

# Introduction

Parsons The New School for Design  
School of Constructed Environments

Interior Design (AAS)

Environmental Design

PAID 1028-X1

SP-17

Hikida

# Learning Objectives

- At the end of this presentation you should learn basic facts about:
  - *Water: composition, states, and ability to seek its own level*
  - *Air (atmosphere): cause, and how to measure: direction and speed*
  - *Fire (energy and light): requirements, types of fuels, and temperature of a candle*
  - *The Sun: size, composition, and distance to Earth*
  - *You should be able to use a sun chart identify the position of the sun at any time anywhere in the world.*
  - *The Earth: age, size, location in the solar system, and composition*

# Elements

- *Water*
- *Air*
- *Fire*
- *Earth*



## Water Facts

H<sub>2</sub>O: Water is composed of 2 hydrogen molecules bonded to 1 oxygen molecule

Three states: solid (at 0° C or 32° F), liquid, gas (around 100 °C or 212 °F)

Water seeks its own level

Example: New York City reservoirs and wooden water tanks

Capillary action



## Wind Facts

*Wind is the flow of gases, here on Earth it refers to the movement of air.*

*It is caused by differences in air pressure. Air rushes from high pressure areas to lower ones.*

*Wind direction is given by the direction from which the wind comes.*

*Anemometers are used to measure wind speed.*



## Fire Facts

*Fire is a chemical reaction that releases light and heat.*

*Fires require fuel, oxygen and heat to burn.*

*Different types of fuel include coal, oil and wood.*

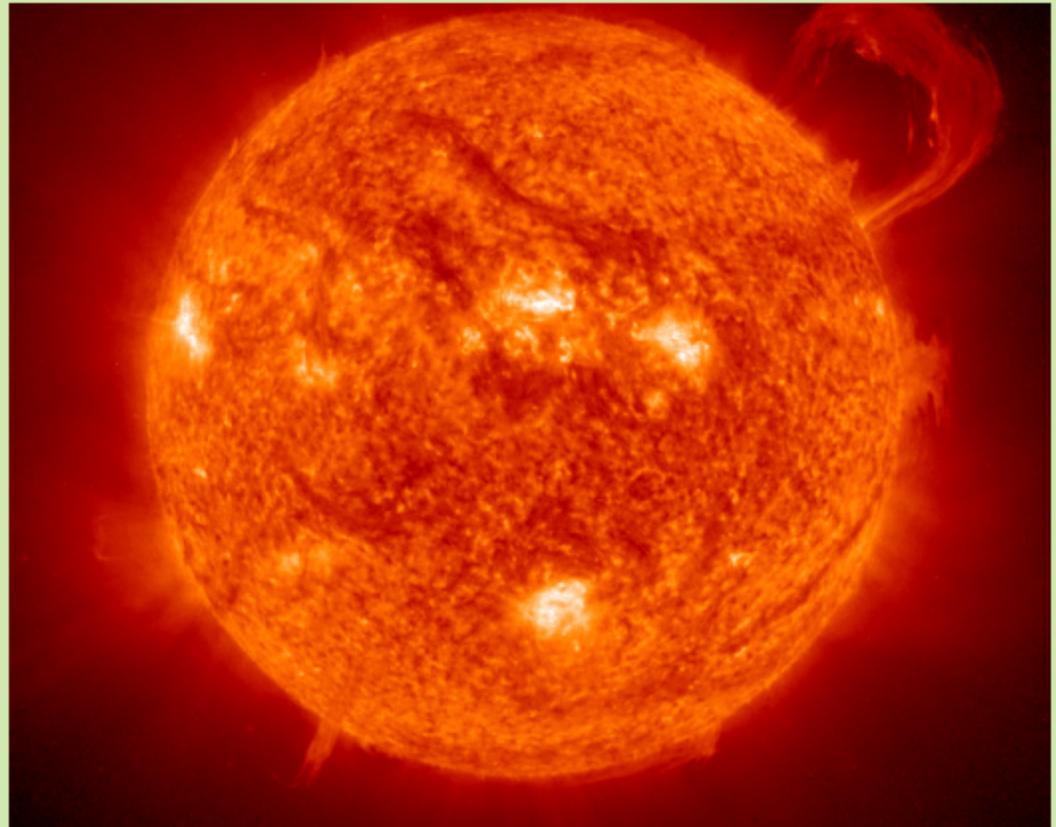
*Flames are the part of a fire which we can see, they can be different colors, depending on the substance which is burning.*

*A candle flame typically burns at around 1000 degrees Celsius (1800 Fahrenheit).*



## Sun Facts

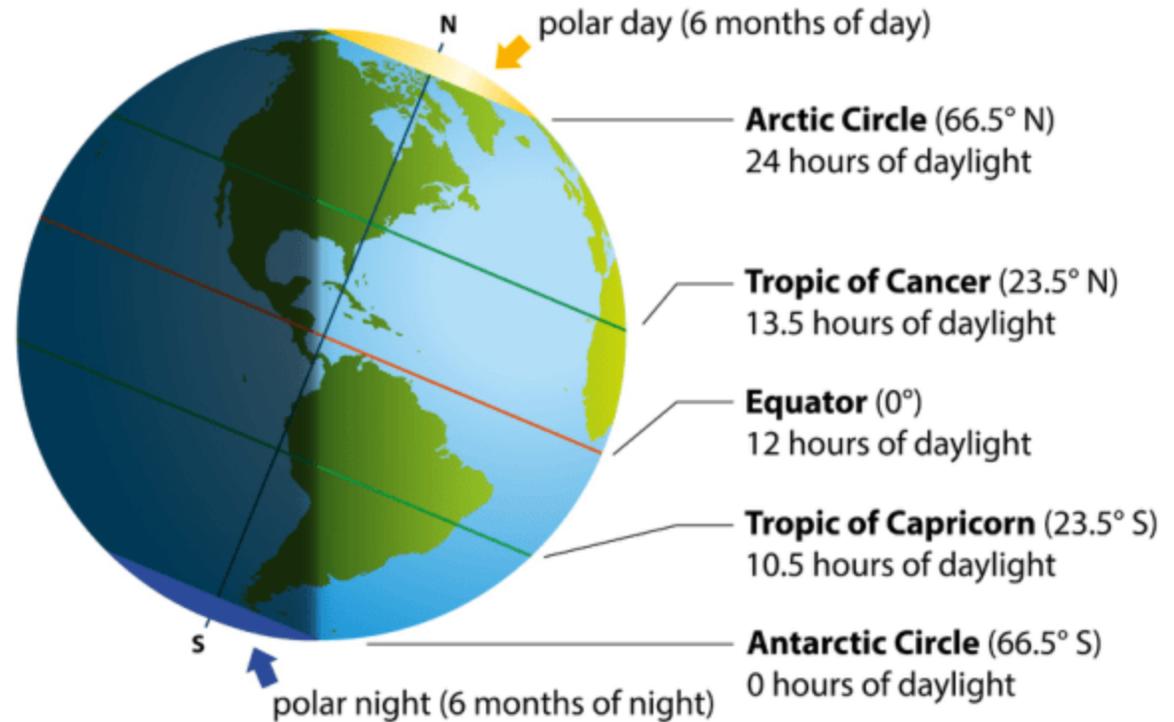
1. *Earth-Sun Distance: 150 million km (93 million miles)*
2. *Elemental Composition of Sun: 74% Hydrogen, 25% Helium, 1% other (by mass).*
3. *Solar Luminosity:  $\sim 4 \times 10^{33}$  erg/s. [As bright as 4 trillion trillion 100-watt light bulbs]*
4. *Age of Sun: 4.5 billion years.*
5. The sun rises in the east, and sets in the west.
6. In the northern hemisphere the sun traverses the southern sky.
7. In the southern hemisphere the sun traverses the northern sky.



## Summer Solstice

*The summer solstice is the date (usually June 20 or 21) when all places in the northern hemisphere receive the most hours of daylight in the whole year. This is because the earth is tilted on an angle of 23.5 degrees away from being up and down (measured from the flat plane created by its orbit around the sun).*

## summer solstice (June 21)

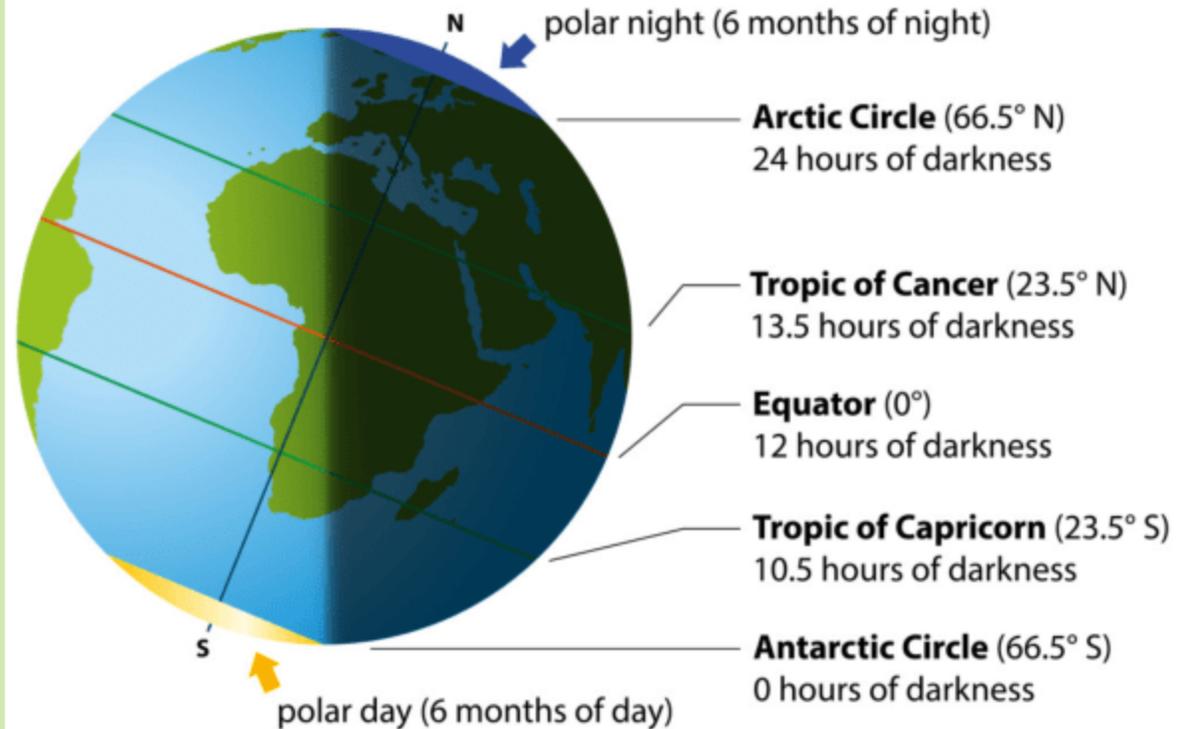


## Winter Solstice

*The winter solstice is also known as the “shortest day of the year”. This usually happens on December 21st or 22nd in the Northern hemisphere, and June 20th or 21st in the Southern hemisphere.*

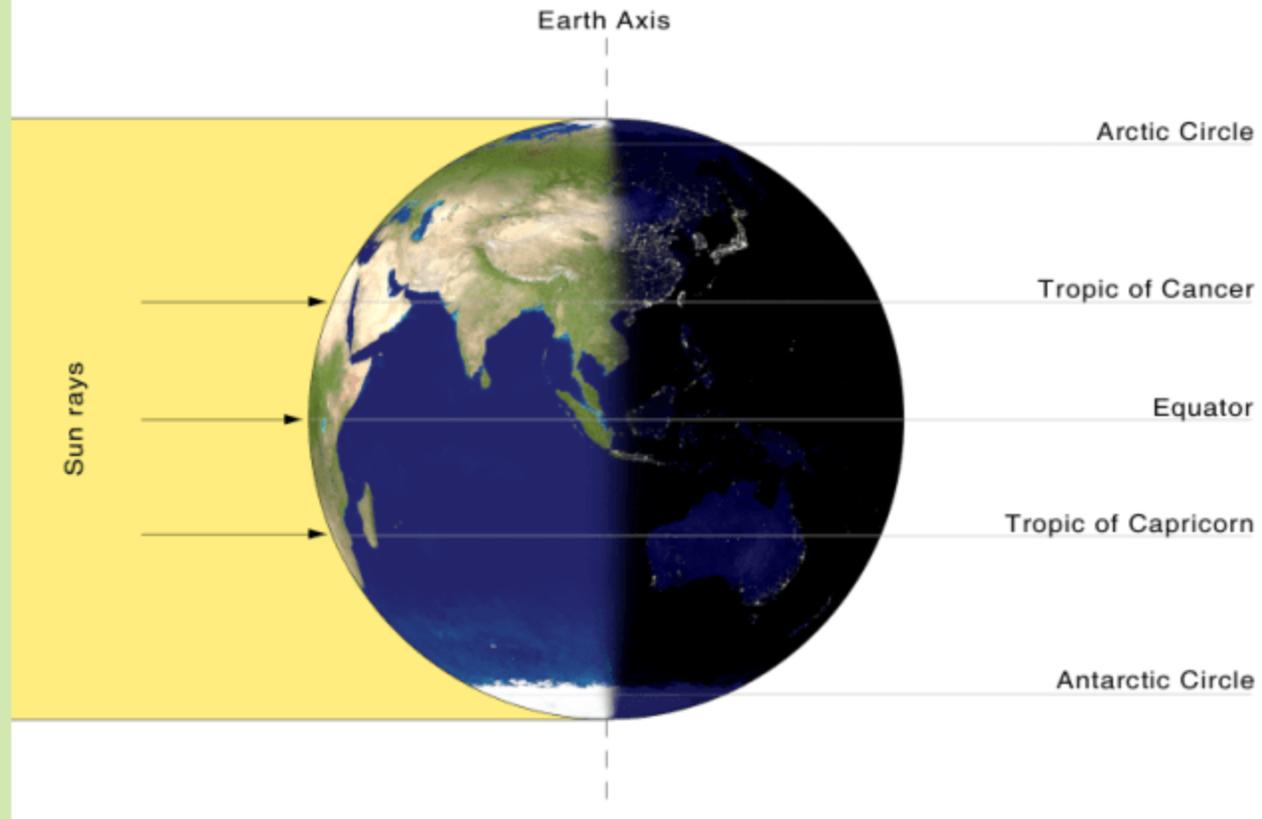
*During the northern hemisphere’s winter solstice (December 21 or 22), the sun sits directly overhead of the Tropic of Capricorn at noon, and places at this latitude have their shortest night of the year.*

## winter solstice (December 21)



## Equinox

*An equinox occurs twice a year, around 20 March and 22 September. The word itself has several related definitions. The oldest meaning is the day when daytime and night are of approximately equal duration. The word equinox comes from this definition, derived from the Latin *aequus* (equal) and *nox* (night).*



## New York Sun Diagram

New York is at approximately 41-degrees north latitude.

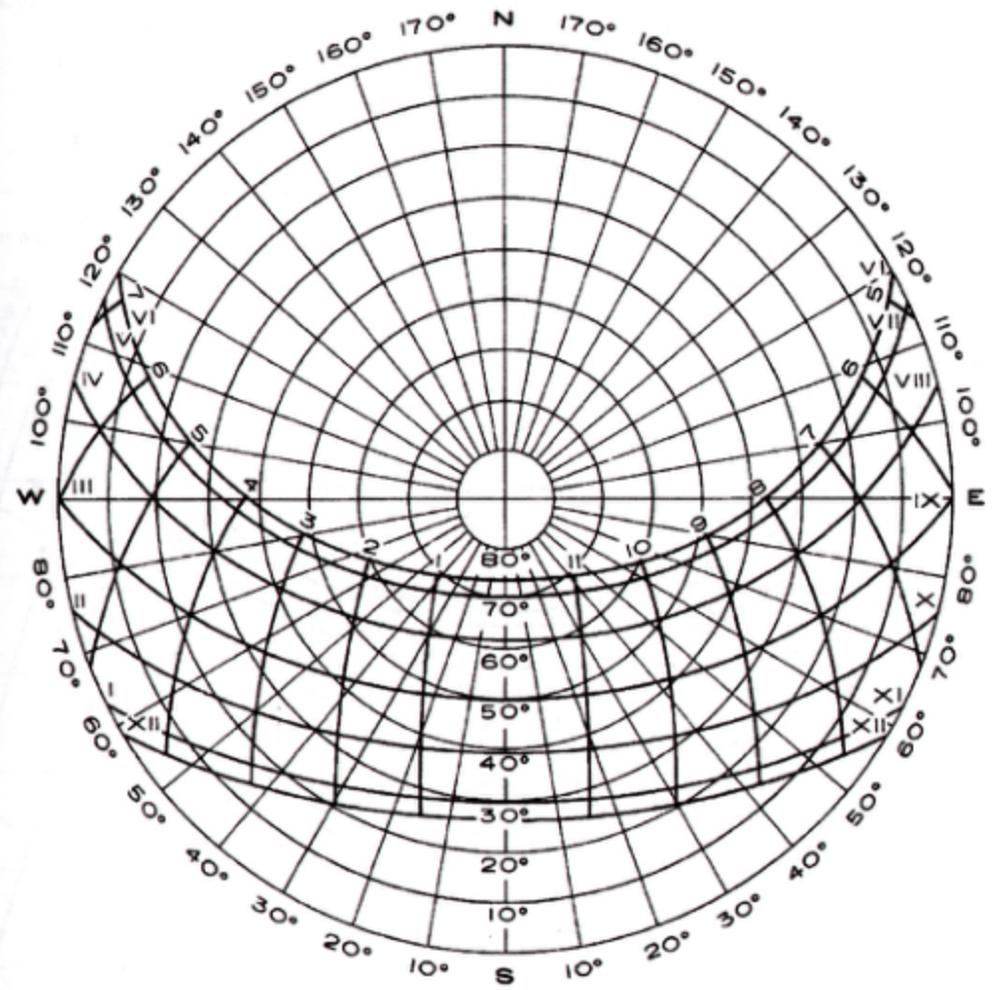
Month is in Roman numerals

Time is shown in Arabic numerals

East-West axis, North-South axis are shown.

Degrees on the horizon begin with 0-degrees at due south.

Angle in the sky is indicated along the lines radiating from the center of the diagram.



(e) 40°N LATITUDE

## New York Sun Diagram

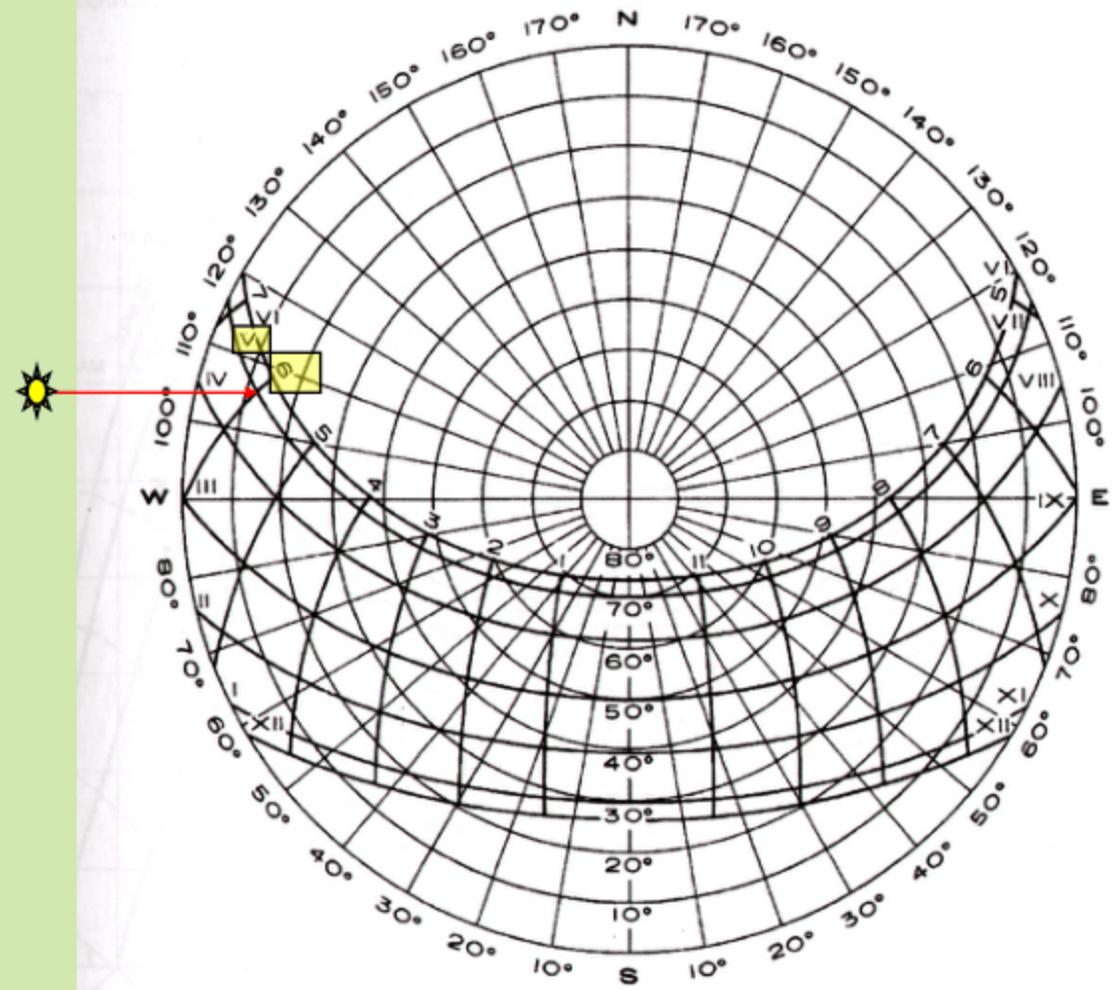
Example:

Where is the sun located in New York at 6:00 PM on May 25?

1. Month May is Roman numeral V.
2. Follow the curve to 6:00 PM.
3. The sun position on the horizon is between 110-degrees and 110-degrees West of due South.
4. The sun angle is approximately 12-degrees above the horizon.

Question:

Where is the sun located in New York at 9:00 AM on October 15?



(e) 40°N LATITUDE

## Earth Facts (1 of 3)

- 1. The Earth was formed 4.6 billion years ago.*
- 2. The Earth is the third planet from the Sun.*
- 3. The Earth orbits the Sun once every 365.27 days and the orbital speed the Earth travels is averaged at 107,000 km/h.*
- 4. The Earth has one satellite, the Moon.*
- 5. The surface of the Earth is 70% water and 30% land.*
- 6. The circumference of Earth around the equator is 24,901 miles.*



## Earth Facts (2 of 3)

- 1. The earth is made from the following materials – 32.1% iron, 30.1% oxygen, 15.1% silicon, and 13.9% magnesium.*
- 2. The Earth's core is made up of 88% iron, and the temperature can reach 3,000 degrees C.*
- 3. The atmosphere on Earth is composed largely of nitrogen (78%) and oxygen (21%) with trace elements of other gases.*
- 4. The troposphere is the region in the atmosphere 12km above the surface of the Earth. It is in the troposphere that all of our weather takes place.*



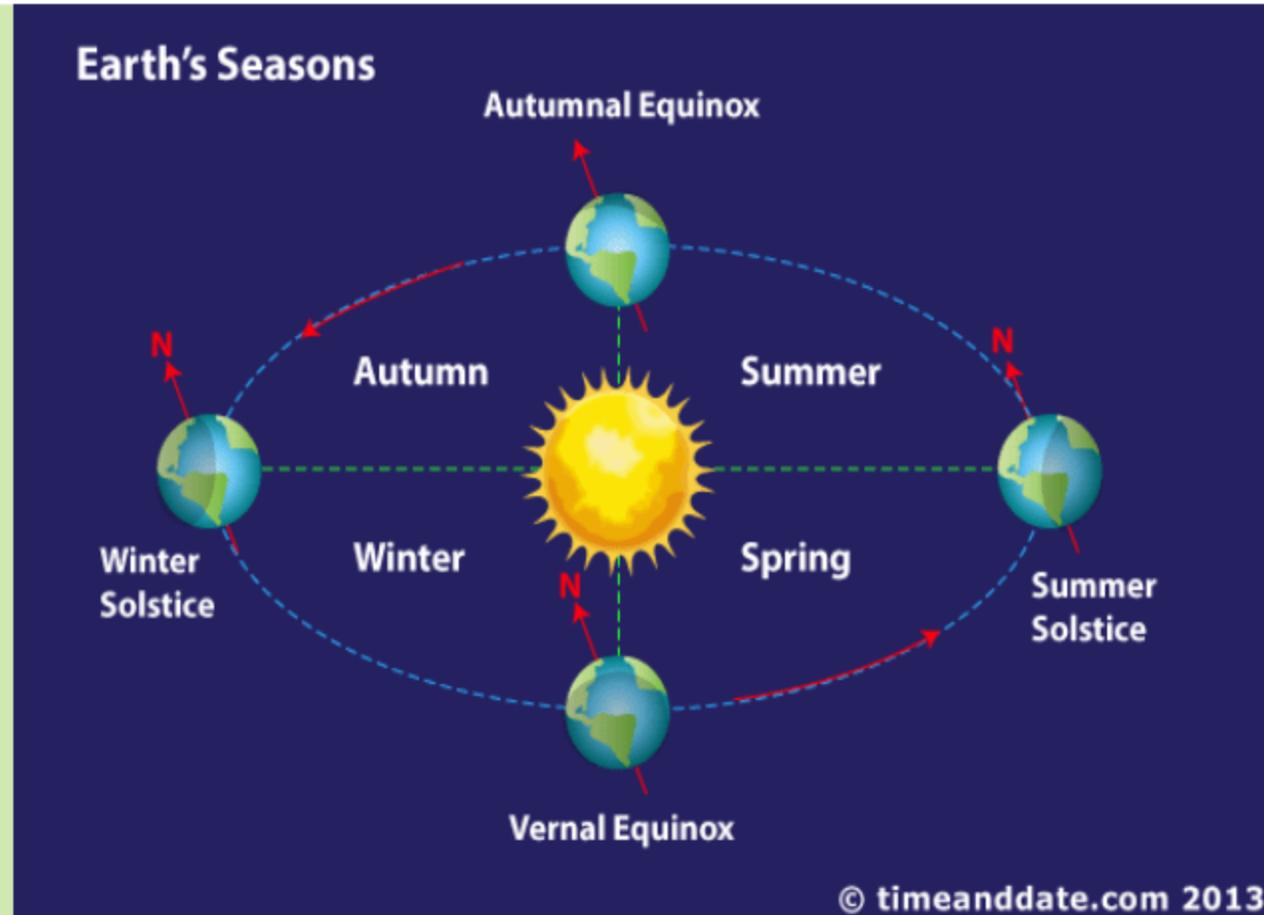
## Earth Facts (3 of 3)

- 1. Approximately 25km above the surface of the Earth is the ozone layer. This is a layer of ozone that protects the Earth from the Sun's harmful ultraviolet radiation.*
- 2. The atmosphere extends as far as 500 km and the Earth's magnetic field stretches as far as 100,000 km.*
- 3. The magnetic field is essential because it protects us from the Sun's solar winds.*



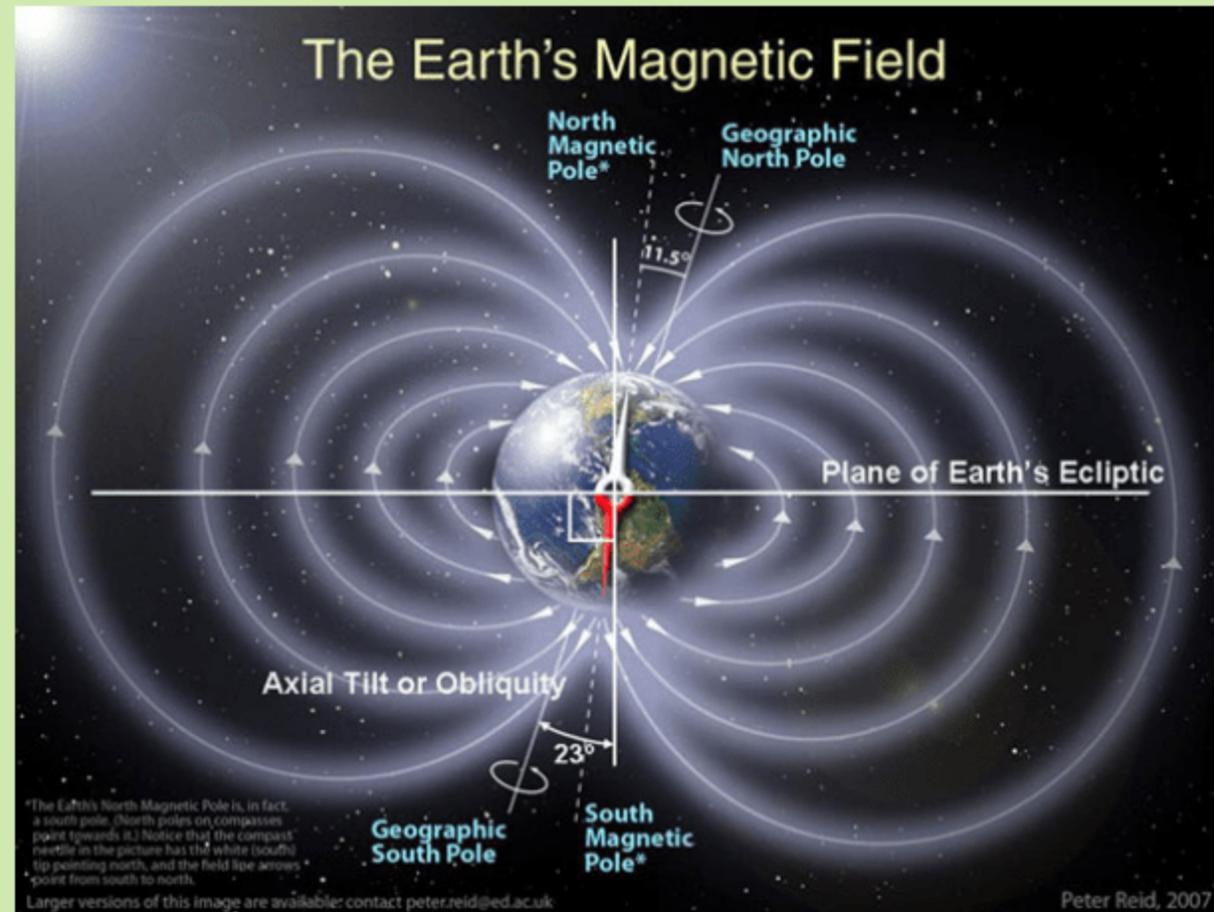
## Earth's tilt

1. The earth tilts 23.5 degrees on its axis as it rotates around the sun.



## Earth's Magnetic Field

The gravity of Earth, which is denoted by  $g$ , refers to the acceleration that the Earth imparts to objects on or near its surface due to gravity. In SI units this acceleration is measured in meters per second squared (in symbols,  $\text{m/s}^2$  or  $\text{m}\cdot\text{s}^{-2}$ ) or equivalently in newtons per kilogram ( $\text{N/kg}$  or  $\text{N}\cdot\text{kg}^{-1}$ ). It has an approximate value of  $9.81 \text{ m/s}^2$ , which means that, ignoring the effects of air resistance, the speed of an object falling freely near the Earth's surface will increase by about 9.81 meters (32.2 ft) per second every second. This quantity is sometimes referred to informally as little  $g$  (in contrast, the gravitational constant  $G$  is referred to as big  $G$ ).



# Sources

- <http://ds9.ssl.berkeley.edu/solarweek/MONDAY/facts.html>
- <http://www.8planets.co.uk/facts-about-earth>
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [solstice.html](#)
- [REDACTED]
- [solstice.html](#)
- [REDACTED]
- [Equinox/](#)
- <http://en.wikipedia.org/wiki/Equinox>

## Sources (continued)

- [http://en.wikipedia.org/wiki/Gravity\\_of\\_Earth](http://en.wikipedia.org/wiki/Gravity_of_Earth)
- [REDACTED]
- <http://hendrix2.uoregon.edu/~imamura/102/images/pascalvases.jpg>
- <http://www.sciencekids.co.nz/sciencefacts/weather/wind.html>
- [REDACTED]
- <http://www.sciencekids.co.nz/sciencefacts/fire.html>