

On the Origins of Science

from seeing patterns to building models

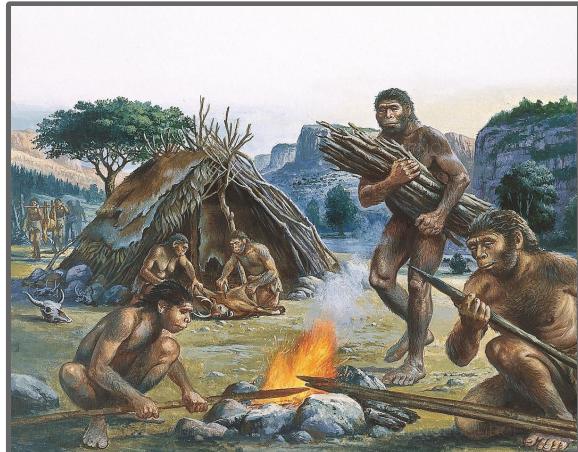


George Matthews, Plymouth State University

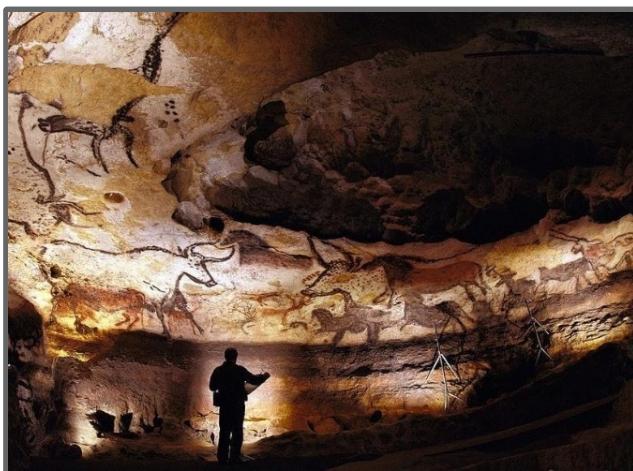
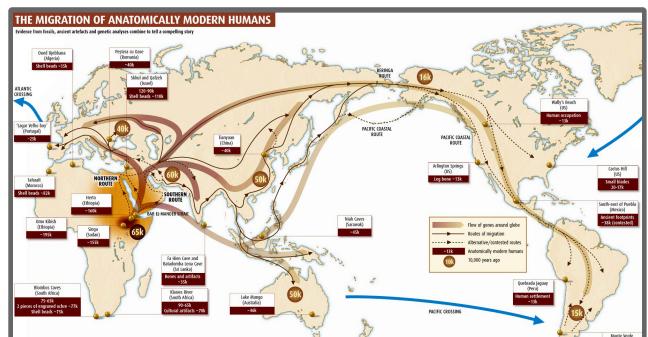
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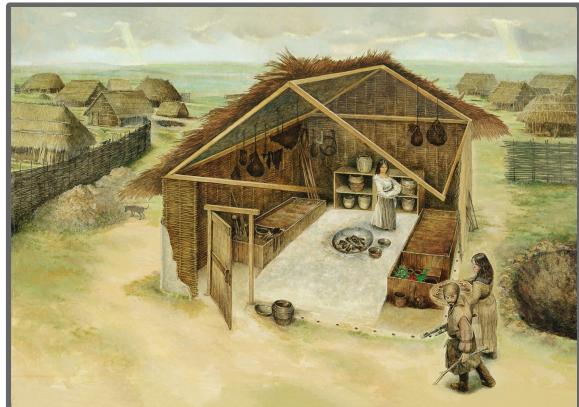
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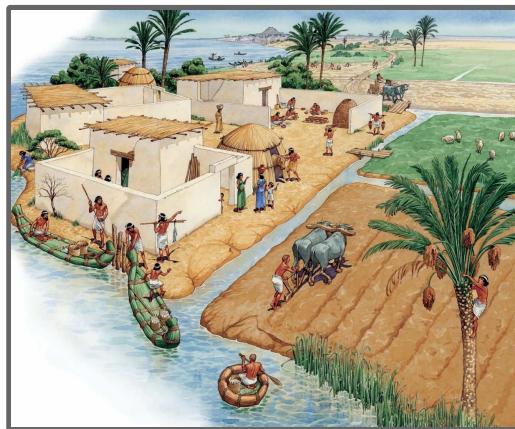
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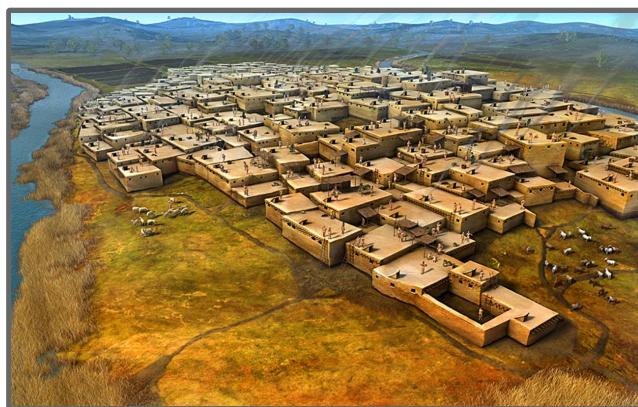
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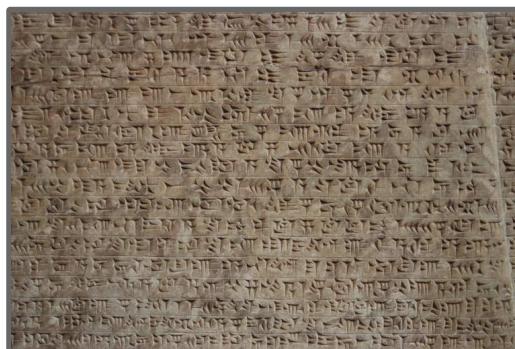
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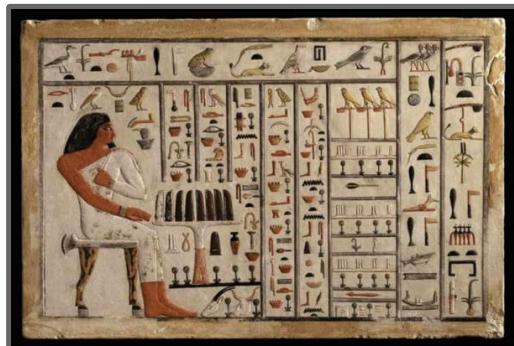
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~5,000 years ago



writing ~5,000 years ago



mathematics ~4,000 years ago





"All things are made of water."

Thales
626-545 BCE

- Thales made first recorded attempt at a naturalistic explanation of things.
- He relied on experience and observation to come up with general claims.



"All things are structured by numbers."

Pythagoras
570-495 BCE

- Pythagoras emphasized proportion, symmetry and order as essential to the nature of things.
- Leader of a vegetarian mystical cult in Sicily.
- Distressed by the discovery of irrational numbers.



"You can't step into the same river twice."

Heraclitus
535-475 BCE

- Heraclitus was an early philosopher who attempted to describe the nature of things in general terms.
- Emphasized change and motion, denying that anything had permanent features.
- Believed that the world was ultimately logical and understandable.



Zeno
495-425 BCE

"Motion and change are illusions."

- Zeno was a follower of Parmenides who emphasized the unity and permanent nature of things.
- Came up with a series of paradoxes to prove that motion and change were impossible.



Aristotle
384-322 BCE

"All people by nature desire to know."

- Aristotle was the teacher of Alexander the great and was the founder of many branches of science.
- Developed a framework for understand all natural phenomena that held sway for 1500 years.
- Emphasized direct observation of nature as the source of knowledge.



Archimedes
288-212 BCE

"Give me a place to stand and a lever and I will move the whole world."

- Archimedes was an engineer, scientist and mathematician.
- Developed theory of simple machines: lever, pulley and screw that have mechanical advantage.
- Famous for his "eureka" moment in a bathtub.



Ptolemy
100-170 CE

"The universe is a set of nested crystal spheres rotating around the earth."

- Ptolemy created first comprehensive model of the known physical universe.
- His "geocentric model" of the cosmos would be consensus view for 1500 years.
- Synthesized the best theoretical and astronomical knowledge of his time and sought to "preserve the phenomena."