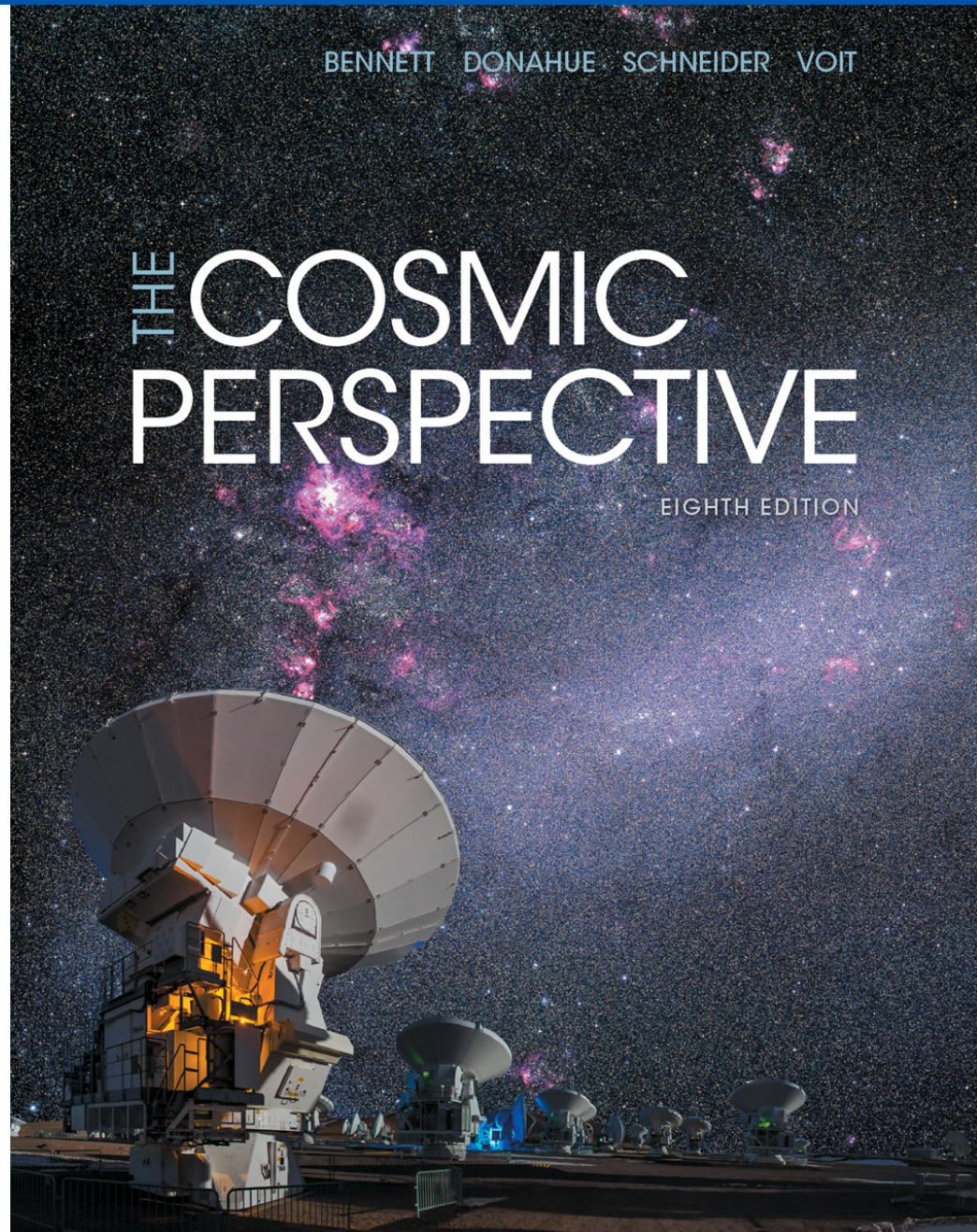
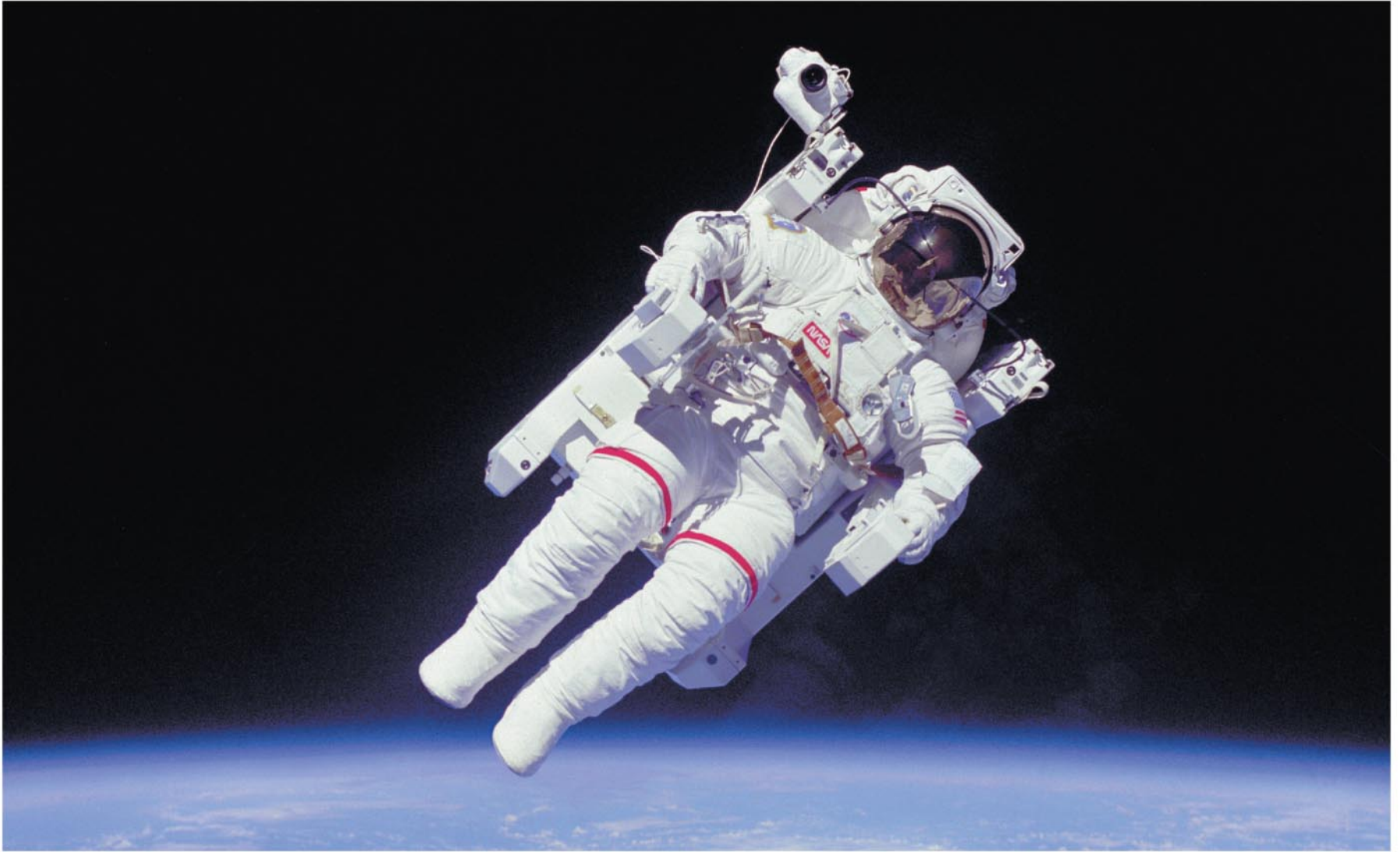


Chapter 3 Lecture

Chapter 3: The Science of Astronomy



The Science of Astronomy



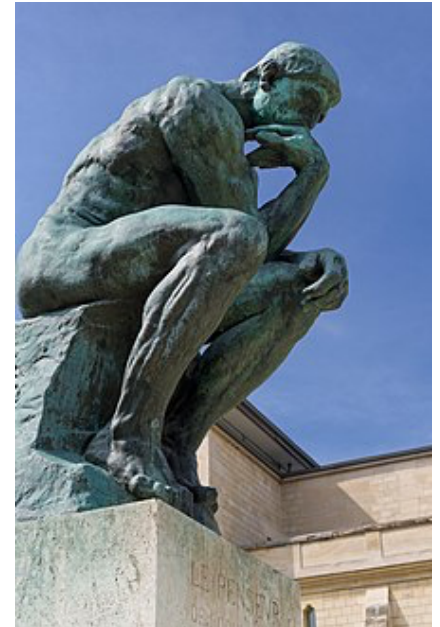
Science vs. Knowledge

- Science → Scientia (or Scire) → *Knowledge, acquired by study*
(Middle English & Old French) (Latin)
- Επιστήμη → Επίσταμαι → *Expert knowledge, stemming from philosophy*
(Επιστήμι [n.]) (Επίσταμε [v.])
(Greek)



Plato's Academy, by Raphael (1509 – 1511)

Le Penseur, Musée Rodin, Paris, France



3.1 The Ancient Roots of Science

- Our goals for learning:
 - **In what ways do all humans use scientific thinking?**
 - **How is modern science rooted in ancient astronomy?**

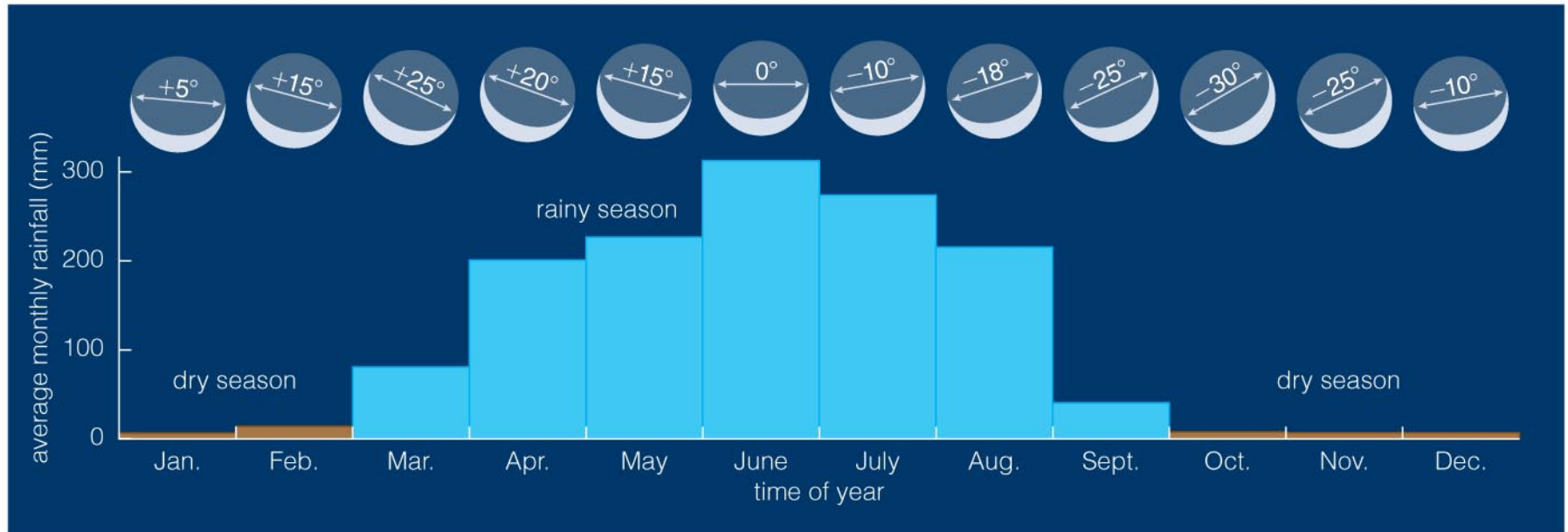
In what ways do all humans use scientific thinking?

- Scientific thinking is based on everyday ideas of observation and trial-and-error experiments.

How is modern science rooted in ancient astronomy?

- Many of our current systems had their roots in the achievements of ancient astronomy
 - Daily timekeeping
 - Tracking the seasons
 - Calendar
 - Monitoring lunar cycles
 - Monitoring planets and stars
 - Predicting eclipses
 - And more...

How is modern science rooted in ancient astronomy?



- Ancient people of central Africa (6500 BC) could predict seasons from the orientation of the crescent Moon.

How is modern science rooted in ancient astronomy?

TABLE 3.1 The Seven Days of the Week and the Astronomical Objects They Honor

The seven days were originally linked directly to the seven objects. The correspondence is no longer perfect, but the pattern is clear in many languages; some English names come from Germanic gods.

Object	Germanic God	English	French	Spanish	Italian	Greek
Sun	—	Sunday	dimanche	domingo	domenica	κυριακή (God's day)
Moon	—	Monday	lundi	lunes	lunedì	δευτέρα (second day)
Mars	Tiw	Tuesday	mardi	martes	martedì	τρίτη (third day)
Mercury	Woden	Wednesday	mercredi	miércoles	mercoledì	τετάρτη (fourth day)
Jupiter	Thor	Thursday	jeudi	jueves	giovedì	πέμπτη (fifth day)
Venus	Fria	Friday	vendredi	viernes	venerdì	παρασκευή (prep. day)
Saturn	—	Saturday	samedi	sábado	sabato	σάββατο (sávvato)

- Days of week were named for the Sun, Moon, and *visible* planets.

How is modern science rooted in ancient astronomy?

- Egyptian obelisk:
Shadows tell time of day.

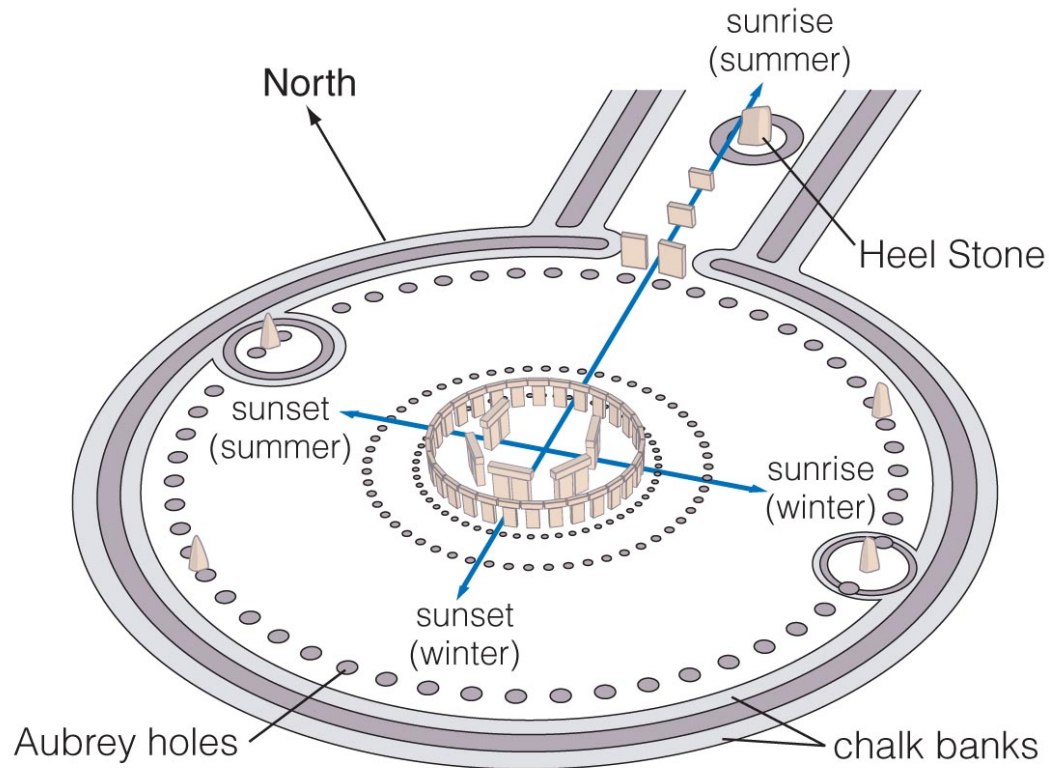


How is modern science rooted in ancient astronomy?



- England: Stonehenge (completed around 1550 B.C.)

How is modern science rooted in ancient astronomy?



b This sketch shows how archaeologists believe Stonehenge looked upon its completion in about 1550 B.C. Several astronomical alignments are shown as they appear from the center. For example, the Sun rises directly over the Heel Stone on the summer solstice.

- England: Stonehenge (1550 B.C.)

How is modern science rooted in ancient astronomy?



- Mexico: Model of the Templo Mayor

How is modern science rooted in ancient astronomy?



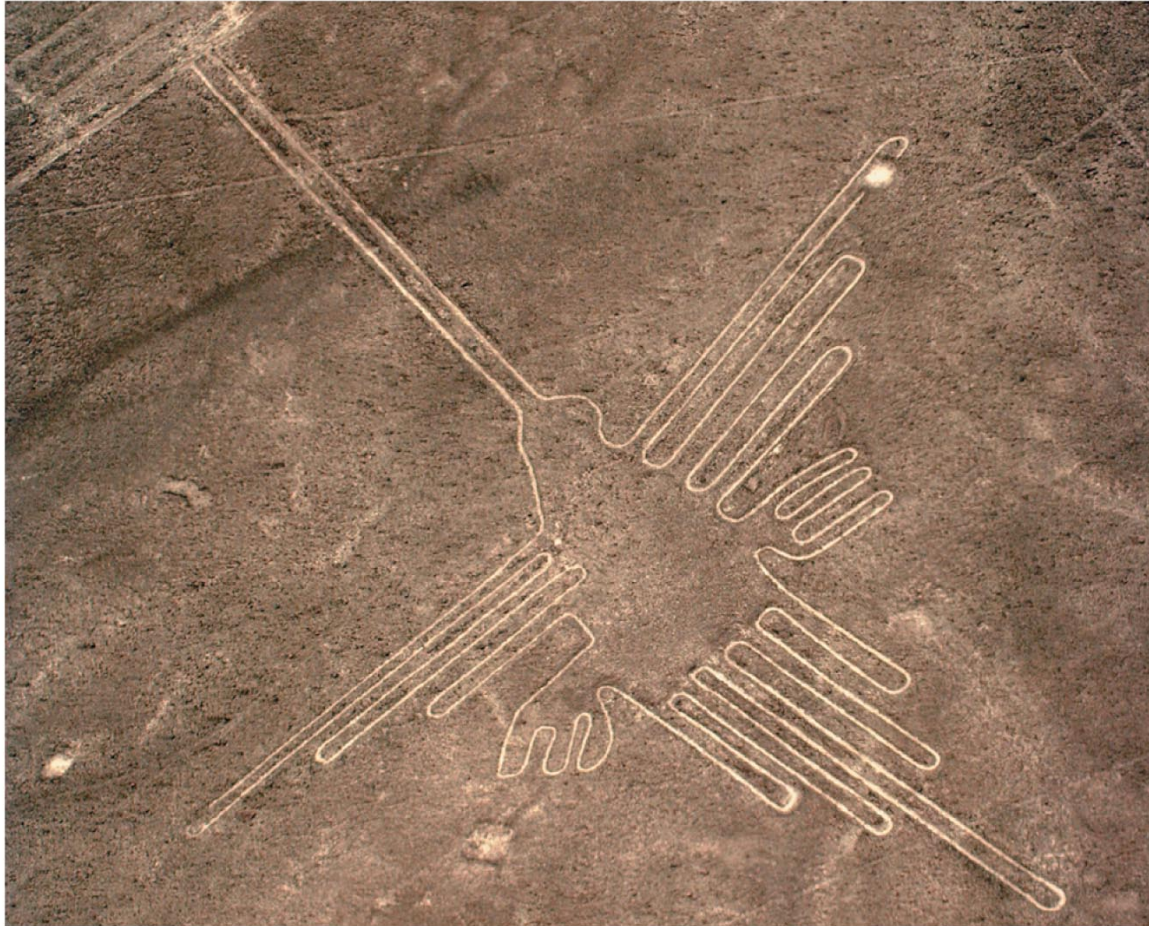
- New Mexico: Anasazi kiva aligned north-south

How is modern science rooted in ancient astronomy?



- SW United States: "Sun Dagger" marks summer solstice

How is modern science rooted in ancient astronomy?



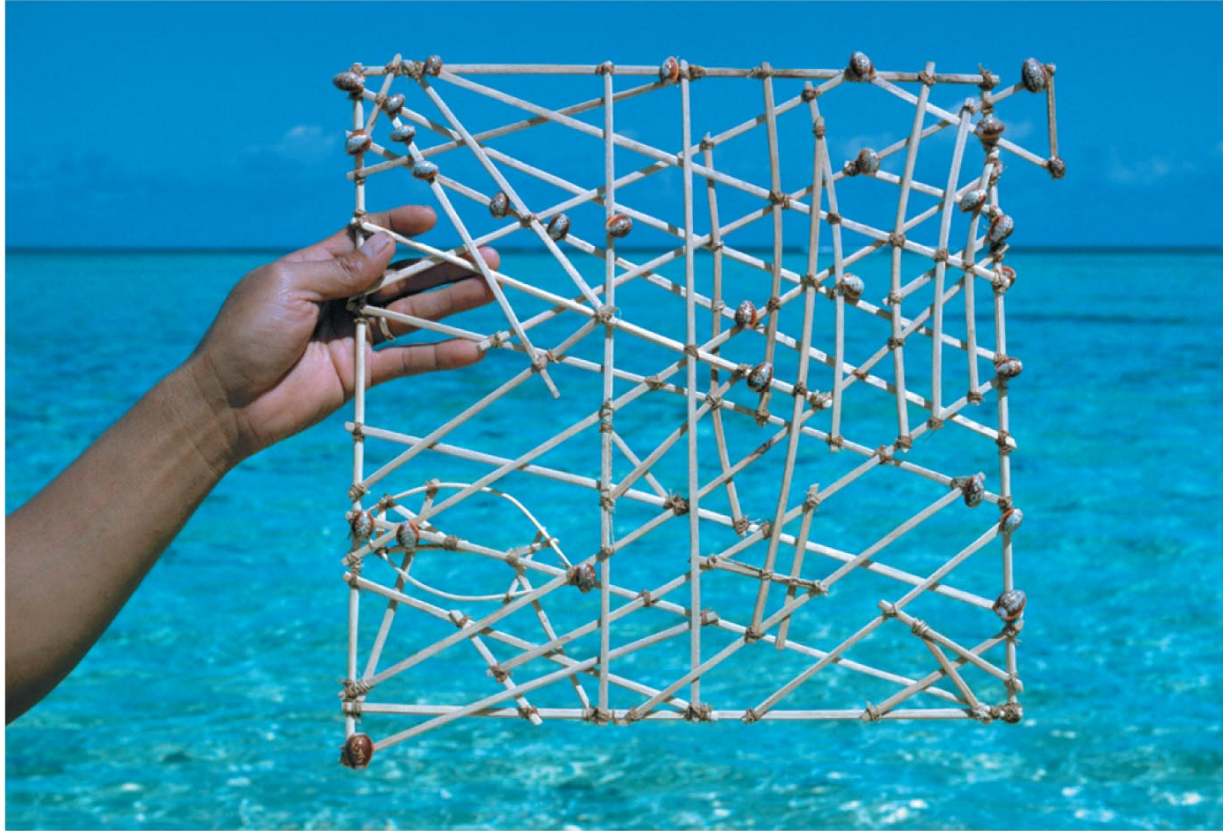
- Peru: Lines and patterns, some aligned with stars.

How is modern science rooted in ancient astronomy?



- Macchu Pichu, Peru: Structures aligned with solstices.

How is modern science rooted in ancient astronomy?



- South Pacific: Polynesians used a knowledge of astronomy alongside a detailed understanding of ocean currents to guide navigation.

What have we learned?

- **In what ways do all humans use scientific thinking?**
 - Scientific thinking involves the same type of trial and error thinking that we use in our everyday life, but in a carefully organized way.
- **How is modern science rooted in ancient astronomy?**
 - Many of our modern timekeeping systems have ancient roots