



Reading the Horizon: Alignments and the Templo Mayor

Module 2 handout · How architecture keeps time

Mesoamerican cities are instruments of naked-eye, horizon-based astronomy. Buildings were oriented so that on a chosen day the sun rises at a precise point on the horizon — behind a notch in the mountains, between twin shrines, or down the axis of a plaza. Orientation is data: the azimuth of a temple records the day its builders wanted marked.

Vocabulary of alignment

Term	Meaning
Azimuth	Compass bearing of a point on the horizon, measured in degrees from true north.
Horizon calendar	A set of landmarks used to mark days by where the sun rises or sets.
Equinox	The two days a year when day and night are of near-equal length.
Solstice	The days the sunrise reaches its northern and southern extremes.
Zenith passage	In the tropics, the days the sun passes directly overhead at noon.
Templo Mayor	The twin-shrine pyramid of Tenochtitlan: Tlalok and Witzilopochtli.

Sites and what they mark

Site	Structure	Event framed
Tenochtitlan	Templo Mayor	Equinox-season sunrise between the twin shrines — the anchor of this system.
Teotihuacan	City grid, Sun Pyramid	Grid skewed $\sim 15.5^\circ$ east of north, tied to horizon sunset dates.
Dzibilchaltún	Temple of the Seven Dolls	Equinox sun rising through the doorway.
Chichén Itzá	El Castillo	Equinox light-and-shadow serpent on the northern stair.
Monte Albán	Building J	Sightlines to stars rising on the horizon.

Why sunrise, not midnight

Because the anchor is a sunrise observed at a place, the day begins at sunrise. A date written in this system therefore does not line up cleanly with a Gregorian calendar day: the Mexika day that starts on a given morning runs until the next sunrise, straddling the midnight that ends the Gregorian date.



Quiz

1. What is an azimuth, and why is a building's azimuth a piece of calendrical evidence?

2. Which horizon event does the Templo Mayor frame?

3. Between which two features of the Templo Mayor does that sunrise appear?

4. Why is it significant that the alignment was maintained across successive construction stages?

5. Name two other sites that mark an equinox event architecturally.

6. What is a zenith passage, and why is it only observable in the tropics?

7. What changes about a date if the day is reckoned from sunrise instead of midnight?

8. A temple faces a notch in a mountain ridge. What would you record to test whether it is a calendrical alignment?



Answer key

1. The compass bearing of a horizon point. A temple's azimuth points at the spot where the sun rose or set on the day the builders wanted marked, so it encodes that date.
2. An equinox-season sunrise.
3. Between the twin shrines of Tlalok and Witzilopochtli, in the notch above the shared platform.
4. It shows the alignment was deliberate and actively preserved — a rebuild that kept the bearing was keeping a working instrument, not repeating a habit.
5. Dzibilchaltún (Temple of the Seven Dolls) and Chichén Itzá (El Castillo); Teotihuacan also carries a deliberate horizon-based skew.
6. The day the sun stands directly overhead at noon and vertical objects cast no shadow; it can only happen between the tropics, where the sun's declination can equal the latitude.
7. The date turns over at first light, so a single Mexika day overlaps two Gregorian dates and the hours after midnight still belong to the previous day's sign.
8. The azimuth of the notch from the temple's center, the temple's own orientation, the horizon altitude of the notch, and the dates on which sunrise actually lands there.

Study tip: use a compass app to take the azimuth of sunrise from your own doorway on three different mornings. Watching the point move is what makes the year visible.