

Reminder: no food or
drinks in the planetarium!

Astronomy 4 - *Solar System Astronomy*

Reminders

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-Feel free to email me about course questions or astronomy in general.

Class website:

-<https://amcody.github.io/astro4>

Your one-stop shop for anything course related, including homework readings and exam practice material.

Lost and found:

-At the end of class, check to make sure you aren't leaving anything behind. Any items will be added to the Lost and Found box in back.

How can we describe the motion of the sun in the sky?

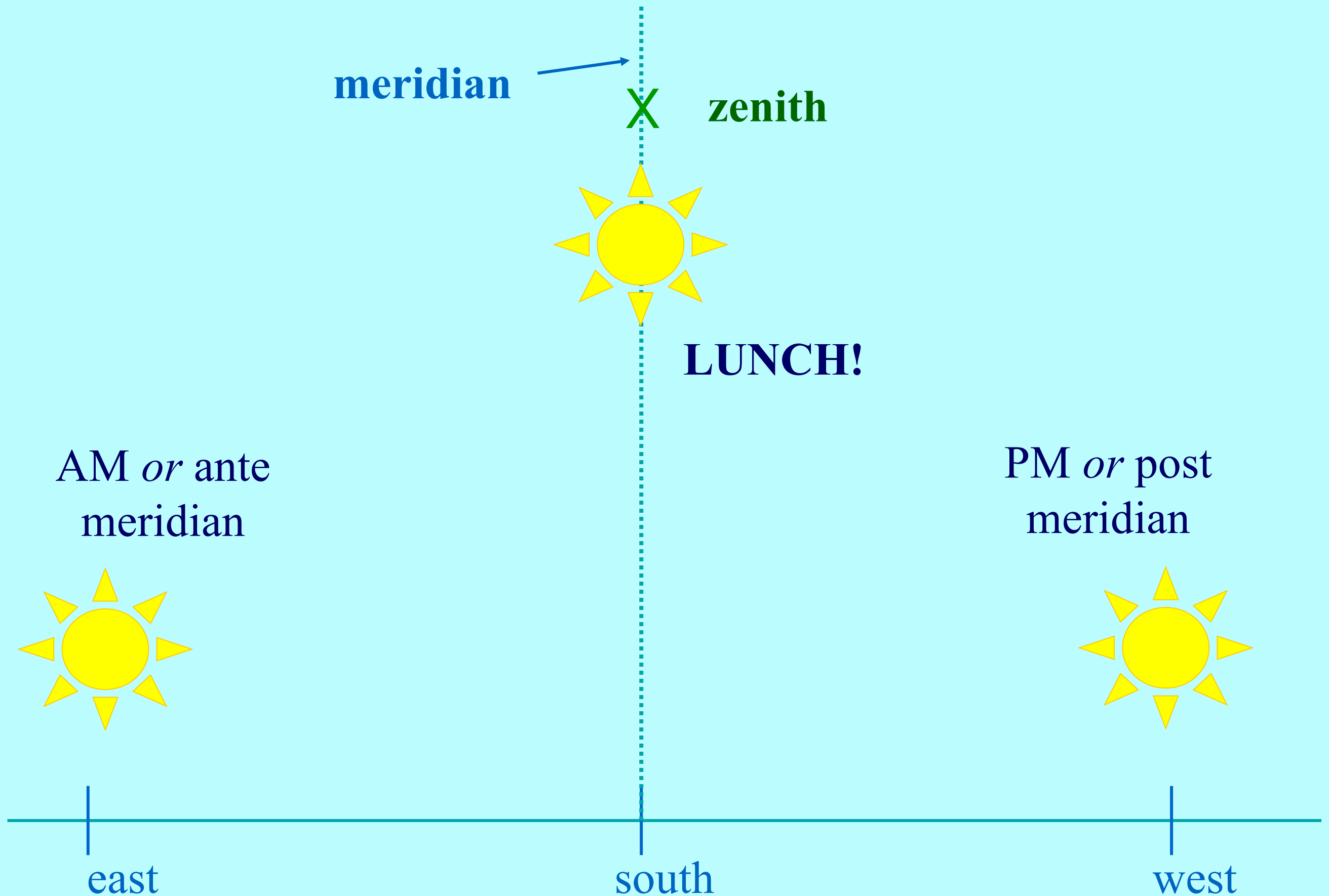
meridian  **X Zenith or overhead**

east

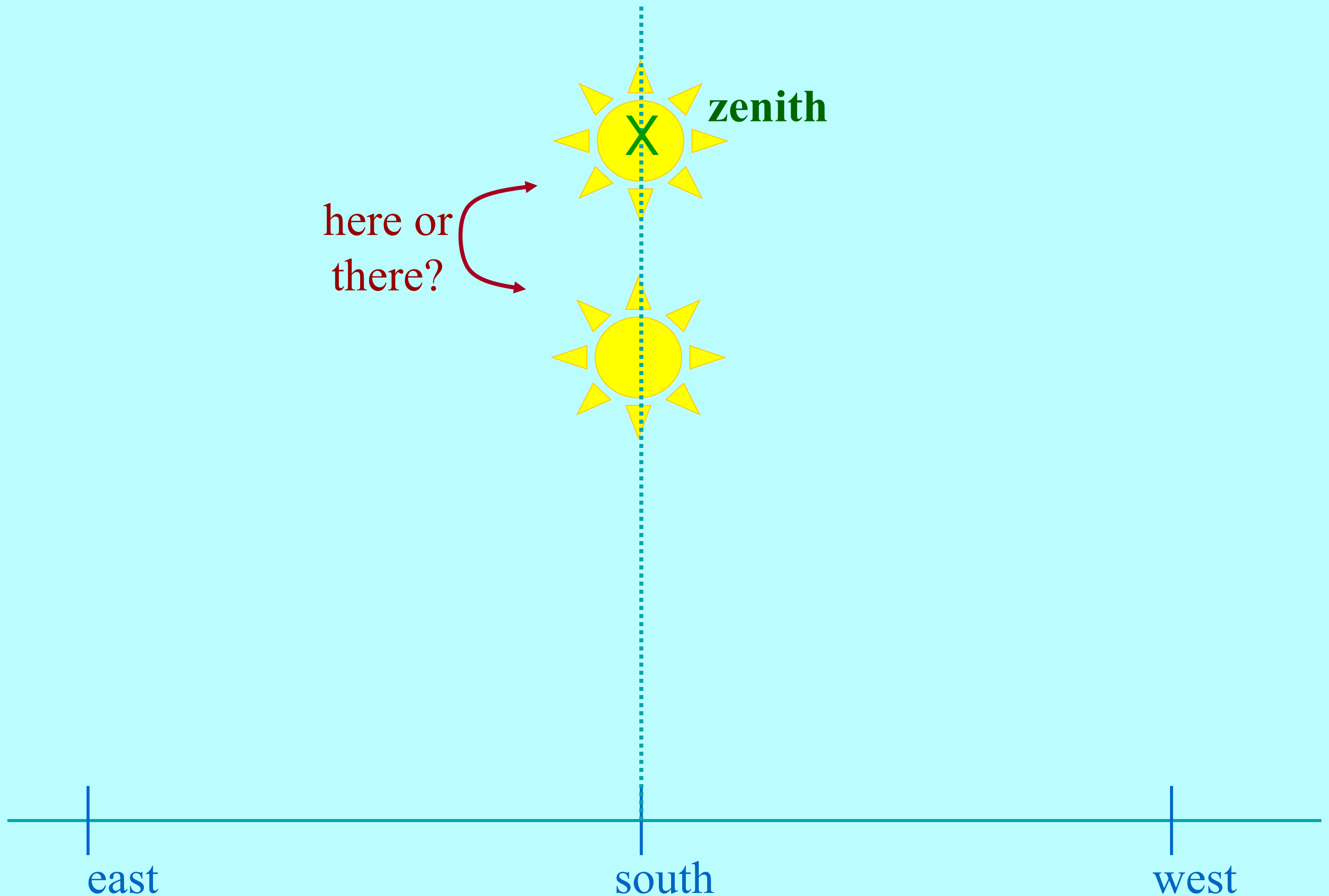
south

west

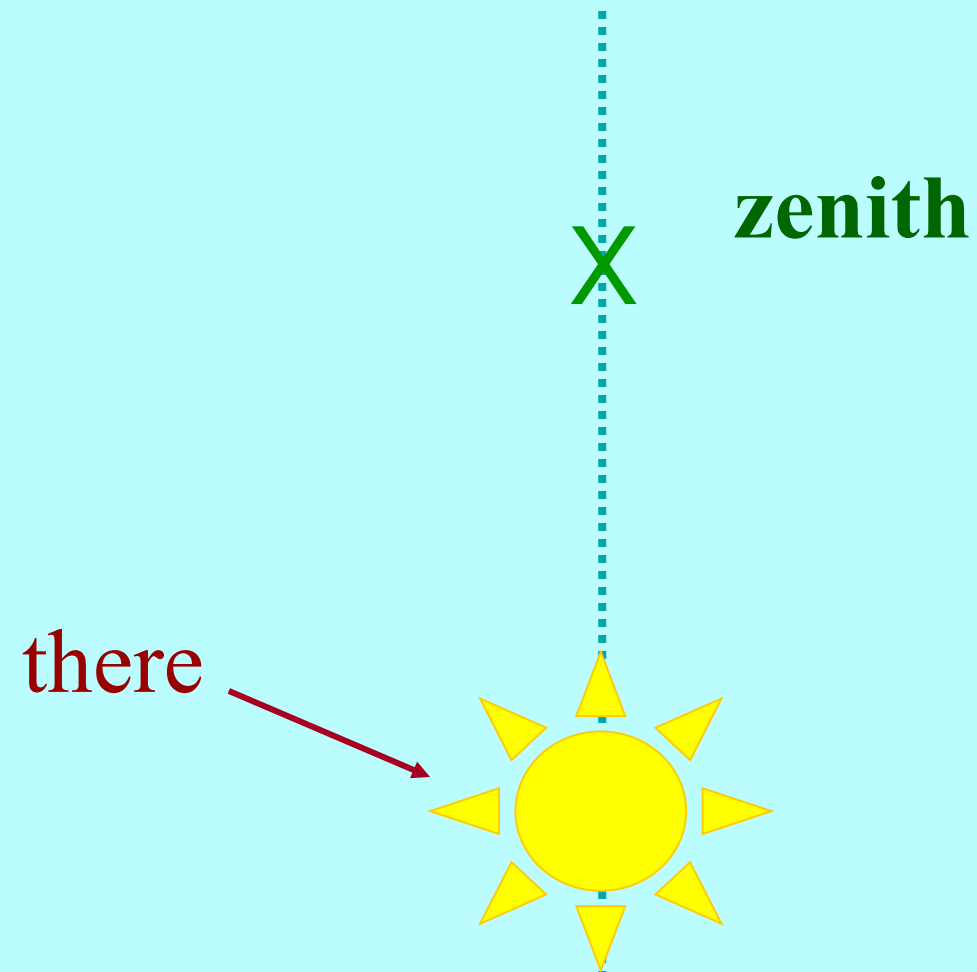
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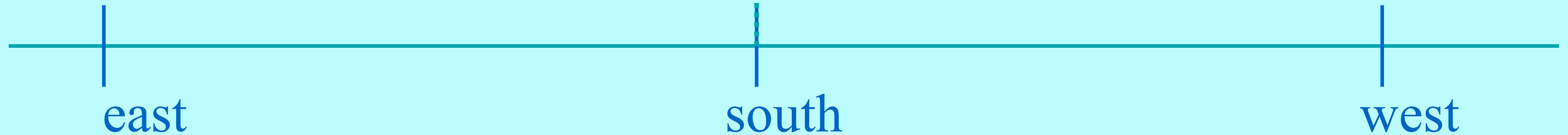
Where is the Sun at noon today?



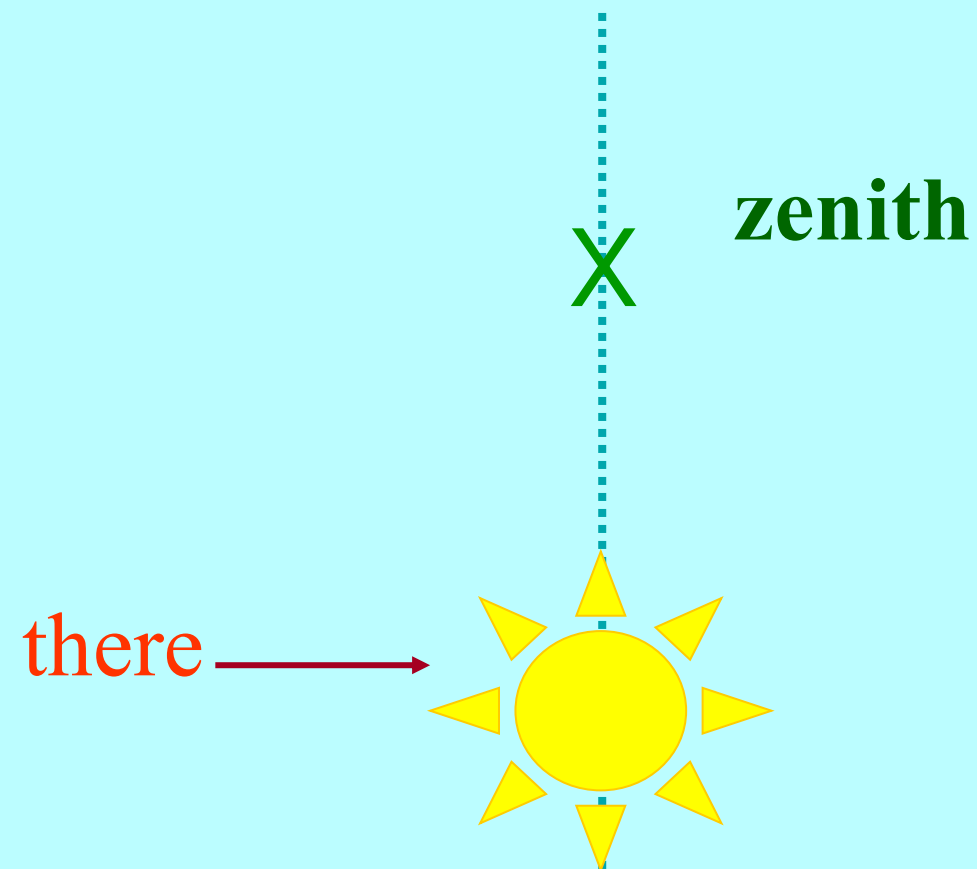
Where is the Sun at noon today?



**What about
tomorrow at
noon?**

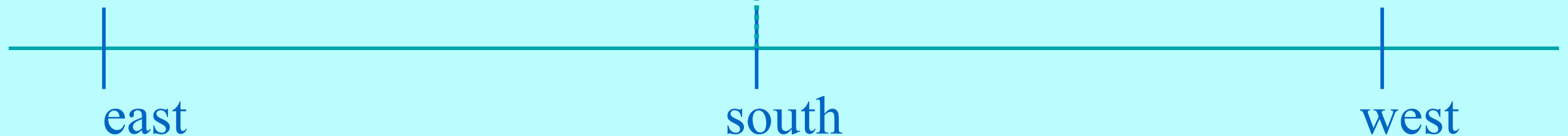


What about the path of the Sun?

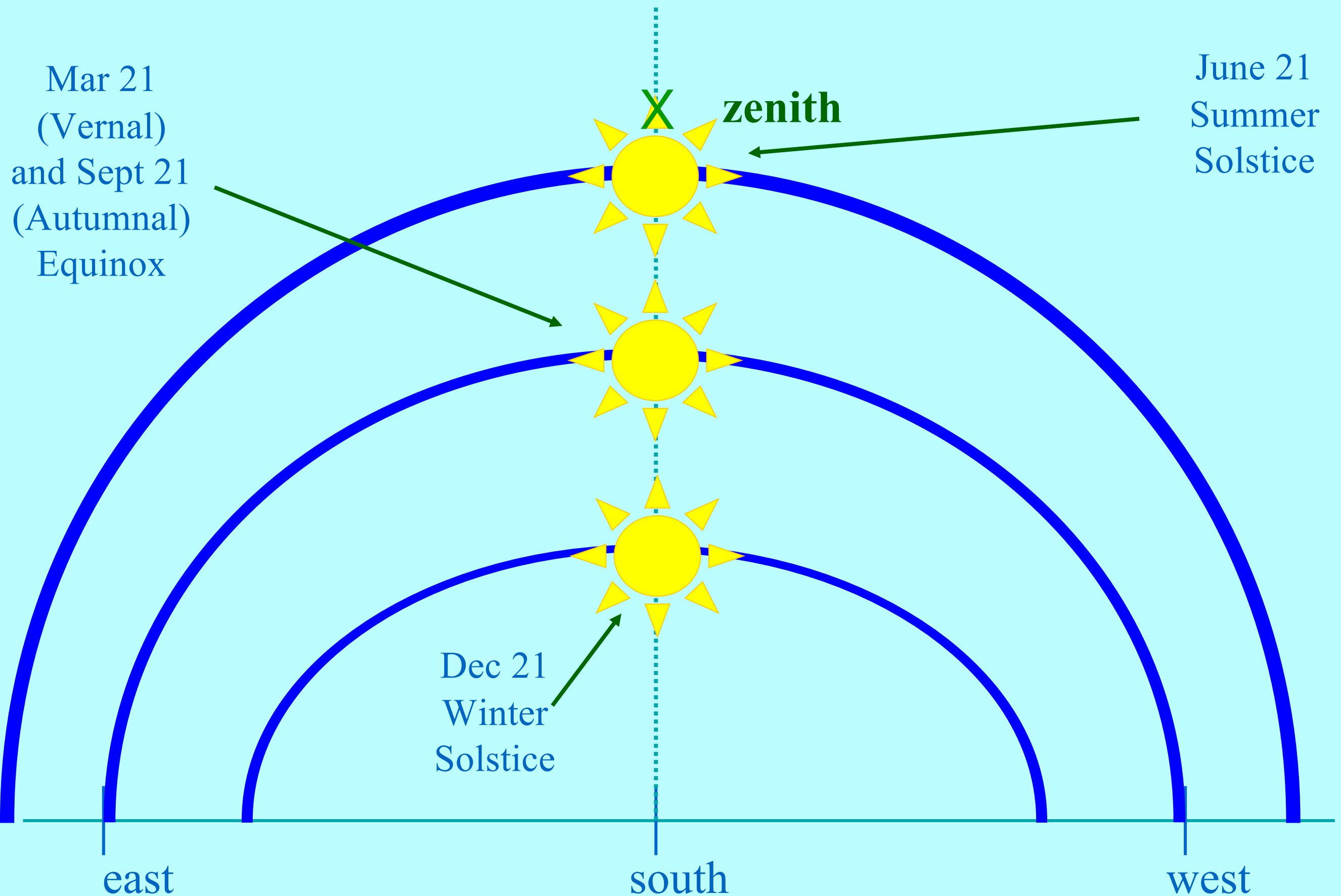


**What about
tomorrow at
noon?**

**JUST A
LITTLE
HIGHER !!**



Where is the Sun throughout the year?



The time for
the sun to go
from being
highest in the
sky at noon, to
lowest and
back to
highest again
is...

**ONE
YEAR**

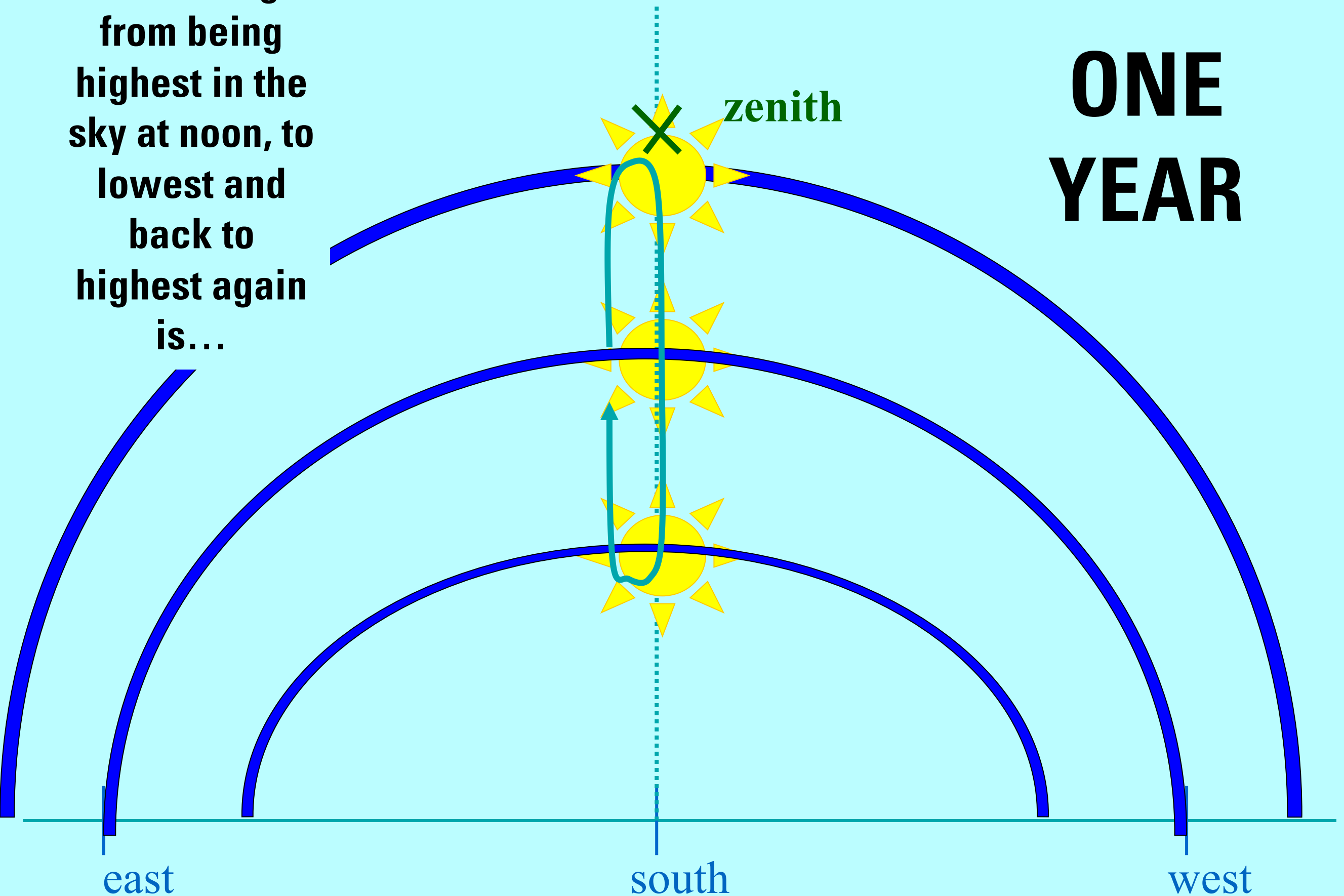
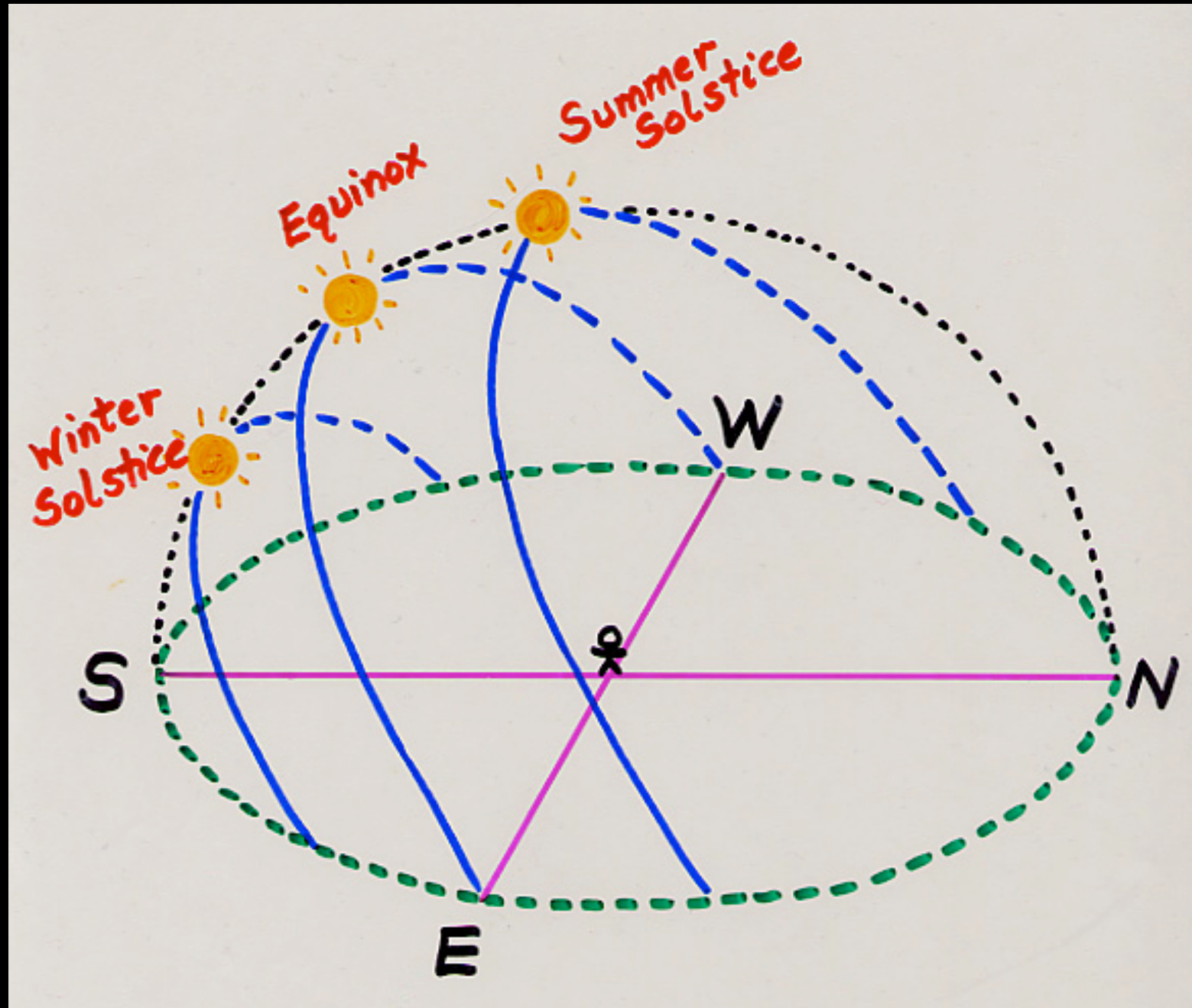
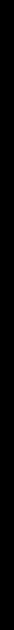
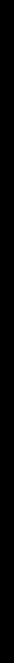


Diagram of the path of the Sun travels on the DAYS of the Solstices and the Equinoxes



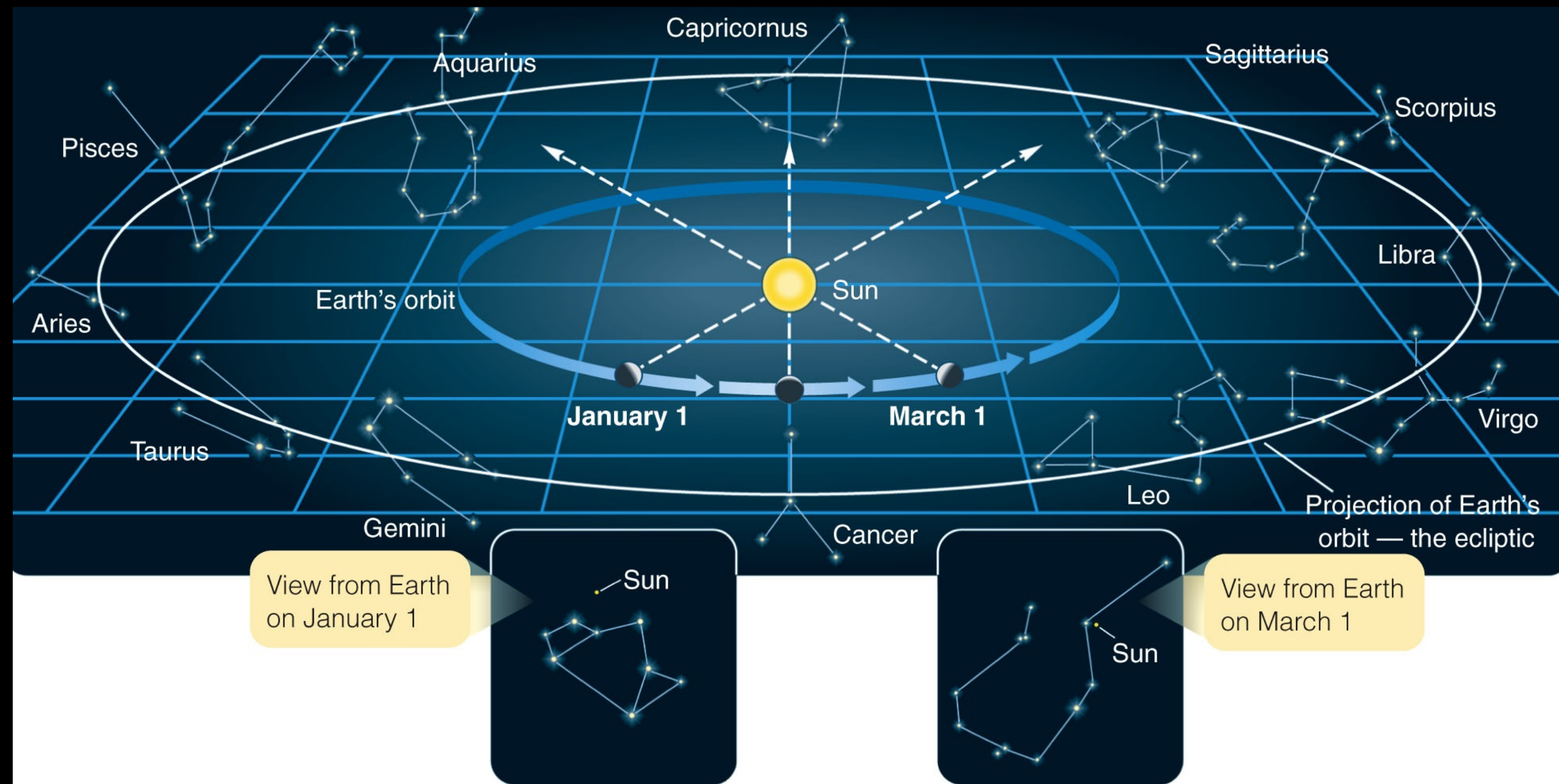
The Sun rises/sets DUE east/west only on the equinoxes!

Position of the Sun when photographed during the day of the winter and summer solstice



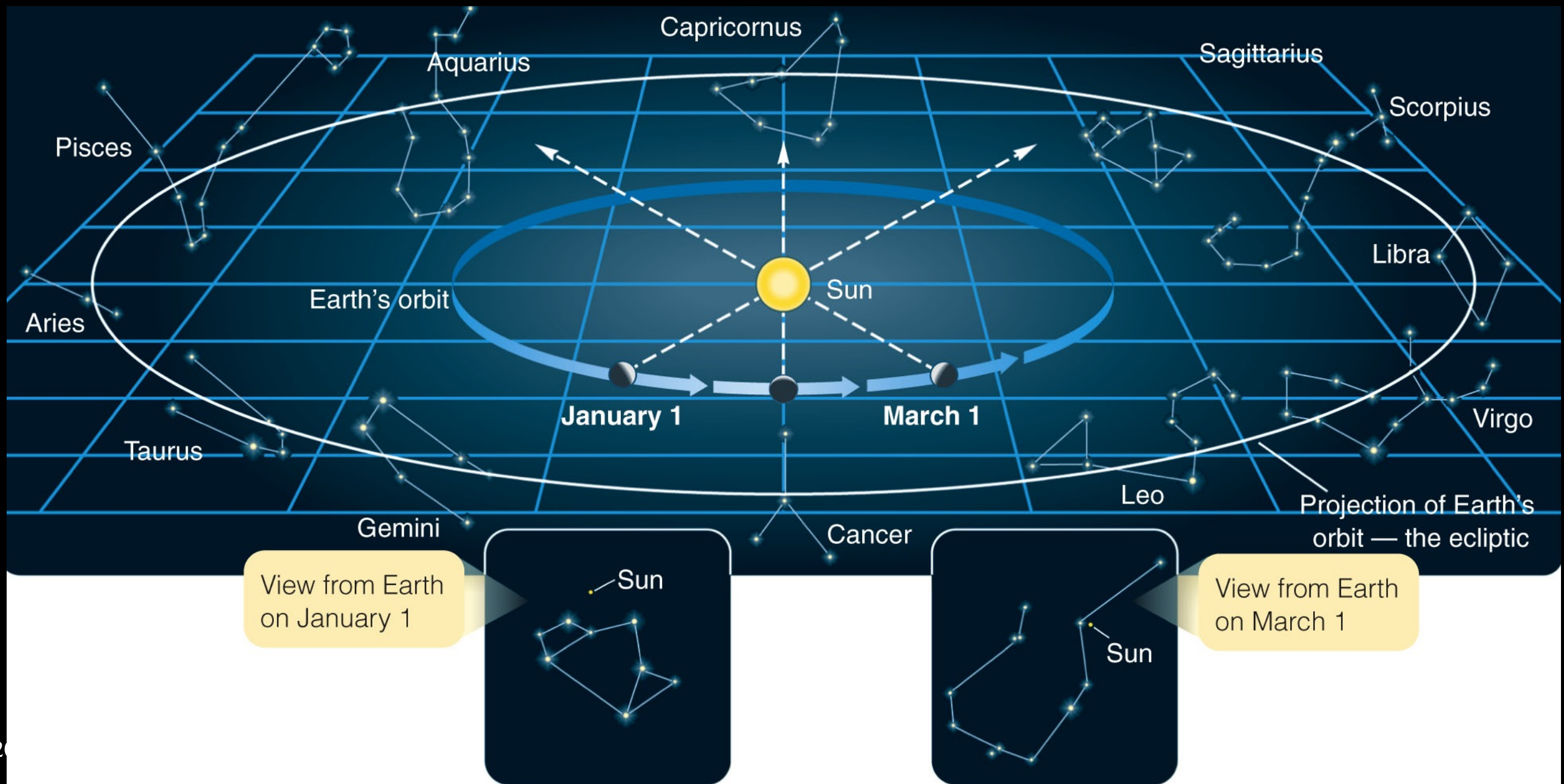
The Sun appears to move across the celestial sphere over the entire year

As the Earth goes around the Sun, the constellations we can see at night will change

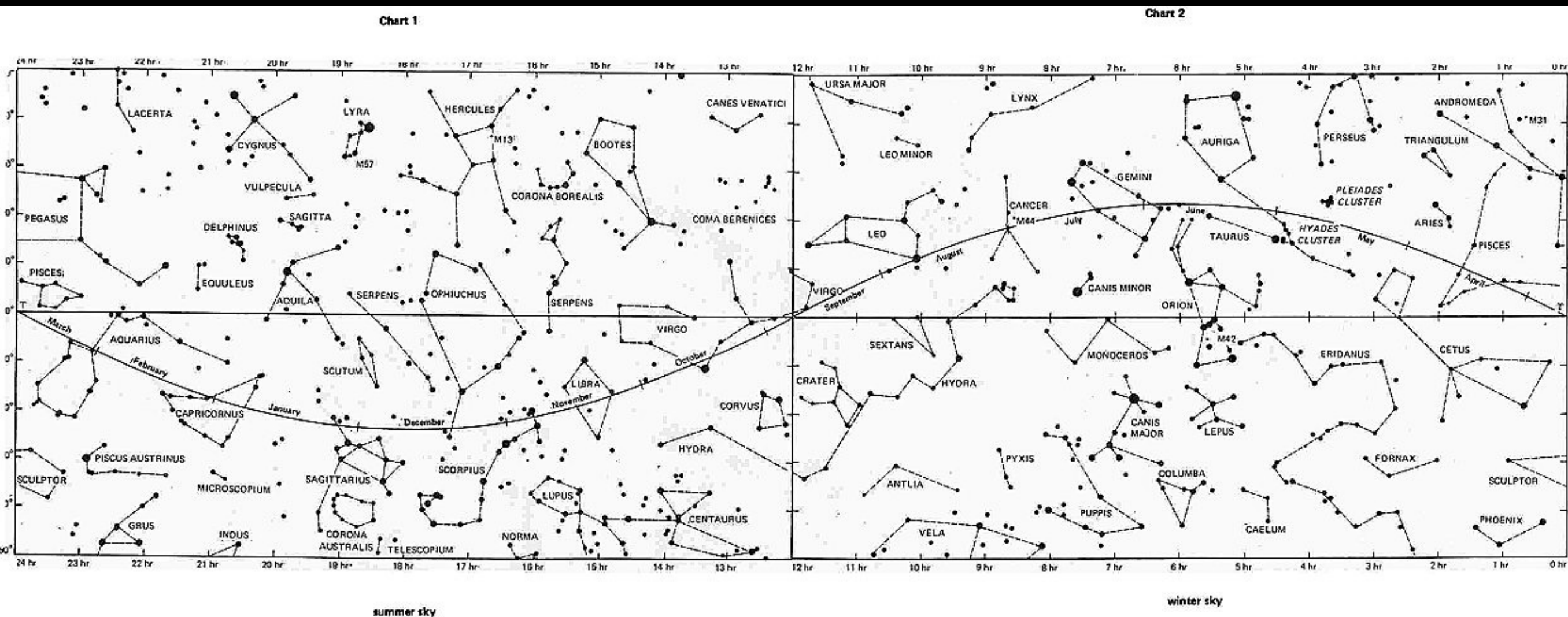


The Annual APPARENT Motion of the Sun

- In January, you would see the sun in front of the constellation Sagittarius.
- By March, it is in front of Aquarius.



- Through the year, the sun moves **eastward** among the stars following a line called the **ecliptic**—the apparent path of the sun among the stars.
- The constellations the Sun goes through over a year are called the **Zodiac**



Your Birth Sign

ROUGHLY, it is the constellation that the Sun is covering up during the day you are born if you were born 2000 years ago.

Zodiac -

The 13 Zodiacal constellations that our
Sun covers-up (blocks) in the course of
one year

(used to be only 12)

- Aquarius
- Pisces
- Aries
- Taurus
- Gemini
- Cancer
- Leo
- Libra
- Virgo
- Scorpius
- Ophiuchus
- Sagittarius
- Capricornus

Table 1-1
The 13 Constellations of the Zodiac

Constellation	Dates of Sun's Passage Through
Pisces	March 13–April 20
Aries	April 20–May 13
Taurus	May 13–June 21
Gemini	June 21–July 20
Cancer	July 20–August 11
Leo	August 11–September 18
Virgo	September 18–November 1
Libra	November 1–November 22
Scorpius	November 22–December 1
Ophiuchus	December 1–December 19
Sagittarius	December 19–January 19
Capricorn	January 19–February 18
Aquarius	February 18–March 13

Did earth's rotation chance the zodiac signs?



TRENDING TONIGHT:
DID EARTH'S ROTATION CHANGE THE ZODIAC SIGNS?

73°

10:18

12NEWS

FRIDAY NIGHT FEVER

TRUMBO BLASTS D-BACKS

WEEKEND WEATHER

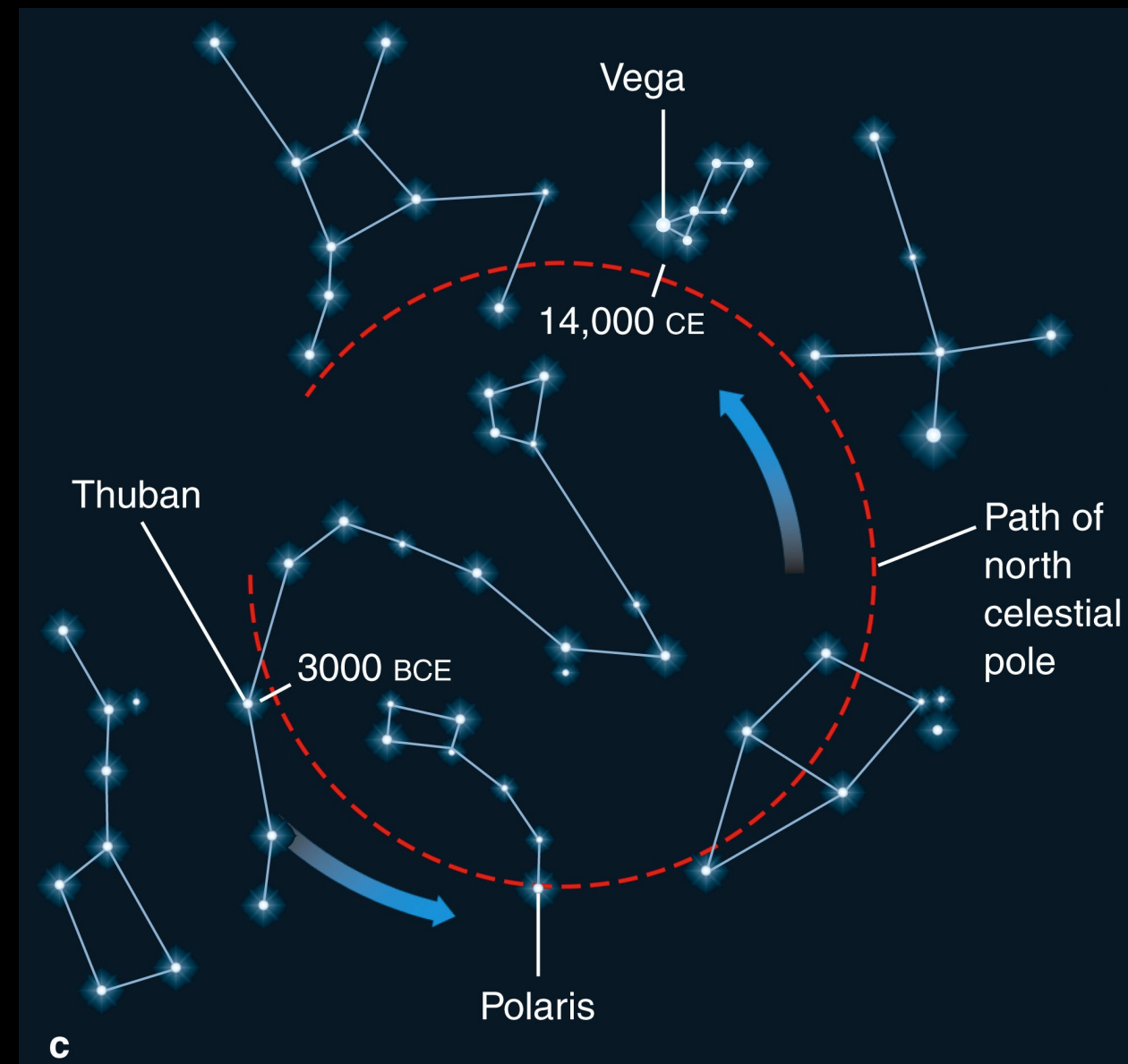
TALKER

No, NASA hasn't changed your zodiac sign

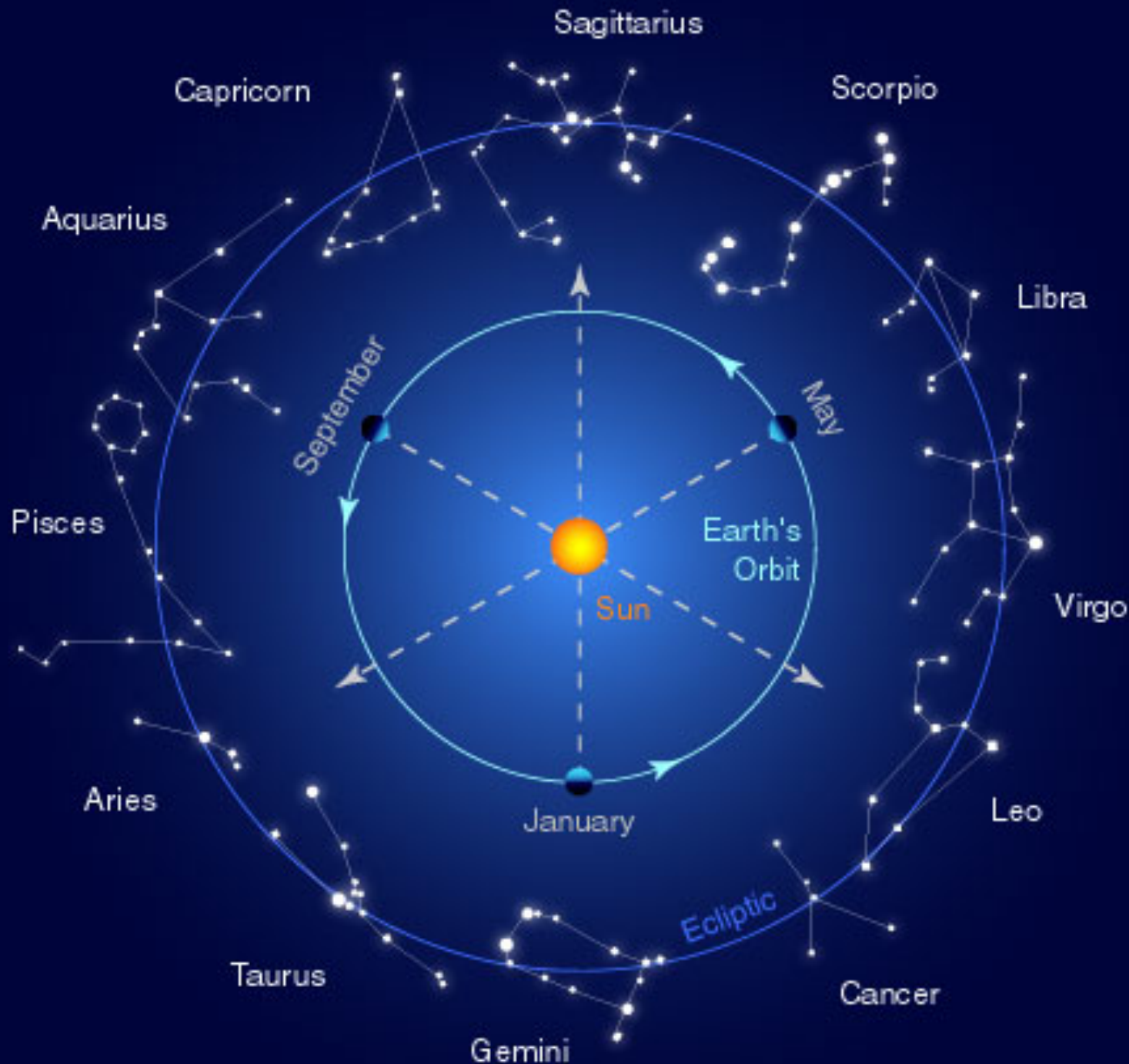
Despite what you may have heard, NASA isn't [ruining your life](#).

Precession

The combination of these forces and Earth's rotation causes Earth's axis to precess in a slow circular sweep—taking about 26,000 years for one cycle.



Precession is why the zodiac signs are off by one sign!!



Aries

Mar 21-Apr 19



Libra

Sep 23-Oct 22



Taurus

Apr 20-May 20



Scorpio

Oct 23-Nov 21



Gemini

May 21-Jun 21



Sagittarius

Nov 22-Dec 21



Cancer

Jun 22-Jul 22



Capricorn

Dec 22-Jan 19



Leo

Jul 23- Aug 22



Aquarius

Jan 20-Feb 18



Virgo

Aug 23-Sep 22



Pisces

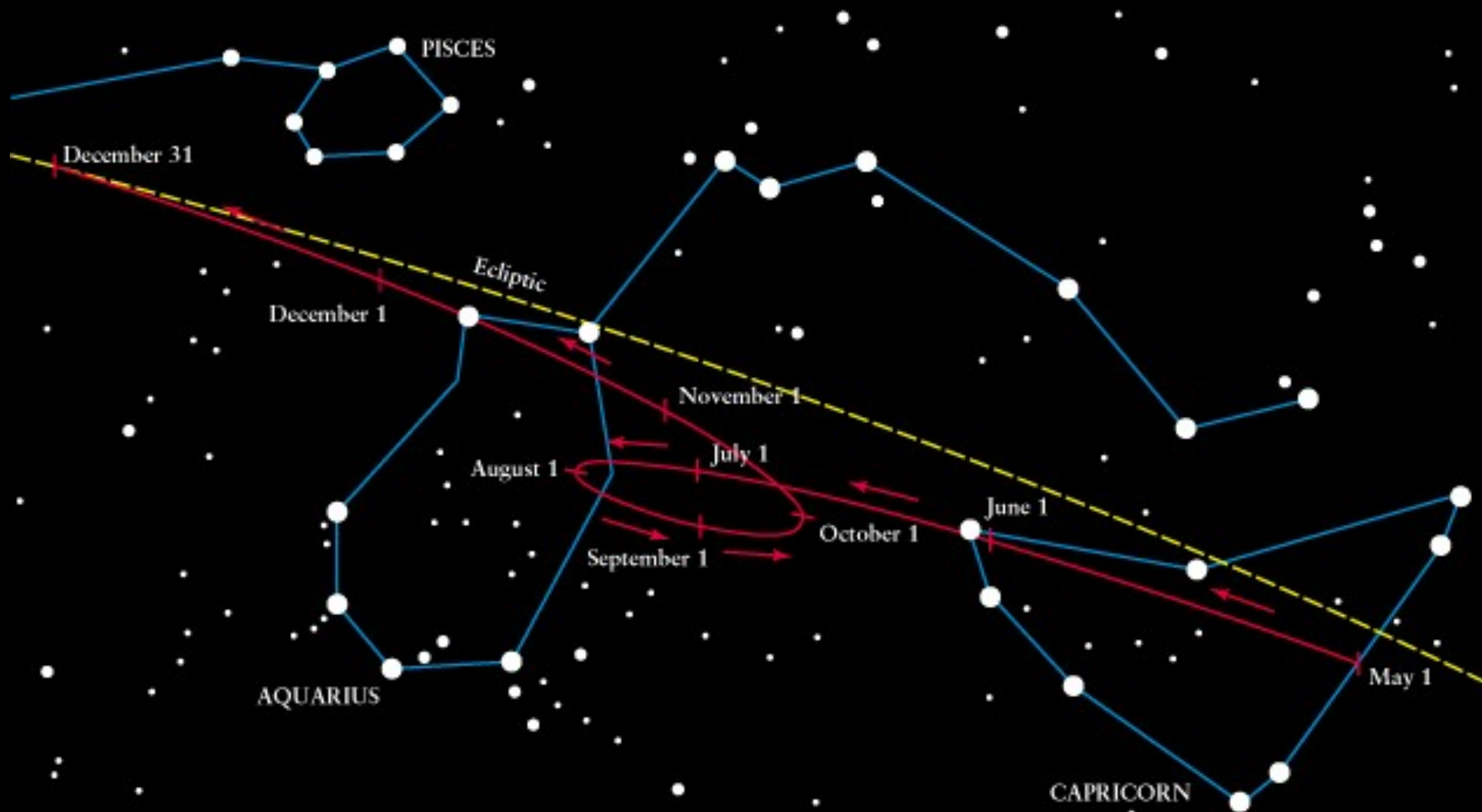
Feb 19-Mar 20



Motion of the Planets

Prograde and Retrograde Motion

- **Prograde Motion (normal motion)** – The apparent **West to East** motion of objects (over many nights) as compared to the stationary background stars.
- **Retrograde Motion** - The apparent **East to West** motion of objects (over many nights) as compared to the stationary background stars.

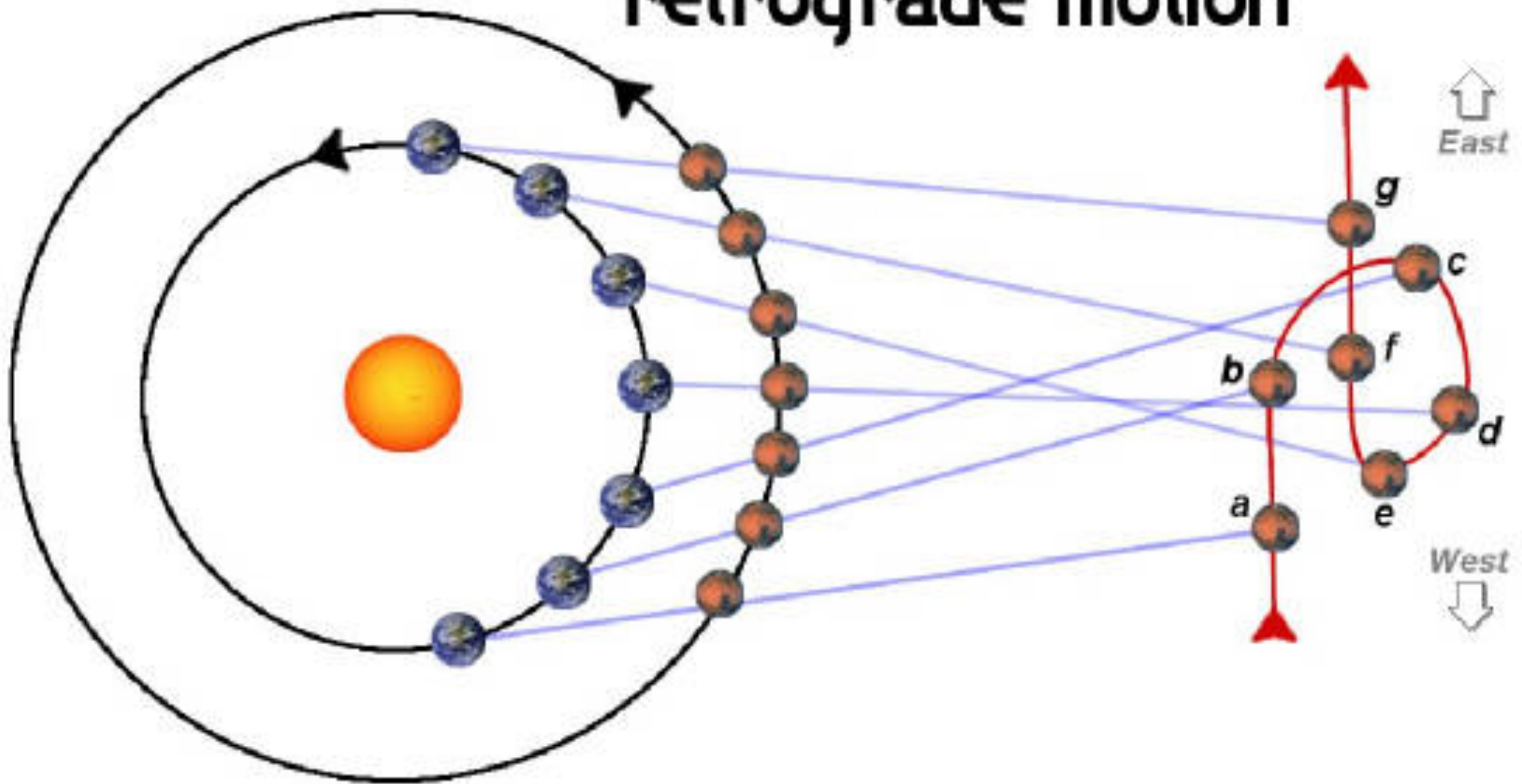


East

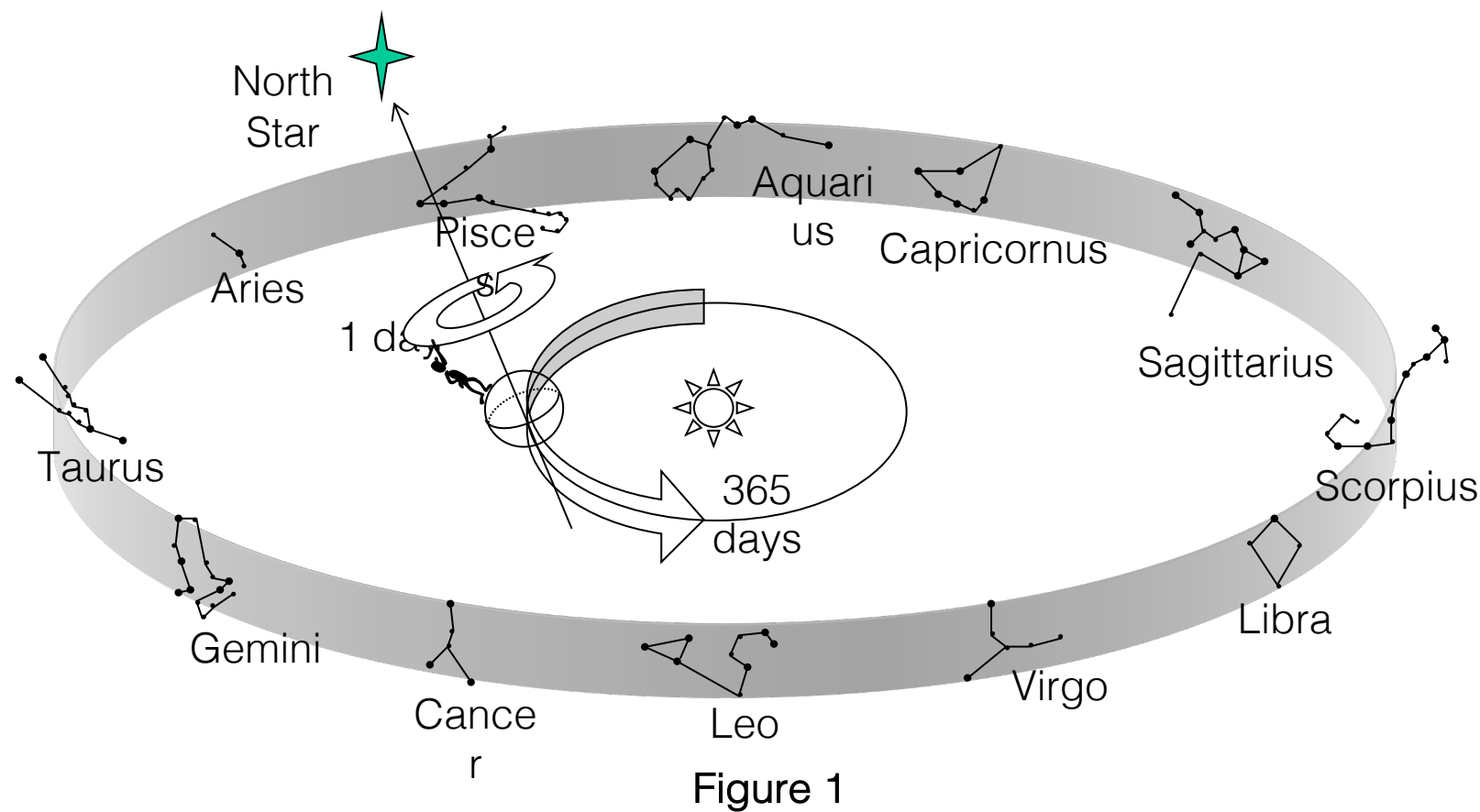
South

West

retrograde motion



[Planetarium demo]



The Zodiacal
Constellations
that our Sun
covers up
(blocks) in the
course of one
year
(only 12 are shown here)

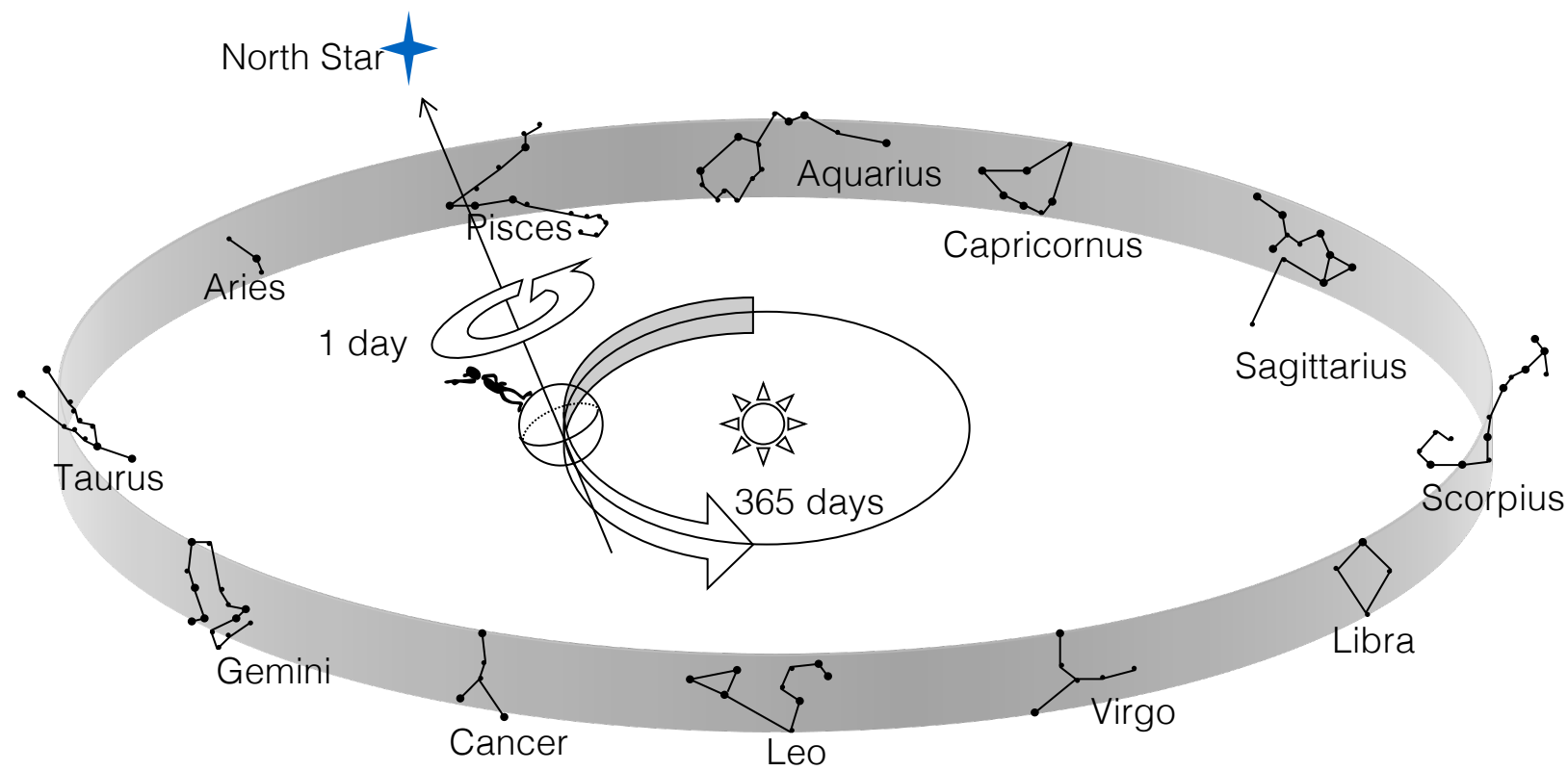


Figure 1

The Zodiacal
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our Sun covers up
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(only 12 are shown here)

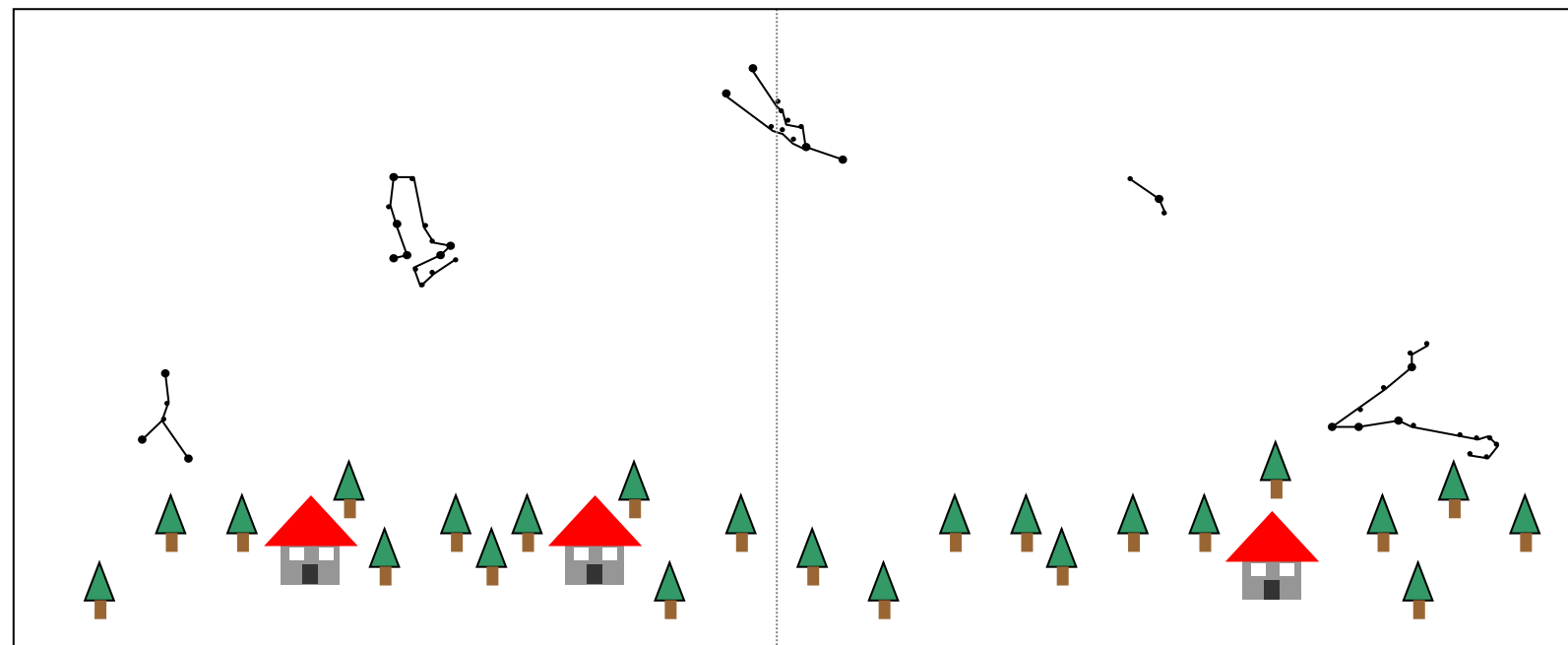


Figure 2 – What it would look like if
you were the observer in Figure 1

Which constellation
would that be for the
situation shown?

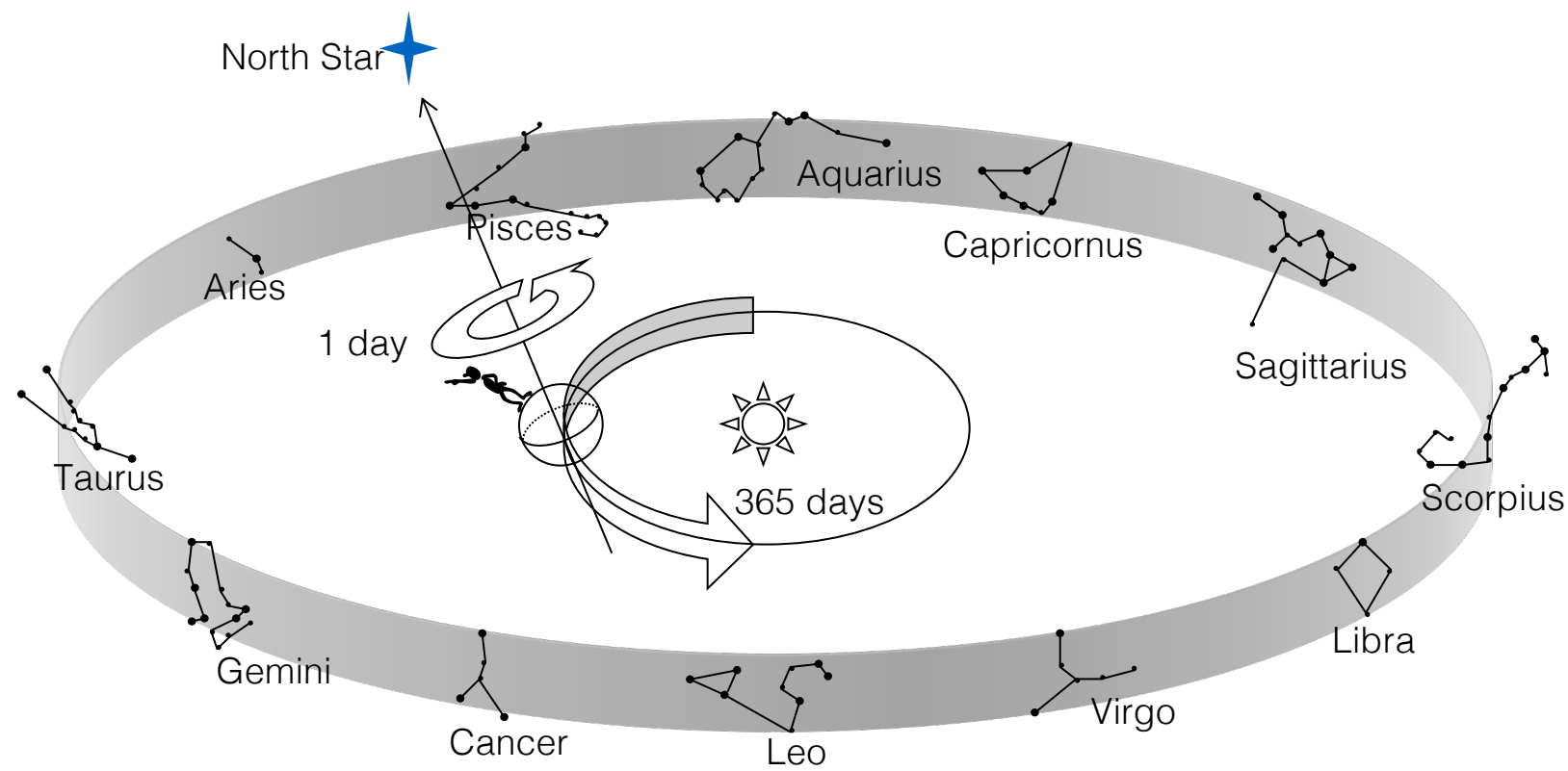


Figure 1

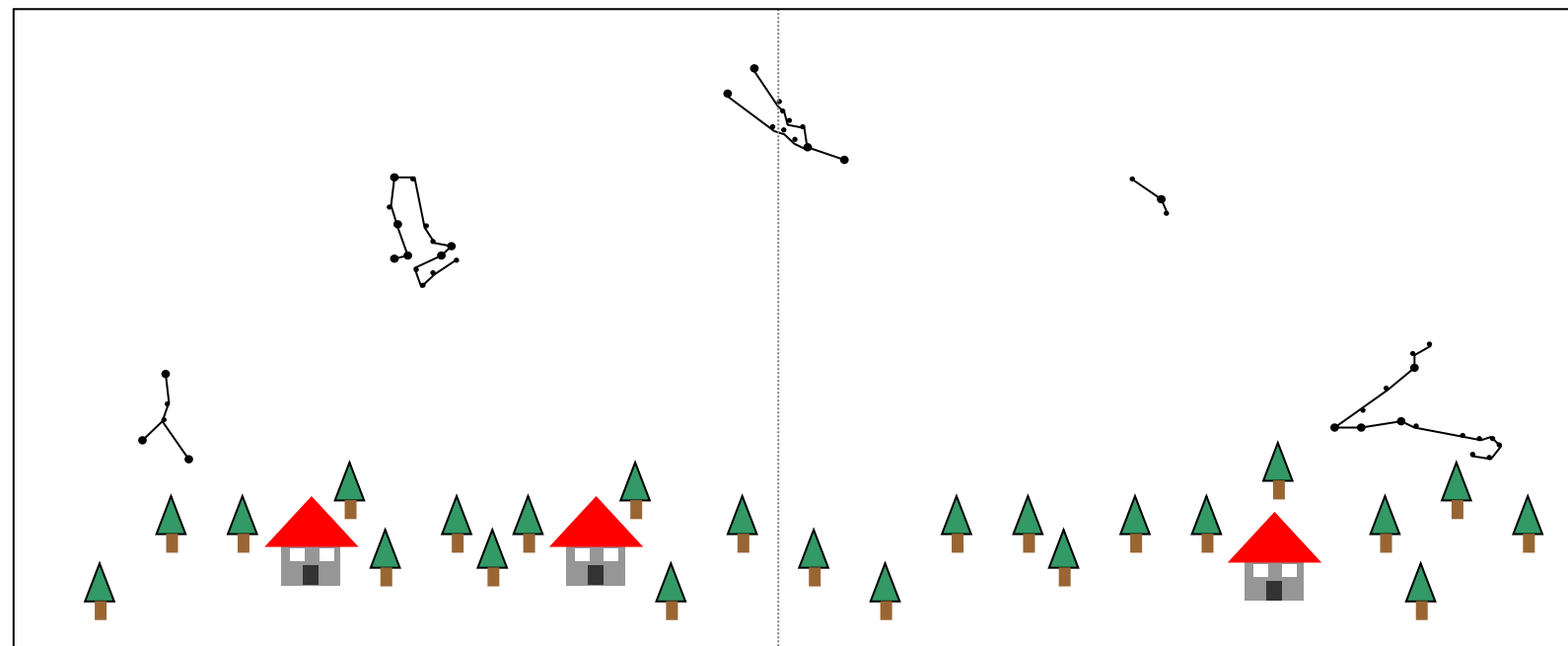


Figure 2 – What it would look like if you were the observer in Figure 1

What time is it for the observer?

What is the name of the constellation that would appear on the observers Eastern Horizon? Western?

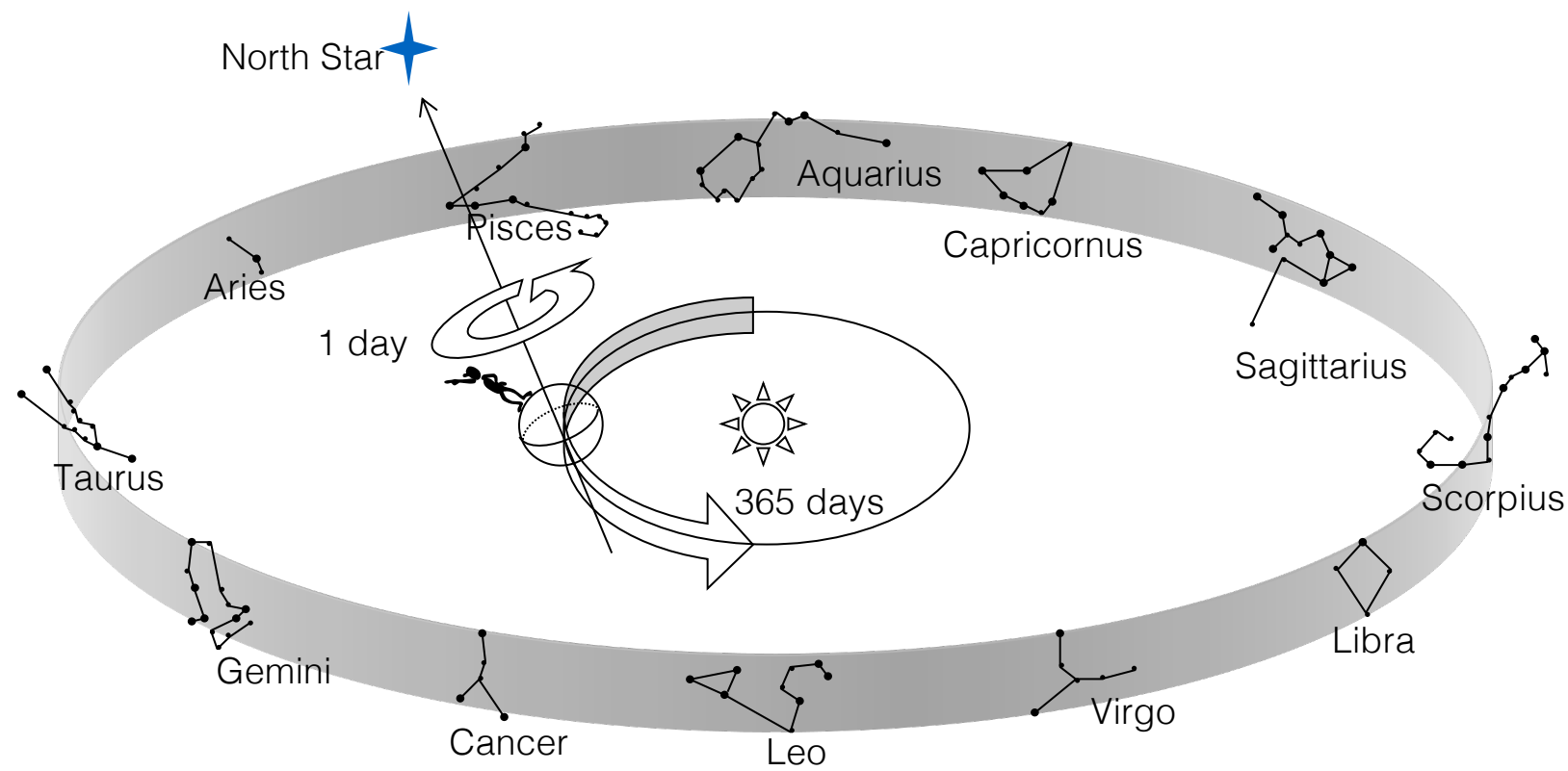


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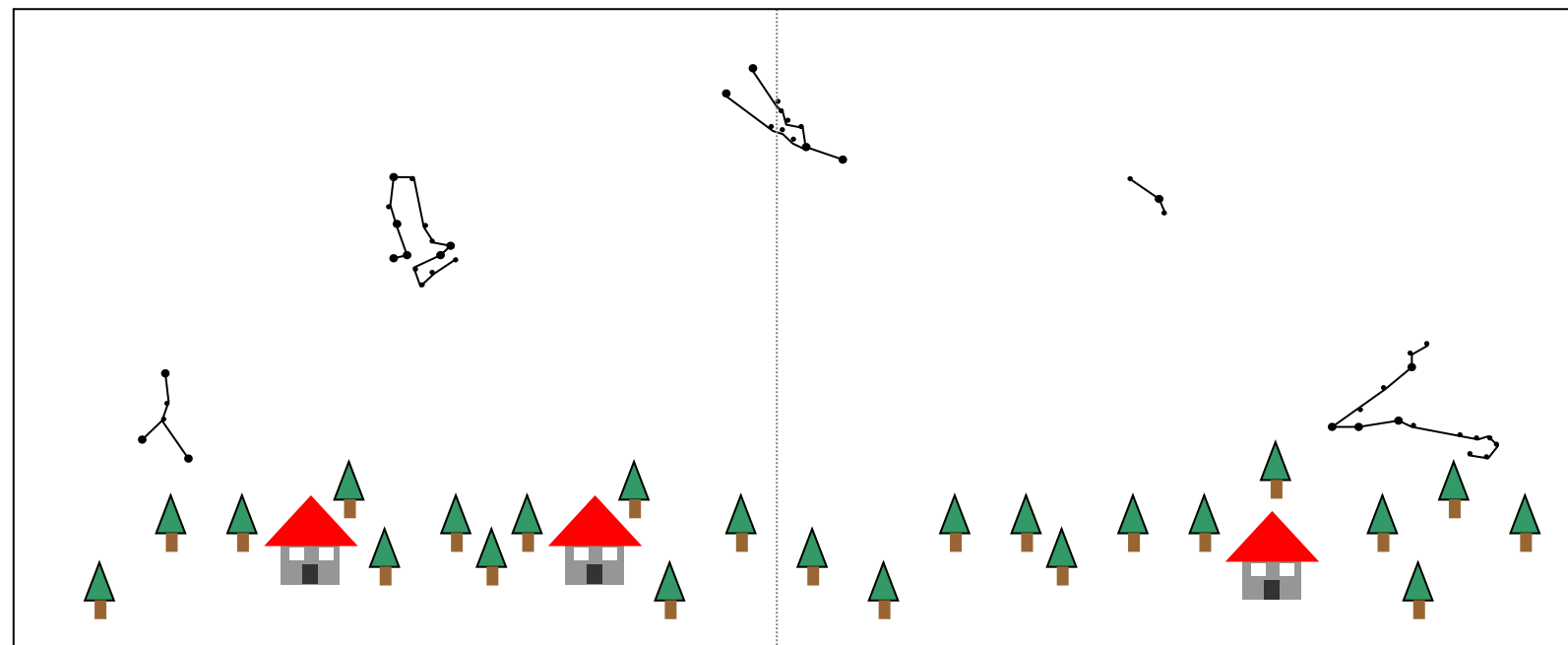


Figure 2 – What it would look like if you were the observer in Figure 1

12 hours later
what object will
be at the position
that Taurus is in
now?

18 hours later
where will the
Sun be?
Where will
Scorpius be?

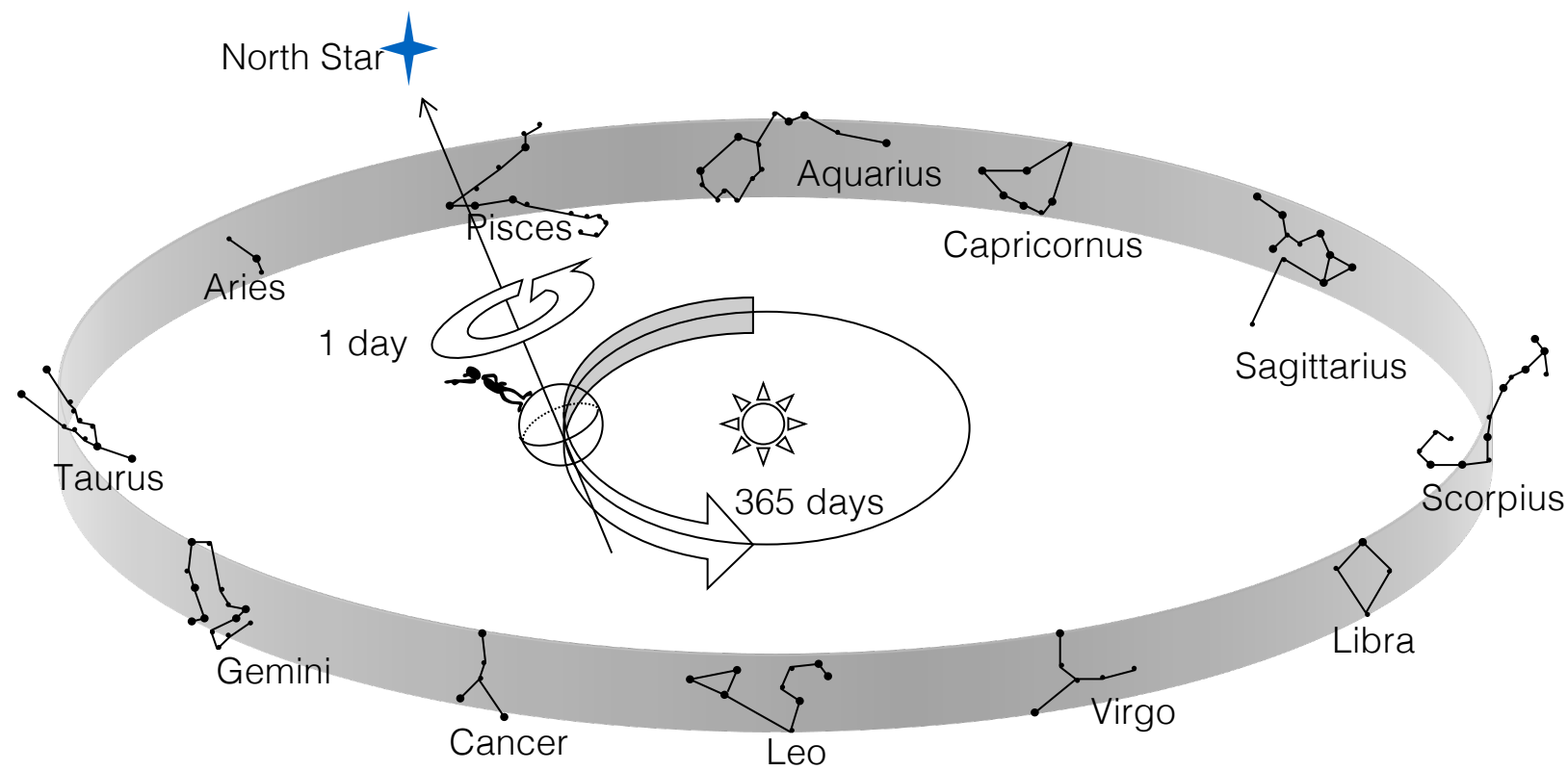


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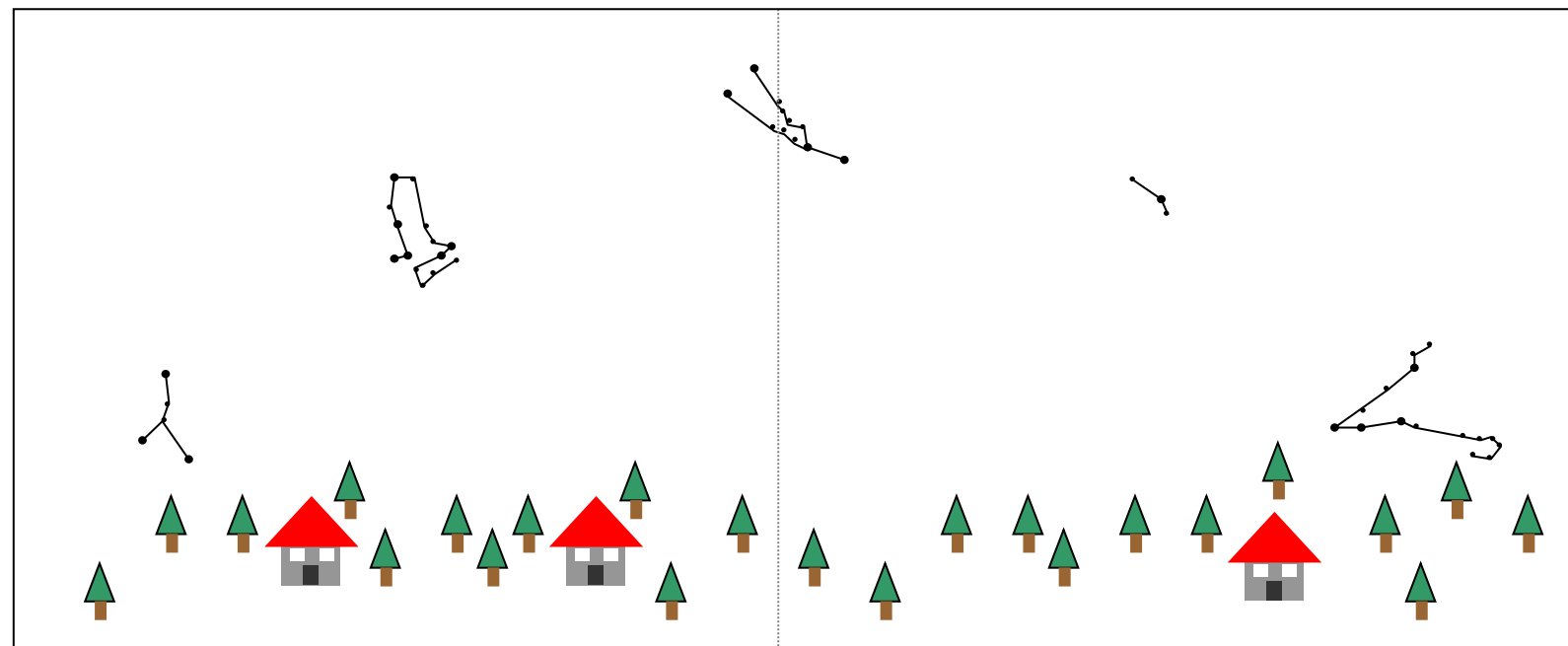


Figure 2 – What it would look like if you were the observer in Figure 1

Two months from
the time shown
what constellation
will be high in the
Southern sky, at
Midnight?
At Noon?

What sign will a
person be if they
are born at that
time?

If you could see stars during the day, the drawing below shows what the sky would look like at noon on a given day. The Sun is near the stars of the constellation Gemini. Near which constellation would you have expect the Sun to be located at *sunrise* on this day?

1. Leo
2. Cancer
3. Gemini
4. Taurus
5. Aries

