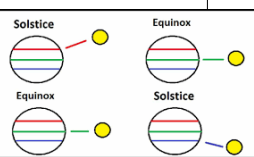


Season and Time

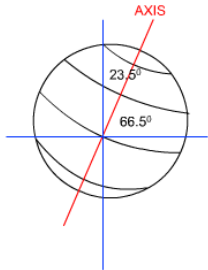
Unit 1

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Date	Day	Peculiarity	Position of the sun	Northern hemisphere	Southern hemisphere
March 21	Equinox	Length of day and night will be equal	Above the Equator (0°)	From March 21 to June 21 Spring	Seasons Autumn
June 21	Summer Solstice	Northern Hemisphere experiences its longest day and shortest night	Above the Tropic of Cancer (23½°N)	From June 21 to September 23 Summer	Winter
					
September 23	Equinox	Length of day and night will be equal	Above the Equator (0°)	From September 23 to December 22 Autumn	Spring
December 22	Winter Solstice	Northern Hemisphere experiences its shortest day and longest night.	Above Tropic of Capricorn (23½°S)	From December 22 to March 21 Winter	Summer

Utharayanam	Dakshinayanam
The Sun sets its northward apparent movement	The Sun sets its southward apparent movement
from Tropic of Capricorn (23½°S) and it culminates on Tropic of Cancer (23½°N)	from Tropic of Cancer (23½°N) and it culminates on Tropic of Capricorn (23½°S)
Following the winter solstice to June 21.	Following the summer solstice to December 22

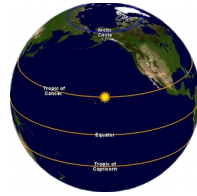
Compare Utharayanam and Dakshinayanam

Causes	
Earth's revolution	
Tilt of the axis (the inclination of axis)	
Parallelism of the Earth's axis.	<p>It is in an elliptical orbit that the Earth revolves around the Sun</p> <p>The axis of the Earth is tilted at an angle of 66½° from the orbital plane. If measured from the vertical plane this would be 23½°</p> <p>The Earth maintains this tilt throughout its revolution.</p>

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The apparent movement of the Sun.

What is apparent movement of the sun?



Since the parallelism is maintained same throughout the revolution, the position of the Sun in relation to the Earth varies apparently between Tropic of Cancer ($23\frac{1}{2}^{\circ}$ North) and Tropic of Capricorn ($23\frac{1}{2}^{\circ}$ South).

The facts associated with rotation.

The Earth rotates from west to east

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It takes 24 hours to complete one rotation

As the Earth rotates from **west to east**, the Sun rises in the east.

The time required to complete a 360° rotation is 24 hours.

On converting 24 hours into minutes $24 \times 60 = 1440$ minutes

That is, the time required for the completion of one rotation = 1440 minutes

The time required for the Earth to complete the rotation of 1° longitude is $1440/360 = 4$ minutes.

The time required for the rotation of 15° longitudinal area is $15 \times 4 = 60$ minutes (1 hour).

15° longitudinal area of the Earth passes by the Sun within a period of one hour.

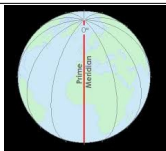
The time required for the rotation of $7\frac{1}{2}^{\circ}$ longitudinal area is $7.5 \times 4 = 30$ minutes ($\frac{1}{2}$ hour).

82.5 degree $\times 4 = 330$ minutes ($5 \frac{1}{2}$ hour)

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Local time

When the Sun is vertically overhead, it is noon. Thus the time estimated at each place, based on the position of the Sun, is termed as the local time.



Greenwich time (GMT)

The zero degree longitude is known as the Greenwich Meridian Time is calculated worldwide based on the Greenwich Line. The local time at the prime meridian is known as the Greenwich Mean Time.

Standard time



Each country in the world considers the longitude that passes almost through its middle as the standard meridian. The countries with large longitudinal extent estimates more than one local time by considering more than one standard meridian. The local time at the standard meridian is the standard time of that country.

International Date Line



180° longitude. 180° longitude to the east and west of Greenwich.

To avoid 24 hours difference adjustments have been made avoiding the land areas along the 180° longitude. It passes only through ocean (the Bering Strait in the Pacific Ocean.). The line is fluctuated.

Travellers gain or loss a day on crossing this line. There ends a day and begins another day.

Indian Standard Time (IST)



The $82\frac{1}{2}^{\circ}$ E longitude which passes almost through the middle of these longitudes has been fixed as the standard meridian of India.

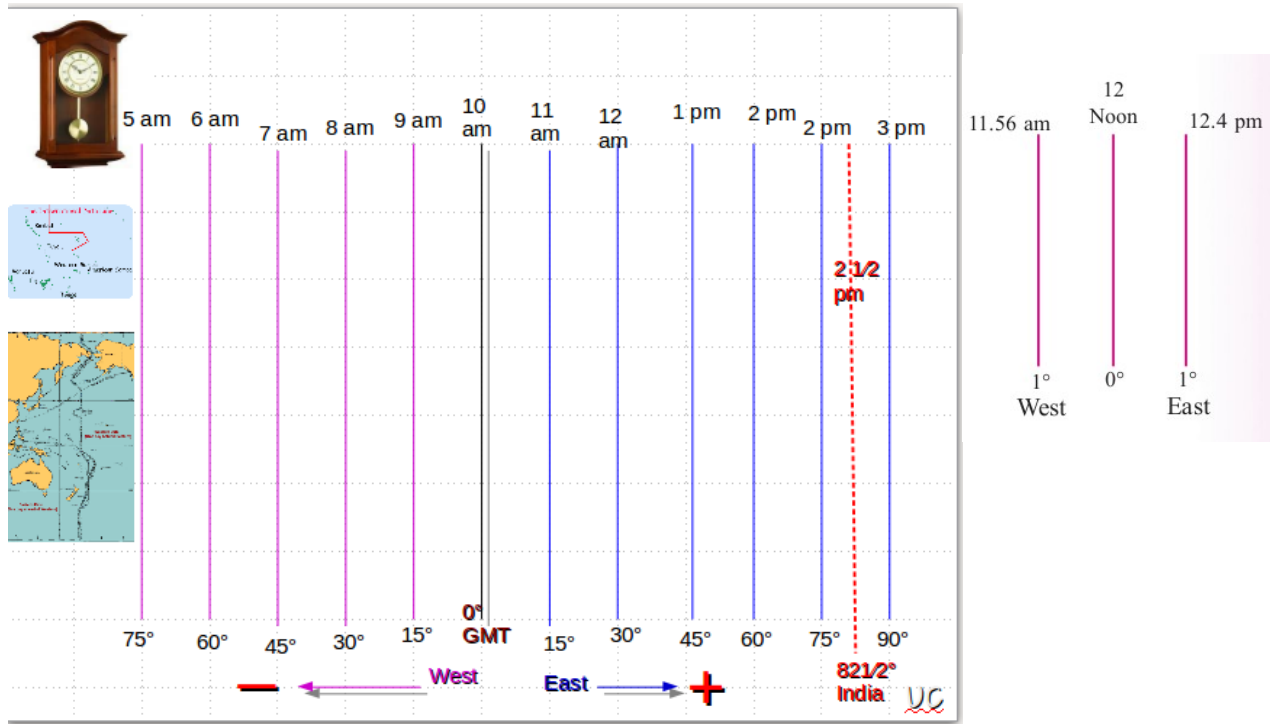
The local time along this longitude is generally considered as

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the Standard Time of India. This is known as the Indian Standard Time.

The difference between the Indian Standard Time and the Greenwich Mean Time is 5 1/2 hours. (5 hours 30 minutes)

We should **increase** the time by 4 minutes towards east and **decrease** it by 4 minute towards west for every one degree longitude ($7.5^\circ \times 4 = 30$ minutes / $15^\circ \times 4 = 60$ minutes (1 hour)



What is Standard Time? Explain how Indian Standard Time is determined?

Complete the table appropriately 3 score

Day	Relative position of the sun	Speciality of th day
21 March	Equator	Equinox
21 June	(a).....	(b)
23 September	(c)	(d)
22 December	(e)	(f)

Write a short note on Equinoxes 3 score 2020 Model

Elucidate Local Time, GMT and Standard Time.

Estimate the Local Time @ the following Longitudes assuming Greenwich Mean Time as 2 pm.

- 1) $82^\circ 30'$ East ii) $82^\circ 30'$ West

Distinguish between summer solstice and winter solstice 3- score 2017 March

Arrange the seasons in the order of their occurrence. Describe the changes in apparent position of the sun during these seasons

-5-score

What do you mean by parallelism of axis? How does it causes seasons? Score 3 2018 March

What i local time? Estimate the time at the following longitude assuming the Greenwich mean time as 10 am.

- i) 45 degree East longitude
ii) 30 degree West longitude

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Score 5

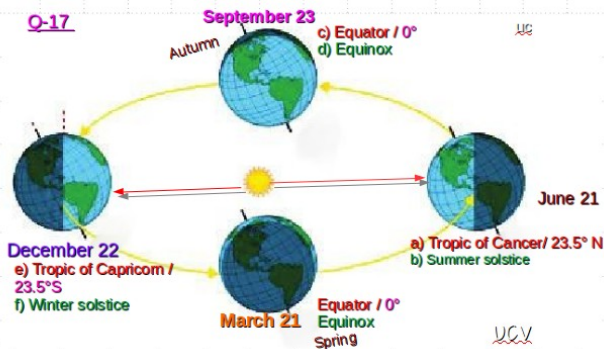
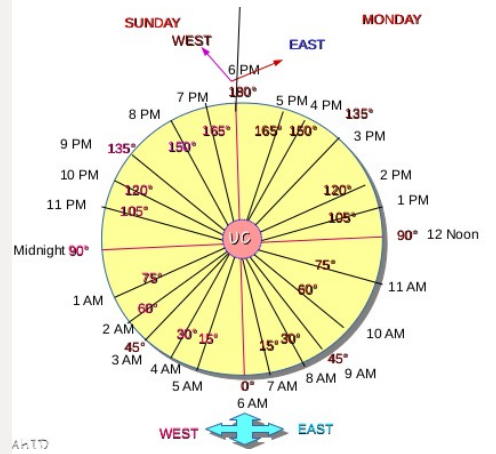
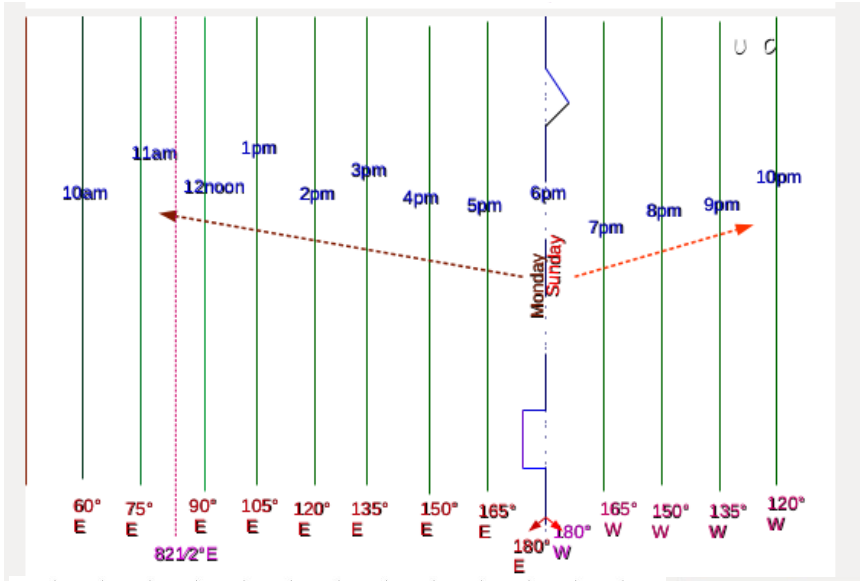
Answer the following questions based on IDL (i) what is IDL? (ii) Explain the peculiarity of the IDL with reason? (iii) Estimate the time at IDL when GMT is 12 noon?

Write a short note on Autumn Season. 3 score 2018 model

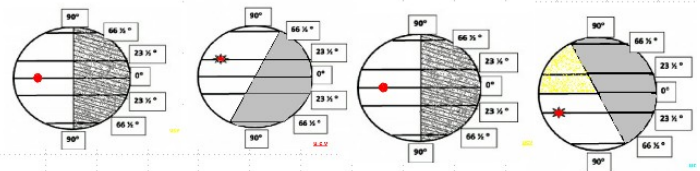
Give an account of the differences between Solstices and Equinoxes **5 score**
 give the reasons for the occurrence of season. **3 score**
 complete the following table showing the apparent movement of the Sun.

	Period	The Apparent Movement	U C Vahid
i	21 March 21 June	
ii	From Tropic of Capricorn to the Equator	
iii	23 September to 22 December	

Elucidate Local Time, GMT and Standard Time. Estimate the Indian Standard Time when GMT is 12 Midnight



Thank You
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SIHSS Ummathur
Parakkadavu
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Day	Relative position of the sun	Speciality of the day
March 21	Equator 0°	equinox
June 21	a) Tropic of Cancer (23.5° N)	b) Summer solstice
September 23	c) Equator (0°)	d) equinox
December 22	e) Tropic of Capricorn (23.5° S)	f) Winter solstice / Picture last