



CHAPTER: Globe: Latitudes and Longitudes

Grade: 6

Board: **CBSE**



Book: **NCERT**



1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

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1. The planet earth and its position in the solar system has been discussed in the previous chapter. This chapter introduces students to the replica of Earth called globe.
 2. The concepts latitudes and longitudes are also discussed in detail. The students will learn about the Greenwich Meridian and the GMT.
 3. Since the chapter talks about the model of the Earth, a globe or a big map which displays latitudes and longitudes can be used in the class for better understanding by the students.





2.

LEARNING OBJECTIVE

<On completion of the chapter, students will be able to:>





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1. Describe a globe and understand how similar and different it is from the planet Earth, based on what is learnt from the previous chapter.
 2. Define equator, Parallels of latitudes.
 3. Explain how different heat zones are formed by the important parallels of latitudes and the sun rays.
 4. Identify lines of longitude and time zones.
 5. Calculate the time difference based on the Greenwich Meridian Time(GMT).
 6. Understand the importance of Indian standard time(IST)



3. Previous Knowledge Requirement (Keywords)


The below points should be refreshed before introducing the chapter:

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- 1) The knowledge about planet Earth and the shape as discussed in chapter one of this book should be recalled.
 - 2) The knowledge about pole star is very important to understand the angles of latitudes and longitudes.



4. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently



Subtopic and Learning Objective #1

Introductions

LO:

Describe a globe and understand how similar and different it is from the planet Earth, based on what is have learnt from the previous chapter. Define equator, Parallels of latitudes.

Teacher Activity

1. Make students understand the similarities and difference between Earth and the replica, globe. Carry a globe to the class. In case a globe is not available, carry a picture or make a drawing of the globe to make students familiar.
2. Explain what a globe is, the different types of globe and parts of globe.
3. Explain about the parallels of latitudes, equator, north latitudes, south latitudes.
4. Perform **Activity 1**.
5. ***Check for understanding:***
 - a) What is an axis of the globe?
 - b) Describe the parallels of latitudes.
 - c) What is the significance of the letter 'N' and 'S' in writing location?

Resources Suggested

Globe, marker pen, textbook, **Resource 1**

Activity 1

Name of the activity – Locate any two places on the same latitude.

Type of activity – Group

Learning Objective: Understand latitude and its uses in locating a place.

Use it for – Explaining latitudes and its uses.

Materials – Textbook, Globe

Teacher instructions:

1. The teacher may take a globe to class. If a globe is not available take a map with that has latitudes and longitudes clearly visible.
2. Have a few pair of places ready for the students to find from the map or globe.
3. The places should be in the same latitude.
4. The teacher may help the students with hints to locate the equator, the places on each side of the equator.
5. Refer to the **Resource 1**.

Resource 1

Name of the Place 1	Name of the Place 2	Latitude
Amsterdam, Netherlands	Berlin, Germany	52°
Toronto, Canada	Nice, France	43°
Kuala Lumpur, Malaysia	Arusha, Tanzania	3°
Washington DC, USA	Rotorua, New Zealand	38°
New Delhi, India	Tenerife, Spain	28°

Subtopic and Learning Objective #2

Heat zones of the Earth:

LO:

Explain how different heat zones are formed by the important parallels of latitudes and the sun rays.

Teacher Activity

1. The teacher can use the blackboard and the text book to explain the heat zones.
2. Perform the **Activity 2**.
3. ***Check for understanding:***
 - a) Describe the torrid zone.
 - b) Why are the areas near the poles very cold?
 - c) Explain the frigid zone.

Resources Suggested

NCERT textbook, a flat surface, flashlight, blackboard, Refer **Resource 2**

Activity 2

Name of the activity – Show the difference in the intensity of light when the surface is straight and slanting.

Type of activity – Teacher may demonstrate the activity

Learning Objective: Understand the effect of the sun rays in creating different heat zones

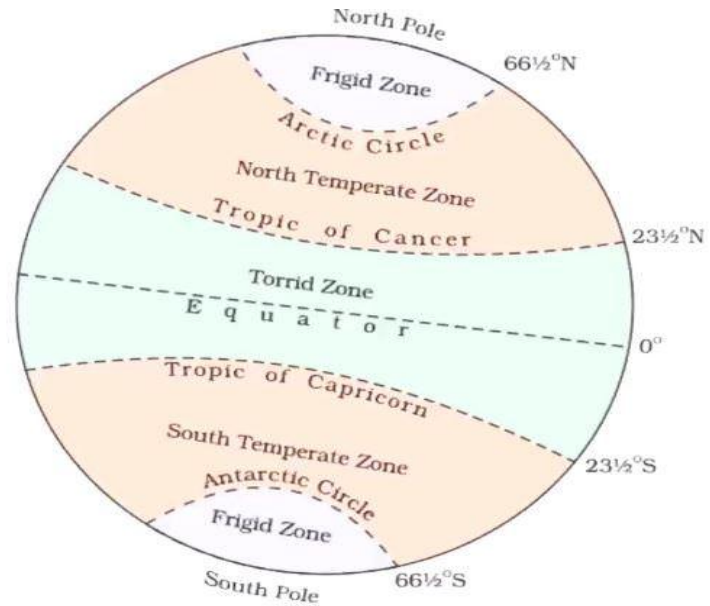
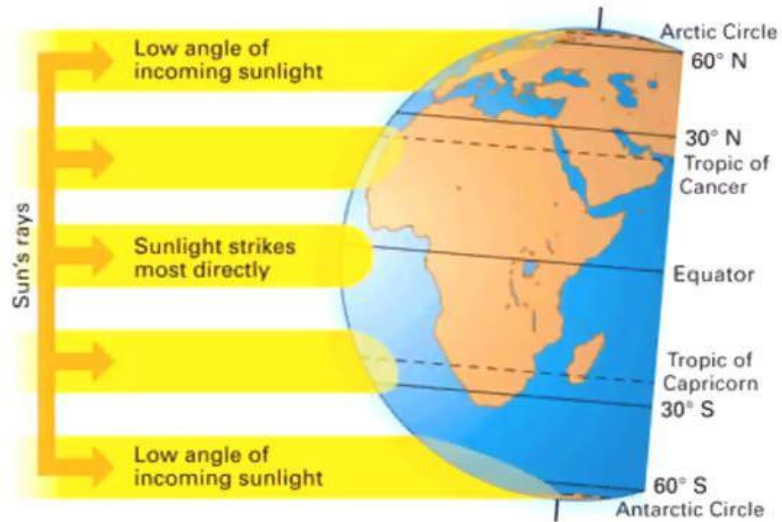
Use it for – Explaining heat zones

Materials – Textbook, flashlight, flat Surface

Teacher instructions:

1. The teacher should bring a small flat surface. It can be a piece of cardboard, a hardbound book.
2. Demonstrate the activity mentioned in Fig 2.4 of the textbook.
3. Flash a beam of light on the plain surface with the help of a flashlight.
4. Show the students the difference of the light falling on the surface when it is straight and slanting.
5. Explain how this leads to differential heating of the Earth's surface and thus creates heat zones.
6. Refer to the **Resource 2**.

Resource 2



Subtopic and Learning Objective #3

What are longitudes?

LO:

Identify lines of longitude and time zones.

Teacher Activity

1. Explain longitudes, difference between latitudes and longitudes.
2. Perform **Activity 3** with the help of **Resource 3**
3. ***Check for understanding:***
 - a) What is a Prime Meridian?
 - b) Mention the location of Singapore in latitudes **and longitudes with the help of a globe.**

Resources Suggested

NCERT textbook, globe, blackboard

Activity 3

Name of the activity – Finding the places in latitudes and longitudes.

Type of activity – Group

Learning Objective: Students will try to find different places with the help of globe or the image by citing latitude and longitude.

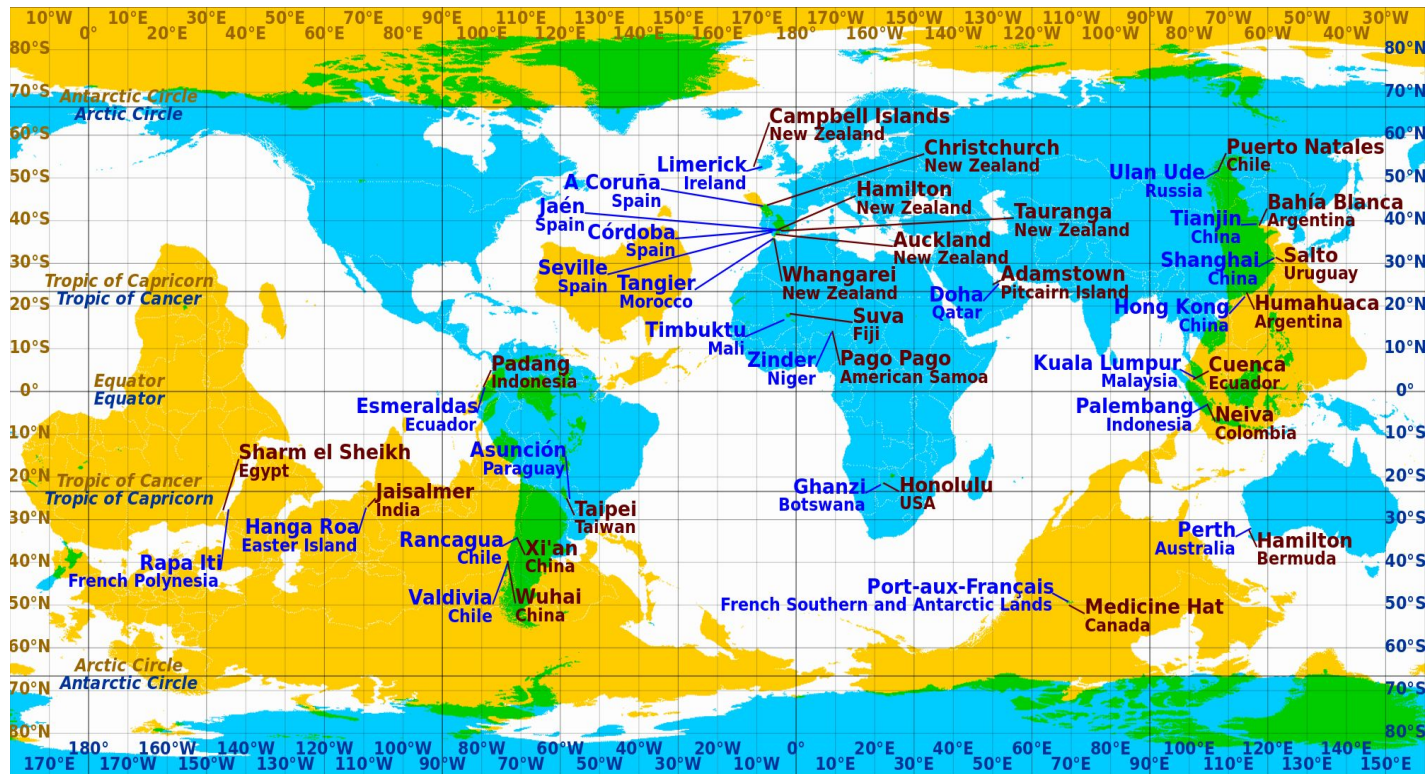
Use it for – Knowing new places, locate the place in latitude and longitude.

Materials – Textbook, globe

Teacher instructions:

1. The teacher may use a globe or a world map which has the latitudes and longitudes clearly visible.
2. Divide the class into group of 3 or 4, based on the class strength and ask them to choose two or three places whose location they would want to know.
3. Each group can be given time to locate their place and have the values of latitude and longitude written along with the name of the place.
4. The teacher may help the students with the values of the latitudes or longitudes for one place as an example.
5. The teacher may also share the list of places and ask students to find the location in latitudes and longitudes.
6. A few locations are given in the table under **Resource 3**.

Resource 3



Resource 3

Country	Capital	Latitude	Longitude
India	New Delhi	28°37'N	77°13'E
New Zealand	Wellington	41°19'S	174°46'E
South Africa	Cape Town	25°44'S	28°12'E
Switzerland	Bern	46°57'N	07°28'E
Spain	Madrid	40°25'N	03°45'W
China	Beijing	39°55'N	116°20'E
Germany	Berlin	52°30'N	13°25'E
United Kingdom of Great Britain and Northern Ireland	London	51°36'N	00°05'W
United Arab Emirates	Abu Dhabi	24°28'N	54°22'E
United States of America	Washington DC	39°91'N	77°02'W

Subtopic and Learning Objective #4

Longitude and time

LO: Calculate the time difference based on the GMT. Understand the importance of Indian standard time(IST)

Teacher Activity

1. Locate the Greenwich Meridian on a globe.
2. Explain how to calculate the time difference between a given meridian and the Prime meridian. Refer, **Resource 4** for an example.
3. Explain the importance of Indian Standard time and how it is selected.
4. ***Check for understanding:***
 - a) Explain the steps to calculate the time difference between the Greenwich Meridian and another longitude.
 - b) What is the standard meridian of India?

Resources Suggested

NCERT Textbook for explanation , globe, blackboard for calculation.

Resource 4

How to calculate the time difference between a given meridian and the Prime meridian.

a) Suppose the time at the Prime meridian is 3:15 PM, then what is the time at 48° W.

Ans: Since earth moves 360° in 24 hours,

i.e $360^\circ/1440 \text{ mins} = 15^\circ \text{ in } 60 \text{ mins} = 1^\circ \text{ in } 4 \text{ minutes.}$

Therefore to cover 48°, earth will take $48 \times 4 = 192 \text{ minutes.}$ I.e $192/60 = 3 \text{ hours and } 12 \text{ mins.}$

Since longitude is towards the West, the time taken should be subtracted from the time of prime meridian.

Thus, 3:15 - 3:12= 0.03 i.e 12:03 PM mins at 48°W

b) Suppose the time at the Prime meridian is 3:15 PM, then what is the time at 48° E.

Ans: Since earth moves 360° in 24 hours,

i.e $360^\circ/1440 \text{ mins} = 15^\circ \text{ in } 60 \text{ mins} = 1^\circ \text{ in } 4 \text{ minutes.}$

Therefore to cover 48°, earth will take $48 \times 4 = 192 \text{ minutes.}$ I.e $192/60 = 3 \text{ hours and } 12 \text{ mins.}$

Since longitude is towards the East, the time taken should be added to the time of prime meridian.

Thus, 3:15 + 3:12= 6.27 i.e 06:27 PM mins at 48°E



5. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Answer the following questions in brief:

1. What does the term 'Grid' mean in Geography
2. What is Prime Meridian?
3. Where does the Temperate Zone lie?
4. Name the two imaginary lines drawn on the surface of the Earth
5. What is the difference between the local time and the standard time?
6. How to calculate time using longitudes?
7. What are the limitations of latitudes and longitudes?
8. Which longitude is taken as International Date Line and why?
9. Why is it necessary to have standard time? Also define Indian Standard Time (IST).
10. Draw a diagram of the earth showing:
 - a) Equator
 - b) Tropics of Cancer
 - c) Tropic of Capricorn
 - d) Frigid Zone
 - e) North Temperate Zone
 - f) South Temperate Zone
 - g) Arctic Circle
 - h) Antarctic Circle
 - i) Torrid Zone
11. Why is latitude and longitude useful?

Worksheet 2

Fill in the blanks:

- 1) Suppose the time at 30° East is 2 p.m, then the time at Greenwich is ____.
- 2) By measuring the angle of the Pole Star from your place, you can know the ____ of your place.
- 3) Latitudes are measured in ____.
- 4) The distances between them are measured in ____.
- 5) When the Prime Meridian of Greenwich has the sun at the highest point in the sky, all the places along this meridian will have ____.

Multiple Choice Questions:

- 1) Suppose the time at 45° east is 2 p.m. then what is the time at Greenwich?
 - a) 11:40 AM
 - b) 11:40 PM
 - c) 10:40 AM
 - d) 10:40 PM
- 2) The longitude of ____ is treated as the standard meridian in India.
 - a) $82\frac{1}{2}^\circ$ E ($82^\circ 30'$ E)
 - b) $82\frac{1}{2}^\circ$ S ($82^\circ 30'$ S)
 - c) $82\frac{1}{2}^\circ$ N ($82^\circ 30'$ N)
 - d) $82\frac{1}{2}^\circ$ W($82^\circ 30'$ W)

Worksheet 2

3 The heat zone lying between the Arctic Circle in the North Pole and the Antarctic Circle in the South pole is called ____.

- a) Torrid zone
- b) Temperate zone
- c) Frigid zone
- d) Polar zone

4 The Arctic circle is situated at ____ of the equator.

- a) $66\frac{1}{2}^{\circ}$ east
- b) $66\frac{1}{2}^{\circ}$ north
- c) $66\frac{1}{2}^{\circ}$ west
- d) $66\frac{1}{2}^{\circ}$ south

5 A needle is fixed through the globe in a tilted manner is called its ____.

- a) pole
- b) beam
- c) Shaft
- d) axis



6. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

1. Grid is a network of parallels of latitude and meridians of longitude.
2. The meridian that passes through the Greenwich, where the the British Royal Observatory is located. This meridian is called the Prime Meridian. Its value is 0° longitude and from it we count 180° eastward as well as 180° westward.
3. The mid-day sun never shines overhead on any latitude beyond the Tropic of Cancer and the Tropic of Capricorn. The angle of the sun's rays goes on decreasing towards the poles. As such, the areas bounded by the Tropic of Cancer and the Arctic Circle in the Northern Hemisphere, and the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere, have moderate temperatures. These are, therefore, called temperate zones.
4. The two imaginary line drawn on the surface of the Earth are Equator and Prime Meridian.
5. Standard time - The time of the standard meridian of a country. Every country has its own particular standard time, and it remains the same for the whole country. Places on the same longitude, can often have varying standard time. Local time - *Local time refers to time at a particular place, that is the time when the midday sun is directly over head. Different places in the same country have their own local times. Places on the longitude always have the same local time.*

Worksheet 1

6 The earth rotates 360° in about 24 hours, which means 15° an hour or 1° in four minutes. Thus, when it is 12 noon at Greenwich, the time at 15° east of Greenwich will be $15 \times 4 = 60$ minutes, i.e., 1 hour ahead of Greenwich time, which means 1 p.m. But at 15° west of Greenwich, the time will be behind Greenwich time by one hour, i.e., it will be 11.00 a.m. Similarly, at 180° , it will be midnight when it is 12 noon at Greenwich.

7 Latitudes and longitudes can locate the exact location of a place but, they are not uniform units of measurement.

i) If you look in the globe, you will see that longitudes are closer together as you move towards north and south of Equator.

ii) Only near the Equator the distance represented by 1° longitude is equal to the distance represented by 1° latitude.

8 The International Date Line (IDL) is an imaginary line on the surface of the Earth opposite the Prime Meridian, where the date changes as one travels across east or west. Roughly along 180° longitude, it almost corresponds to the time zone boundary separating -12 and +12 hours Greenwich Mean Time (GMT). Crossing the IDL, travelling east results in a day or 24 hours being added and crossing west results in a day being subtracted. The exact number of hours depends on the time zones.

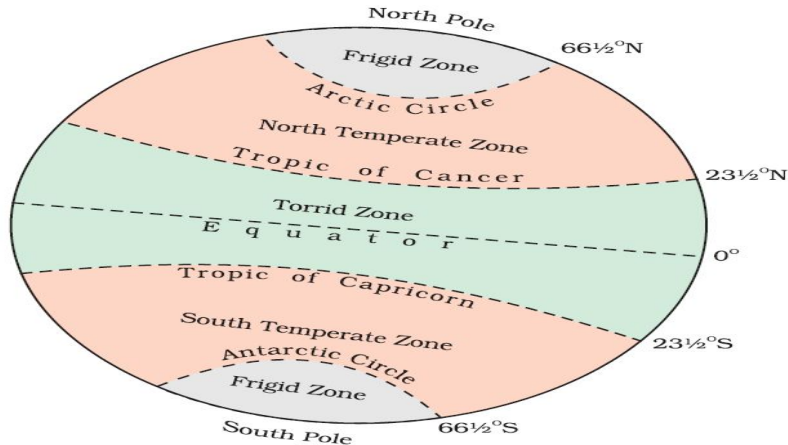
Worksheet 1

9 Standard time is necessary because

- a) The different meridian's having different time is likely to create problems for trains & flights.
- b) To maintain uniformity in the throughout the country.
- c) The local time over 82o 30' is considered standard time.

In India, the longitude of $82\frac{1}{2}^{\circ}$ E ($82^{\circ} 30'E$) 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).

10.



Worksheet 1

11 Latitude and longitude allow you to use two coordinates to define any point on earth. Latitude and longitude have been useful to navigators, geographers, cartographers and surveyors for a long time. Latitude and longitude are useful on a daily basis for a great number of people for global positioning system, GPS and computerised mapping. Using latitude and longitude, it is possible to calculate all sorts of things such as calculate the distances from city to city, calculate the distance from any point on earth to any other point. For example, we can calculate the distance from your house to school.

Worksheet 2

Fill in the blanks:

1. 12:00 pm (Since earth moves 360° in 24 hours, then, 15° in an hour and 1° in four minutes. 30° east means $30 \times 4 = 120$ minutes ahead of Greenwich. This implies when at 30° east time is 2 p.m, and then at Greenwich time will be 2 pm – 2 hours = 12 p.m)
2. latitude
3. degrees
4. degrees of longitude
5. mid-day

Multiple Choice Questions:

1. 10:40 AM
2. $82\frac{1}{2}^\circ$ E ($82^\circ 30'E$)
3. Frigid zone
4. $66\frac{1}{2}^\circ$ north
5. axis



6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them



Extension Activity 1

Purpose: Helping the students to implement the knowledge they have learnt about globe, axis, latitudes and longitudes

The teacher may perform a group activity by dividing the students into small groups and guide them in making a globe based on the video provided below:

https://www.youtube.com/watch?v=Y95tm_02HNq