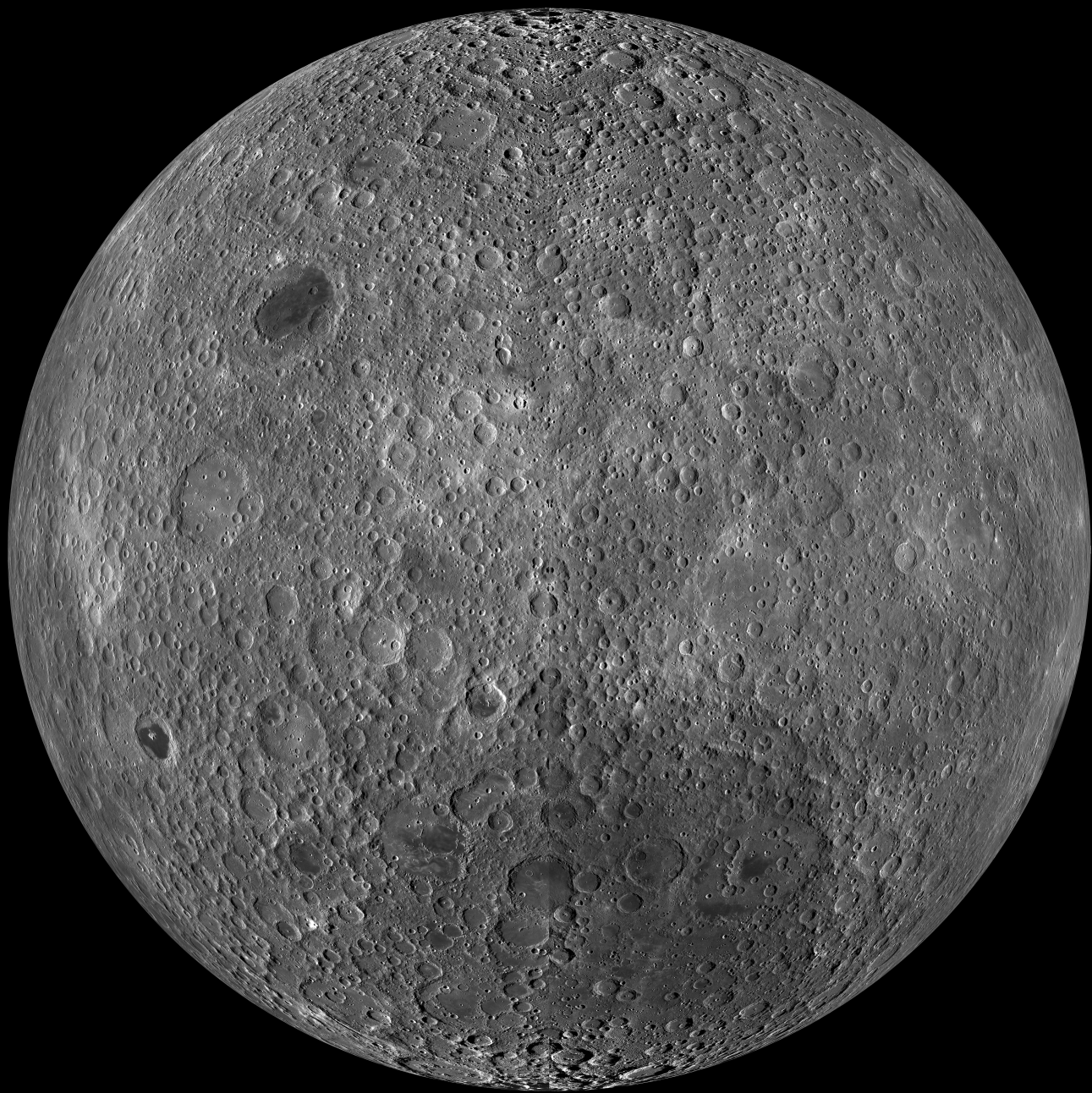


# Lunar phases









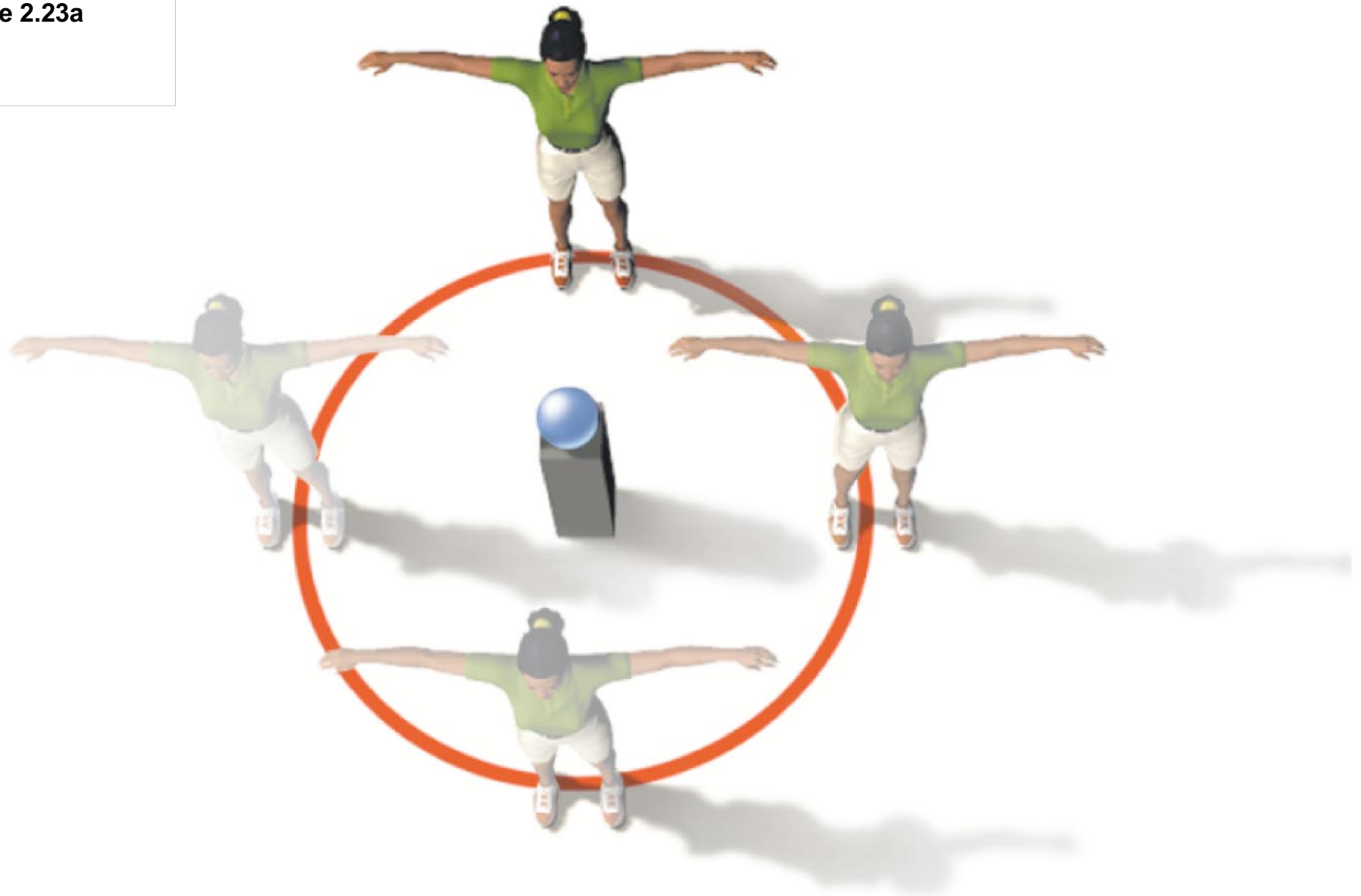
# Why does the appearance of the Moon's features remain so consistent?

1. The moon doesn't rotate
2. The moon rotates once a day, so the same side is present whenever it is in our sky
3. The moon rotates once a month
4. The moon actually looks the same from any direction

# Why does the appearance of the Moon's features remain so consistent?

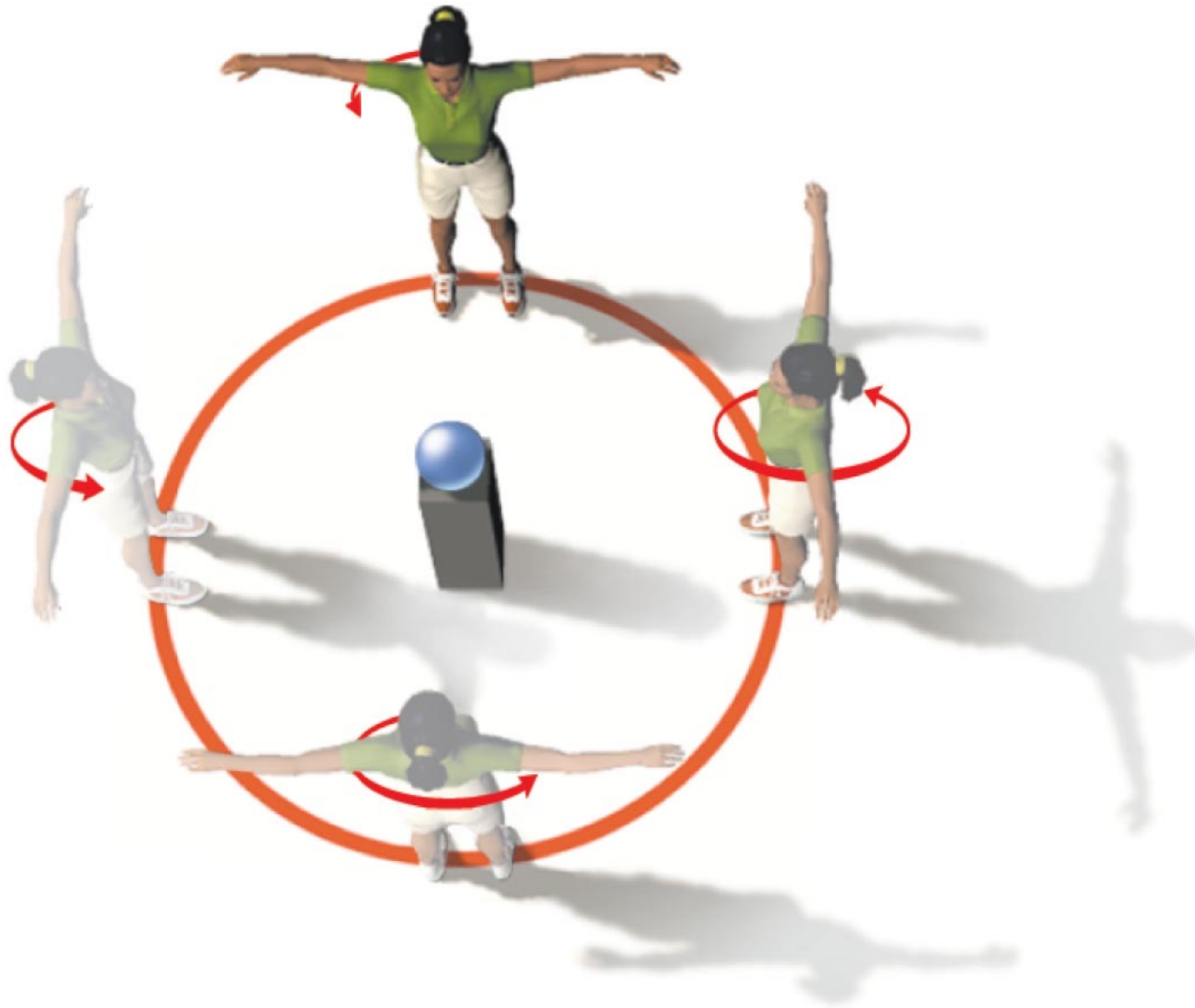
1. The moon doesn't rotate
2. The moon rotates once a day, so the same side is present whenever it is in our sky
- 3. The moon rotates once a month**
4. The moon actually looks the same from any direction

Figure 2.23a

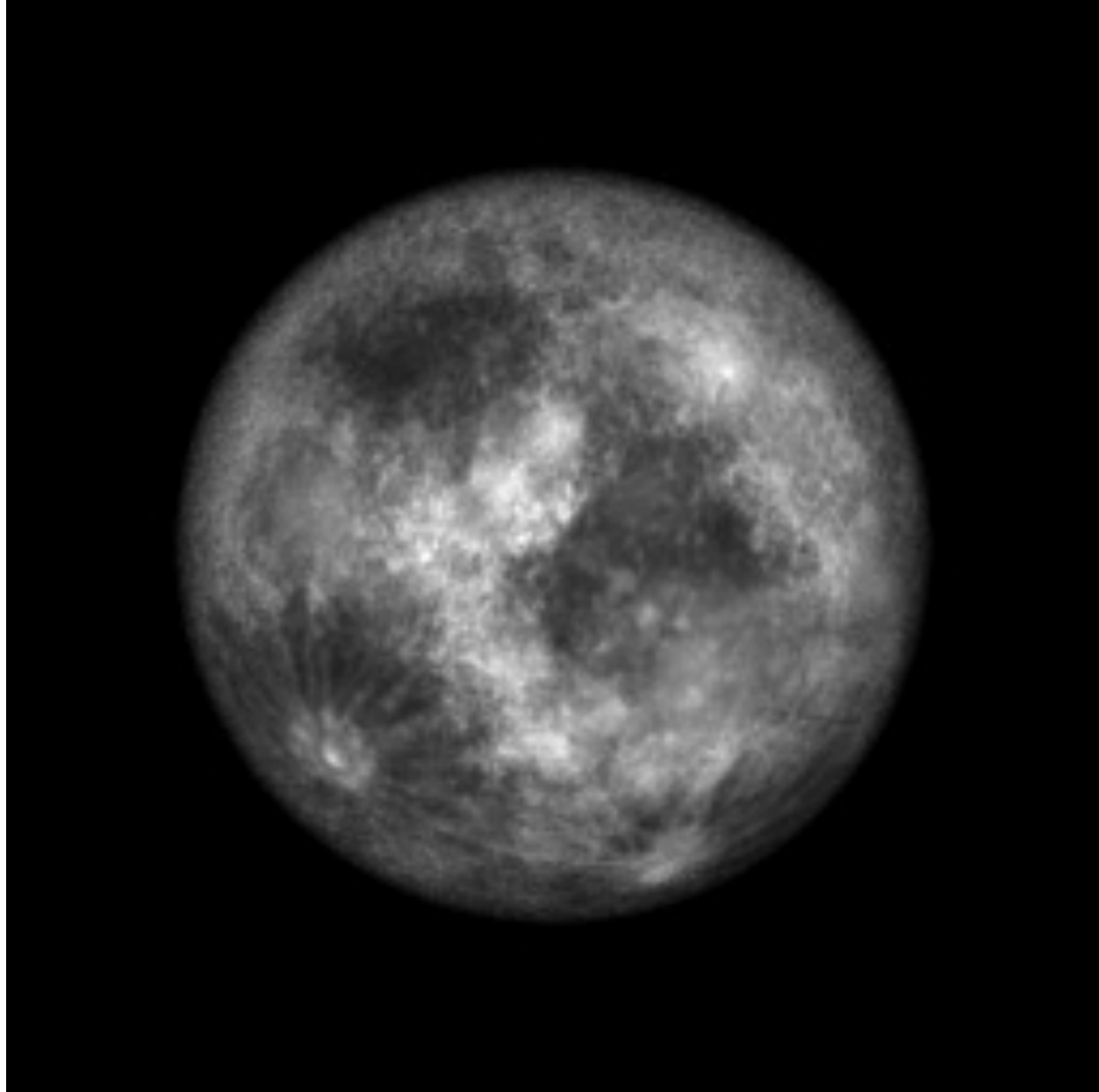


a If you do not rotate while walking around the model, you will not always face it.

Figure 2.23b



**b** You will face the model at all times only if you rotate exactly once during each orbit.

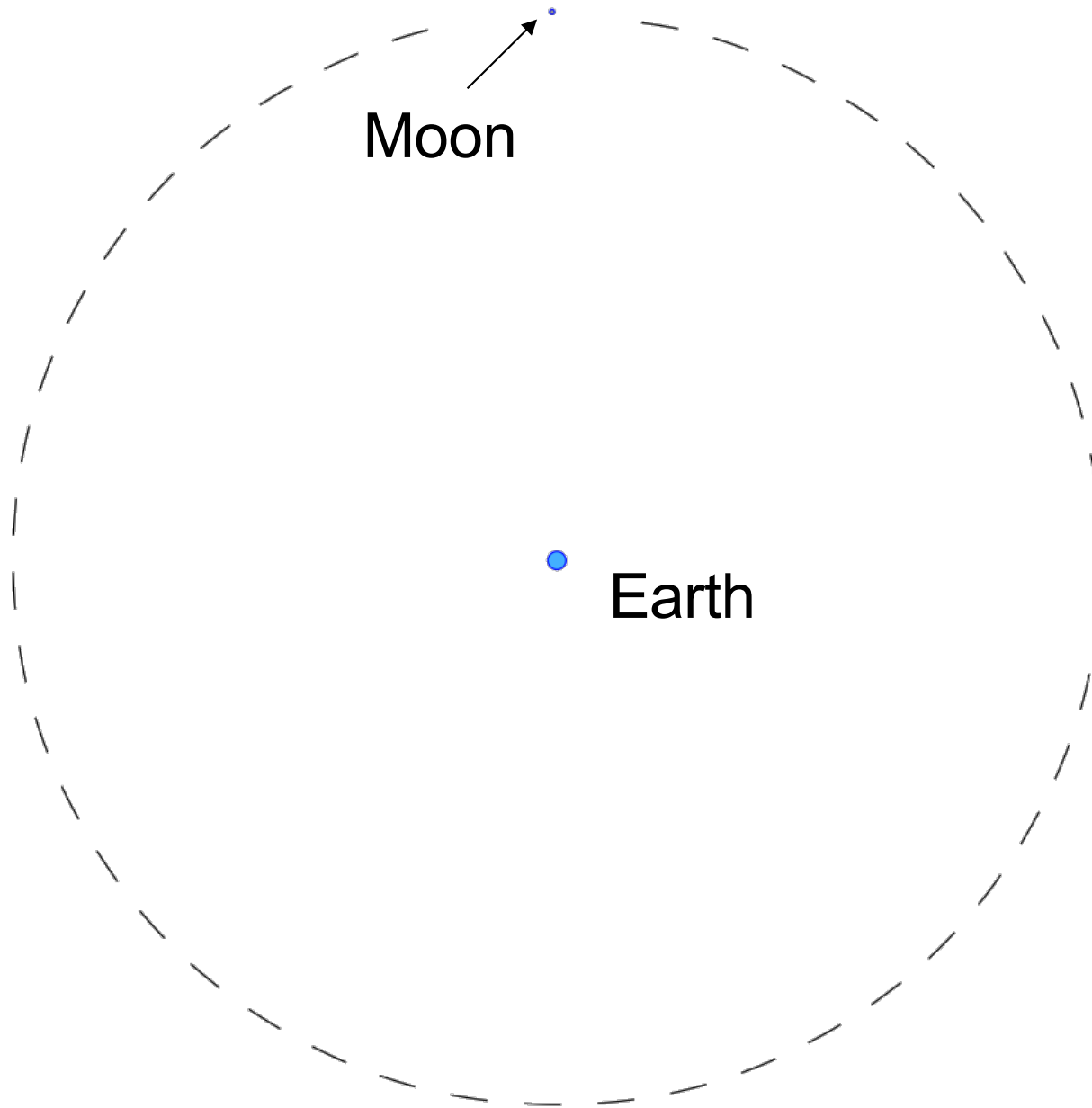


## Why is part of the Moon's surface regularly obscured by shadow?

1. Earth comes between Sun and Moon
2. Moon comes between Sun and Earth
3. Half its surface is always light, half is always dark, but the part we can see varies
4. The moon is illuminated by light reflected from Earth's surface, and clouds in our atmosphere sometimes block that light



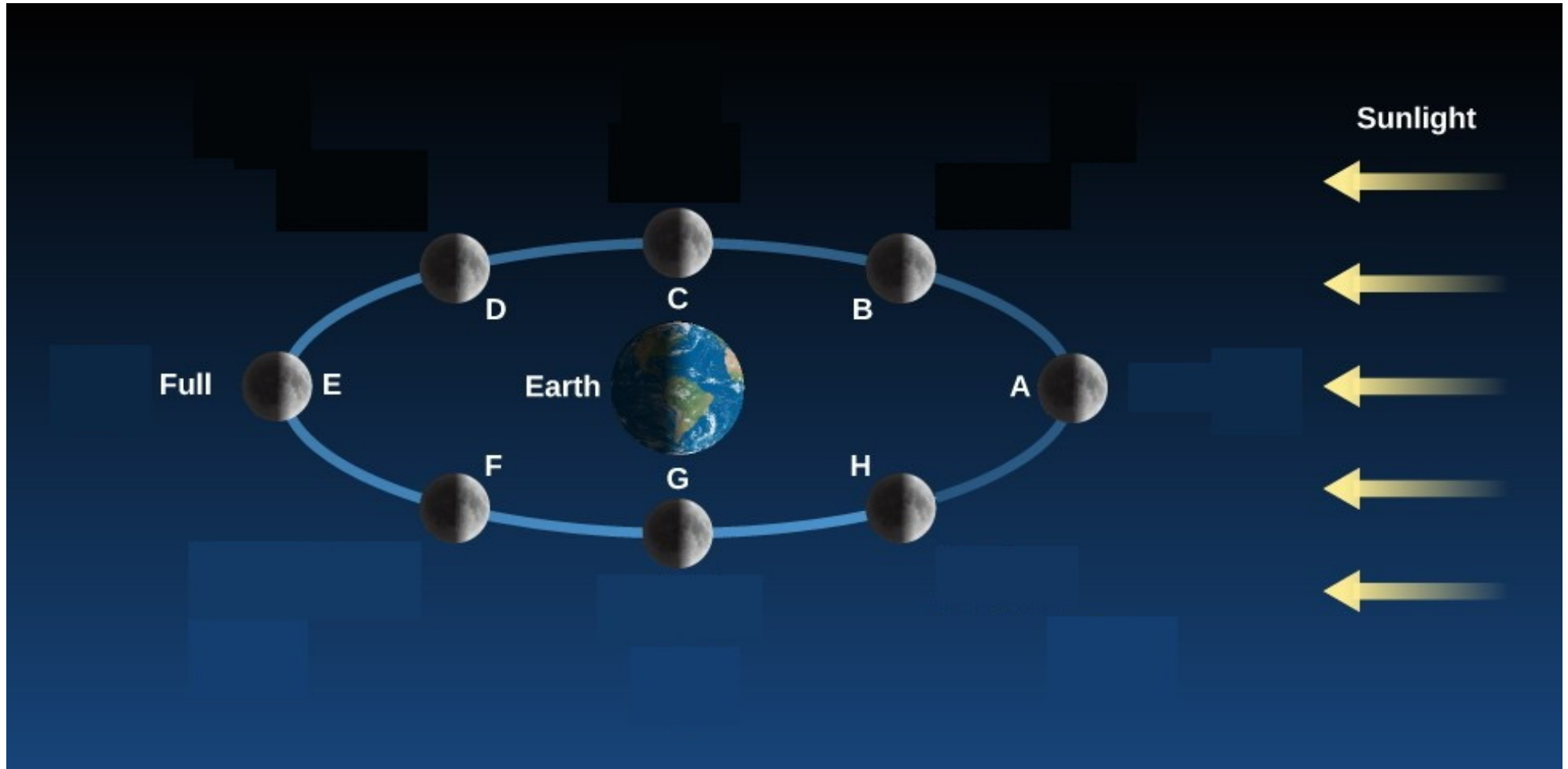
# Earth and Moon to scale



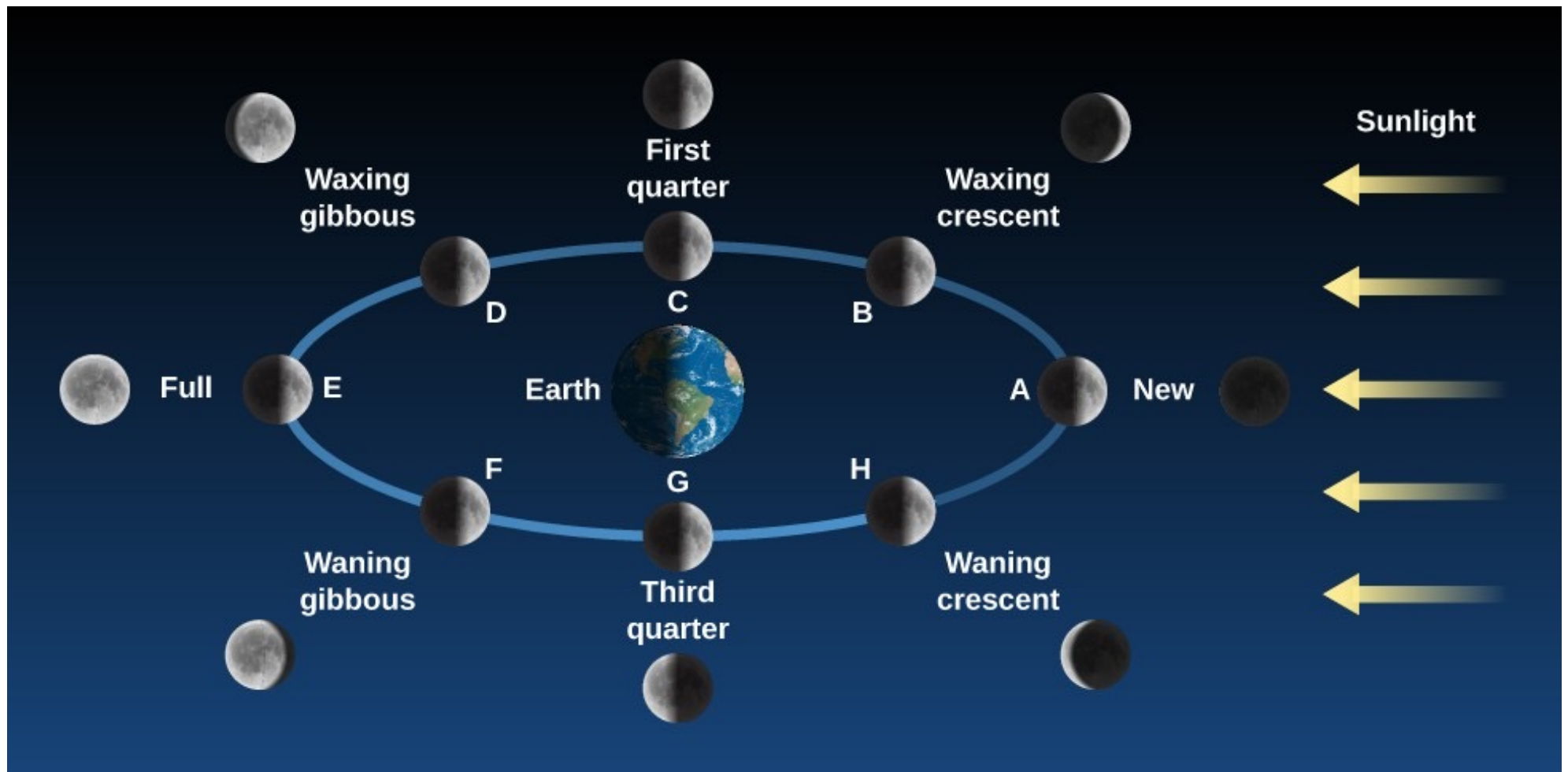
## Why is part of the Moon's surface regularly obscured by shadow?

1. Earth comes between Sun and Moon
2. Moon comes between Sun and Earth
3. **Half its surface is always light, half is always dark, but the part we can see varies**
4. The moon is illuminated by light reflected from Earth's surface, and clouds in our atmosphere sometimes block that light

# Perspective view of Moon orbiting Earth



# Perspective view of Moon orbiting Earth with inserts of Moon's appearance from Earth



**If we see a first quarter moon today, what will people on the other side of the Earth see later today?**

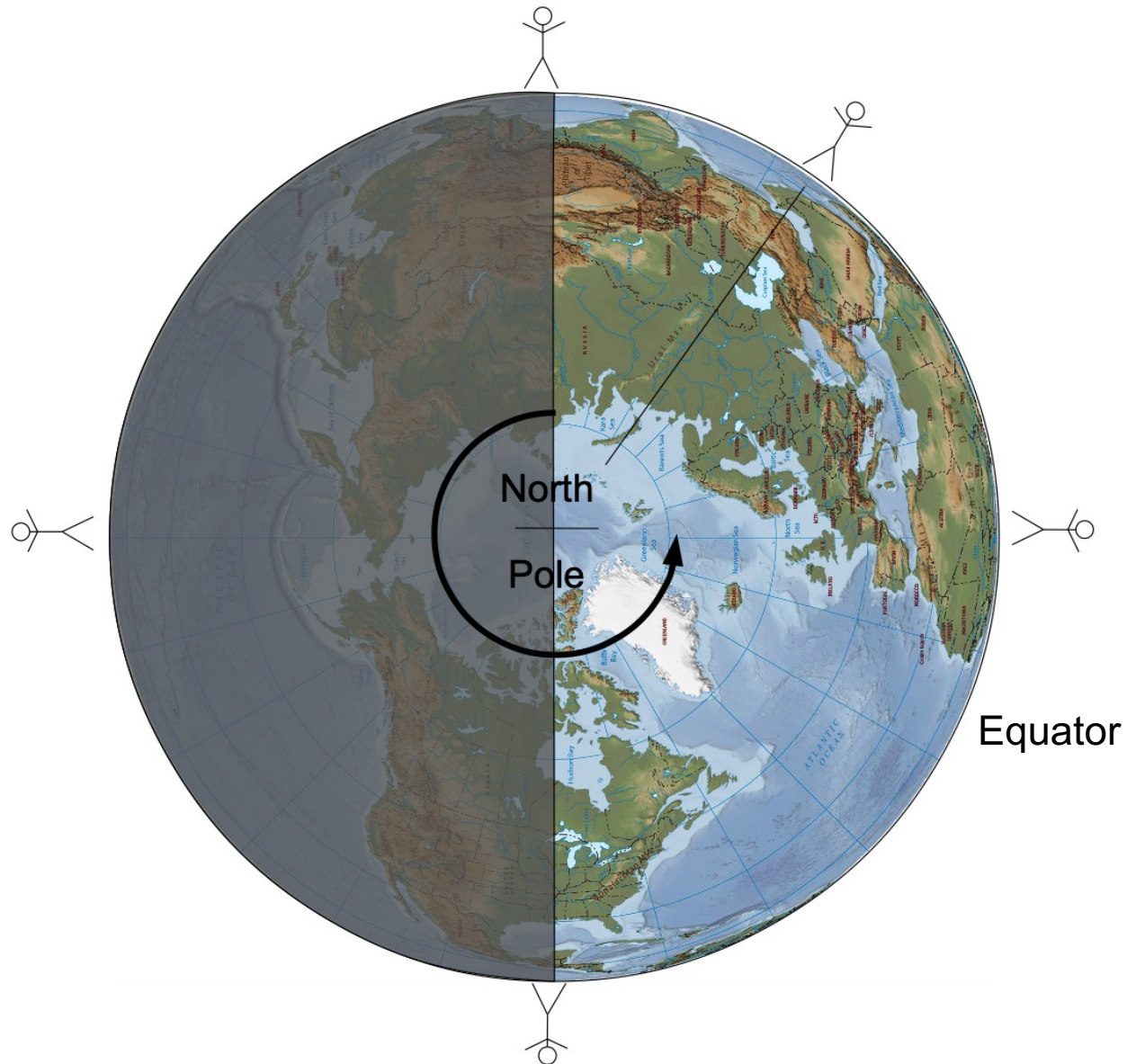
1. new Moon (slim crescent)
2. first-quarter Moon (half illuminated)
3. full Moon (fully illuminated)
4. third-quarter Moon (other half illuminated)
5. Any of the above, depending upon the time of night.

**If we see a first quarter moon today, what will people on the other side of the Earth see later today?**

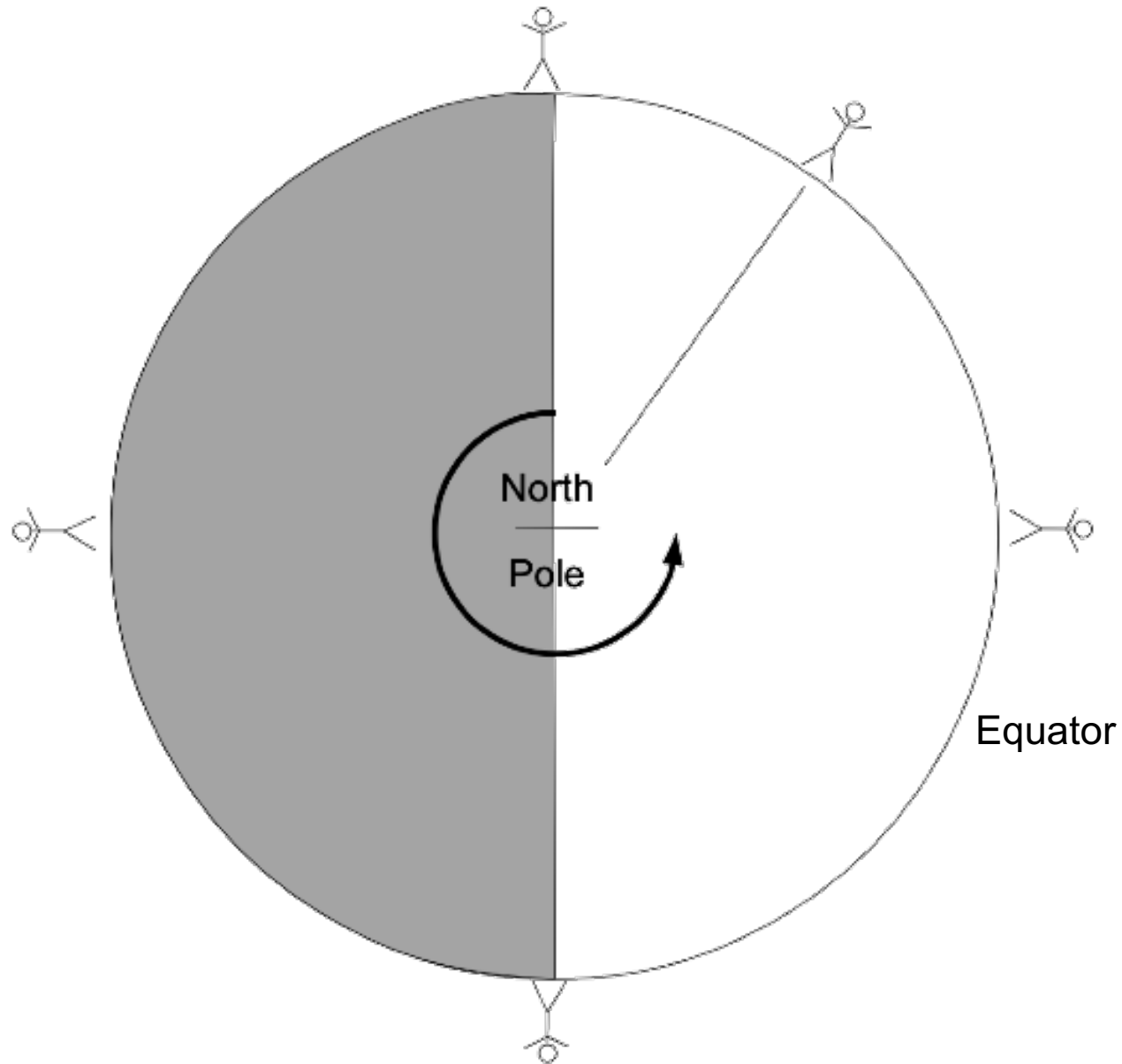
1. new Moon (slim crescent)
- 2. first-quarter Moon (half illuminated)**
3. full Moon (fully illuminated)
4. third-quarter Moon (other half illuminated)
5. Any of the above, depending upon the time of night.



# Earth viewed from above the North Pole



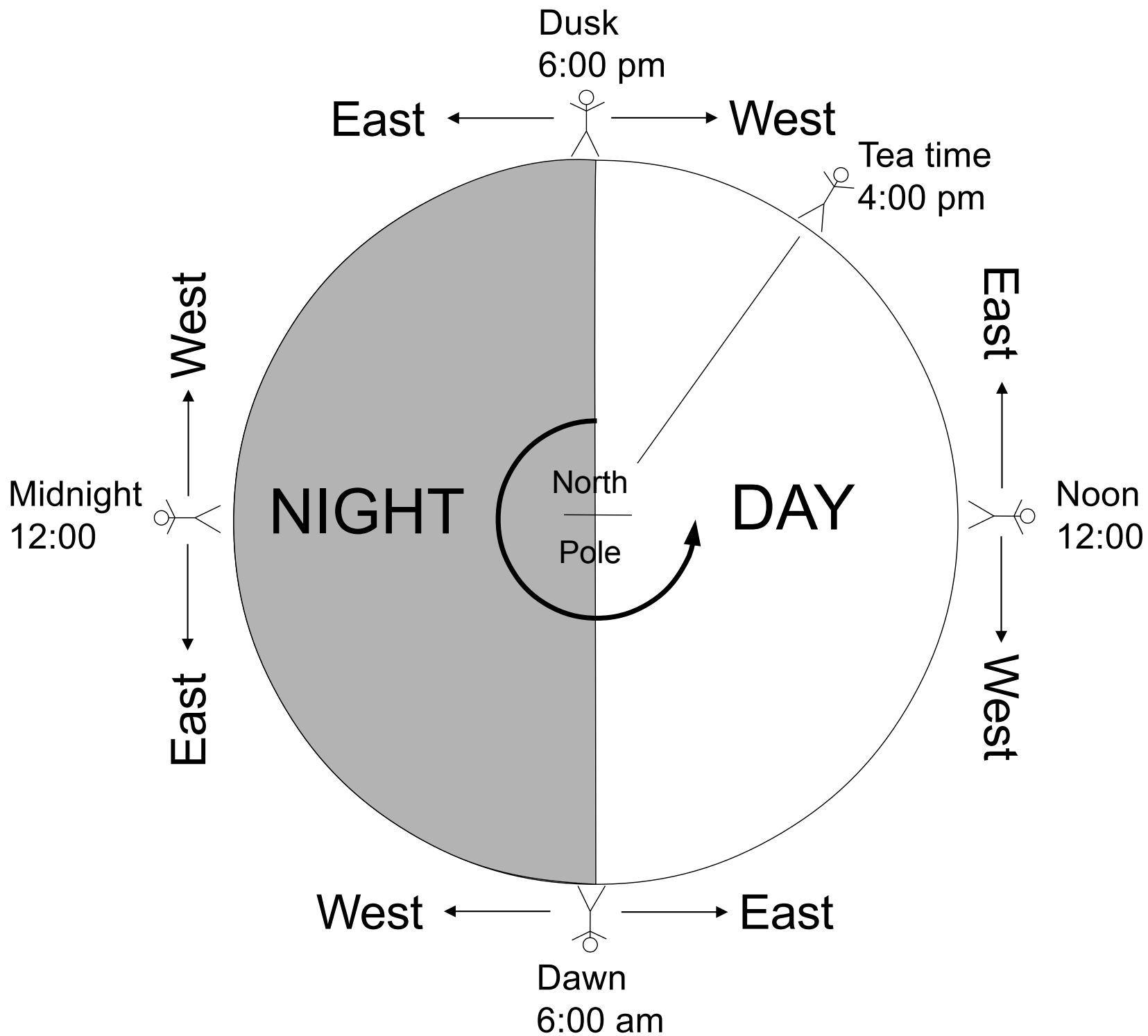
# Earth viewed from above the North Pole



**Reproduce this figure on your boards and identify these regions and locations**

- Day
- Night
- Noon
- Dusk
- Dawn
- Midnight

**Then identify the directions East and West at each of those locations**



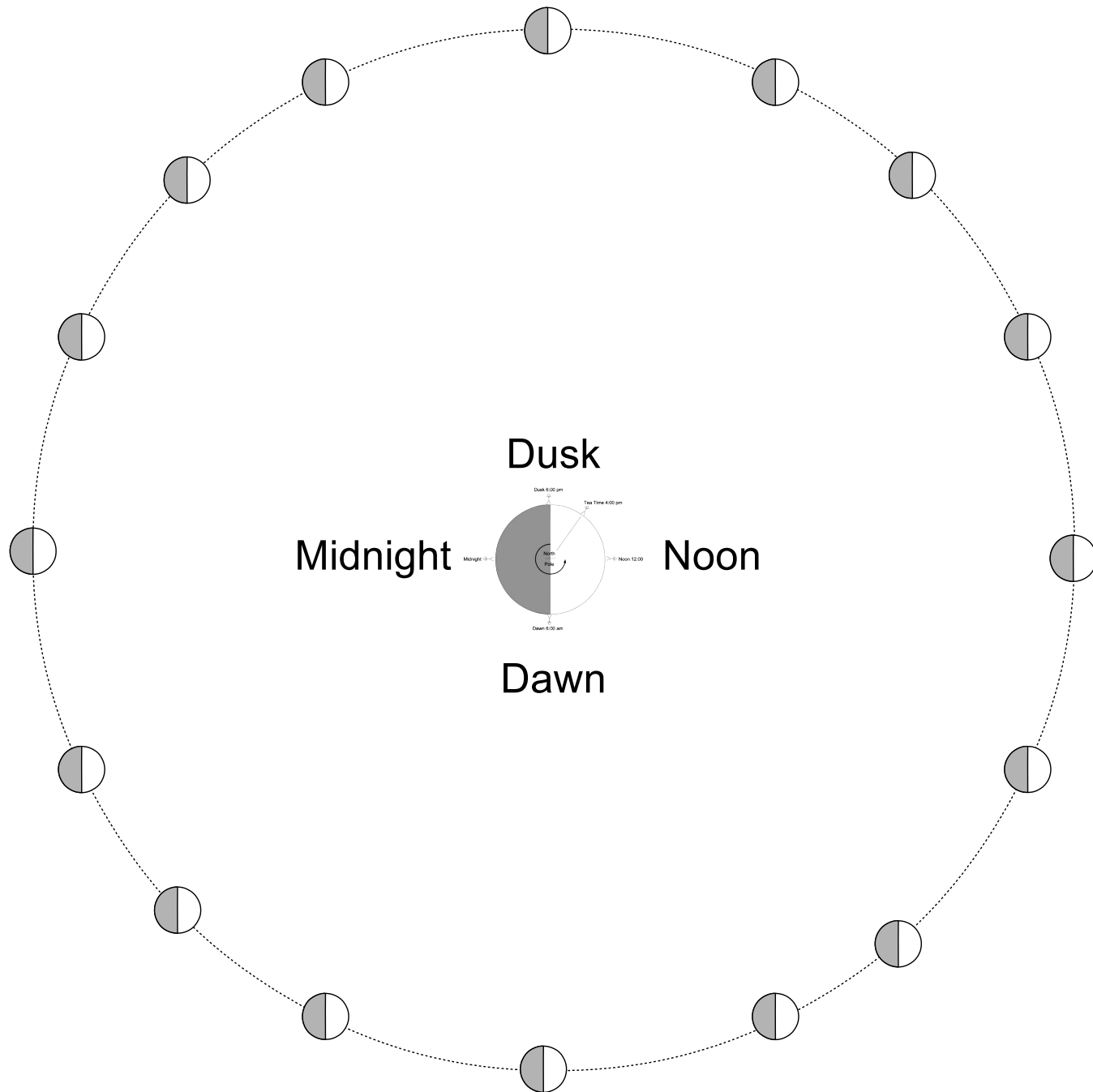
## Quick tips to help you remember

- Earth rotates counter-clockwise when viewed from above the North pole
- Moving from night into day is dawn
- Moving from day into night is dusk
- The direction of Sun at dusk indicates West
- West points clockwise everywhere around the world
- Hence, East points counterclockwise everywhere
- Can also use knowledge of geography



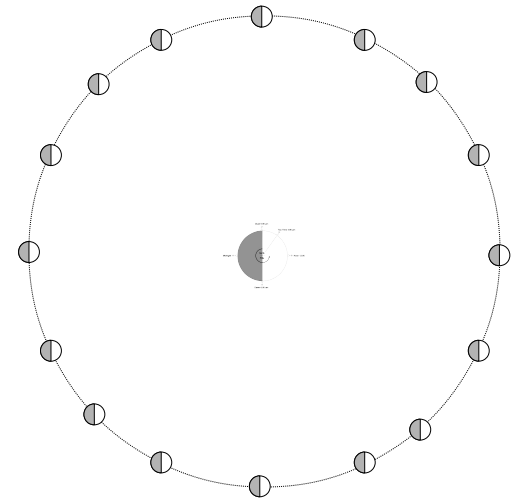






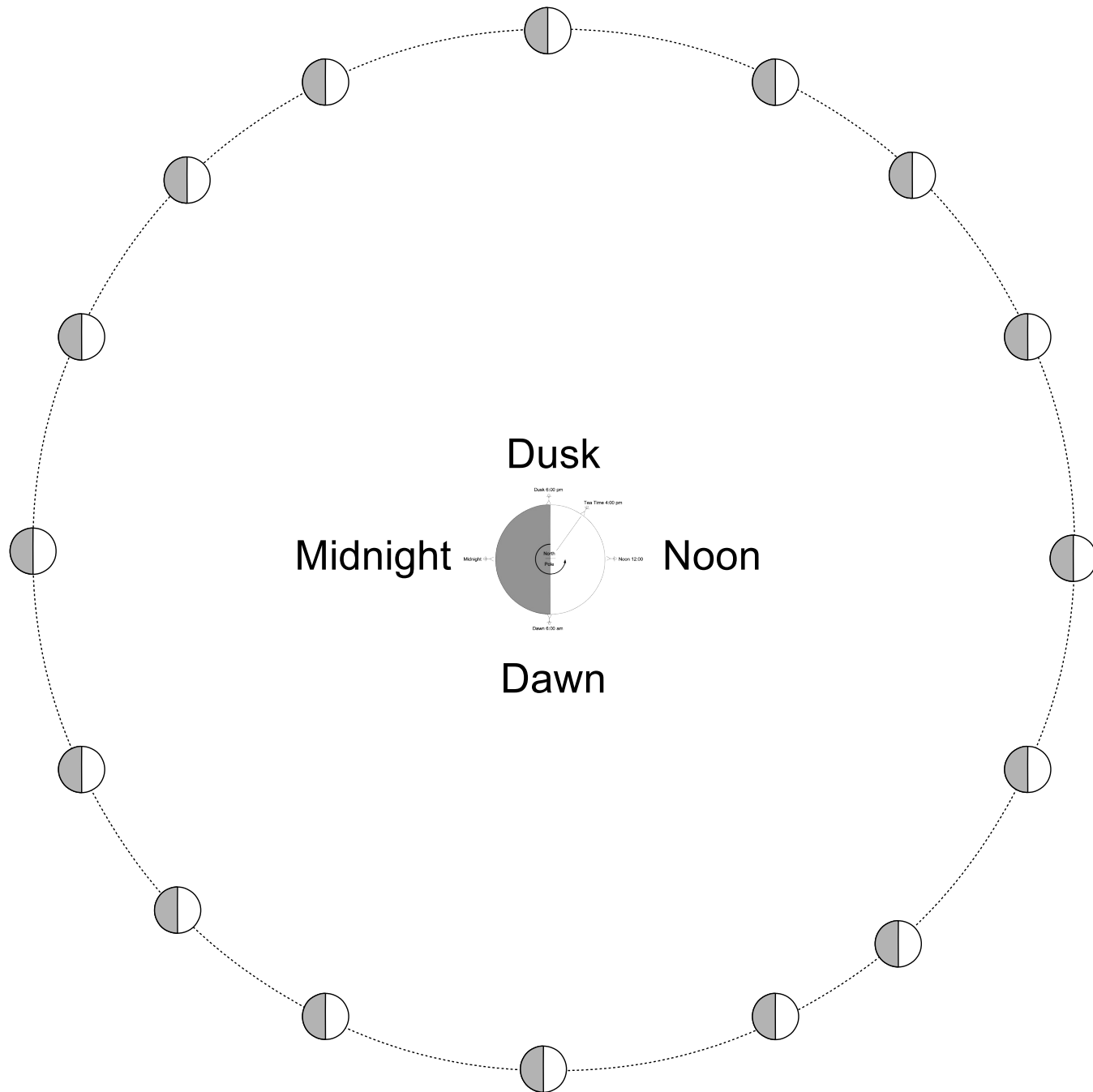
# You see a crescent moon at dusk. Where in the sky is it?

1. On the Western horizon
2. On the Eastern horizon
3. Overhead, near the zenith
4. It depends on the time of year



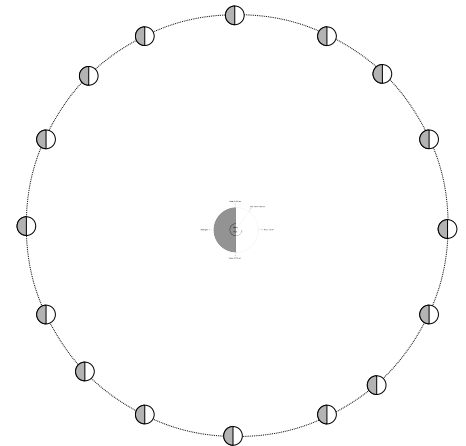
**You see a crescent moon at dusk. Where in the sky is it?**

- 1. On the Western horizon**
2. On the Eastern horizon
3. Overhead, near the zenith
4. It depends on the time of year



# You see a first quarter moon at dusk. Where in the sky is it?

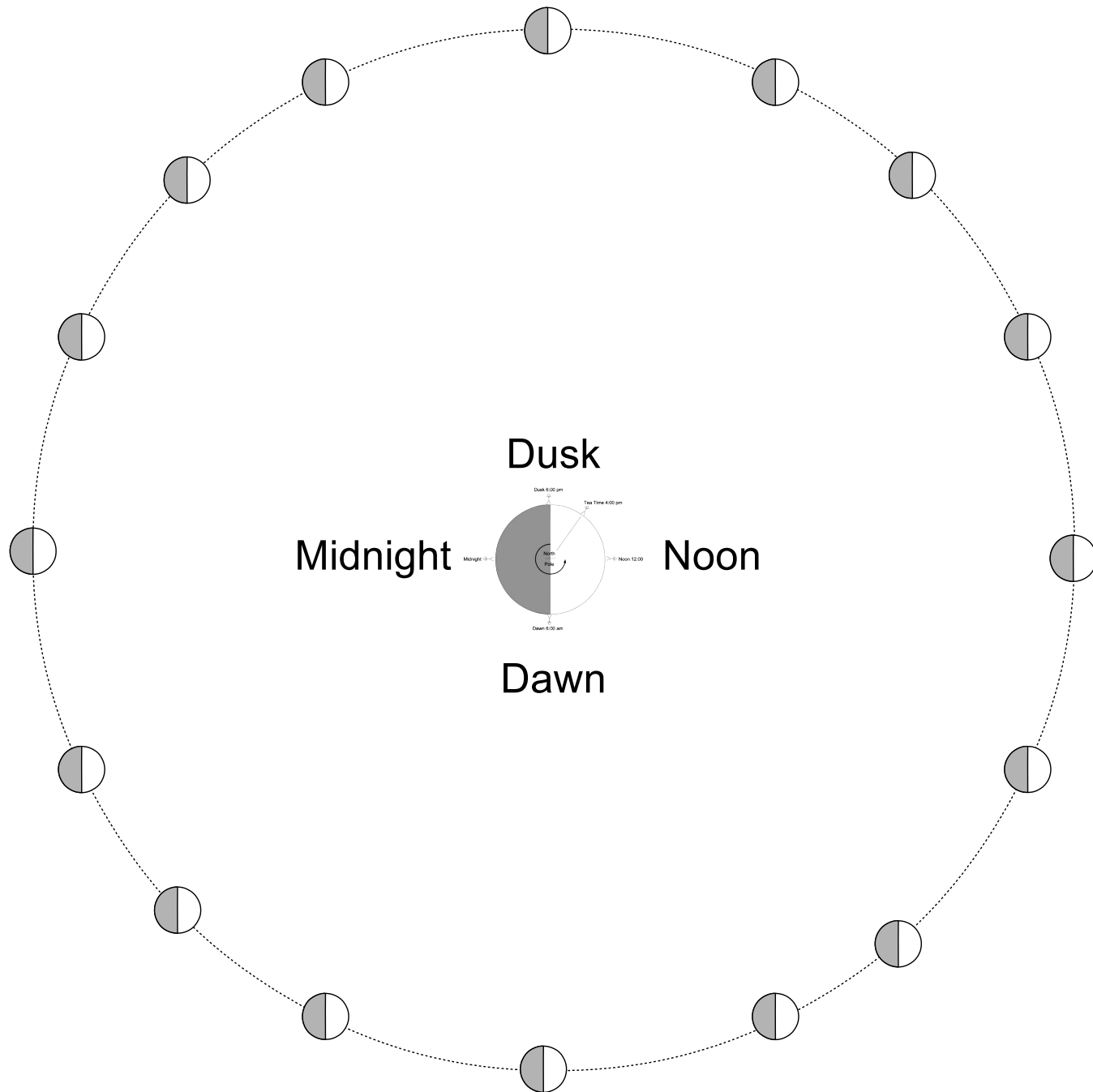
1. On the Western horizon
2. On the Eastern horizon
3. Overhead, near the zenith
4. It depends on the time of year



**You see a first quarter moon at dusk.  
Where in the sky is it?**

1. On the Western horizon
2. On the Eastern horizon
3. **Overhead, near the zenith**
4. It depends on the time of year



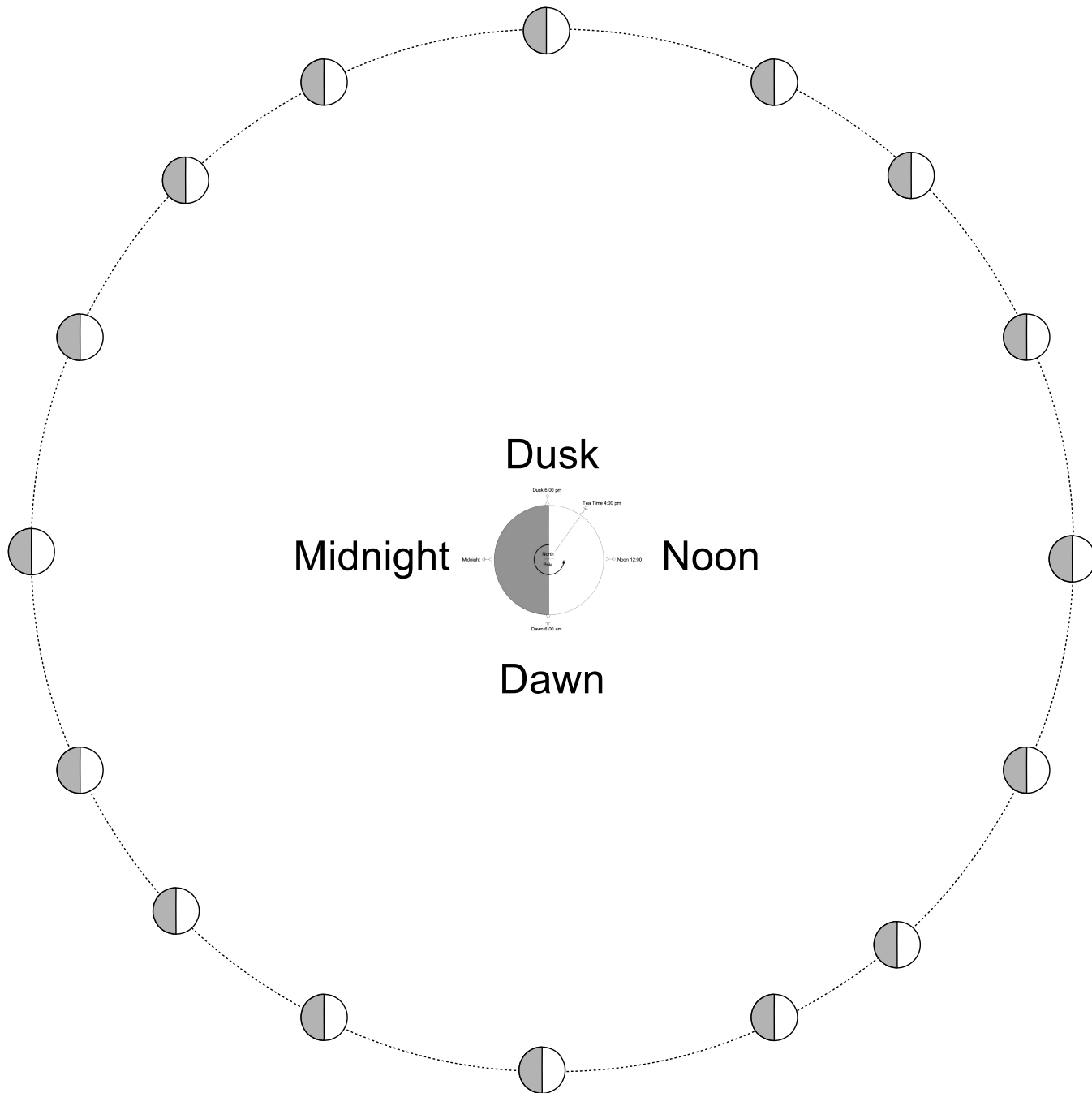


## **You see a first quarter moon at noon. Where in the sky is it?**

1. On the Western horizon
2. On the Eastern horizon
3. Overhead, near the zenith
4. It depends on the time of year

**You see a first quarter moon at noon.  
Where in the sky is it?**

1. On the Western horizon
- 2. On the Eastern horizon**
3. Overhead, near the zenith
4. It depends on the time of year



# As seen from the Moon, how often does the Sun rise?

1. Never.
2. About every 24 hours.
3. About once per week.
4. About once per month.
5. About once per year.

# As seen from the Moon, how often does the Sun rise?

1. Never.
2. About every 24 hours.
3. About once per week.
4. **About once per month.**
5. About once per year.

# As seen from the Moon, how often does the Earth set?

1. Never.
2. About every 24 hours.
3. About once per week.
4. About once per month.
5. About once per year.

# As seen from the Moon, how often does the Earth set?

1. **Never.**
2. About every 24 hours.
3. About once per week.
4. About once per month.
5. About once per year.