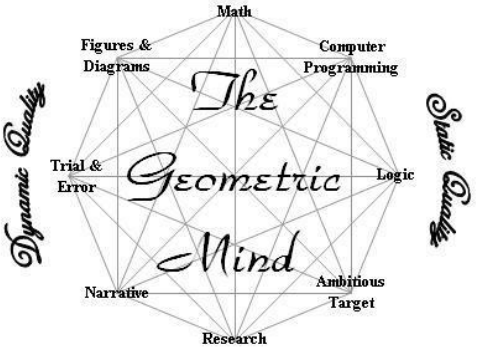
THE GEOMETRIC MIND SERIES
an *auto*SOCRATIC QUICK-START publication

Simple Observations

Volume #1
In Search of Understanding





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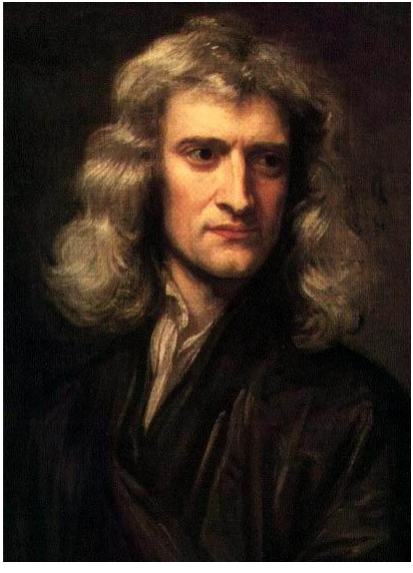
Five Short Stories

A Simple Observation

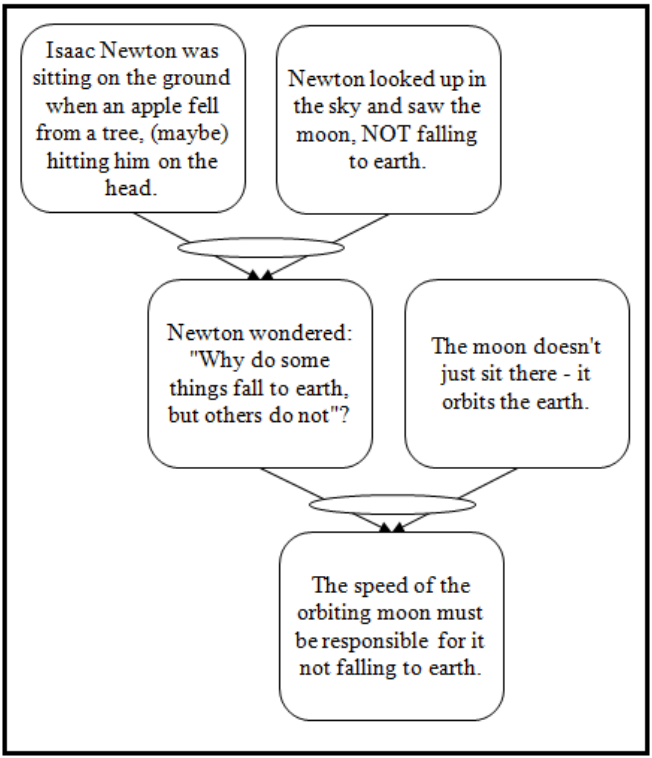
An apple fell from the tree. The moon is not falling. *Why not?*

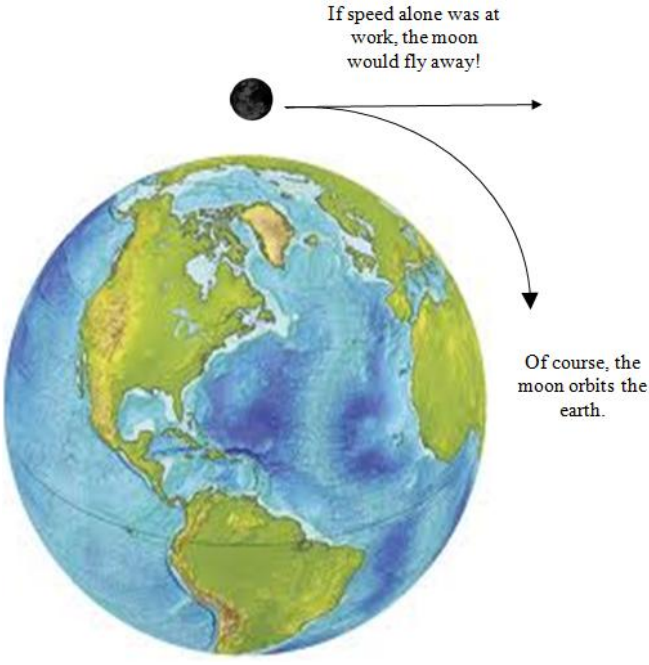


ISAAC NEWTON
1642 – 1727

NEWTON'S APPLE

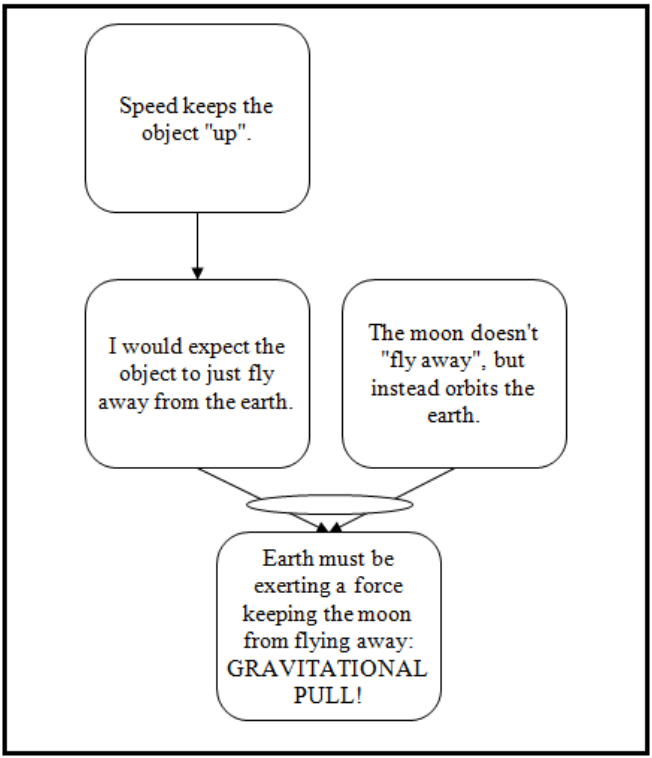
An Interesting Astronomical Story




If speed alone was at work, the moon would fly away!
Of course, the moon orbits the earth.

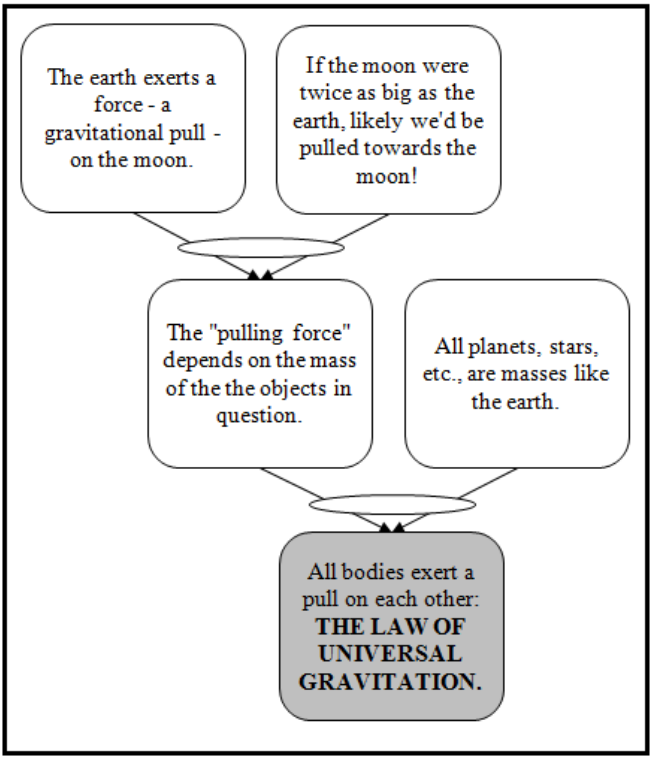
SPEED IS THE KEY

But where does "attraction" come from?



UNIVERSAL GRAVITATION

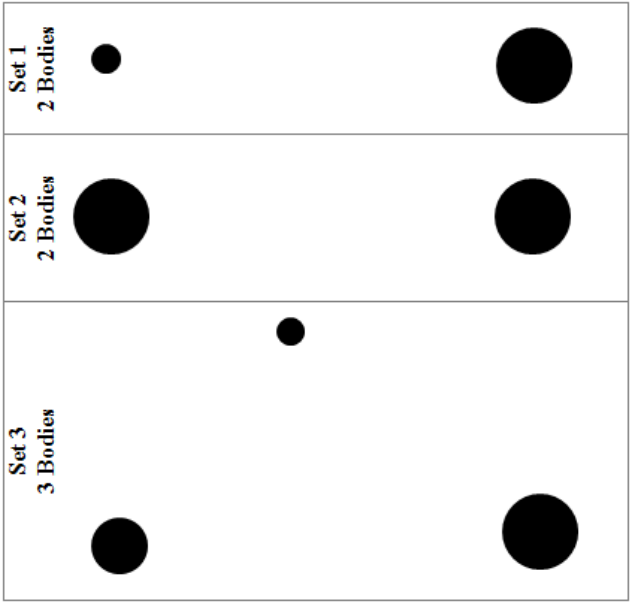
Newton's Famous Law



A FEW EXAMPLES

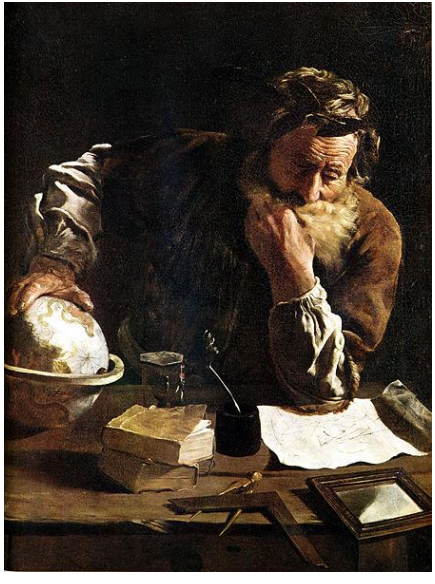
Planetary Systems

If there are no other forces acting, and these bodies are completely stationary, and if Newton is right about the Law of Universal Gravitation is correct, then where will these planets meet?



A Simple Observation

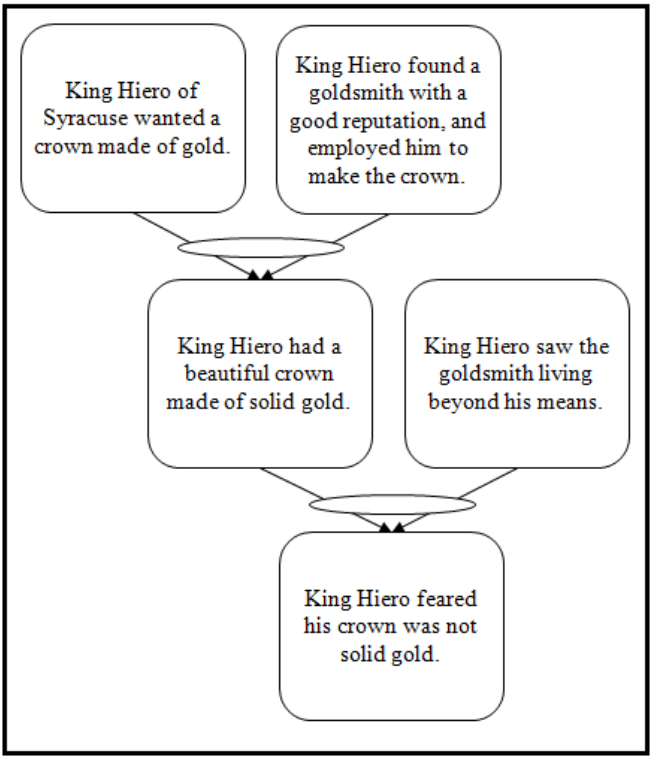
I sit in the bathtub and the water overflows.
I've solved the problem of the Gold Crown!



ARCHIMEDES
287 BC – 212 BC

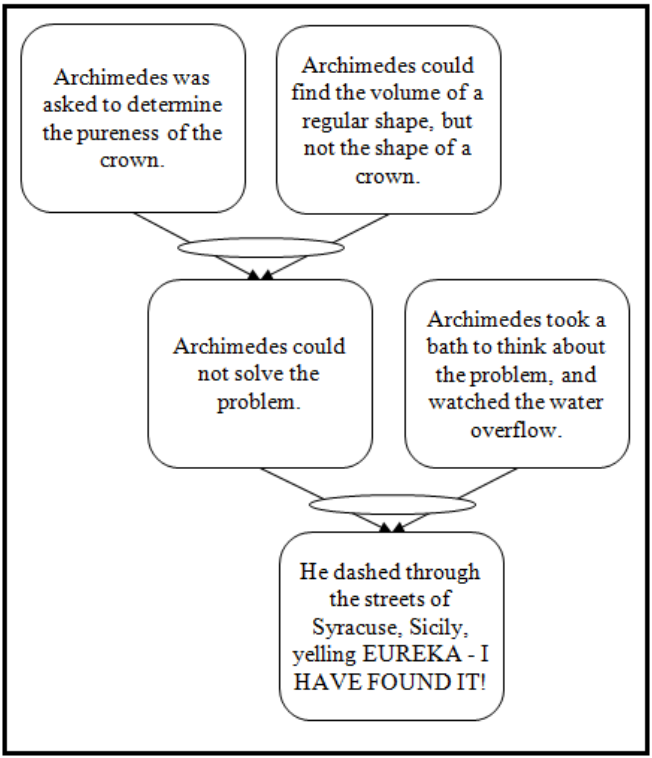
A CROWN MADE OF GOLD

How Does One Solve a Difficult Problem?



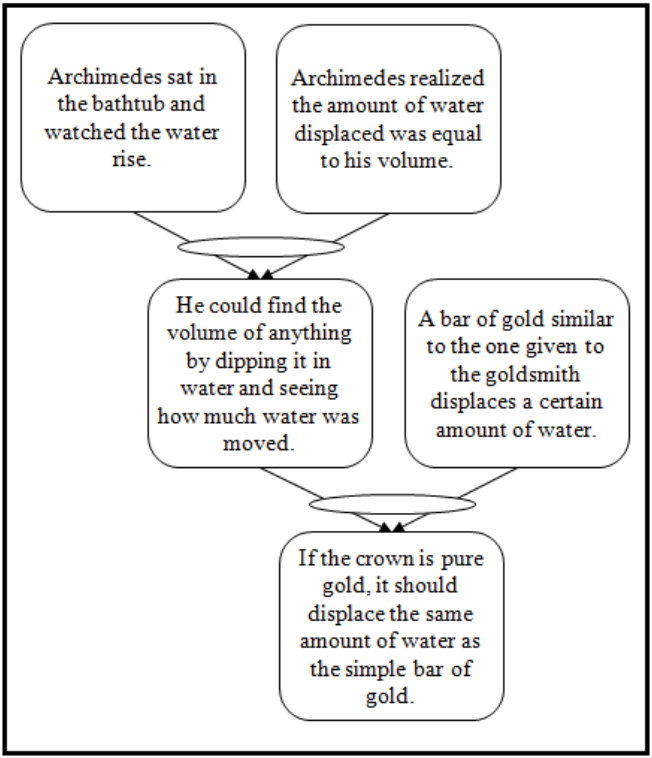
THE EUREKA MOMENT

Archimedes Discovers the Principle of Buoyancy



WHAT ARCHIMEDES' FOUND

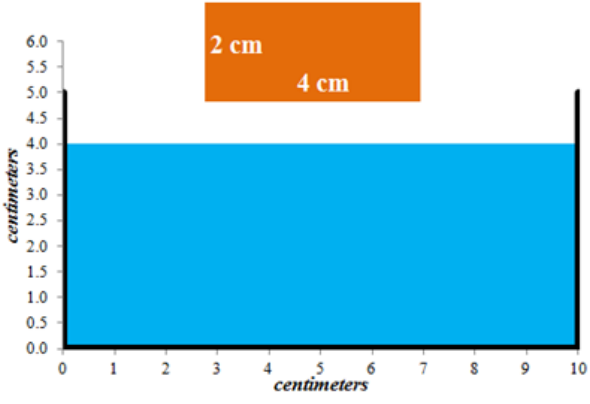
What Does Overflowing Water Have to do With Anything?



BUOYANCY

What Did Archimedes Discover?

Assume this is a 2-dimensional bathtub below. The bar of gold (also 2-dimensional) will sink. How high will the water rise?



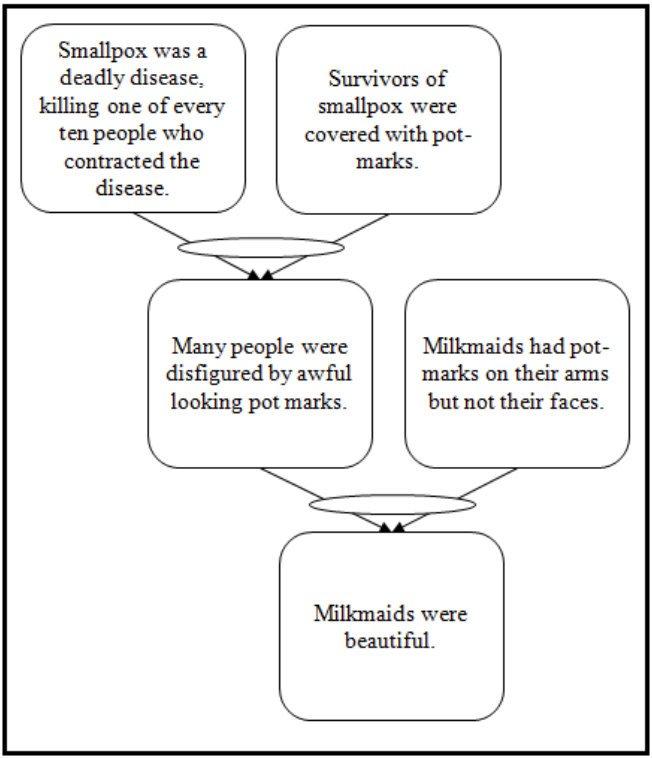
A Simple Observation

Milkmaids have pot marks on their arms but not their faces. *Why not?*

EDWARD JENNER
1749 - 1823
15

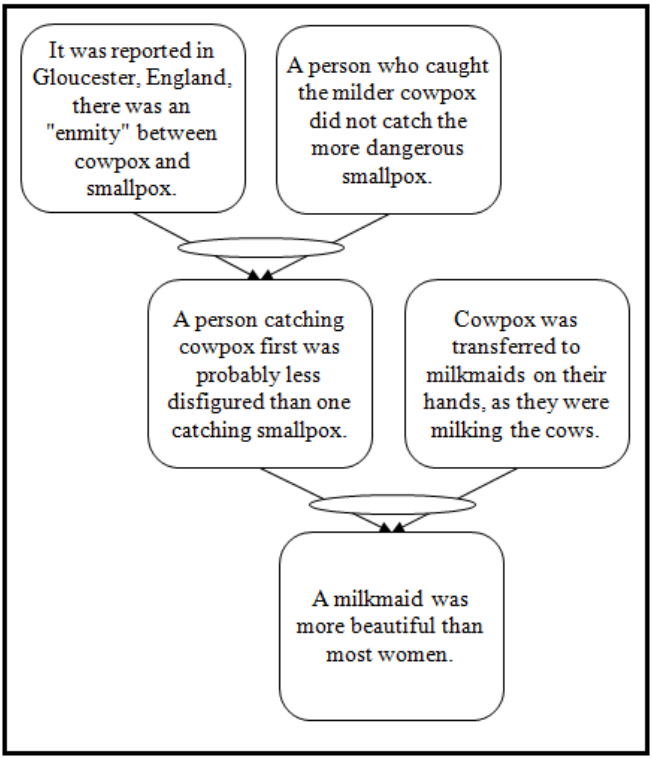
A BEAUTIFUL MILKMAID

Relatively Speaking



THE COWPOX ENMITY

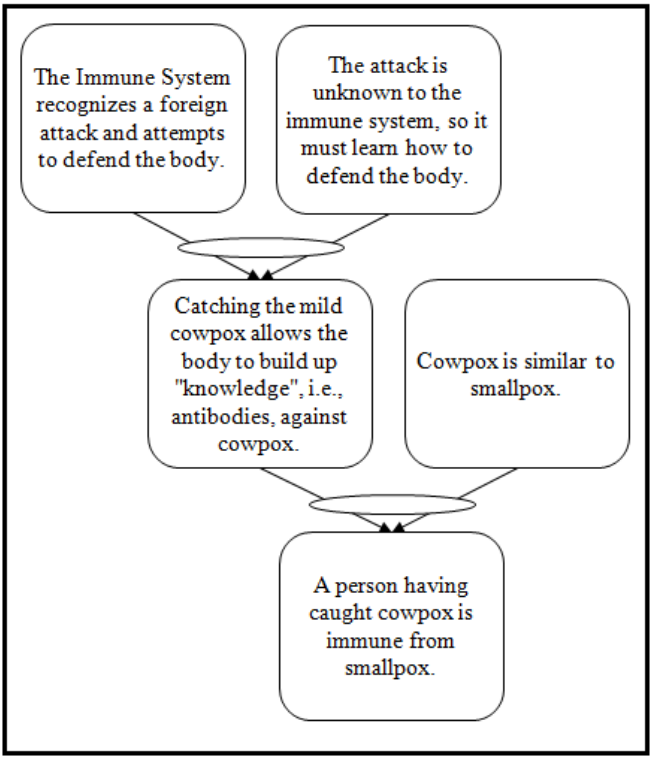
Cowpox as a Clue



The hand of a person infected with cowpox

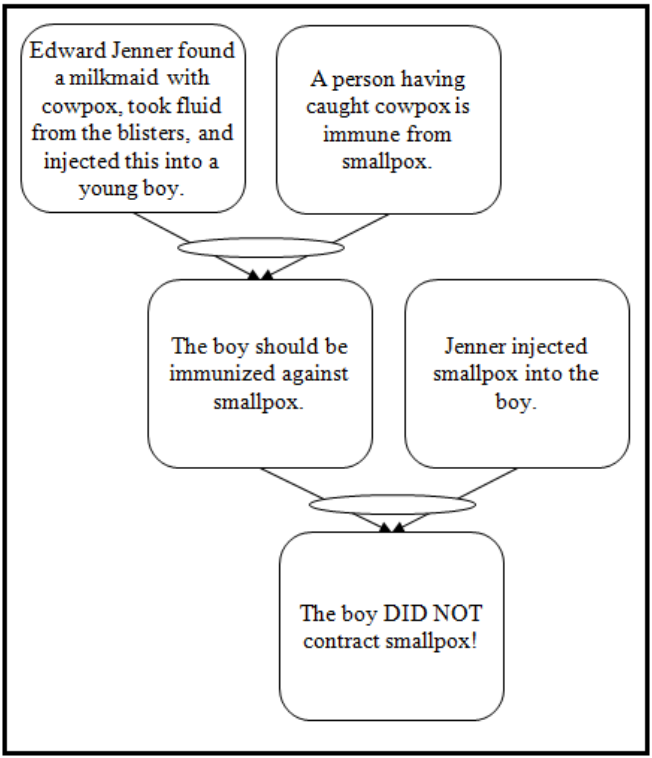
THE IMMUNE SYSTEM

Memory and Recognizing Danger



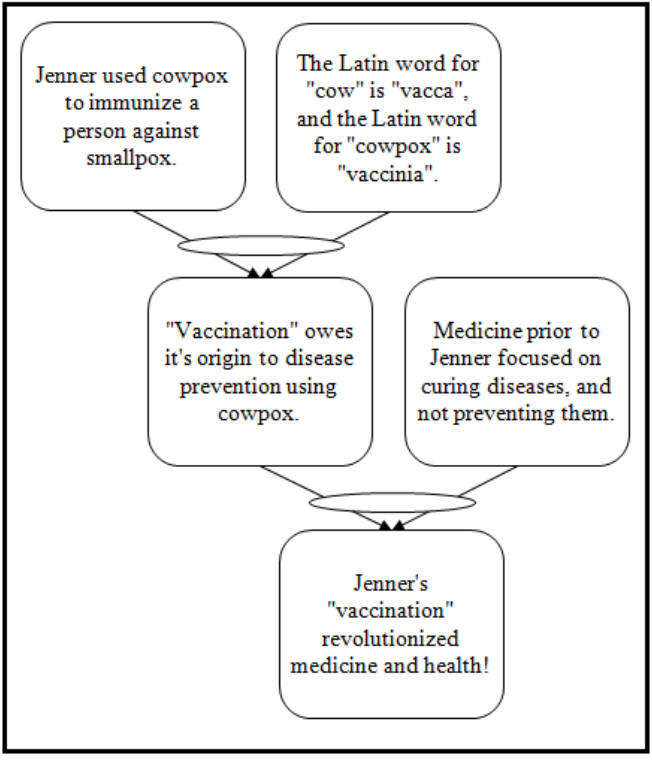
EDWARD JENNER

A Brave Experiment



VACCINATION

From Cowpox to Prevention



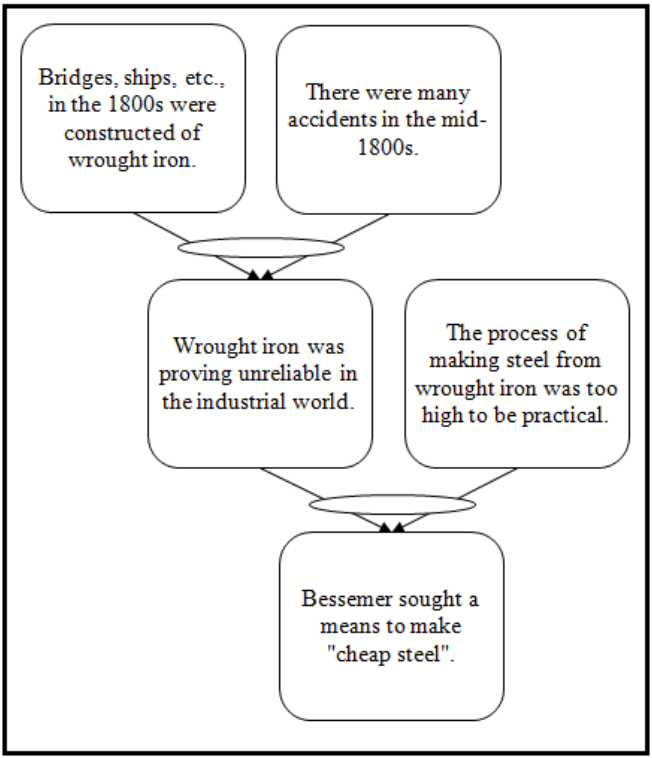
A Simple Problem

Why can't we make steel cheaply?

HENRY BESSEMER
1813 - 1898

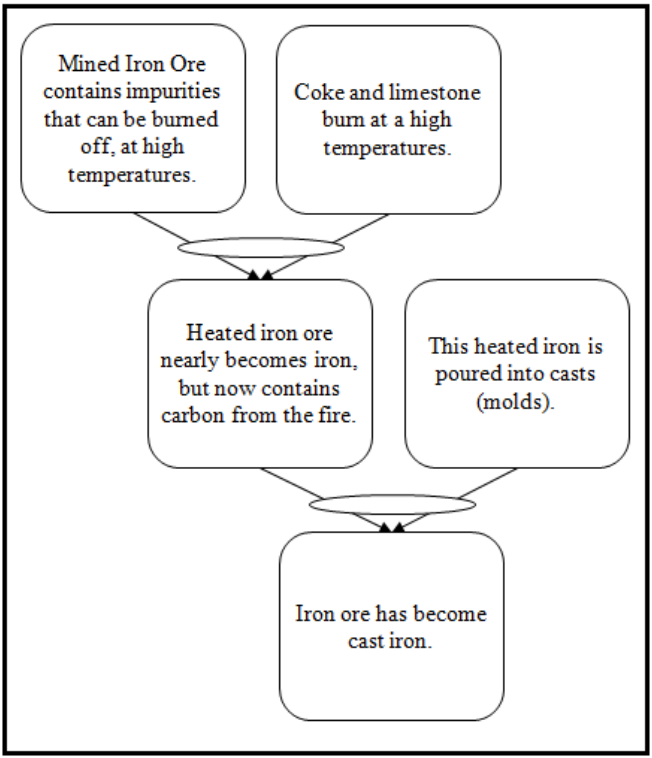
IN SEARCH OF CHEAP STEEL

The Need for Better Materials



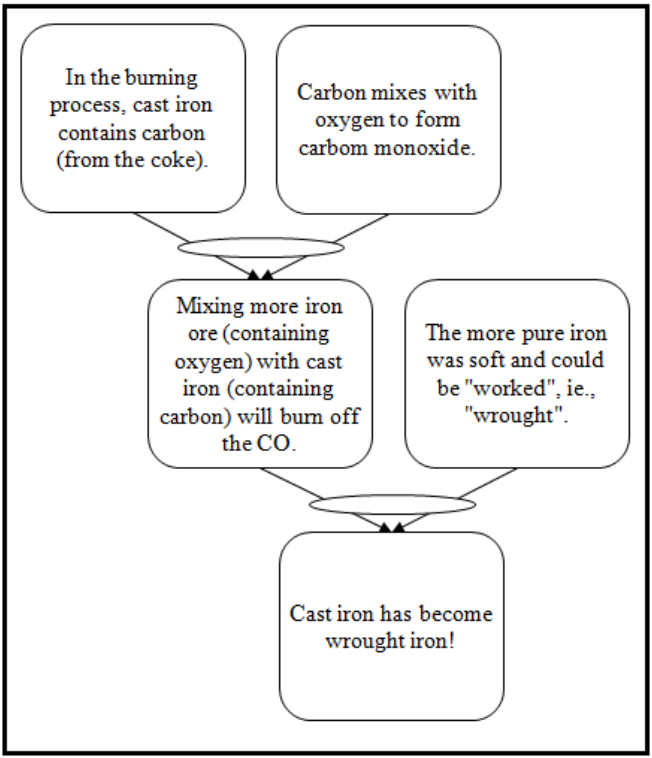
CAST IRON

A Chemical Revolution



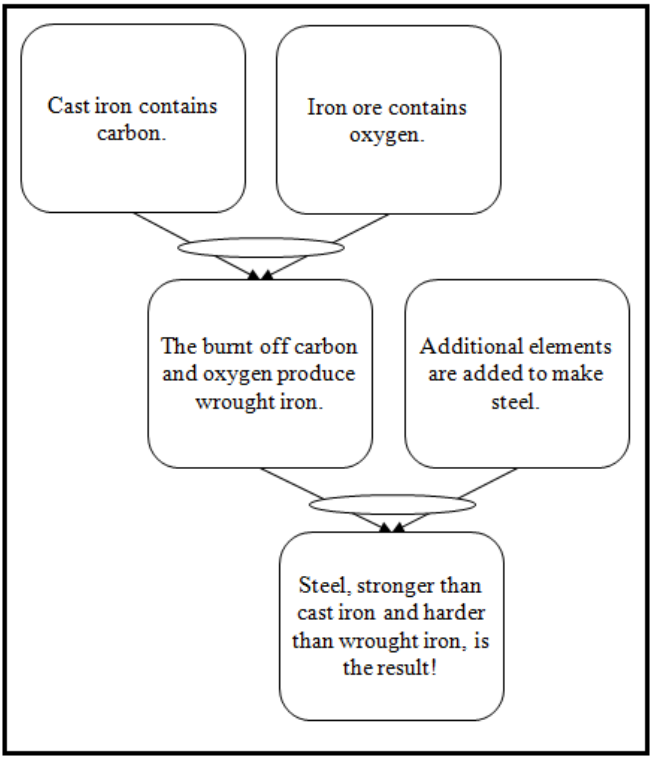
WROUGHT IRON

Removing the Impurities



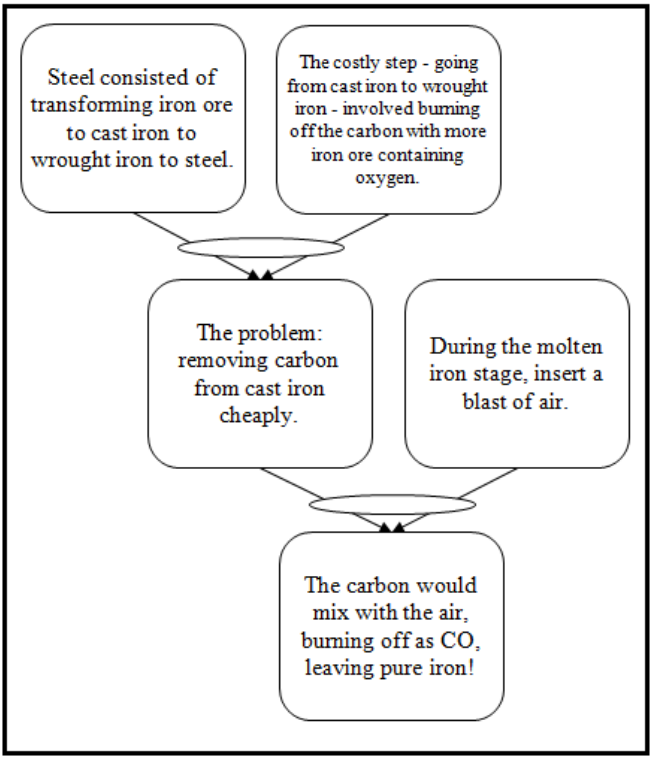
STEEL

Metallurgical Magic!



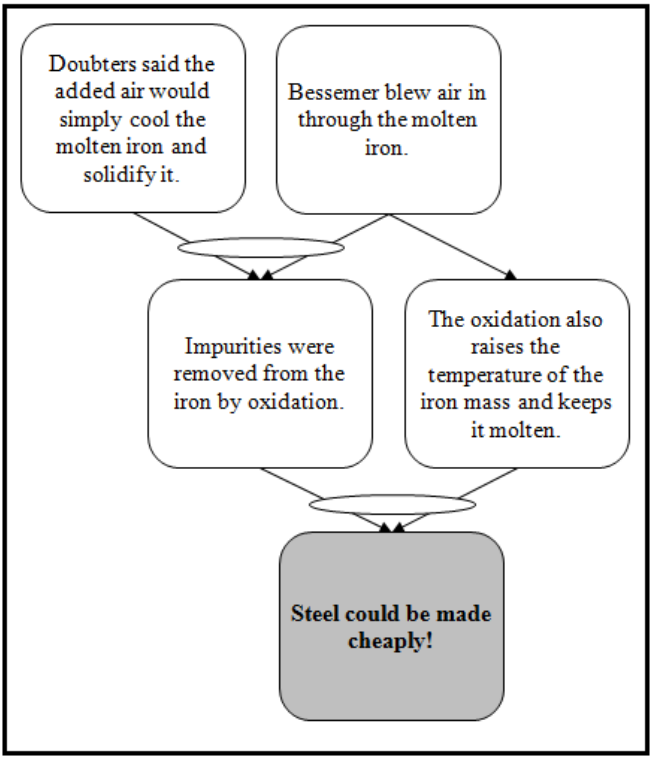
STEEL

A Dilemma



JUST TRY IT!

From Theory to Practice



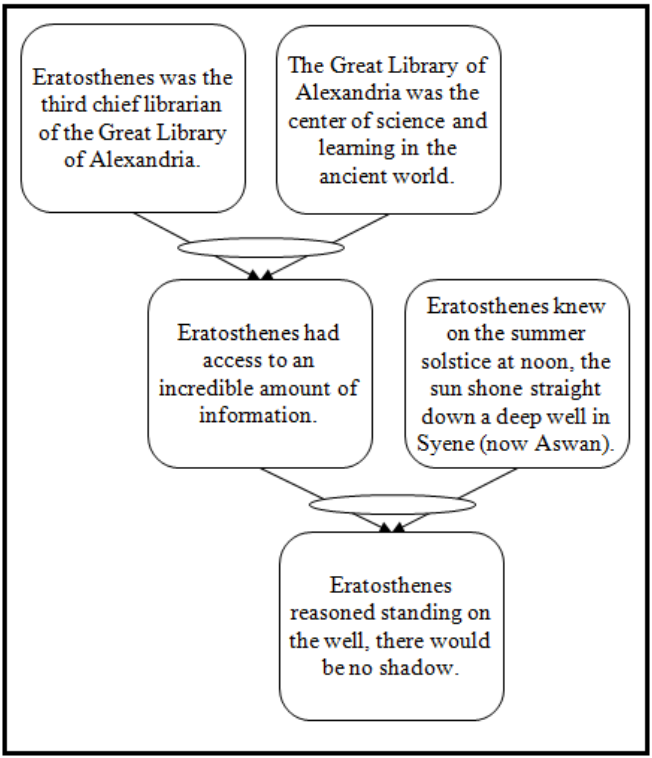
A Simple Observation

The sun is straight overhead here – but not there. Now I can find distances! How?

ERATOSTHENES
276 BC – 194 BC

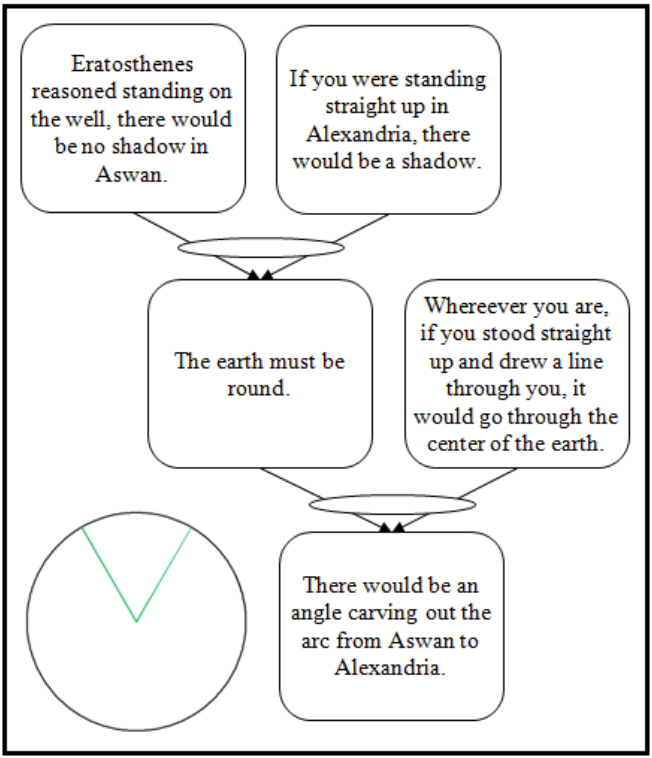
THE LIFE OF ERATOSTHENES

Access to Information



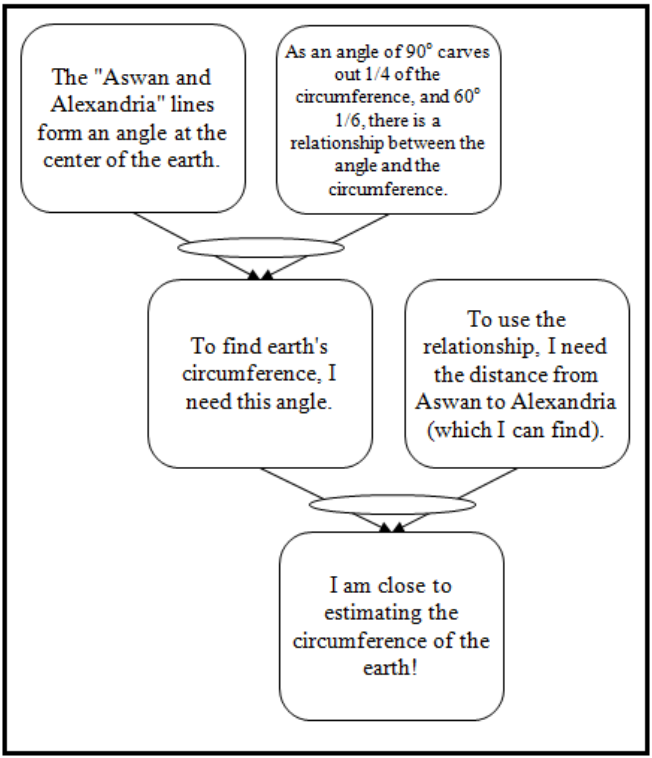
SHADOWS IN THE LIGHT

The Importance of the Shadow



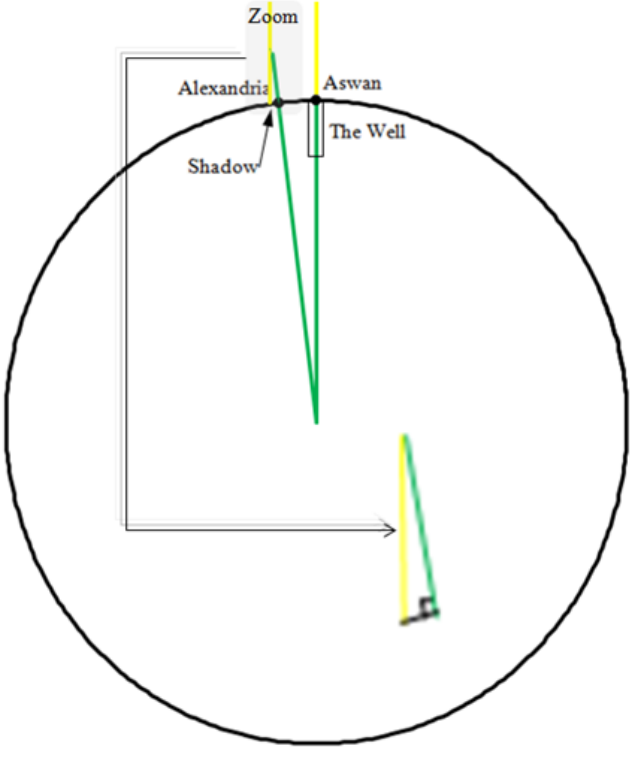
A PLAN IN THE MAKING

The Arc and the Circumference



THE LAY OF THE LAND

He's Almost There!

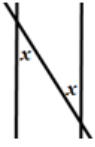


THE ANGLE!

I Know the Angle at the Center of the Earth!

The opposite interior angles of two parallel lines cut by a transversal are equal.

The sun rays are always perpindicular to the earth, and therefore parallel to each other.



Measuring one 'x' means I have the angle at the center of the earth.

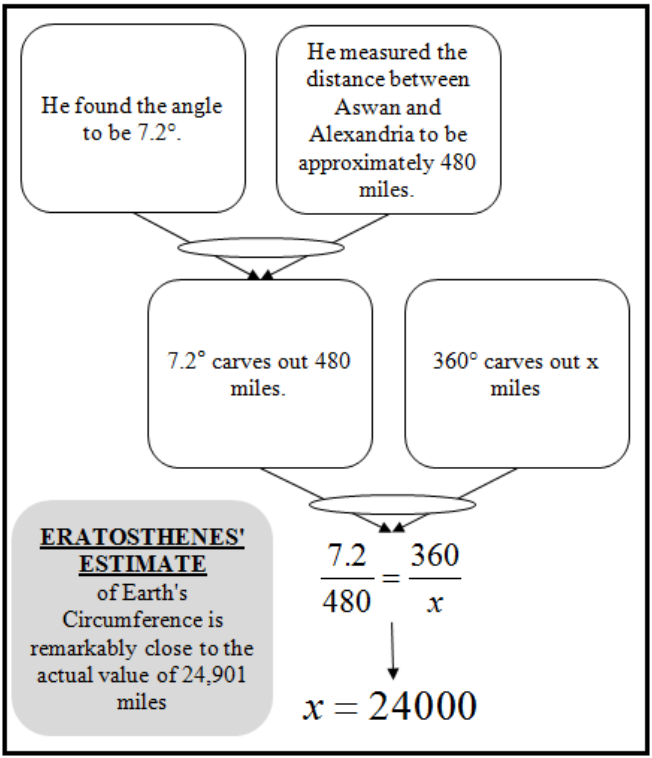
The shadow's length and the rod's height form a ratio:

$$\tan(\alpha) = \frac{opposite}{adjacent}$$

I know the angle formed by the "Aswan and Alexandria" lines at the center of the earth!

ERATOSTHENES' ESTIMATE

The Circumference of the Earth



A Summary

				
Isaac Newton	**Archimedes**	**Edward Jenner**	**Henry Bessemer**	**Eratosthenes**
An apple fell from the tree. The moon is not falling. Why not?	I sit in the bathtub and the water overflows. I've solved the problem of the Gold Crown!	Milkmaids have pot marks on their arms but not their faces. Why not?	Why can't we make steel cheaply?	The sun is straight overhead here - but not there. Now I can find distances! How?
The Discovery of the Law of Universal Gravitation	The Discovery of the Laws of Buoyancy	The Discovery of Immunization	The Industrial Revolution	The Measurement of the Earth