying current science concepts and therefore must adopt some views without understanding their basis. A scientist rejects superstition and prefers science paradigms out of an appreciation for the power of reality based knowledge.
13. **A Thirst for Knowledge - an Intellectual Drive**.
    Scientists are addicted puzzle-solvers. The little piece of the puzzle that doesn't fit is the most interesting. However, as Diederich notes, scientists are willing to live with incompleteness rather than "...fill the gaps with off-hand explanations."
14. **Suspended Judgment.**
    Again Diederich describes: "A scientist tries hard not to form an opinion on a given issue until he has investigated it, because it is so hard to give up opinion already formed, and they tend to make us find facts that support the opinions... There must be however, a willingness to act on the best hypothesis that one has time or opportunity to form."
15. **Awareness of Assumptions**.
    Diederich describes how a good scientist starts by defining terms, making all assumptions very clear, and reducing necessary assumptions to the smallest number possible. Often we want scientists to make broad statements about a complex world. But usually scientists are very specific about what they "know" or will say with certainty: "When these conditions hold true, the usual outcome is such-and-such."
16. **Ability to Separate Fundamental Concepts from the Irrelevant or Unimportant.**
    Some young science students get bogged down in observations and data that are of little importance to the concept they want to investigate.
17. **Respect for Quantification and Appreciation of Mathematics as a Language of Science.**
    Many of nature's relationships are best revealed by patterns and mathematical relationships when reality is counted or measured; and this beauty often remains hidden without this tool.
18. **An Appreciation of Probability & Statistics.**
    Correlations do not prove cause-and-effect, but some pseudoscience arises when a chance occurrence is taken as "proof." Individuals who insist on an all-or-none world and who have little experience with statistics will have difficulty understanding the concept of an event occurring by chance.

19. **<u>An Understanding that all Knowledge has Tolerance Limits.</u>**
    All careful analyses of the world reveal values that scatter at least slightly around the average point; a human's core body temperature is about so many degrees and objects fall with a certain rate of acceleration, but there is some variation. There is no absolute certainty.
20. **Empathy for the Human Condition.**
    Contrary to popular belief, there is a value system in science, and it is based on humans being the only organisms that can "imagine" things that are not triggered by stimuli present at the immediate time in their environment; we are, therefore, the only creatures to "look" back on our past and plan our future. This is why when you read a moving book, you imagine yourself in the position of another person and you think "I know what the author meant and feels." Practices that ignore this empathy and resultant value for human life produce inaccurate science. (See Bronowski for more examples of this controversial "scientific attitude.")



Self-Rate Your Scientific Attitude *

	Need to Inculcate	Significant	High
Empiricism *			
Determinism *			
Belief that Problems have Solutions *			
Parsimony *			
Scientific Manipulation *			
Skepticism *			
Precision *			
Respect for Paradigms *			
Respect for Power of Theoretical Structure *			
Willingness to Change Opinion *			
Loyalty to Reality *			
Aversion to Superstition and An Automatic Preference for Scientific Explanation *			
A Thirst for Knowledge - An Intellectual Drive *			
Suspended Judgement *			
Awareness of Assumptions *			
Ability to Separate Fundamental Concepts from the Irrelevant or Unimportant *			
Respect for Quantification & Appreciation of Mathematics as a Language of Science *			
An Appreciation of Probability & Statistics *			
An Understanding that All Knowledge has Tolerance Limits *			
Empathy for the Human Condition *			



1. Your very personal experiments & experiences in **EMPIRICISM**

There is one real world following constant rules in nature, and that we can probe that real world and build our understanding--it will not change on us. Nor does the real world depend upon our understanding--we do not "vote" on science.

2. Your personal understanding about **DETERMINISM** - "Cause-and-effect" underlie everything.

An action causes a reaction, and effects do not occur without causes. This does not mean that some processes are not random or chaotic. But a causative agent does not alone produce one effect today and another tomorrow.

3. What bolsters your belief that **Problems have Solutions**. Give Examples from Real Life.

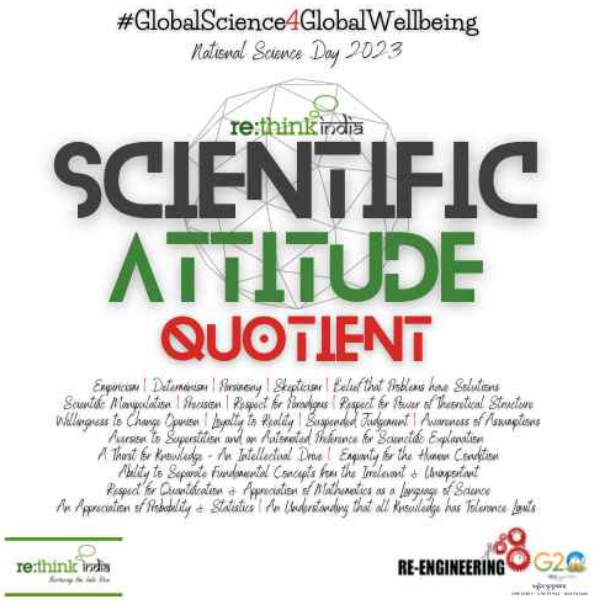
All Problems such as pollution, war, poverty, and ignorance are seen as having REAL CAUSES and are therefore SOLVABLE--perhaps not easily, but possible.

4. What makes you **PARSIMONIOUS** - To Prefer the Simple Explanation to the Complex?

When both the complex earth-centered system with epicycles and the simple Copernican sun-centered system explain apparent planetary motion, we choose the simpler.

5. How often do you indulge in **Scientific Manipulation**?

Any idea, even though it may be simple and conform to apparent observations, must usually be confirmed by work that teases out the possibility that the effects are caused by other factors.



6. Elucidate your **Scientific Skepticism** in Practice with Examples from Real Life

Nearly all statements make assumptions of prior conditions. A scientist often reaches a dead end in research and has to go back and determine if all the assumptions made are true to how the world operates.

7. How PRECISE are You in Real Life? Explain with some Real Life Examples.

Scientists are impatient with vague statements: A virus causes disease? How many viruses are needed to infect? Are any hosts immune to the virus? Scientists are very exact and very "picky".

8. Elaborate upon some of the **PARADIGMS** which you use in your Day to Day Usage...

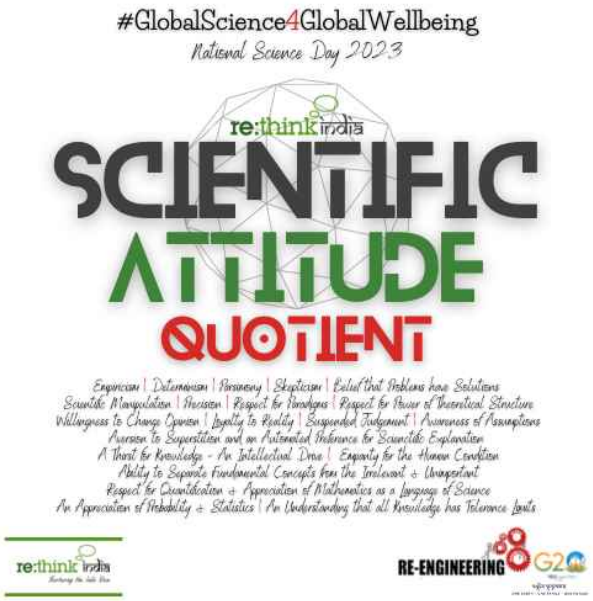
A paradigm is our overall understanding about how the world works. Does a concept "fit" with our overall understanding or does it fail to weave in with our broad knowledge of the world?

9. Elaborate upon the power of **Theoretical Structure** whereby it had to be altered owing to Practical Outcomes. Give Example(s) *

Theory is "all right" only if it does work in practice. Indeed the rightness of the theory is in the end what the scientist is working toward; no science facts are accumulated at random.

10. How Willing you remain to **Change Opinion(s)** in the Wake of Changed Facts/Realities. Establish.

When Harold Urey, examined the moon rocks brought back from the Apollo mission, he immediately recognized his theory did not fit the hard facts laying before him. "I've been wrong!" he proclaimed.



11. Establish your **Loyalty to Reality** with Real Life Examples.

Dr. Urey above did not convert to just any new idea, but accepted a model that matched reality better. He would never have considered holding to an opinion just because it was associated with his name.

12. Explain your personal **Aversion to Superstition** and an automatic preference for **Scientific Explanation** with Real Life Examples.

No scientist can know all of the experimental evidence underlying current science concepts and therefore must adopt some views without understanding their basis, rejects superstition and prefers science paradigms.

13. Explain your **Thirst for Knowledge** - your **"Intellectual Drive."**

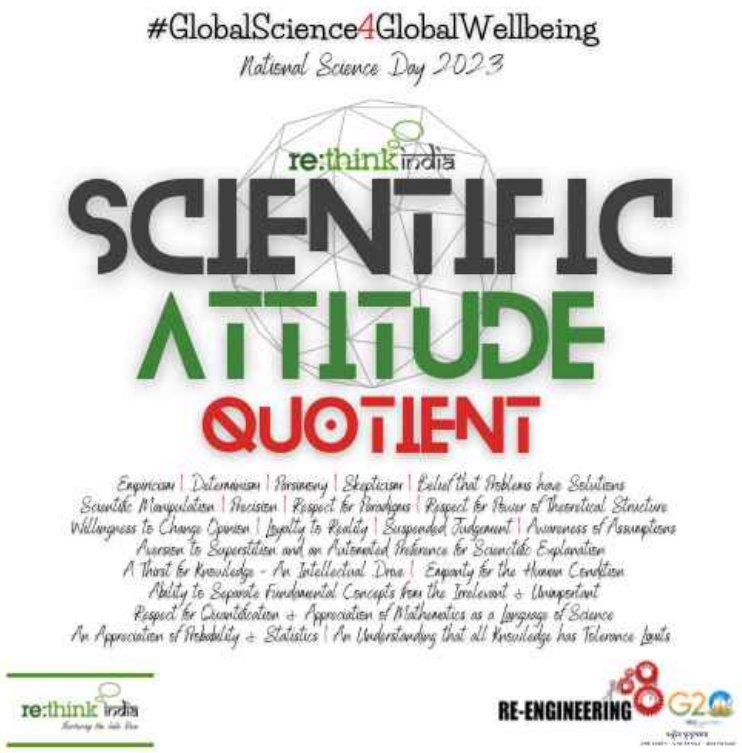
Scientists are addicted puzzle-solvers. The little piece of the puzzle that doesn't fit is the most interesting. Scientists are willing to live with incompleteness rather than "...fill the gaps with off-hand explanations."

14. **Suspended (Restrained) Judgment** as in Your willingness to act on the best Hypothesis that you had the time or opportunity to form.

"A scientist tries hard not to form an opinion on a given issue until he has investigated it, because it is so hard to give up opinion already formed, and they tend to make us find facts that support the opinions..."

15. How Aware you Remain about your **Assumptions** in the process of an Exploration/Analysis?

A Good Scientist starts by defining terms, making all assumptions very clear, and reducing necessary assumptions to the smallest number possible. Scientists are very specific about what they "know" or will say with certainty.



16. Explain your **Ability to Separate Fundamental Concepts** from the irrelevant or unimportant through a Case.

Some young science students get bogged down in observations and data that are of little importance to the concept they want to investigate.

17. Entail your **Respect for Quantification** & Appreciation of Mathematics as a Language of Science.

Many of nature's relationships are best revealed by patterns and mathematical relationships when reality is counted or measured; and this beauty often remains hidden without this tool.

18. Elaborate upon your Appreciation for the precepts of **Probability & Statistics**

Correlations do not prove cause-and-effect, but some pseudoscience arises when a chance occurrence is taken as "proof." Therefore an appreciation of the precepts of Probability & Statistics is important.

19. Explain your Understanding that **All Knowledge has Tolerance Limits** with Examples...

All careful analyses of the world reveal values that scatter at least slightly around the average point; a human's core body temperature is about so many degrees for example...

20. What constitutes your **Empathy for the Human Condition**

Contrary to popular belief, there is a value system in science, and it is based on humans being the only organisms that can "imagine" things that are not triggered by stimuli present at the immediate time in their environment.