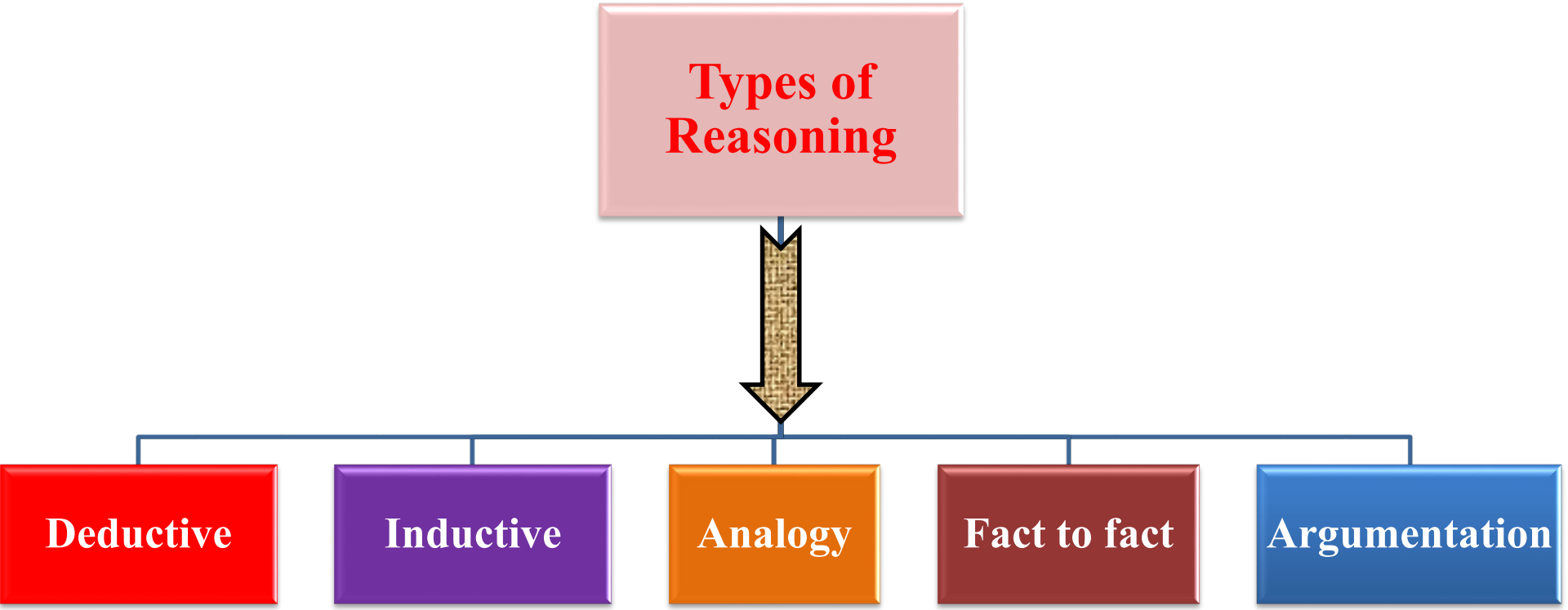

Types of Reasoning
Deductive
Inductive
Analogy
Fact to fact
Argumentation

Deduction is a form of reasoning:

1-which goes from the general to the specific and involve formulating one or more **hypotheses** and then testing them against reality**.**

Deduction yields particularizations.

Thory ➡ Hypothesis ➡ Observation ➡ Confirmation

2-In a deductive reasoning :

-It starts with a theory about a topic of interest

-Refine this theory through specific hypotheses that can be tested

-Further refine by collecting observations to address these hypotheses

-Test the hypotheses with the specific data collected to confirm (or not) the original theory.

It involves applying a general rule to a specific case: it is a logical activity that allows one to use a model, a law, a theory to explain a fact or anticipate an event.

The conclusion of a deductive reasoning is valid only if the initial general rule is correct or truly general

If A is true ……..then…….. B is true.

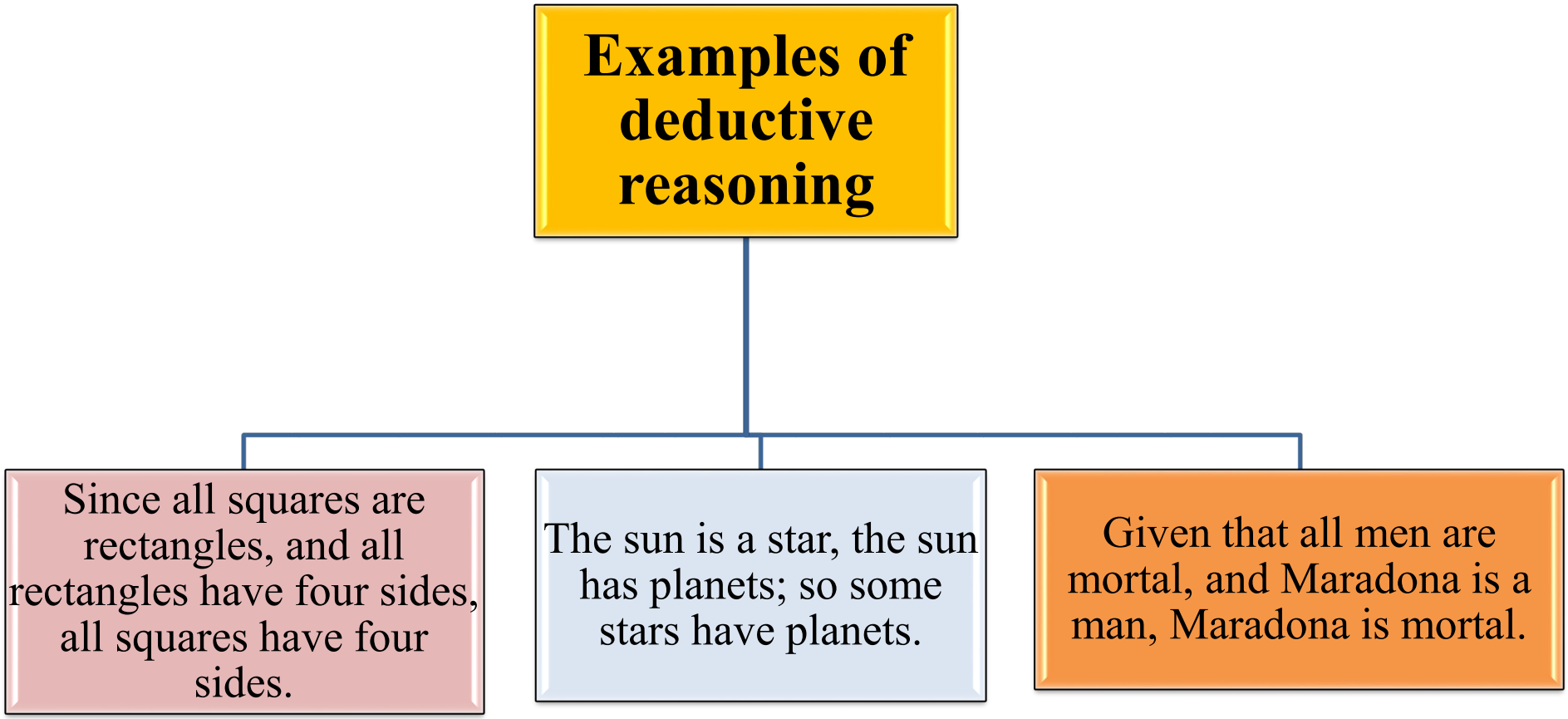
RULE → FACT

Cause → Consequence

But the converse (contrary) of a deduction is not necessarily true:

A → B is not equivalent to B → A

DEDUCTION goes from the GENERAL to the PARTICULAR


Examples of deductive reasoning
Since all squares are rectangles, and all rectangles have four sides, all squares have four sides.
The sun is a star, the sun has planets; so some stars have planets.
Given that all men are mortal, and Maradona is a man, Maradona is mortal.

Inductive reasoning:

It is a form of reasoning where one goes from the specific to the general, from facts to causes, and from consequences to principles. It allows for the development of a theory, a law, a model, etc.

It produces generalizations.

Observation ⟹ Pattern ⟹ Hypothesis ⟹ Theory

2-In inductive reasoning:

- Specific observations and measurements are made
- Regularities and possible patterns are detected
- Attempts are made to formulate hypotheses to explore these patterns
- Finally, general conclusions or theories are developed

Pure induction involves GENERALIZING from a limited series of observations.

B1, B2, …and Bn observed …….. thus

…….A is true

FACTS OBSERVED ==========> LAWS

induced

Consequences ==========> Cause

INDUCTION goes from the PARTICULAR to the GENERAL

Examples of inductive arguments:

-All known planets travel around the sun on elliptical orbits; therefore, all planets move on elliptical orbits around the sun.

Analogy

- It relies on the comparison of two facts, and this transition from one fact to another is based on a resemblance. It involves transferring from one specific case to another specific case that resembles it. The principle of analogical reasoning is the similarity observed between two things. Analogical reasoning occurs when one relies on the fact that two things resemble each other in one aspect to demonstrate that they should resemble each other in another. It has been the basis for significant discoveries.
- The forms of analogy: the image, the symbol, the metaphor, and the model, which is the most elaborate form of analogy as a representation (verbal, graphic, mathematical, etc.) of a real system.

ANALOGY goes from PARTICULAR to PARTICULAR.

Fact to fact reasoning

Reasoning from **FACT to FACT** or semiological reasoning (study of symptoms) consists of inferring one fact from another fact that is its sign. It is the reasoning of causal thinking. It operates in both directions from cause to consequence (e.g., meteorology) or from effect to cause (e.g., a doctor's diagnosis).

Here are some examples to clarify:

Meteorology: When meteorologists predict the weather, they use reasoning from fact to fact. They examine various weather-related facts and symptoms (such as air pressure, temperature, wind patterns, and cloud formations) to make predictions about future weather conditions. For example, a drop in air pressure and the presence of specific cloud types may be facts that lead to the conclusion of an impending storm.

Medical Diagnosis: Doctors use this type of reasoning when diagnosing illnesses. They gather information about a patient's symptoms (facts) and use their medical knowledge to identify the underlying causes. For instance, if a patient presents with a high fever, cough, and difficulty breathing, a doctor may reason from the facts to conclude that the patient has a respiratory infection, such as pneumonia.

Criminal Investigation: In a criminal investigation, detectives analyze various pieces of evidence (facts) to determine the sequence of events and identify potential suspects. For example, if there is a broken window, signs of forced entry, and missing valuables at a crime scene, investigators may reason from these facts to conclude that a burglary has occurred.

Historical Analysis: Historians often use causal reasoning to understand historical events. They examine historical records, artifacts, and eyewitness accounts (facts) to piece together the causes and consequences of significant events. For instance, by studying documents and eyewitness testimonies, historians can reason from the facts to determine the causes of a historical revolution.

In these examples, reasoning from fact to fact involves drawing conclusions based on observable evidence or symptoms, leading to an understanding of cause-and-effect relationships. This type of reasoning is fundamental in various fields, from science to medicine to law, as it allows professionals to make informed decisions and predictions.

Argumentation

ARGUMENTATION is a complex form of reasoning that involves presenting reasons for or against a thesis. It presents both FAVORABLE and UNFAVORABLE arguments to justify or refute the thesis. It is primarily applied in practical contexts and in philosophy.

Argumentation is a fundamental process of presenting and evaluating reasons to support or oppose a particular claim or thesis. It's a complex form of reasoning that's often used in debates, discussions, persuasive writing, and critical thinking.

It is a multipurpose and critical skill that helps individuals engage in informed, persuasive, and critical discussions on a wide range of topics, from everyday debates to academic and philosophical inquiries. It is an essential tool for advancing one's perspective and understanding opposing viewpoints.

Here's a more detailed explanation and some examples:

Thesis: Argumentation starts with a thesis or claim, which is a statement or proposition that someone is trying to prove or disprove. It serves as the central point of the argument.

Reasons: In argumentation, individuals present reasons to support or challenge the thesis. These reasons are the building blocks of the argument and can be based on evidence, logic, or appeals to emotion.

Favorable and Unfavorable Arguments: Argumentation encompasses (involves) both favorable (with) and unfavorable (against) arguments. Favorable arguments aim to support the thesis, while unfavorable arguments aim to refute it.

Justification and Refutation: Favorable arguments justify the thesis by providing evidence, logic, or persuasive rhetoric to demonstrate its validity. Unfavorable arguments seek to counter the thesis by highlighting weaknesses, contradictions, or alternative perspectives.

Context: Argumentation is often applied in practical contexts, such as legal debates, political discussions, or persuasive essays, where individuals aim to convince others of their point of view. It's also a significant element of philosophical discourse, where complex ideas and beliefs are examined and debated.

Examples:

Debate on Climate Change: In a debate on climate change, the thesis could be "Human activity is the primary cause of global warming." Favorable arguments might include scientific data showing the increase in greenhouse gases, while unfavorable arguments could point to natural climate variability.

Political Campaign: During a political campaign, a candidate may use argumentation to support their candidacy. Favorable arguments may emphasize their experience, accomplishments, and policy proposals, while unfavorable arguments may critique their opponent's record.

Persuasive Essay on Social Media: In a persuasive essay about the impact of social media on mental health, favorable arguments could cite research studies showing correlations between excessive social media use and mental health issues. Unfavorable arguments might challenge the methodology of those studies or argue that other factors are at play.

Philosophical Discourse: In philosophy, argumentation is used to divide complex concepts. For example, in a debate about the nature of knowledge, one side might favor empiricism, arguing that knowledge is derived from sensory experience, while the opposing side may favor rationalism, contending that knowledge is essential and a result of reason.