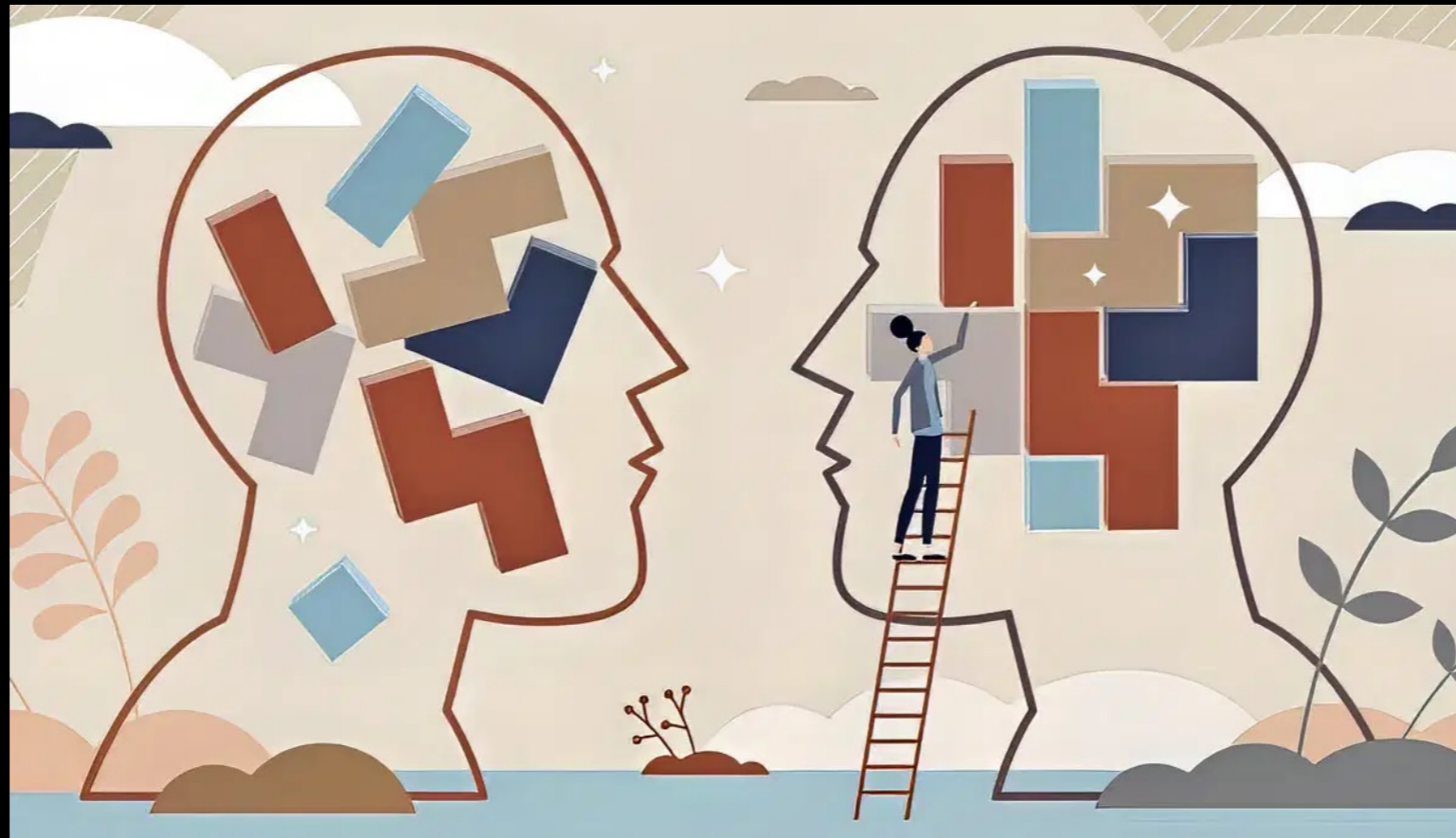
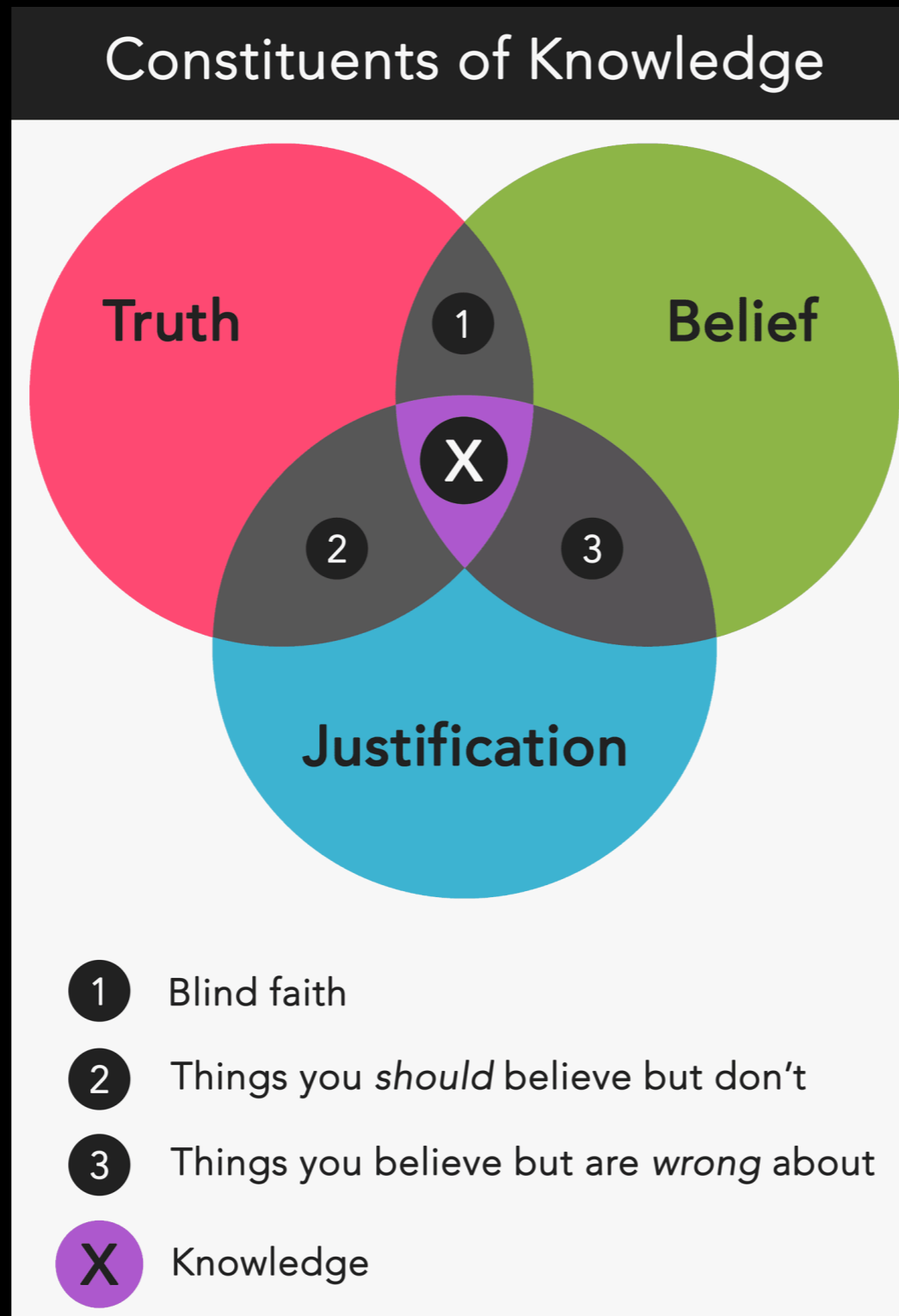


The main purpose of science is to trace, within the chaos and flux of phenomena, a consistent structure with order and meaning. This is called the philosophy of rationalism, rational as in conforming with reason.



Science is far from a perfect instrument of knowledge, but it provides something that other philosophies fail to, concrete results. Science is a 'candle in the dark' to illuminate irrational beliefs or superstitions. Science does not, by itself, advocate courses of human action, but it can certainly illuminate the possible consequences of alternative courses.



Rationalism

- ▶ **Rationalism** is an epistemological position in which reason is said to be the primary source of all knowledge, superior to the senses.
- ▶ In general, **rationalists** believe that abstract reasoning can produce undeniable, absolutely certain truths about nature, existence, and the whole of reality.

Science is any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation. In general, a science involves a pursuit of knowledge covering general truths or the operations of fundamental laws of nature.

RATIONALISM VS EMPIRICISM

Enter your sub headline here

Rationalism



VS



Empiricism

Rationalism is a theory based on the claim that reason is the source of knowledge.

01

Empiricism is a theory based on the claim that experience is the source of knowledge.

Rationalists believe in intuition.

02

Empiricists do not believe in intuition.

Claim that individuals have innate knowledge or concepts.

03

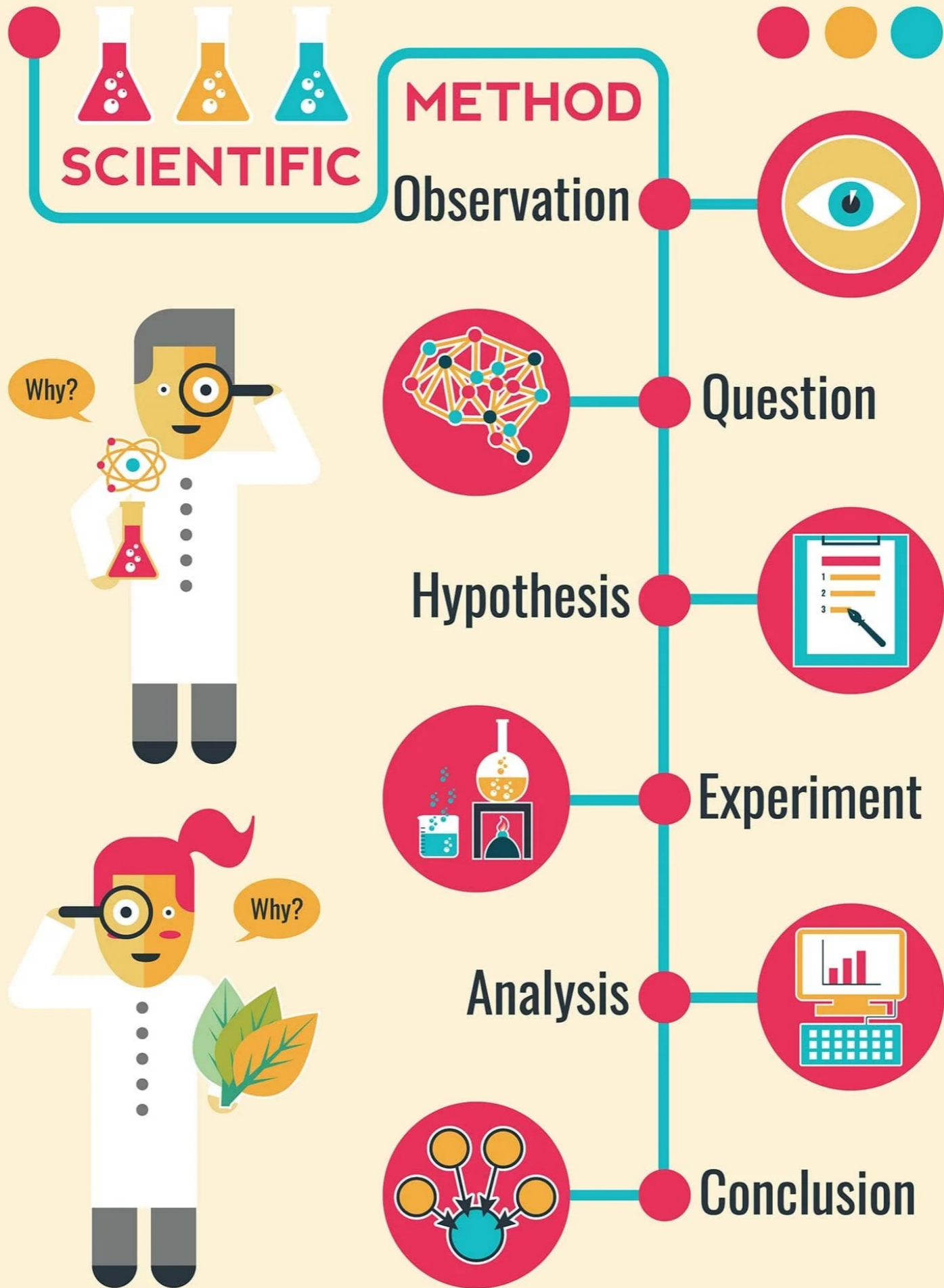
Claims that individuals have no innate knowledge.

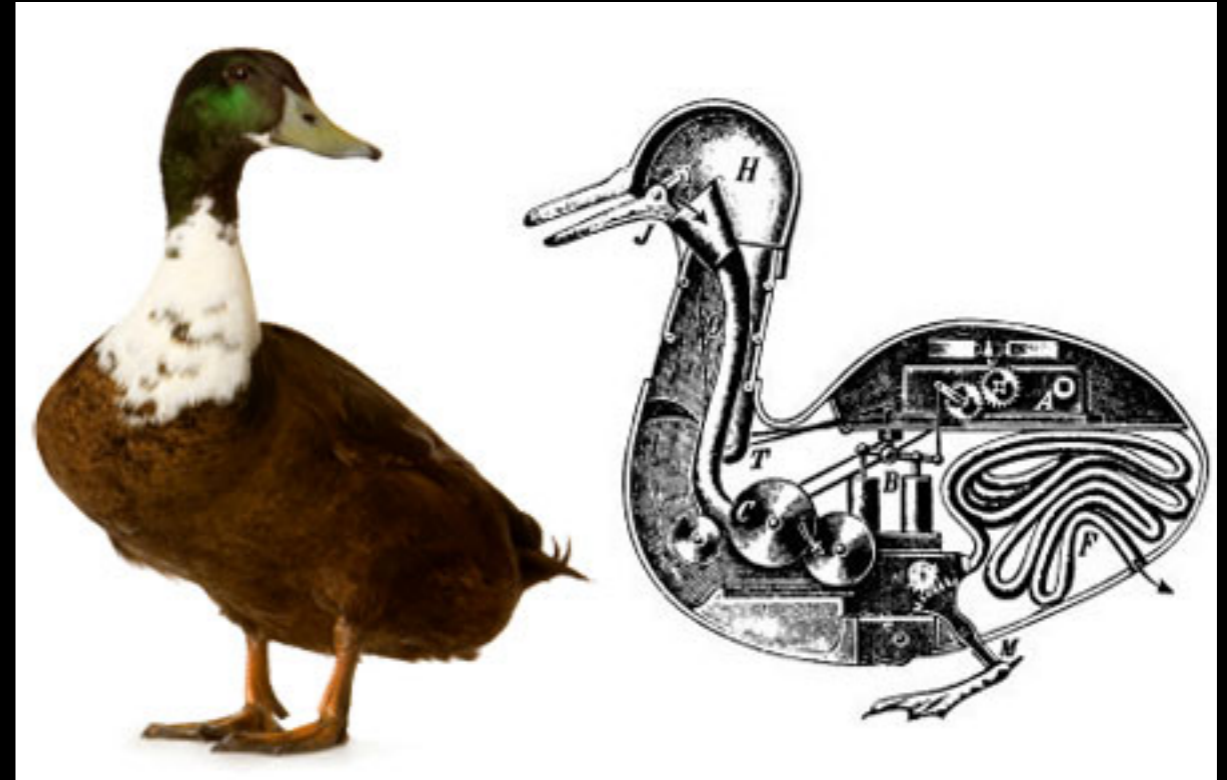


The Criterion of Falsifiability


The perspective that for a hypothesis, theory, or enterprise to be regarded as scientific, it must be falsifiable (refutable) on the basis of some physical observation

- A necessary but not sufficient criterion of scientific knowledge






Reductionism is the belief that any complex set of phenomena can be defined or explained in terms of a relatively few simple or primitive ones.



A machine is the sum of its parts. Individual parts summing up the whole is **'Reductionism'**.

Gestalt psychology which looks at the human mind and behavior as a whole is an example of **'Holism'**.





A common definition of astronomy is a science field that "deals with the stars and the planets". This is true, but only contains a fraction of what astronomy studies. Another common definition is that astronomy deals with everything above the atmosphere, which is a little vague.



Astronomy involves many scientific disciplines and captures the imagination more than any other science due to its far-ranging inquiries.

Astronomy asks the basic, most fundamental questions of existence. The purpose of astronomy is to explain extraterrestrial phenomenon in rational, coherent manner.

ASTRONOMY VERSUS ASTROLOGY

Astronomy is the study of celestial objects, space and the universe as a whole.

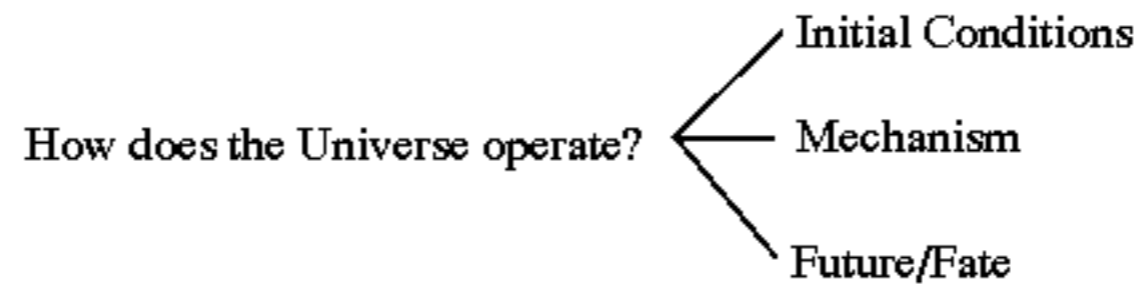
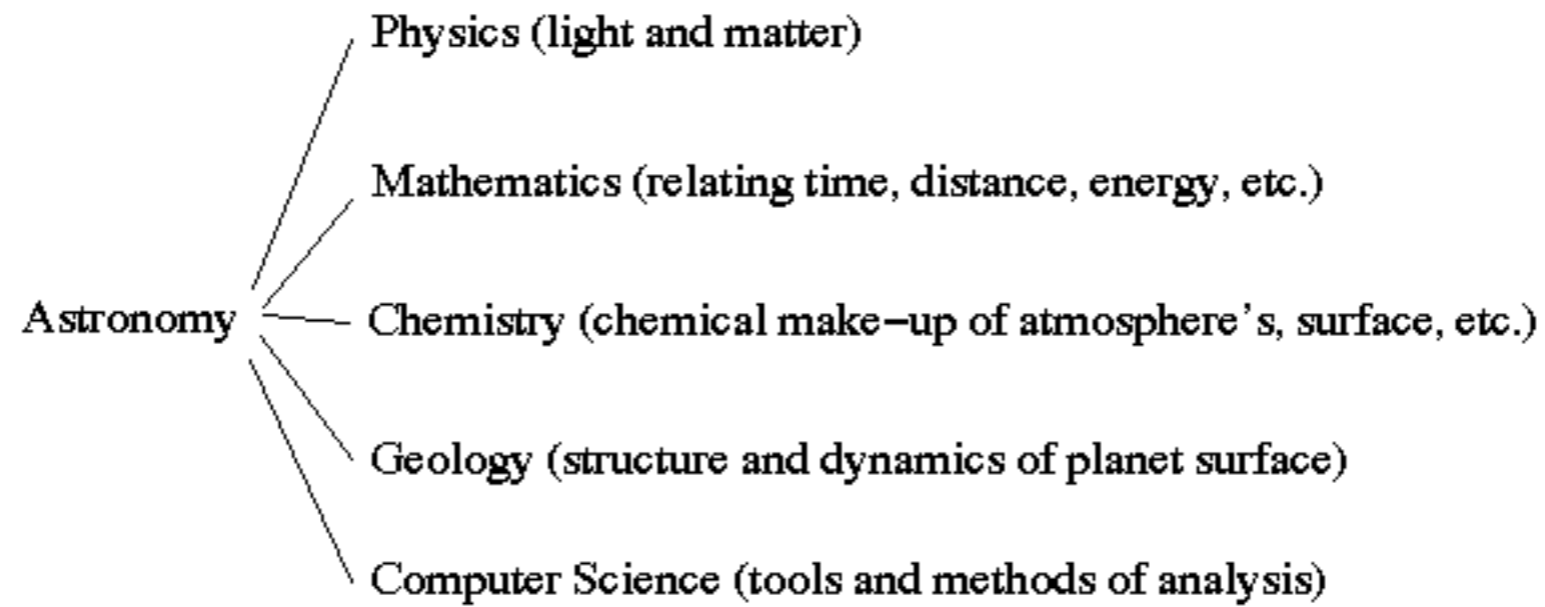
Astrology is the study of movement and position of celestial objects and their supposed influence on the lives of human beings.

Astronomy is a branch of science.

Astrology is considered a pseudoscience.

Astronomer refers to scientists who study astronomy.

Astrologers are people who use astrology to predict future events.



Astronomy differs from other sciences in that:

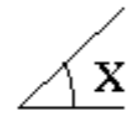
an astronomer can not change the parameters of an experiment,
i.e. only passive observations are allowed

the distances are very large

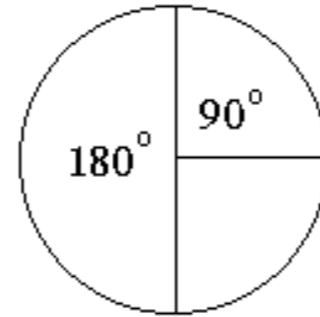
timescales are very long

we are exploring very exotic phenomenon, yet we are limited by
current physical framework

Angular Measure

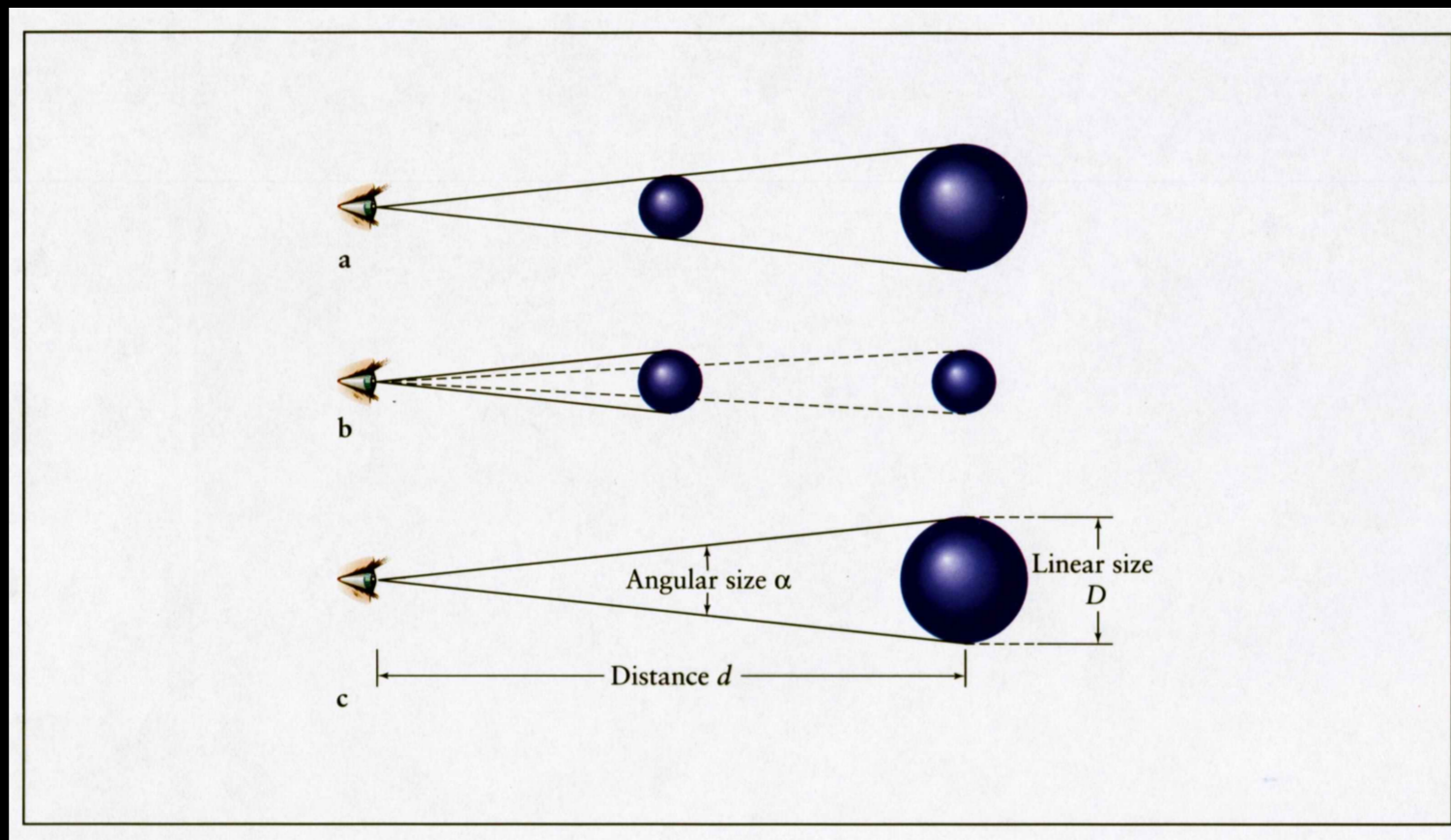


angle X is a measure of an opening or arc expressed in degrees or radians



360 degrees = circle = 2π radians

Measurements in astronomy are usually performed using trigonometry, a system of lengths and angular measures. Angular measure is used to denote apparent size, then deduce absolute size if distance to object is known.



$$\begin{aligned}
 10^0 &= 1 \\
 10^1 &= 10 \\
 10^2 &= 10 \times 10 = 100 \\
 10^3 &= 10 \times 10 \times 10 = 1000 \\
 &\vdots \\
 10^{-1} &= 0.1 \\
 10^{-2} &= 0.01 \\
 10^{-3} &= 0.001 \\
 &\vdots
 \end{aligned}$$

A Key To The Laws Of Exponents

Law	Example
$a^m a^n = a^{m+n}$	$2^3 2^4 = 2^{3+4} = 2^7 = 128$
$(a^m)^n = a^{mn}$	$(2^3)^4 = 2^{3 \cdot 4} = 2^{12} = 4096$
$(ab)^n = a^n b^n$	$(20)^3 = (2 \cdot 10)^3 = 2^3 \cdot 10^3 = 8 \cdot 1000 = 8000$
$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$
$\frac{a^m}{a^n} = a^{m-n}$	$\frac{2^5}{2^3} = 2^{5-3} = 2^2 = 4$
$\frac{a^m}{a^n} = \frac{1}{a^{n-m}}$	$\frac{2^3}{2^5} = \frac{1}{2^{5-3}} = \frac{1}{2^2} = \frac{1}{4}$

Table 1: Numbers and Powers of 10

Name	Common Notation	Math Notation	Exponent	Prefix
Quintillion	1 000 000 000 000 000 000	10^{18}	18	Exa (E)
Quadrillion	1 000 000 000 000 000	10^{15}	15	Peta (P)
Trillion	1 000 000 000 000	10^{12}	12	Tera (T)
Billion	1 000 000 000	10^9	9	Giga (G)
Million	1 000 000	10^6	6	Mega (M)
Thousand	1 000	10^3	3	kilo (k)
Hundred	100	10^2	2	hecto (h)
Ten	10	10^1	1	Deca (da)
One	1	10^0	0	
One Tenth	0.1	10^{-1}	-1	deci (d)
One Hundredth	0.01	10^{-2}	-2	centi (c)
One Thousandth	0.001	10^{-3}	-3	milli (m)
One Millionth	0.000 001	10^{-6}	-6	micro (μ)
One Billionth	0.000 000 001	10^{-9}	-9	nano (n)
One Trillionth	0.000 000 000 001	10^{-12}	-12	pico (p)
One Quadrillionth	0.000 000 000 000 001	10^{-15}	-15	femto (f)
One Quintillionth	0.000 000 000 000 000 001	10^{-18}	-18	atto (a)