

Master Lesson Plan

For

Globe Latitudes and Longitudes

Board	Standard	Subject	Chapter	Language	Reference Link	Creation date
CBSE	STD VI	Social Science	Globe Latitudes and Longitudes	English	Globe : Latitudes and Longitudes	2020-06-23 12:58:35

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Globe Latitudes and Longitudes

1. MS_Objective_Globe Latitudes and Longitudes.

Objectives

Note to Teachers: This asset lays down the proposed plan for transacting this chapter. It states the objectives of this lesson plan. It conveys the same in terms of expected outcome for each asset. This asset is only for teacher's reference and hence it need not be taught to the students.

Students will be able to

- realise the importance to set goals to be successful in life
- explain about the features of a globe.
- develop the idea of tilt of the earth and its hemispheres.
- discuss about the latitudes of the Earth
- discover the heat zones of the earth.
- explain the heat zones of the world.
- compare between places near the equator and far from it.
- explain the features of the equator and important latitudes.
- appreciate the importance of Greenwich Royal Observatory.
- analyse the importance of longitudes.
- compare between time of different countries.
- discuss the calculation for determining time.
- solve calculations related to time of a place.
- analyse the need for adaption of a standard meridian for our country.
- discriminate between time in neighboring countries.

differentiate between latitude and longitude

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

2. VC_Concentrate on your goals

Concentrate on your goals

Value asset:

To fix the position of a place precisely, it is necessary to know something more than the latitude of that place. We should know the direction that is through the meridian of vertical lines called longitudes.

So too, in our life we should have to set goals on how to move about in the right direction according to the capability, talent and passion that is in each one of us. Otherwise we will either not move at all or will move in a wrong direction.

Asset--Concentrate on your goals

There was an archery master. One morning, he invited one of his disciples to watch him display his skill. Though the disciple had seen this more than a hundred times before, he had to obey his teacher.

They went into the wood beside the ashram. When they reached a magnificent tree, the master took a flower and placed it on one of the branches.

He then opened his bag and took out three objects:

1. his bow made of precious wood,

2. an arrow and
3. a white handkerchief.

The master positioned himself a little away from the spot where he had placed the flower. He then faced the target and asked his disciple to blindfold him with the handkerchief.

The disciple did as his teacher requested.

With his eyes covered by the handkerchief, the master drew back the bowstring with all his might - aiming at the flower - and then released the arrow.

The arrow whistled through the air, but it did not even touch the tree, missing the target by a wide margin.

'Did I hit it?' asked the master, removing the handkerchief from his eyes.

'No, you missed it awkwardly,' replied the disciple. 'I thought you were going to demonstrate to me the power of thought and your ability to perform magic.'

'I wanted to teach you the most important lesson,' replied the master. **'No one can ever hit a target they cannot see.' But with concentrated goal and deep focus everything can be achieved.**

The teacher discusses in the class:

Children! You just heard that unless we set a goal we cannot achieve what we want to in life.

1. **Write down what you want to become when you grow up?**

(let the children write down their thoughts)

(example: I want to become a teacher, I want to become a singer, I want to become a doctor, I want to join the army, etc)

1. **Write down what and how you are planning to achieve this?**

(let the children write down their thoughts)

Example: singer—I am learning music; teacher and doctor—I am studying hard to get good marks to get a seat in teachers' college / medical college; join the army—I read inspiring stories of jawans who work in the border to keep me motivated etc)

The teacher makes sure all have written their goals. Makes random children read out their goals and plans

A student asks, "teacher, what if I change my goals as I grow?"

Answer: It is fine if you want to change your goal as you grow. But keep in mind that commitment plays an important role in achieving goals. And it is not advisable to keep changing your goals often. When a goal is vague, the motivational value is limited. Follow this pattern:

Set goals $\Rightarrow$ start working $\Rightarrow$ be committed $\Rightarrow$ stick to it $\Rightarrow$ reach goal

and continues:

- Now that you know what you want to become, it is easier to get motivated.
- It also allows us to choose how we want to move through life.
- So start working towards your goal

Time to teach	Value Type	Value Sub Type	Value Attribute
7 Minutes	Right Action		Group Activities

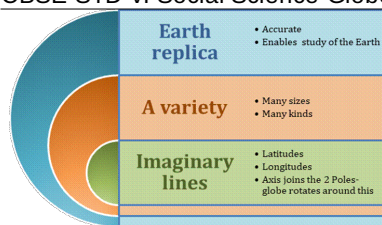
3. MS_The Globe

The Globe

- The globe is an exact model of our Earth.



Characteristics

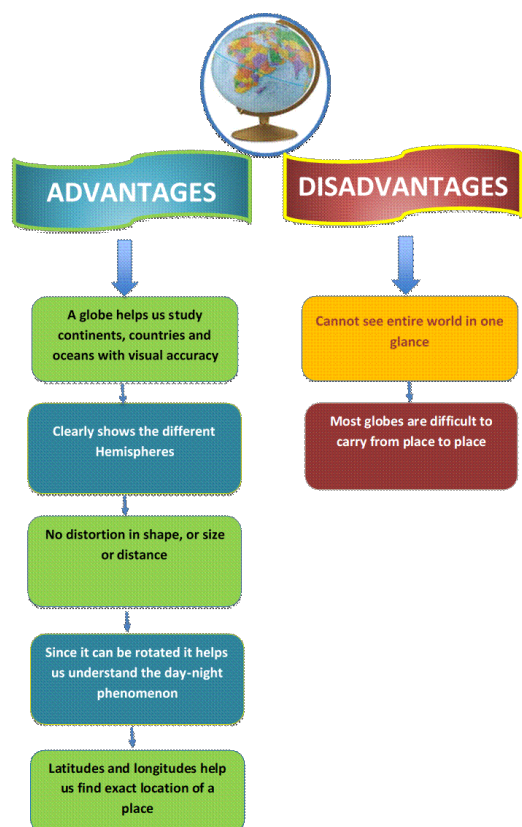
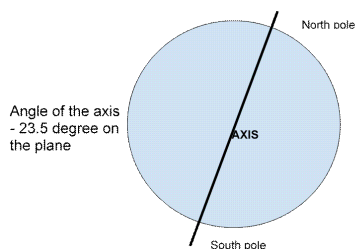


• A globe can be large and difficult to move, or it can be convenient to carry, they are of varying sizes and types; big or small; or like balloons, inflated and carried easily.

• A pin passes through the globe; its two ends indicate the two poles of the earth.

• The angle of the axis is 23.5° on the plane.

• The globe can be rotated around this pin, just like the Earth rotates on an imaginary axis, from west to east.



ADVANTAGES	DISADVANTAGES
Globe helps us to study the continents, countries, water bodies, etc.	The globes are difficult to be carried from one place to another.
Globe gives a clear understanding of the different Hemispheres that exist.	Due to its round shape cannot see the entire world map at one glance
It is an accurate replica of the Earth and has no distortions in shape, size or distance.	
Globe is not fixed and can be rotated. So it helps us to understand the day-night phenomenon.	
On the globe, we have circular lines called latitudes and longitudes which help in finding the location of a place*.	

URLs

Refer to PPT for Links

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Maps	Globe, Globe

4. SA_Axis of the earth and the hemispheres

Axis of the Earth and the Hemispheres

All of you have seen the model of a globe. Globe is a true model of the earth in miniature form. The globe is not a fixed object. It can be rotated like the potter's wheel. Today we will make a Globe, fix the Axis on it and mark the Hemispheres also.

Aim : To enable the students to develop the knowledge of Axis and Hemisphere on the model of planet Earth made by them. They will fix an axis on the model to show the tilt of the earth and also mark the Hemispheres on it.

Resources required :

1. Both side open unused knitting needle (4 Nos.)
2. Four paper mache ball made by the students beforehand.
3. Pen, marker, measuring tape, cello tape, colour, painting brush
4. 20 inches long 4 bamboo twigs. (Can be collected from old baskets)
5. Thread.
6. Big size potato cut into two halves (2 Nos.)
7. A4 size white paper which will be termed as Worksheet. (Quantity : according to class strength)
8. Model of Globe.

Setting for the activity :

This will be a Project based group activity and it will be performed in the class room. Total strength of the class will be divided into 4 groups. Each group will be termed as group A, B, C, and D respectively.

Procedure :

Group A, B, C and D will sit separately in class. Each group will get one paper mache ball. Group A and B will mark the line of equator through the centre of the ball horizontally. Two halves of the ball are joined together to make a round ball. The joined portion is very prominent so this can help the children of group A and B to mark the line of equator correctly. Now one child from each group, with good handwriting, will write or tag on the upper portion of the equator as 'NORTHERN HEMISPHERE' and lower portion of the equator as 'SOUTHERN HEMISPHERE'.

Now group C and D will mark the prime meridian on the ball given to them. For this they can take the help of measuring tape to divide the ball vertically into two halves. Now one child with good handwriting will write on the right side of the Prime meridian as 'EASTERN HEMISPHERE' as well as left side as 'WESTERN HEMISPHERE'.

If the students like they can draw the outline of the continents with the help of a pencil with reference to model globe.

The top point of the ball is called the 'NORTH POLE' and the bottom point is called 'SOUTH POLE'. Now all the four groups will pierce the knitting needle from North pole to South pole in their respective balls.

Next they will colour the bamboo twig according to their choice. After the colour gets dry, they will bend the twig to make a half circle. Now one end of the twig should be joined with the needle of the North pole with the help of thread and cello tape. The other end of the twig could be joined in the same manner towards the needle of South pole. Now the projected part of the needle towards south pole could be pierced into the half portion of the

potato in a tilted way like the model Globe. Here portion of potato will serve as the base of Globe. Actually the equator and the prime meridian are imaginary lines which are very important reference point to locate places on the earth.

Questions for Worksheet :

1. Which are the continents through which Equator is passing ?
2. Name the continents of North Western Hemisphere.
3. Name one continent which is totally situated in the Southern Hemisphere.

Note to the Teacher :

For preparing the paper mache ball, which will represent the planet Earth, please follow the following procedure 2/3 days before the project starts.

Students will prepare the ball in guidance with the teacher.

1. Cut old newspapers into small pieces of 4" size.
2. Then take some flour in a bowl and pour little warm water in it to make a thin paste/glue.
3. Take any medium size plastic ball and cover it with a polythene bag.
4. Now put little glue on the polythene and start pasting small newspaper strips on it covering half of the ball.
5. Now cover the ball with a white paper/tissue paper with the help of glue on it.
6. Let it dry for 3/4 hours .
7. Now turn the ball and pull it out from the polythene bag. Now carefully pull the polythene bag from the case of the paper ball. You will get a half circle paper mache. Please cut the edge of the circle neatly.
8. Now make another half circle paper mache following the same method.
9. Take one hard, old invitation card. Put one half circle on it and mark with a pencil all around. You will get a round mark of pencil.
10. Now cut the card along the line but little bigger in size. Put glue along the line and take one of the half circles and place it tightly on the card. After 10 minutes, paste glue on the opposite side of the card and place the other half circle on this side of the card and press tightly. This makes a circle. Let it dry completely. Now cut extra papers of the card neatly.
11. Take another strip of tissue paper and paste on the joint neatly.
12. Planet earth is ready.

(For making the paper Mache ball it would be nice if the teacher could be given some pictures or video prepared by the MM in line with the following reference -

https://www.youtube.com/watch?v=Y95tm_02HNq&t=18s)

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Maps	Latitudes And Longitudes, Latitudes And Longitudes

5. MS_ Latitudes of the Earth_06

Latitudes of the Earth

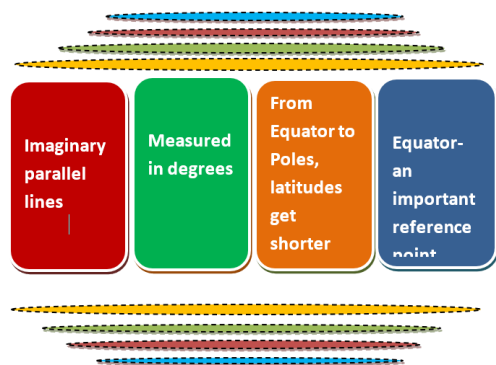
Latitudes

- Horizontal lines drawn across a globe are latitudes.

These are imaginary lines and do not exist on Earth.

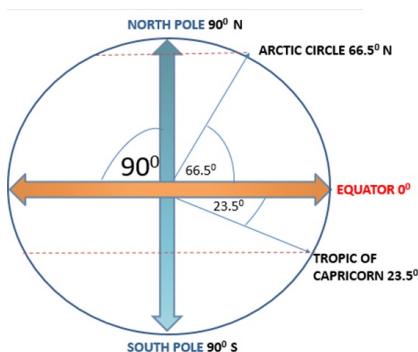
- They have been created to help people locate places on a map.
- These horizontal lines, along with vertical lines called longitudes, allow us to find the exact location of a place.

Characteristics



- Around the centre of the globe is an important horizontal line called the Equator.
- This line of latitude divides the globe into two equal parts, called Hemispheres.
- ❖ From Equator to the North Pole – the Northern Hemisphere
- ❖ From Equator to the South Pole – the Southern Hemisphere
- From the Equator to the Poles run many horizontal parallel lines called parallels of latitude.
- These are measured in degrees.
- Latitudes are shortest at the Poles and get longer as closer to the Equator.

How latitudes are expressed



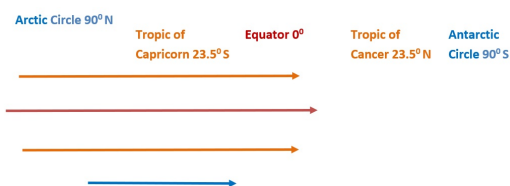
- Latitudes are expressed in degrees followed by the letter 'N' or 'S'.
- The distance from the Equator to the Poles is $\frac{1}{4}^{\text{th}}$ of the circumference of the Earth i.e. $\frac{1}{4}^{\text{th}}$ of 360° which is 90°.

The latitude of the North Pole is thus 90°N and South Pole is 90°S.

All parallels of latitude in the Northern Hemisphere are called 'North Latitudes' and indicated by the letter 'N', and those in the Southern Hemisphere are called 'South Latitudes', and indicated by the letter 'S'.

Example – A place in North America and another in South America may both be located on 20° latitude, but the place in the Northern Hemisphere is marked as 20°N, and the place in Southern Hemisphere as 20°S.

Important Latitudes



Equator

- The Equator is an important reference point on a map.

- It divides the globe into two halves and represents 0-degree latitude.

Moving northwards from the Equator towards the North Pole there are two important latitudes:

- 23.5°N – Tropic of Cancer
- 66.5°N – Arctic Circle

Moving southwards from the Equator towards the South Pole, there are two important latitudes:

- 23.5°S – Tropic of Capricorn
- 66.5°S – Antarctic Circle

- The North Star/Pole star (Polaris), has historically been used as a tool for navigation by seafarers.

By measuring the angle made by the Pole Star to the horizon, one can find out the latitude of the location.

URLs

<https://pixabay.com/vectors/world-map-world-map-earth-global-297315>

Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

6. IQ_Heat Zones of the earth

Heat Zones of the earth

[Notes to the teacher-Teacher may enable the students to think and come out with as many answers as possible before giving out the right answer/ answers]

Ques 1: When we stand under the Sun during summers, why do we feel the heat of the sun so intensely?

Suggested Ans:

During summers the sun rays seem to be direct and so they heat the environment intensely. We feel the tremendous heat of the sun.

Ques 2 : Why do you think during winter we hardly feel the heat of the sun?

Suggested Ans : The rays of the sun are indirect and slanting. Hence the rays are not so intense.

Ques 3 : How do you think is it possible for Antarctica or Greenland to have ice cover throughout the year?

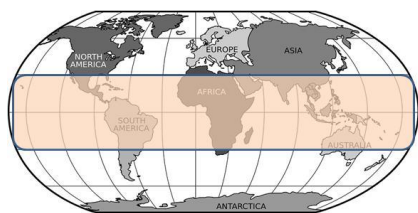
Suggested Ans:

The polar region of the Earth receives slanting rays of the sun and as a result the sun rays are very faint and incapable of heating up the land surface. Thus the ice of these regions do not melt quickly and so the surface remain covered with ice throughout the year.



Ques 4: In the picture below the shaded region gets direct sunrays. What kind of climate do you think the places in this region experience and what

amount of amount of rainfall do they get?



(Shaded part in the map self created.)

Suggested Ans:

The shaded region experiences hot weather throughout the year as rays of the sun falls directly. Since it is hot throughout the year, there is high rate of evaporation and so it experiences heavy rain.

URLs

Iceberg_CC- <https://pixabay.com/photos/iceberg-antarctica-polar-blue-ice-404966/>

World map – CC- <https://pixabay.com/en/world-map-robinson-projection-globe-42641/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Inquisitive Questions	Maps	Latitudes And Longitudes, Latitudes And Longitudes

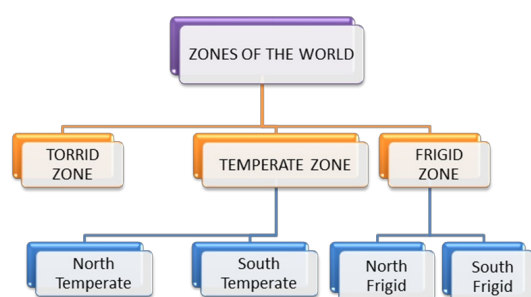
7. MS_Discovering the Heat Zones of the World

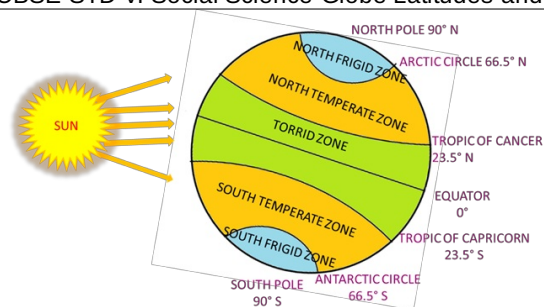
Discovering the Heat Zones of the World

The world is divided into three broad heat zones on the basis of latitudes. This latitudinal extent decides the major climatic conditions of the countries that are under the zones.

The Heat Zones of the World are

- Torrid Zone
- Temperate Zone
- Frigid zone





Torrid Zone

The Torrid zone lies between the Tropic of Cancer 23.5° N and the Tropic of Capricorn 23.5° S.

The sun rays fall directly on the latitudes of this zone. Hence the Torrid zone receives the maximum heat.

The countries that lie in the torrid zone are Indonesia, Thailand, Vietnam, Burma, Sri Lanka, Chile, Brazil, Argentina, Mexico.



Tropic of Cancer to Tropic of Capricorn

Direct sunlight

Maximum heat

Temperate Zones

The North Temperate zone lies between the Tropic of Cancer 23.5° N and the Arctic Circle 66.5° N in the Northern Hemisphere.

The South Temperate zone lies between the Tropic of Capricorn 23.5° S and the Antarctic Circle 66.5° S in the Southern Hemisphere.

The sun rays fall slanting on these zones. The heat is not as severe as we experience in the Torrid zone and so these regions have moderate temperatures. The angle of the sun rays decreases as we go towards the poles.

The countries that lie in the Temperate zone would be Japan, Korea, China, and some countries of Europe and North America.



Tropic of Cancer to Arctic Circle

Tropic Of Capricorn to Antarctic circle

Slanting Sunrays

Moderate temperatures

Frigid Zones

The North Frigid zone lies between the Arctic Circle 66.5° N and the North Pole 90° N in the Northern Hemisphere.

The South Frigid zone lies between the Antarctic Circle 66.5° S and the South Pole 90° S in the Southern Hemisphere.

In these zones the sun does not rise much above the horizon. The sun rays are always slanting and provide less heat. Hence the regions are very cold.

The countries that lie in the Frigid zones include the United States of America, Canada, Russia, Iceland, Sweden, Finland, Norway and Greenland which is part of Denmark from the Northern Hemisphere, and Antarctica from the Southern Hemisphere.



Arctic Circle to North Pole

Antarctic Circle to South Pole

Sunrays slanted, low heat

Very low temperatures

URL LINKS:

Heat Zone Diagram:

SSSVV Gallery

Torrid zone:

<https://pixabay.com/photos/outback-desert-nature-australia-405656/>

Temperate Zone:

<https://pixabay.com/photos/rivers-streams-california-258367/>

Frigid Zone:

<https://pixabay.com/photos/iceberg-antarctica-polar-blue-ice-404966/>

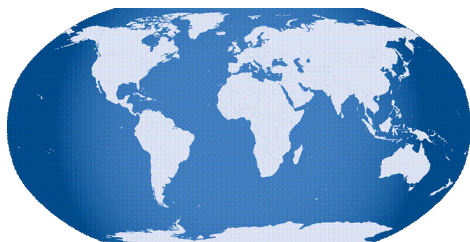
Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Main Script	Maps	Heat Zones Of Earth, Heat Zones Of Earth

8. DD_Variation in Temperature

Variation in Temperature

Note to teacher: Students we know that due to different locational factors, the different places on earth have various temperature patterns. Let us see how temperature varies across the world.

- Countries and places at the equator have temperatures as high as 58°C and the average temperature is usually around $23^{\circ} - 31^{\circ}\text{C}$.
- Countries which are located beyond the tropics experience temperature which remain within 30 degree Celsius
- Countries in the Frigid Zone experience temperatures which are usually around 10 degree Celsius during summers and winter temperatures go down well below minus 20 degree Celsius.



Countries	Average Annual Temperature (In degrees Celsius)
United Kingdom	8.4
United States	8.5
Singapore	26.6
Somalia	27
Sri Lanka	27
Colombia	25
Egypt	22
Georgia	6
Denmark	8
India	24

URLs

<https://pixabay.com/en/globe-world-map-earth-32299/>

Reference(s): (URL of internet site)

https://en.wikipedia.org/wiki/Climate_of_Colombia

<https://en.climate-data.org/location/513570/>

<https://www.safaribookings.com/kenya/climate>

<https://www.safaribookings.com/uganda/climate>

https://en.wikipedia.org/wiki/List_of_countries_by_average_yearly_temperature

<https://en.wikipedia.org/wiki/Equator>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Day-to-day Relevance	Maps	Latitudes And Longitudes, Latitudes And Longitudes

9. MS_Features of the important latitudes

Features of the important latitudes

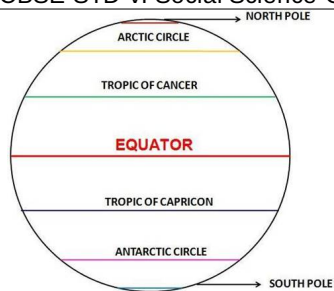
Note to teacher: Students, we know that horizontal imaginary lines on the earth are latitudes. Now we shall see what the important latitudes are.

Latitudes are horizontal imaginary lines on the spherical earth. Each line of latitude is parallel to each other.

The lines of latitude never intersect each other at any point on the earth's surface.

The important latitudes of the earth are:

- Equator
- Tropic of Cancer
- Tropic of Capricorn
- Arctic Circle
- Antarctic circle

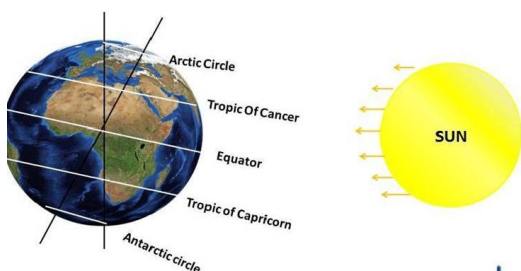


The Equator

- Equator is the 0° parallel of latitude that divides the earth into two hemispheres – Northern hemisphere and southern hemisphere.
- The equator is an imaginary line is also called the great circle and is about 40,075 km.
- True equatorial plane is perpendicular to the Earth's spin axis.
- The earth bulges at the equator and therefore the diameter of the Earth is greater at the equator than at the poles.
- Mathematical calculations of the speed of the Earth's rotation at the equator and near the poles reveal the earth rotates faster at the poles.
- The circumference of the Earth at the equator if roughly taken to be around 40000 km, then by dividing it by 24 we get approximately 1666.66 km/hour speed. The north pole and south poles are points hence speed is approximately zero at the poles.
- Some prominent countries through which the equator passes are: Indonesia, Uganda, Somalia, Kenya, Congo, Gabon, Brazil, Ecuador and Colombia.
- Equatorial regions witness heavy rainfall throughout the year and possess lush green equatorial rain forests of the world.

The Tropic of Cancer

- This is the imaginary parallel of latitude where the sun is directly overhead on 21st June (summer solstice). On this day the northern hemisphere experience longest day.
- It is located $23^\circ 30'$ North of the equator.
- The places through which the tropic of cancer passes, generally witness extremes of temperature and dryness.
- The word 'Tropic' comes from the Greek word 'trope' meaning change in direction.
- Some countries through which the Tropic of cancer passes are India, Bangladesh, Myanmar, China, Saudi Arabia, Algeria, Egypt, UAE, Libya and Mexico.



The Tropic of Capricorn

- This the imaginary parallel of latitude at $23^\circ 30'$ South of the equator.
- During December the sun is directly overhead on this latitude on 22 December which is also called winter solstice. On this day the northern hemisphere experience shortest day while days are longest at the southern hemisphere.
- Countries through which the tropic of Capricorn passes are Chile, Argentina, Paraguay, Brazil, Namibia, Mozambique, Madagascar, Australia.

The Arctic Circle

- It is the imaginary parallel of latitude at $66^\circ 30'$ North of the equator.
- The places in this region generally experience harsh weather conditions.
- During summers solstice (21st June) the Arctic Circle witness midnight sun when the sun appears as a disk at local midnight.
- During the winter solstice (22nd December) the sun is invisible at local noon within the Arctic Circle.
- Some countries through which the Arctic Circle passes are Russia, Denmark, Canada, Finland, Sweden, Norway and Alaska.

The Antarctic Circle

- It is the imaginary parallel of latitude at 66°30' South of the equator.
- The places in this region generally experience harsh weather conditions.
- During summer solstice of the northern hemisphere (21st June) the Antarctic Circle witnesses darkness when the sun is invisible at local noon.
- During the winter solstice (22nd December) the Antarctic Circle witness midnight sun when the sun appears as a disk at local midnight.
- There is no permanent human habitation south of the Antarctic Circle. Antarctica is the only continent situated below the Antarctic Circle.

The North Pole and South Pole are just points.



URLs

Diagram self made with the help of Powerpoint

Diagram self-made with the help of Power point.

<https://pixabay.com/en/world-globe-earth-planet-blue-1303628/>

[World Map – CC - https://pixabay.com/vectors/world-map-earth-global-continent-146505/](https://pixabay.com/vectors/world-map-earth-global-continent-146505/)

Reference(s): (URL of internet site)

<https://en.wikipedia.org/wiki/Equator>

<https://www.scientificamerican.com/article/how-fast-is-the-earth-mov/>

<https://sciencing.com/earth-rotate-slower-faster-top-17525.html>

https://en.wikipedia.org/wiki/Tropic_of_Cancer

https://en.wikipedia.org/wiki/Arctic_Circle

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

10. IA_Greenwich Royal Observatory

Greenwich Royal Observatory

Note To Teacher : Greenwich Meridian also known as Prime meridian is very important in calculating time of a place. We shall now gain some knowledge about the Royal Observatory at Greenwich.

The observatory in Greenwich known as the Royal Observatory, Greenwich is located overlooking the River Thames. The observatory has contributed significantly to astronomy and navigation.



- The requirement of accurate astronomical information, cartography for navigation and exploration through sea routes compelled the Europeans to build an observatory.
- King Charles II set a royal commission for the purpose and Sir Christopher Wren an architect and an astronomer was very much part of the commission.
- It was on the recommendations of this Royal Commission that Britain's first state funded Scientific observatory was built.
- The observatory was established in 1675.



- Sir Christopher Wren also suggested the location of the observatory and drew the design for the building as well.
- The foundation stone was laid by the first appointed Astronomer Royal for the observatory, John Flamsteed.

Importance of the Observatory in Global Timing

- The Royal Observatory marks the divide between the Eastern and Western Hemisphere.
- It is known for the location of the Prime Meridian (00) and therefore Greenwich Mean Time, which is local time according to the Prime Meridian.
- Greenwich meridian was recognized to be the Prime meridian Longitude (0° 0' 0") in 1884 when 41 delegates from 25 countries met at a conference.





URLs

<https://pixabay.com/photos/london-greenwich-observatory-244275/>

https://commons.wikimedia.org/wiki/File:Portrait_of_Sir_Christopher_Wren_From_a_painting_by_Sir_Godfrey_Kneller.jpg Attribution: Internet

Archive Book Images

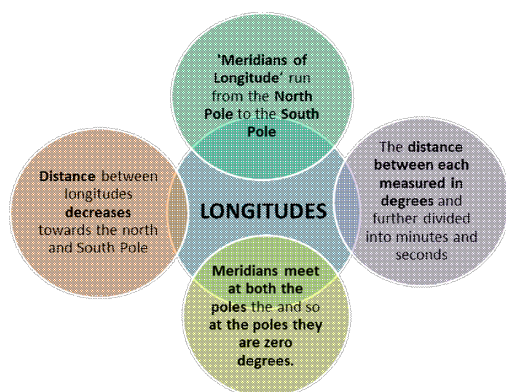
<https://www.flickr.com/photos/ell-r-brown/8131031429> Attribution: Elliott Brown

<https://www.publicdomainpictures.net/en/view-image.php?image=10570&picture=prime-meridian>

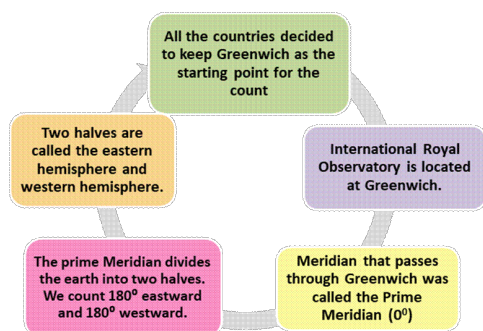
Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Interesting Asides	Maps	

11. MS_What are Longitudes

What are Longitudes?



Numbering the Meridians of Longitude



Importance of Longitude: Helps Locate a Place Along With Latitude

- You can locate any place on the globe if you know the latitude and longitude of the place.

- Example: Kolkata is at 22° N and 88° E. If you draw these lines and find out where these two lines meet, that's the location of Kolkata.

Importance of Longitude: Helps Know the Time

- All places on the same meridian have the same time. When it is noon in Prime meridian, all places along this meridian will also have noon.
- Since the earth rotates from East to West, countries east of Greenwich will be ahead of Greenwich time and those places to the west of Greenwich will be behind Greenwich time.
- Example: if it is 12 noon in Greenwich, then for places that are 15° east of it will be 1 hour ahead of it, i.e. 1 p.m. and those 15° west will be 1 hour behind, that is, 11 a.m.

How do we calculate this?

Earth rotates 360° in 24 hours. That means 15 degrees in 1 hour ($360 \div 24 = 15$)

So it rotates 1 degree in 4 minutes.

Thus places 15 degrees east of Greenwich will be (15 x 4) 60 minutes ahead in time.

In the same way, if it is 12 Mid Night. in Greenwich can you calculate the time at a place 50° west of Greenwich?

(Notes for the teacher: Teacher can ask this to students if time permits. Answer will be: Since the place is west of Greenwich, it will be behind it in time. The time will be $50 \times 4 = 200$ minutes, or 3 hours and 20 minutes behind, i.e., 8:40 p.m.)

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

12. DDR_New Year Celebration around the world

New Year Celebration around the world

All places on the Earth's surface do not follow the same time.

- As time varies according to their respective standard meridians, all places do not usher in the New Year at the same time.
- Greenwich Mean Time is the reference point for places to the east of Greenwich which celebrates New Year ahead of the places situated in the west.
- India has adopted 82° 30' E longitudes as its standard meridian.
- So when it is 12:00 am in India and Indians celebrate and welcome New Year on January 1, it will be
- 4:30 am in Melbourne, which means they have already celebrated and ushered in New Year.
- While, it will be 2:30 pm in Toronto and this city is yet to welcome the New Year.
- Greenwich Mean Time will be 6:30 pm when it is 12 am in India
- There time vary according to different time zones and standard meridian of a country.

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Day-to-day Relevance	Maps	Latitudes And Longitudes, Latitudes And Longitudes

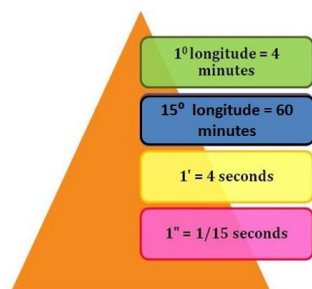
13. MS_Calculating time

Calculating time

Note To Teacher : Students we know that longitude is very important for locating places on earth. We shall now see how they are also very useful for calculating time of a place on earth.



Any place located on the east of the prime meridian gains time whereas a place on the west of the Prime meridian loses time.



As we go eastward from the Greenwich it is observed that local time of each longitude is 4 minutes ahead. As we go westward from the Greenwich local time is observed to be 4 minutes behind.

To avoid confusion of a time difference of about 24 hours at 180° East and 180° West, 180th meridian has been adopted international date line. Any traveller crossing the international date line gains a day on going eastward and similarly loses a day if the person goes westward after crossing the international date line. As travellers cross this line the date changes.



To calculate time of a place we need to first find the difference of longitude between the two places and then find the time for the place.

EXAMPLE 1

If it is 6 pm at Greenwich ,England what is the time at Perth located at $115^{\circ} 51' E$?



Solution :

Greenwich is located at 0° so, the longitudinal difference between the places is

$$115^\circ 51' - 00 0' = 115^\circ 51'$$

$$115^\circ \times 4 = 460 \text{ minutes} ; 51' \times 4 \text{ seconds} = 204 \text{ seconds or } 3'24''$$

Therefore $460 + 3 \text{ minutes } 24 \text{ seconds}$,

Or, 463 minutes 24 seconds

Or, $463 \div 60 = 7 \text{ hrs } 23 \text{ mins}$ precisely.

Time at Greenwich is 18 hours. Since Perth is located in the eastern hemisphere, the time at Perth would be

$$18 \text{ hrs} + 7 \text{ Hrs } 23 \text{ mins } 24'' \text{ or, } 25 \text{ hrs } 7 \text{ mins } 24''$$

$$1 \text{ day} = 24 \text{ hrs so the difference is, } 25 \text{ hrs} - 24 \text{ hrs} = 1 \text{ hr}$$

Now if we convert 23 mins into hrs $23 \div 60$ (as 1 hour comprises 60 mins) = 1 hr 2 mins

So time would be 2 hrs 2 mins 24'' (2:02:24 AM) at Perth ($115^\circ 51'$ E) on the next day.

EXAMPLE 2

If it is 4 am at a place 160° W of Greenwich, what is the time of the place at 160° E of Greenwich ?

Solution:

The longitudinal difference between the two places would be $160^\circ + 160^\circ = 320 \text{ degrees}$

Therefore, 320 degrees is equal to $320 \times 4 \text{ minutes} = 1280 \text{ minutes}$

Or, $1280 \div 60 = 21 \text{ hrs } 20 \text{ minutes}$.

Time at 160° W is 4 hrs hence, $21 \text{ hrs} + 4 \text{ hrs} = 25 \text{ hrs}$.

1 day = 24 hrs, So the difference in hours would be 25 hours - 24 hours = 1 hour.

Therefore time at 160° E longitude would be 1hr 20 mins (1: 20 AM) on the next day.

EXAMPLE 3

If it is 4 pm in Mumbai ($82^\circ 30'$ E), then what is the time in London?



**Solution:**

-

London follows Greenwich Mean Time so the longitude value $0^{\circ} 0'$

The longitudinal difference between the two places would be

$$82^{\circ} 30' - 0^{\circ} 0' = 82^{\circ} 30'$$

$$82 \text{ degrees} = 82 \times 4 = 328 \text{ minutes}$$

$$30' = 30 \times 4 \text{ seconds} = 120 \text{ seconds or } 120 \div 60 = 2 \text{ minutes}$$

Hence, $328 + 2 \text{ minutes} = 330 \text{ minutes or } 330 \div 60 = 5 \text{ hrs } 30 \text{ minutes}$.

So when it is 16hrs in Mumbai, time at London would be 16 hrs – 5hrs 30 minutes as London is situated in the west of Mumbai.

Time at London would be 11:30 AM (on the same day)

URLs

<https://pixabay.com/en/clock-pocket-watch-movement-3179167/>

image self created with Ms Word Features

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OC – sriram.bharu@gmail.com

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Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

14. QA_Time of a place east or west of Greenwich

Time of a place east or west of Greenwich

Note to teacher : Students, we know how time varies from one place to another on earth. Now let us see how much we can recollect.

Ques 1:

Fill up the blanks

a) Number of longitudes travelled in 4 minutes is _____ (ans: one)

b) After crossing the international date line you _____ a day if you go westward and you _____ a day if you go eastward. (ans: Lose; gain)

c) Local time of each longitude is observed to be 4 minutes _____ if we go eastward from Greenwich prime meridian. (ans: faster)

d) _____ has been adopted as the International Date Line. (ans: 180th meridian)



Ques 2:

Local Time of a place is 15 hrs and Greenwich Mean Time is 8 hrs. Calculate the longitude of the place and also mention whether it is in the east or west of Greenwich.



Suggested Ans:

Time of the place = 15 hrs, GMT = 8 hrs

Therefore, 15 hrs – 8 hrs = 7 hours or 7 X 60 = 420 minutes

4 minutes = 1° of longitude

Hence, 420 minutes = 420 ÷ 4 = 10 hrs and 50 mins

Since Greenwich Time is less than the time of the place, whose longitude is found to be 150°, therefore it is concluded that the place is in the east of Greenwich as it is ahead of GMT.

So the place is located at 105°E

Quest 3:

What will be the time of a place located at 170° west of Greenwich, when GMT is 14 hrs?

Suggested Answer:

The longitudinal difference is 170 – 0 = 170° or 170 X 4 = 680 minutes.

680 minutes when converted to hrs is $680 \div 60 = 11 \text{ hrs } 33 \text{ mins}$

Since the place is located at 170° west of Greenwich so the time of the place will be

$14 \text{ hrs} - 11 \text{ hrs } 33 \text{ min} = 3 \text{ hrs } 33 \text{ mins (3:33 AM)}$

Quest 4:

If it is 4 am at a place 160° W of Greenwich, what is the time of the place at 160° E of Greenwich?

Suggested Answer:

The longitudinal difference between the two places would be $160^{\circ} + 160^{\circ} = 320 \text{ degrees}$

Therefore, 320 degrees is equal to $320 \times 4 \text{ minutes} = 1280 \text{ minutes}$

Or, $1280 \div 60 = 21 \text{ hrs } 33 \text{ minutes}$.

Time at 160° W is 4 hrs hence, $21 \text{ hrs} + 4 \text{ hrs} = 25 \text{ hrs}$.

1 day = 24 hrs, so the difference in hours would be 25 hours - 24 hours = 1 hour.

Therefore time at 160° E longitude would be 1 hr 33 mins (1:33 AM) on the next day.

URLs

OC – sriram.bharu@gmail.com

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Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Assessments	Maps	Latitudes And Longitudes, Latitudes And Longitudes

15. MS_Need for Standard Meridian for India_06

Need for Standard Meridian for India

STANDARD TIME:

- The time of a place depends on longitude which passes through that place.
- India is situated between **97° E in the east to 67° E in the west**. This means that there are around **30 longitudes** from the eastern most and western most of INDIA. It takes **4 minutes** to cross a longitude. Therefore, there would be two hours difference from the eastern most and western most of INDIA. This creates confusions in many ways.
- Hence **Standard Meridian Time** is fixed. Standard time is the fixed common time for a geographical area or region. The standard time is usually the local mean time of the centre of the region.
- In India, the longitude of **$82^{\circ} 30'$ E** is treated as the **STANDARD MERIDIAN**. The local time at this meridian is taken as the standard time for the whole country. It is known as the **Indian Standard Time (IST)**.
- Greenwich Mean Time(GMT)** is taken as a standard reference to time all over the globe because it is the place where the "**Prime Meridian**" **0° longitude** passes through.

Need for standard time:

- NO CONFUSION WHILE TRAVELLING:** For example, it would be difficult to make a time-table for trains which travel across several longitudes.
- UNIFORM TIME THROUGHOUT THE COUNTRY:** All people of the country have same work time. This is very useful to have better communication and to complete the work quickly.

· **ALL EVENTS WITHIN THE COUNTRY FOLLOW THE TIME ACCORDING TO THE STANDARD MERIDIAN:** For example, it is simpler to refer an event occurring in India at given time in standard time.

NO CONFUSION WHILE TRAVELLING:

- It would be difficult to make a time-table for trains which travel across several longitudes.

UNIFORM TIME THROUGHOUT THE COUNTRY:

- This is very useful to have better communication and to complete the work quickly.

ALL EVENTS WITHIN THE COUNTRY FOLLOW SAME TIME

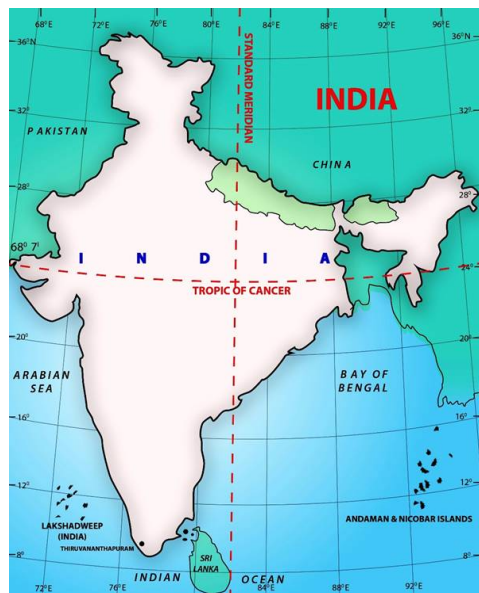
- It is simpler to refer an event in Standard Time.

STANDARD MERIDIAN TIME

The standard meridian time is usually the local mean time of the centre of the region.

In India, the longitude of $82^{\circ} 30'E$ is standard meridian. It is known as the **Indian Standard Time (IST)**.

Greenwich Mean Time(GMT) is taken as a standard time all over the globe. It is the place where the "**Prime Meridian**" 0° longitude passes through.



ALLAHABAD: THE CITY WHERE STANDARD MERIDIAN PASSES THROUGH



"Steel sculpture marking the Prime Meridian" by Ryan Buterbaugh



URLs

INDIA MAP: SSSVV gallery; Keyword: India map

[CLOCK:](#)

<https://pixabay.com/illustrations/time-time-management-stopwatch-3222267/>

https://commons.wikimedia.org/wiki/File:Allahabad_Junction_-_Railway_Station_-_Leader_Road_-_Allahabad_-_Uttar_Pradesh_2014-07-04_5602.JPG Attribution: Biswarup Ganguly

"Steel sculpture marking the Prime Meridian" by Ryan Buterbaugh is licensed under [CC BY-NC 2.0](#):

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Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes

16. SA_Standard Meridian for Neighbouring countries

Standard Meridian for Neighbouring countries

Note To Teacher : Students, today let us do an activity to remember how time differs from one country to another.

Aim: To understand about the time differences around the world on the basis of respective standard meridians.

Resources Required: [mention quantities]

- Chart paper (number to be decided by the teacher)
- Pictures (maps) of countries.
- Coloured pens, pencils, rulers, erasers, scissors etc.
- Note books

Setting for the Activity [Indoor/Outdoor]: Indoor (Classroom Activity)

Type of Activity: [Demonstration / Experiment/ Field Trip/ Project]: Project

Procedure:

1. It is an individual activity and requirements and details for activity may be discussed by the teacher in the previous class, so that students come prepared for the activity.
2. Chart paper may be divided into 4 parts or 2 parts and each part may be used for information about each country. Number of chart papers to be decided by the teacher based on the number of divisions to be made.
3. Students will Stick map of the countries - Myanmar, Bangladesh, China, Nepal, Sri Lanka, and Pakistan. Students who are good at drawing may attempt to draw the map of the countries instead of sticking map images.
4. Below each country they will mention the Standard meridian value followed by the countries and their time differences with Greenwich Mean Time.
5. They will also stick / draw map of India and mention the above said details about India as well.
6. Capital city of each country should also be mentioned.

A Worksheet may be given to students at the end of the activity.

Country	Standard Meridian	Time difference with GMT	Capital City
Bangladesh	90.00° East	GMT +6.00 (BDT)	Dhaka
Nepal	86°20' East	GMT + 5.45 (NST)	Kathmandu
Pakistan	74° 22' East	GMT+ 5.00 (PKT)	Islamabad
Sri Lanka	82° 30' East	GMT+ 5.30 (SLST)	Colombo
Myanmar	97°30' East	GMT + 6.30 (MST)	Naypyidaw
China	130° East	GMT+8.00 (CST)	Beijing
INDIA	82° 30' East	GMT+ 5.30 (IST)	Delhi

IST - Indian Standard Time, **CST** - China standard time, **PKT** - Pakistan standard Time, **SLST** - Sri Lanka Standard Time, **MST** - Myanmar Standard Time,

NST- Nepal Standard Time, **BDT** - Bangladesh Standard Time.

Observation: It will be observed that each country follows time according to its own standard Meridian, while Sri Lanka follows time according to India's standard Meridian.

Conclusion: With reference to **Greenwich mean time (GMT)**, all countries adjust time accordingly east or west of the Prime Meridian.

Instructions to Teacher: (If any – Optional)

- Teacher is an observer and helps as and when required.
- A Worksheet may be given to each student at the end of the activity.

Precautions: (If any – Optional): Ensure that maps are available before hand

Troubleshooting: (If any – Optional): Nothing expected

Reference(s): (URL of internet site)

<https://pixabay.com/en/borders-country-flag-geography-map-2099205/>

[https://commons.wikimedia.org/wiki/File:Sri_Lanka_-_Colombo_\(original_size\).png](https://commons.wikimedia.org/wiki/File:Sri_Lanka_-_Colombo_(original_size).png)

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WORK SHEET

What is the time difference of India with the following countries?

1. Bangladesh :

2. Myanmar :

3. Pakistan :

4. Nepal :

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Maps	Latitudes And Longitudes, Latitudes And Longitudes

17. QA_Latitudes and longitudes

Latitudes and longitudes

Note To Teacher : Let us recall what we have discussed till now on the latitudes and longitudes of the world.

Answer in one word:

- The latitudes between 300 and 600 are referred to as:
- The region between the Tropic of Cancer and Tropic of Capricorn is known as:
- 0° longitude is also called:
- The linear distance between each meridian at the Equator is:
- The Royal Astronomical Observatory is at:

Answers:

- a) Mid Latitudes b) Torrid Zone c) Prime Meridian d) 111 km e) Greenwich

Fill up the blanks

- Since places on a particular longitude have noon at the same time, they are also called _____ of _____.
- The earth takes _____ to rotate 1° of longitude.
- Frigid zones are associated with low temperature as it receives _____ rays of the sun.
- Smallest parallel of latitude in the northern hemisphere is the _____.
- The highest possible latitude is _____.

Answers:

-

- 1) Meridians ;noon 2) 4 minutes 3) tangential 4) North Pole 5) 90°

True False

True False

- a) All parallels of latitude are of the same size as the Equator
- b) Tropic of Capricorn lies in the northern hemisphere.
- c) If it is 12 noon at 00 (Greenwich), it will be 12:40 pm at 100 east longitude.
- d) Longitude is the angular distance measured along the equator.
- e) All meridians are full circles.

Answers:

a) False b) False c) True d) True e) False

Answer in brief.

1. How does latitude and longitude help to find a particular location?

Answer: The coordinates formed by the latitudes and longitudes give us an idea about the location of a place on the earth, whether it is in the eastern hemisphere or western hemisphere or in the northern or southern hemisphere.

2. What are the various purposes of parallels of latitudes?

Answer :

- Latitudes tell us whether a place is located in the southern or northern hemisphere.
- Latitude of a place tell us whether it is located in the the hotter regions of the earth or in the colder belts.
- Latitude of a place also help to determine how far a place is from the equator.

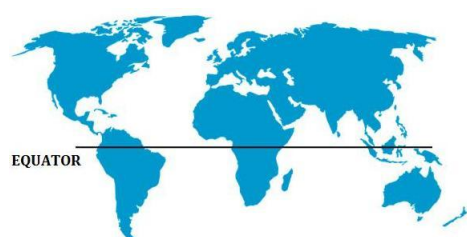
Give reasons.

1. Countries with greater extent require multiple standard meridians to determine time.

Answer: If a country has a large east west extent, then it becomes difficult to choose one particular longitude as standard meridian to determine time. So countries like USA or Russia choose more than one standard meridian to follow time according to that meridian. But countries like India and Bangladesh have chosen one standard meridian, and the whole country follows time according to that meridian.

Picture based Question:

Quest: Name the countries through which the equator passes.

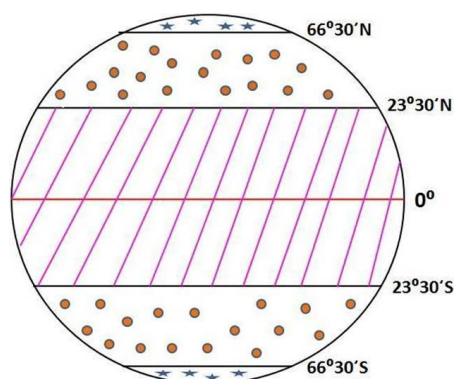


Answers:

Some prominent countries through which the equator passes are: Indonesia, Uganda, Somalia, Kenya, Congo, Gabon, Brazil, Equador and Colombia.

Quest: Diagrammatically show the relation of latitudes and heat zones.

Answer:



INDEX



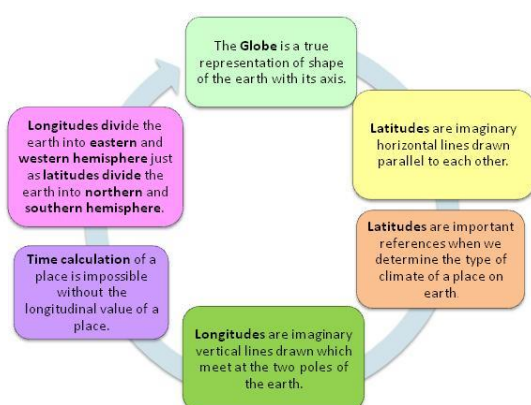
Diagram_OC: chandranidebhaumik@gmail.com

Map of the world –CC-<https://pixabay.com/en/world-map-earth-global-continents-306338/>

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Assessments	Maps	Latitudes And Longitudes, Latitudes And Longitudes

18. MS_Summary_Globe latitudes and longitudes

Summary



• The Globe is a true representation of the earth with its axis.

- Latitudes are imaginary horizontal lines drawn parallel to each other.
- Latitudes are important references when we determine the type of climate of a place on earth.
- Longitudes are imaginary vertical lines drawn which meet at the two poles of the earth.
- Time calculation of a place is impossible without the longitudinal value of a place.
- Longitudes divide the earth into eastern and western hemisphere just as latitudes divide the earth into northern and southern hemisphere.

Time to teach	Asset Type	Theme	SubTheme
3 Minutes	Main Script	Maps	Latitudes And Longitudes, Latitudes And Longitudes