

## *On the Origins of Science*

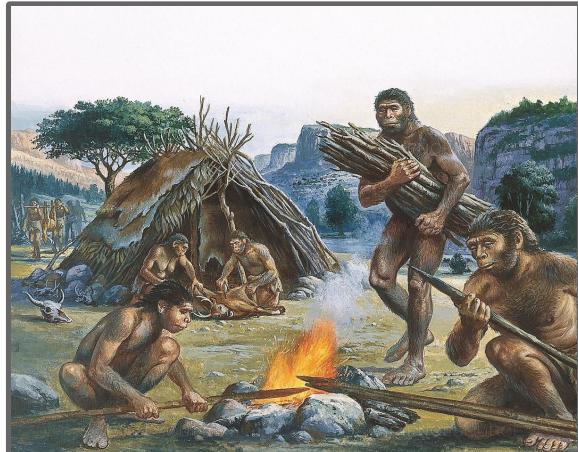
*from seeing patterns to building models*



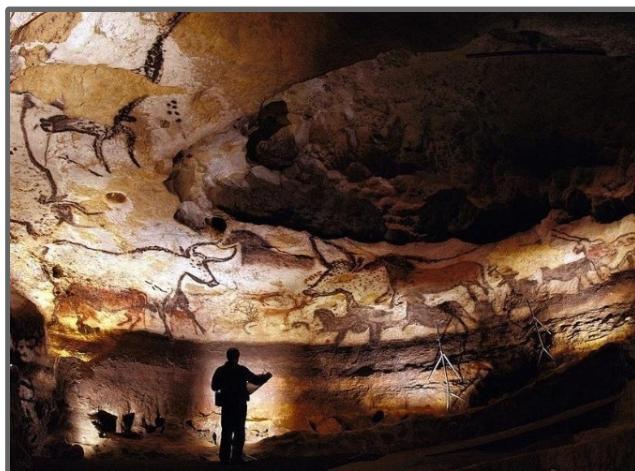
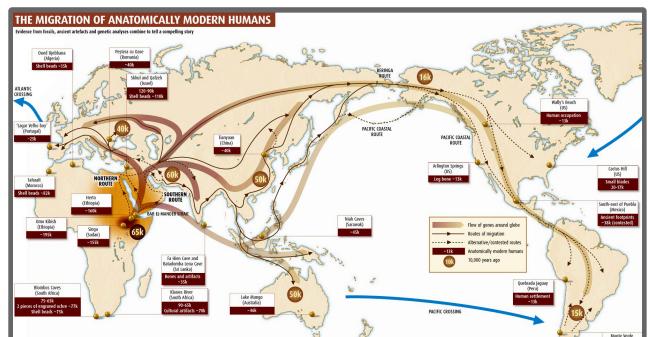
George Matthews, Plymouth State University  
2020



~2,000,000 years ago



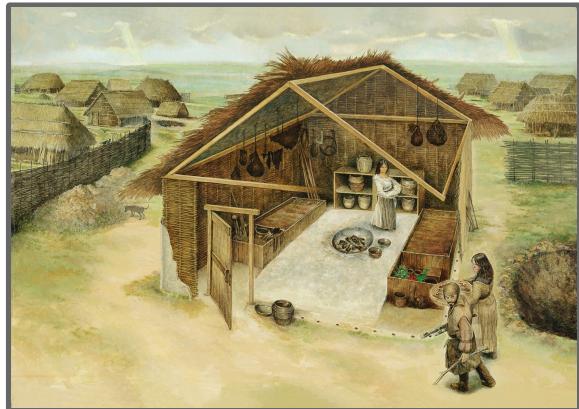
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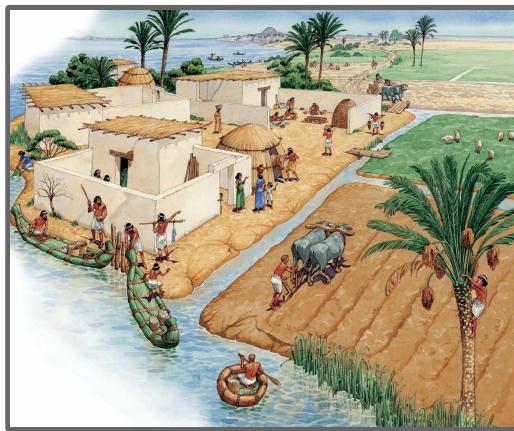
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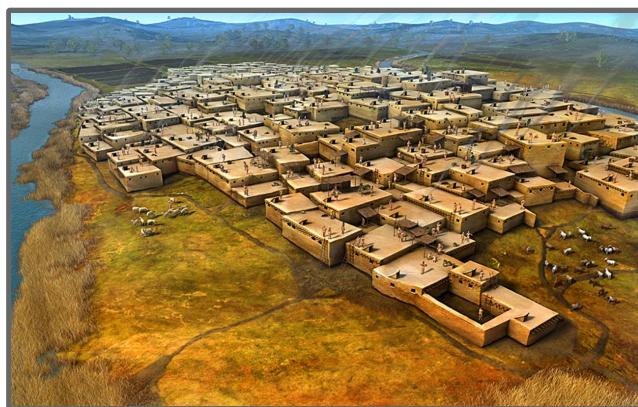
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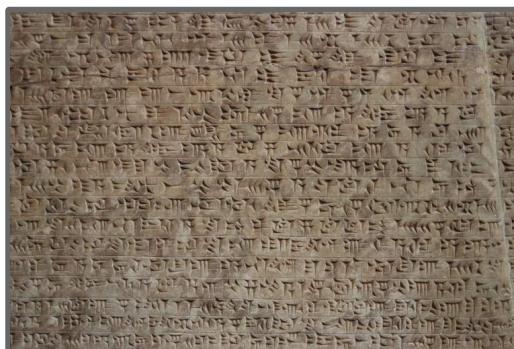
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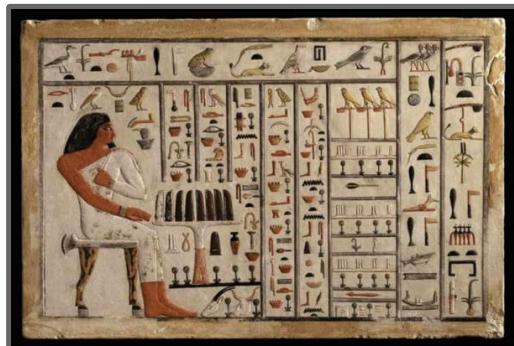
~5,000 years ago



~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."