THE STANDARD

Earth-Sun-Moon System

Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

DCI
DISCIPLINARY CORE IDEA

ESS1.A · The Universe and Its Stars

> *Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.*

The moon orbits Earth. Earth orbits the sun. Earth also spins on a tilted axis. Three motions running at once, all predictable. Lunar phases come from where the moon sits relative to Earth and the sun. Eclipses come from those three lining up. Seasons come from the tilt, not from how close Earth gets to the sun. **Same system, different cycles, all geometry.**

SEP
SCIENCE & ENGINEERING PRACTICE

Developing and Using Models

> *Develop and use a model to describe phenomena.*

Students aren't memorizing a phase chart. They're building a model (a ball and a flashlight, a diagram, a 3D sim) that shows where the moon and Earth and sun sit relative to each other. Then they use that model to predict what an observer on Earth would see. **If the model can explain a full moon and a solar eclipse and a Texas summer, it's doing real work.**

CCC
CROSSCUTTING CONCEPT

Patterns

> *Patterns can be used to identify cause-and-effect relationships.*

Every cycle in this standard is a pattern. Full moon every ~29.5 days. Solstice every six months. Eclipses on a longer rhythm. Patterns let students stop guessing and start predicting. Once they see the pattern, they can ask the better question: what's causing it? **That's the bridge from observation to mechanism.**