

Please watch: <https://www.youtube.com/watch?v=MXLIkk67prY>

The Characteristics of Scientific Knowledge

What Investigations do Scientific Investigations Involve?

Scientific investigations involve observing, collecting empirical evidence, using logical reasoning, inferring and applying imagination.

Observing

Observing means using one or more of your senses to gather information.

Observing is the process of gathering information from which scientific conclusions are drawn.

Data

Specific information that is recorded during observations is called data.

Data are facts, figures and other evidence collected during a scientific investigation.

When data are collected in a precise logical and consistent manner the data are called **empirical evidence**.

Empirical evidence is data and observations that have been collected through scientific processes that also explain a particular observation.

All scientific investigations involve the collection of relevant empirical evidence to support researchers' conclusions.

Using Logical Reasoning

Scientists collect data, review their figures and look for patterns that explain their observations. Using logic and reason, they can then draw a conclusion based on the pattern they see.

Scientists use logical reasoning to examine their data and reach conclusions that explain their observations.

Inferring

Inferring means explaining observations in a logical manner. It does not mean guessing wildly.

Scientific investigations involve inferring or basing conclusions on reasoning from what is already known.

Applying Imagination

Applying Imagination is an important element of scientific investigation. It helps scientists to design experiments. It also allows scientists to solve scientific problems and to see patterns in data that no one else has noticed.

Objective and Subjective Reasoning

Objective reasoning is based on evidence. Because scientific reasoning relies on gathering and evaluating evidence.

Subjective reasoning is based on personal feeling or personal values.

Opinions are personal feelings.

Science Versus Pseudoscience

Pseudoscience is a set of beliefs that may make use of science but whose conclusions and predictions are not based on observation, objective reasoning or scientific evidence.

Science is based on empirical evidence and well reasoned interpretation of data.

Pseudoscience may make use of scientific data. But the conclusions of pseudoscience are based on either subjective reasoning or faulty beliefs rather than on careful examination of evidence.

Non-scientific Ways of Knowing

Understanding other aspects of the world requires training outside of science.

Philosophy (the meaning of life) reasons for historical events, appreciating works of art and music can not be explained or toughed by science.

What Characterizes Science and Its Methods?

Science and its methods characterized by and ordered approach to learning about the world. This approach relies on objective analysis of data obtained through careful observation. Because scientific investigations are well-reasoned, they can be repeated by other scientists to confirm results.