Scientific Knowledge

The purpose of science is to create scientific knowledge

Scientific Knowledge

refers to a generalized body of **laws** and **theories** to explain a phenomenon or behavior of interest that are acquired using the scientific method.

Scientific Knowledge

Laws are observed patterns of phenomena or behaviors, while **theories** are systematic explanations of the underlying phenomenon or behavior.

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Law example: in physics, the Newtonian Laws of Motion describe what happens when an object is in a state of rest or motion (Newton's First Law), what force is needed to move a stationary object or stop a moving object (Newton's Second Law), and what happens when two objects collide (Newton's Third Law).

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Collectively, the three laws constitute the basis of classical mechanics – a theory of moving objects.

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Theory example: the theory of optics explains the properties of light and how it behaves in different media, electromagnetic theory explains the properties of electricity and how to generate it, quantum mechanics explains the properties of subatomic particles, and thermodynamics explains the properties of energy and mechanical work.

Scientific Knowledge

The goal of scientific research is to discover **laws** and postulate **theories** that can explain natural or social phenomena ➔ build scientific knowledge.

Scientific Knowledge

It is important to understand that this knowledge may be imperfect or even quite far from the truth.

Scientific Knowledge

Sometimes, there may not be a single universal truth, but rather an equilibrium of “multiple truths.”

Scientific Knowledge

We must understand that the theories, upon which scientific knowledge is based, are only explanations of a particular phenomenon (resulting in poor or good theories), as suggested by a scientist.

The progress of science is marked by our progression over time from poorer theories to better theories, through better observations using more accurate instruments and more informed logical reasoning

We arrive at scientific laws or theories through a process of logic and evidence.
Logic (theory) and evidence (observations) are the two, and only two, pillars upon which scientific knowledge is based.

In science, theories and observations are interrelated and cannot exist without each other.

Theories provide meaning and significance to what we observe, and observations help validate or refine existing theory or construct new theory. Any other means of knowledge acquisition, such as faith or authority cannot be considered science.