

ISBN 81-7450-491-5

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**OFFICE OF THE PUBLICATION
DIVISION, NCERT**

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Cover

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Illustrations and Cartography

Sarita Verma Mathur, Mehta Gupta,
Ishwar Singh, Praevel Misra
and Narendra Tyagi

Printed on 80 GSM paper with NCERT watermark

Published at the Publication Division by the
Secretary, National Council of Educational
Research and Training, Sri Aurobindo Marg,
New Delhi 110 016 and printed at Shakti
Printers, 241, Patparganj Industrial Area,
Delhi 110 092



राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

FOREWORD

The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986).

The success of this efforts depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other sources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience.

The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory group in Social Sciences, Professor Hari Vasudevan and the Chief Advisor for this book, Vibha Parthasarathi for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

New Delhi
20 December 2005

Director
National Council of Educational
Research and Training

THE CONSTITUTION OF INDIA

PREAMBLE

**WE, THE PEOPLE OF INDIA, having
solemnly resolved to constitute India into a
[SOVEREIGN SOCIALIST SECULAR
DEMOCRATIC REPUBLIC] and to secure
to all its citizens:**

**JUSTICE, social, economic and
political;**

**LIBERTY of thought, expression, belief,
faith and worship;**

**EQUALITY of status and of opportunity;
and to promote among them all**

**FRATERNITY assuring the dignity of
the individual and the [unity and
integrity of the Nation];**

**IN OUR CONSTITUENT ASSEMBLY
this twenty-sixth day of November, 1949 do
HEREBY ADOPT, ENACT AND GIVE TO
OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2.

2. for 'Sovereign Democratic Republic' (w.e.f. 3.1.1977)

2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2.

for 'Unity of the Nation' (w.e.f. 3.1.1977)

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ACKNOWLEDGEMENTS

The National Council of Educational Research and Training acknowledges the valuable contributions of the following participants in finalising this book: Sudesha Bhattacharya, Reader, Miranda House, University of Delhi, Delhi; Poonam Behari, Reader, Miranda House, University of Delhi, Delhi; Vyasraj T. Ambekar, Incharge Headmaster, SVM High School, Tilakwadi, Belgaum; Seema Agnihotri, Lecturer, Management Education and Research Institute, I.P. University, New Delhi; Daulat Patel, Teacher (Reid.), Sardar Patel Vidyalaya, New Delhi; Samita Dasgupta, PGT (Geography), Anandlalay, Anand, Gujarat.

The Council is thankful to the Survey of India for certification of maps given in the textbook. It also gratefully acknowledges the support of individuals and organisations as listed below for providing various photographs, and other materials such as articles and paintings used in this textbook –

M.H. Qureshi, Professor, JNU, New Delhi (Photograph No. 9 on page 45); Praveen Mishra (Fig. 8.3); Science Popularisation Association of Communications and Educators (SPACE), New Delhi (Fig. 1.6); Photo Division, Ministry of Information and Broadcasting, Govt. of India (Agricultural Field – Cover page); Ministry of Environment and Forests Govt. of India (Figs. 8.1 and 8.5); (Stork – A migratory bird); ITDC/Ministry of Tourism, Govt. of India, (Figs. 5.5, 6.5, 6.6 and 6.7); (Photographs Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 10 on Page Nos. 44 and 45); (Tiger – Cover page and page 63); (Himalayas – cover page and page 30 and 40); (Fig. 8.7). (Waterfalls on page 39), (Skating on page 42), (Beer on page 56); *The Times of India, New Delhi* (Fig. 8.4); (Collage on Project Tiger on Page 63); Prakash Higher Secondary School, Bodakdev, Ahmedabad (Poem and paintings related to the Tsunami on page 52 and 53); Social Science, Part-II, Class-VI, NCERT, 2005 (Fig. 1.3); Social Science, Part-II, Class-VIII, NCERT, 2005 (Fig. 6.8 and Fig. 8.2).

Special thanks are due to Savita Sinha, Professor and Head, Department of Education in Social Sciences and Humanities, NCERT, New Delhi for her support.

Consultant Editor, for going through the manuscript and suggesting relevant changes.

The Council also gratefully acknowledges the contributions of Ishwar Singh DTP Operator; Sameer Khatana and Amar Kumar Prusty, Copy Editors; Bharat Sanwaria and Dilip Kumar Agasti, Proof Readers; Dinesh Kumar, Incharge, Computer Station for giving a final shape to this book. The contribution of the Publication Department in bringing out this book is also duly acknowledged.

The following are applicable to all the maps of India used in this book

- © Government of India, Copyright 2006
- 1. The responsibility for the correctness of internal details rests with the publisher.
- 2. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
- 3. The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.
- 4. The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted from the "North-Eastern Areas (Reorganisation) Act, 1971," but have yet to be verified.
- 5. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.
- 6. The state boundaries between Uttaranchal & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by the Governments concerned.
- 7. The spellings of names in this map, have been taken from various sources.

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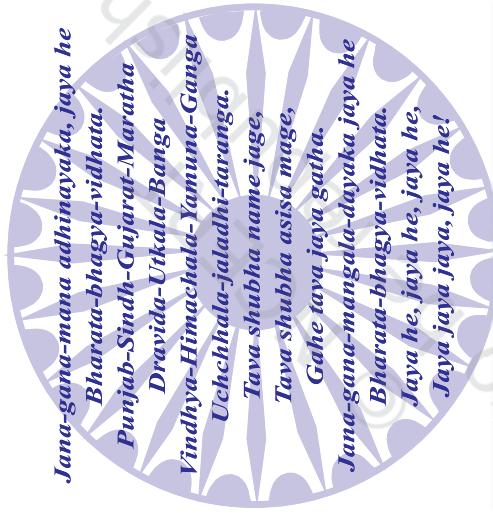
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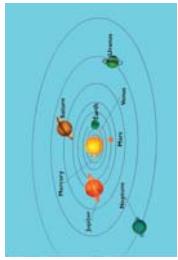
Our National Anthem, composed originally in Bangla by Rabindranath Tagore, was adopted in its Hindi version by the Constituent Assembly as the national anthem of India on 24 January 1950.

Our National Anthem



1

THE EARTH IN THE SOLAR SYSTEM



How wonderful it is to watch the sky after sunset! One would first notice one or two bright dots shining in the sky. Soon you would see the number increasing. You cannot count them any more. The whole sky is filled with tiny shining objects – some are bright, others dim. It seems as if the sky is studded with diamonds.

They all appear to be twinkling. But if you look at them carefully you will notice that some of them do not twinkle as others do. They simply glow without any flicker just as the moon shines.

Along with these bright objects, you may also see the moon on most of the days. It may, however, appear at different times, in different shapes and at different positions. You can see the full moon only once in about a month's time. It is **Full moon** night or *Poorntima*. A fortnight later, you cannot see it at all. It is a **New moon** night or *Amavasya*. On this day, you can watch the night sky best, provided it is a clear night.

Do you wonder why can't we see the moon and all those bright tiny objects during day time? It is because the very bright light of the sun does not allow us to see all these bright objects of the night sky.

The sun, the moon and all those objects shining in the night sky are called **celestial bodies**.

Some celestial bodies are very big and hot. They are made up of gases. They have their own heat and light, which they emit in large amounts. These celestial bodies are called **stars**. The sun is a star.

Countless twinkling stars in the night sky are similar to the sun. But we do not feel their heat or light, and they look so tiny because they are very very far from us.

Let's Do



You'll need : 1 torch,
1 sheet of plain paper, pencil and a needle.

Step :

1. Place the torch in the centre of the paper with its glass front touching the paper.
2. Now draw a circle around the torch.
3. Perforate the paper with the needle within the circled area.
4. Now place the perforated circle part of the paper on the glass front and wrap the paper around the torch with a rubber band.
5. Take care that the switch of the torch is not covered.
6. In a dark room, stand at some distance facing a plain wall. Switch off all other lights. Now flash the torch light on the wall. You will see numerous dots of light on the wall, like stars shine in the night.
7. Switch on all the lights in the room. All dots of light will be almost invisible.
8. You may now compare the situation with what happens to the bright objects of the night sky after the sun rises in the morning.

ISBN 81-7450-491-5

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❑ The correct price of this publication is the price printed on this page. Any revised price indicated by a tube stamp or by sticker or by anyone means is incorrect and should be unacceptable.

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Cover

Sarita Verma Mathur

Illustrations and Cartography
Sarita Verma Mathur, Meeta Gupta,
Ishwar Singh, Praveen Mishra
and Narendra Tyagi

First Edition
February 2006 Phalguna 1927
Reprint
December 2006 Pausa 1928
November 2007 Kartika 1929
January 2009 Pausa 1930
December 2009 Agrahayana 1931
November 2010 Kartika 1932
February 2012 Phalguna 1933
November 2012 Kartika 1934
November 2013 Kartika 1935

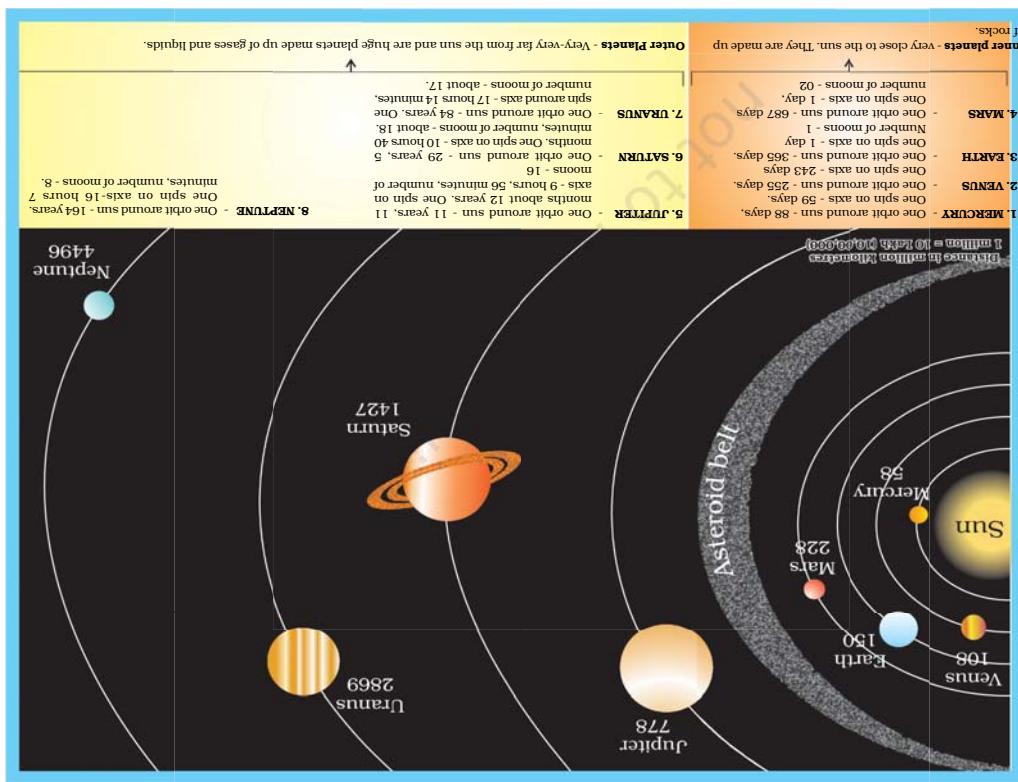
₹ 460/- MJ

© National Council of Educational
Research and Training, 2006

₹ 40.00

Printed on 80 GSM paper with NCERT
watermark

Published at the Publication Division by the
Secretary, National Council of Educational
Research and Training, Sri Aurobindo Marg,
New Delhi 110 016 and printed at Chaar
Dishhaven Printers, G-39 to 41, Sector-3,
Noida 201 301 (UP).



THE EARTH IN THE SOLAR SYSTEM

You must have noticed that all objects look smaller when seen from a distance. How small an aeroplane looks when it is flying at a great height!

While watching the night sky, you may notice various patterns formed by different groups of stars. These are called **constellations**. Ursa Major or Big Bear is one such constellation. One of the most easily recognisable constellation is the *Saptarishi* (Sapta-seven, rishi-sages). It is a group of seven stars (Figure 1.1) that forms a part of Ursa Major Constellation. Ask someone elder in your family or neighbourhood to show you more stars, planets and constellations in the sky.

In ancient times, people used to determine directions during the night with the help of stars. The North star indicates the north direction. It is also called the **Pole Star**. It always remains in the same position in the sky. We can locate the position of the Pole Star with the help of the Saptarishi. Look at Figure 1.1. You will notice that, if an imaginary line is drawn joining the pointer stars and extended further, it will point to the Pole Star.

Some celestial bodies do not have their own heat and light. They are lit by the light of the stars. Such bodies are called **planets**. The word 'planet' comes from the Greek word "planetai" which means 'wanderers'. The earth on which we live is a planet. It gets all its heat and light from the sun, which is our nearest star.

If we look at the earth from a great distance, say the moon, it will appear to be shining just as the moon. The moon that we see in the sky is a satellite. It is a companion of our earth and moves round it. Like our earth, there are eight other planets that get heat and light from the sun. Some of them have their moons too.

THE SOLAR SYSTEM

The sun, eight planets, satellites and some other celestial bodies known as asteroids and meteoroids

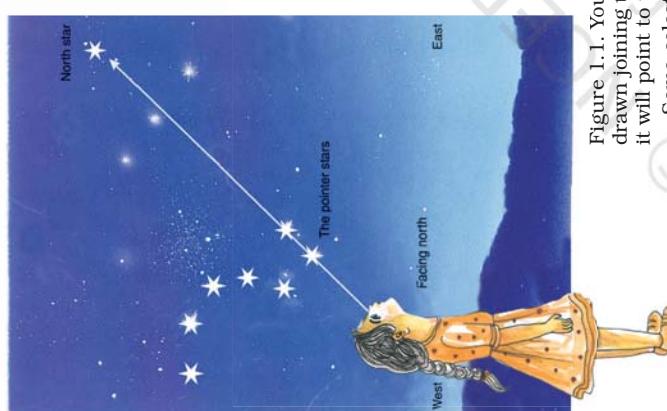


Figure 1.1 : Saptarishi and the North Star

Interesting Fact
Jupiter, Saturn and Uranus have rings around them. These are belts of small debris. These rings may be seen from the earth with the help of powerful telescopes.

**Do you know?**

'Sol' in Roman mythology is the 'Sungod'. 'Solar' means 'related to the sun'. The family of the sun is, therefore, called the solar system. Write down as many words using the word solar on your own as you can.

**Word Origin**

Many words used in a language may have been taken from some other language. Geography, for example, is an English word. It has its origin in Greek, which relates to the description of the earth. It is made of two Greek words, 'ge' meaning 'earth' and 'graphia' meaning 'writing'. Find out more about the earth.

geo (Greek) : study of the earth
metry (Greek) : measurement of the (inertia) earth
odd (Latin) : resembling the shape (excesses) or form of the earth

Do you know?

Humans have always been fascinated gazing at the night sky. Those who study the celestial bodies and their movements are called astronomers. Aryabhata was a famous astronomer of ancient India. Today, astronomers all over the world are busy exploring the universe.

form the solar system. We often call it a solar family, with the sun as its Head.

The Sun

The sun is in the centre of the solar system. It is huge and made up of extremely hot gases. It provides the pulling force that binds the solar system. The sun is the ultimate source of heat and light for the solar system. But that tremendous heat is not felt so much by us because despite being our nearest star, it is far away from us. The sun is about 150 million km away from the earth.

Planets

There are eight planets in our solar system. In order of their distance from the sun, they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

An easy way to memorise the name of the planets in order of their distance from the sun is:

My Very Efficient MOTHER JUST SERVED US Nuts.

All the eight planets of the solar system move around the sun in fixed paths. These paths are elongated. They are called **orbits**. Mercury is nearest to the sun. It takes only about 88 days to complete one round along its orbit. Venus is considered as 'Earth's-twin' because its size and shape are very much similar to that of the earth.

Till recently (August 2006), Pluto was also considered a planet. However, in a meeting of the International Astronomical Union, a decision was taken that Pluto like other celestial objects (Ceres, 2003 UB₃₅₁) discovered in recent past may be called 'dwarf planets.'

The Earth

The earth is the third nearest planet to the sun. In size, it is the fifth largest planet. It is slightly flattened at the poles. That is why, its shape is described as a **Geoid**. Geoid means an earth-like shape.

Conditions favourable to support life are probably found only on the earth. The earth is neither too hot nor too cold. It has water and air, which are very essential for our survival. The air has life-supporting gases like oxygen. Because of these reasons, the earth is a unique planet in the solar system.

From the outer space, the earth appears blue because its two-thirds surface is covered by water. It is, therefore, called a **blue planet**.

The Moon

Our earth has only one satellite, that is, the moon. Its diameter is only one-quarter that of the earth. It appears so big because it is nearer to our planet than other celestial bodies. It is about 3,84,400 km away from us. Now you can compare the distance of the earth from the sun and that from the moon.

The moon moves around the earth in about 27 days. It takes exactly the same time to complete one spin. As a result, only one side of the moon is visible to us on the earth.

The moon does not have conditions favourable for life. It has neither water nor air. It has mountains,

*Figure 1.3. The moon as seen from the space**Figure 1.3. The moon as seen from the space***What do animals and plants require in order to grow and survive?**

Conditions favourable to support life are probably found only on the earth. The earth is neither too hot nor too cold. It has water and air, which are very essential for our survival. The air has life-supporting gases like oxygen. Because of these reasons, the earth is a unique planet in the solar system.

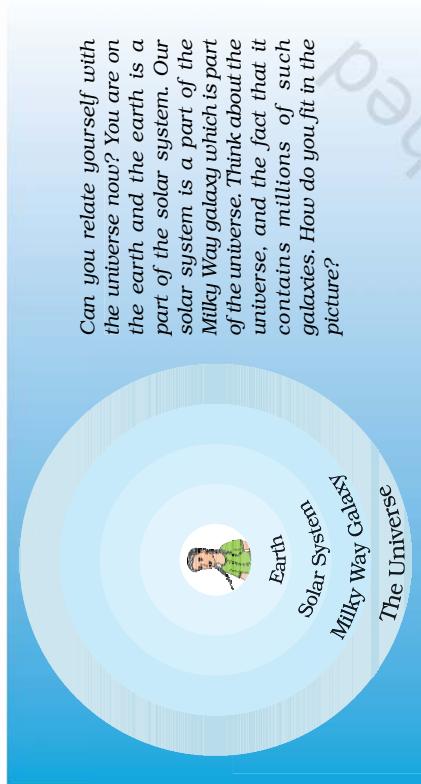
From the outer space, the earth appears blue because its two-thirds surface is covered by water. It is, therefore, called a **blue planet**.

Neil Armstrong was the first man to step on the surface of the moon on 21 July 1969. Find out whether any Indian has landed on the moon?

A Satellite is a celestial body that moves around the planets in the same way as the planets move around the sun.

A Human-made Satellite is an artificial body. It is designed by scientists to gather information about the universe or for communication. It is carried by a rocket and placed in the orbit around the earth. Some of the Indian satellites in space are INSAT, IRS, EDUSAT, etc.

Figure 1.4. Human-made Satellite



EXERCISES

1. Answer the following questions briefly.

- How does a planet differ from a star?
- What is meant by the 'Solar System'?
- Name all the planets according to their distance from the sun.
- Why is the Earth called a unique planet?
- Why do we see only one side of the moon always?
- What is the Universe?

2. Tick the correct answer:

- The planet known as the "Earth's Twin" is
 - Jupiter
 - Saturn
 - Venus
 - Mercury
- Which is the third nearest planet to the sun ?
 - Venus
 - Earth
 - Saturn
 - Mercury
- All the planets move around the sun in a
 - Circular path
 - Rectangular path
 - Elongated path
- The Pole Star indicates the direction to the
 - South
 - North
 - East

THE EARTH IN THE SOLAR SYSTEM

plains and depressions on its surface. These cast shadows on the moon's surface. Look at the full moon and observe these shadows.

Asteroids

Apart from the stars, planets and satellites, there are numerous tiny bodies which also move around the sun. These bodies are called **asteroids**. They are found between the orbits of Mars and Jupiter (Figure 1.2). Scientists are of the view that asteroids are parts of a planet which exploded many years back.

Meteoroids

The small pieces of rocks which move around the sun are called **meteoroids**. Sometimes these meteoroids come near the earth and tend to drop upon it. During this process due to friction with the air they get heated up and burn. It causes a flash of light. Sometimes, a meteor without being completely burnt, falls on the earth and creates a hollow.

Do you see a whitish broad band, like a white glowing path across the sky on a clear starry night? It is a cluster of millions of stars. This band is the **Milky Way galaxy** (Figure 1.6). Our solar system is a part of this galaxy. In ancient India, it was imagined to be a river of light flowing in the sky. Thus, it was named *Akash Ganga*. A **galaxy** is a huge system of billions of stars, and clouds of dust and gases. There are millions of such galaxies that make the **Universe**. It is difficult to imagine how big the universe is. Scientists are still trying to find out more and more about it. We are not certain about its size but we know that all of us – you and I belong to this universe.



Figure 1.5 : Asteroid

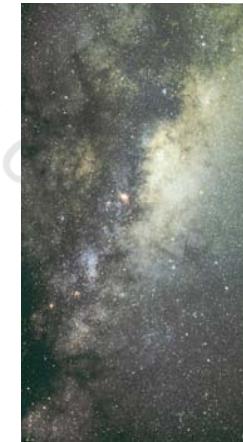
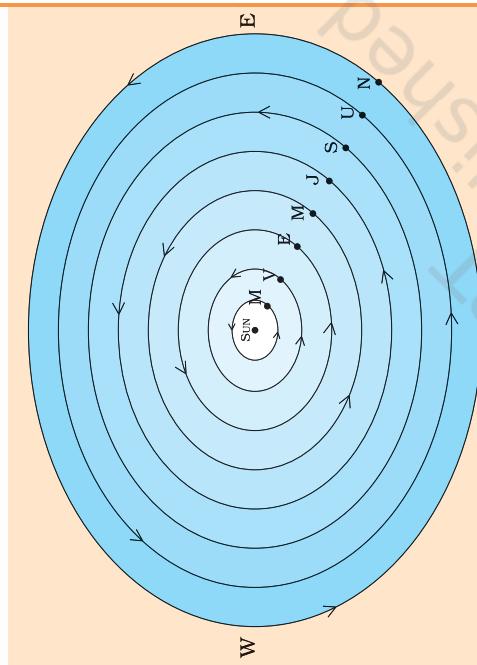


Figure 1.6 : Milky Way



Step 4: Select 10 children in the following order and give each one of them a placard.

Order of placard distribution

The Sun - tallest; The moon - smallest; Mercury, Mars, Venus and Earth (almost equal heights); Neptune, Uranus, Saturn and Jupiter taller than the earlier four planets but smaller than the Sun.

Now ask the children holding placards to take their places with the Sun in the centre in their orbits. Ask the child holding the moon placard to keep the hand of the child holding the earth placard always.

Now your Solar System is almost ready to go into action.

Now make everybody move slowly in the anti-clockwise direction. Your class has turned into a small human replica of the solar system.

While moving on your orbit you can also turn around. For everybody the spin should be anti-clock wise except for Venus and Uranus who will make the spin in the clock-wise direction.



- (e) Asteroids are found between the orbits of
 (i) Saturn and Jupiter (ii) Mars and Jupiter (iii) The Earth and Mars
- 3. Fill in the blanks.**
- A group of _____ forming various patterns is called a _____.
 - A huge system of stars is called _____.
 - _____ is the closest celestial body to our earth.
 - _____ is the third nearest planet to the sun.
 - Planets do not have their own _____ and _____.



THINGS TO DO

- Prepare a chart of the solar system.
- During a vacation visit a planetarium and describe your experience in the class.
- Organise a quiz contest on the earth and the solar system.

FOR FUN

1. The sun is commonly known as *Soorya* or *Surya* in Hindi. Find out its name in different languages of our country. Take help of your friends, teachers and neighbours.

2. You might have heard that people make human chains and run for world peace etc. You can also make a human solar system and run for fun.

Step 1: All children of your class can play this game. Assemble in a big hall or on a playground.

Step 2: Now draw 8 circles on the ground as shown in the figure drawn on the opposite page.

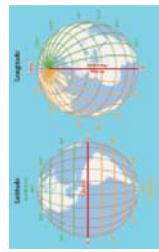
Use a 5-metre long rope. Mark at every half a metre with a chalk or ink. Place a small nail to mark the centre. Now hold one end of the rope at the central position. Ask your friend to hold a chalk at the $\frac{1}{2}$ metre mark and move around the nail holding rope and chalk together on the ground.

You have drawn one circle just as you do on paper using a compass and a pencil. Draw other circles in the same manner.

Step 3: Prepare 10 placards. Name them as Sun., Moon, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

2

GLOBE : LATITUDES AND LONGITUDES



In the previous chapter, you have read that our planet earth is not a sphere. It is slightly flattened at the North and the South Poles and bulge in the middle. Can you imagine how it looks? You may look at a globe carefully in your classroom to get an idea. **Globe** is a true model (miniature form) of the earth (Figure 2.1).

Globes may be of varying size and type – big ones, which cannot be carried easily, small pocket globes, and globe-like balloons, which can be inflated and are handy and carried with ease. The globe is not fixed. It can be rotated the same way as a top spin or a potter's wheel is rotated. On the globe, countries, continents and oceans are shown in their correct size.

It is difficult to describe the location of a point on a sphere like the earth. Now the question arises as to how to locate a place on it? We need certain points of reference and lines to find out the location of places.

You will notice that a needle is fixed through the globe in a tilted manner, which is called its **axis**. Two points on the globe through which the needle passes are two poles – North Pole and South Pole. The globe can be moved around this needle from west to east just as the earth moves. But, remember there is a major difference. The real earth has no such needle. It moves around its axis, which is an imaginary line.

Another imaginary line running on the globe divides it into two equal parts. This line is known as the **equator**. The northern half of the earth is known as the Northern Hemisphere and the southern half is known as the Southern Hemisphere. They are both

Let's Do

Take a big round potato or a ball. Pierce a knitting needle through it. The needle resembles the axis shown in a globe. You can now move the potato or the ball around this axis from left to right.

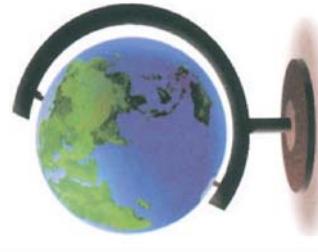


Figure 2.1 : Globe

equal halves. Therefore, the equator is an imaginary circular line and is a very important reference point to locate places on the earth. All parallel circles from the equator up to the poles are called **parallels of latitudes**. Latitudes are measured in degrees.

The equator represents the zero degree latitude. Since the distance from the equator to either of the poles is one-fourth of a circle round the earth, it will measure $\frac{1}{4}$ th of 360 degrees, i.e., 90° . Thus, 90° degrees north latitude marks the North Pole and 90° degrees south latitude marks the South Pole.

As such, all parallels north of the equator are called 'north latitudes.' Similarly, all parallels south of the equator are called 'south latitudes.'

The value of each latitude is, therefore, followed by either the word north or south. Generally, this is indicated by the letter 'N' or 'S'. For example, both Chandrapur in Maharashtra (India) and Belo Horizonte in Brazil (South America) are located on parallels of about 20° latitude. But the former is 20° north of the equator and the latter is 20° south of it. We, therefore, say that Chandrapur is situated at 20° N latitude and Belo Horizonte is situated at 20° S latitude. We see in Figure 2.2 that as we move away from the equator, the size of the parallels of latitude decreases.

IMPORTANT PARALLELS OF LATITUDES

Besides the equator (0°), the North Pole (90° N) and the South Pole (90° S), there are four important parallels of latitudes –

(i) **Tropic of Cancer** ($23\frac{1}{2}^\circ$ N) in the Northern Hemisphere. (ii) **Tropic of Capricorn** ($23\frac{1}{2}^\circ$ S) in the Southern Hemisphere. (iii) **Arctic Circle** at $66\frac{1}{2}^\circ$ north of the equator. (iv) **Antarctic Circle** at $66\frac{1}{2}^\circ$ south of the equator.

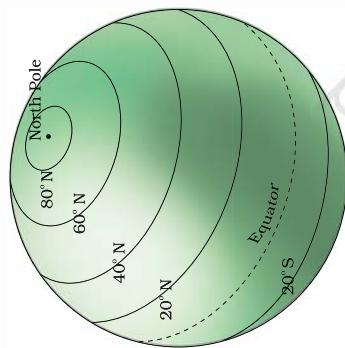


Figure 2.2 : Latitude

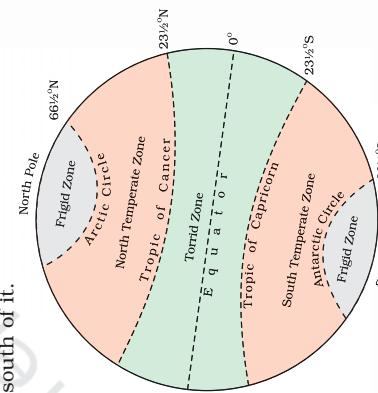


Figure 2.3 : Important Latitudes and Heat Zones



Let's Do

and the distances between them are measured in 'degrees of longitude.' Each degree is further divided into minutes, and minutes into seconds. They are semi-circles and the distance between them decreases steadily polewards until it becomes zero at the poles, where all the meridians meet.

Unlike parallels of latitude, all meridians are of equal length. Thus, it was difficult to number the meridians. Hence, all countries decided that the count should begin from the meridian which passed through Greenwich, where 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. The Prime Meridian and 180° meridian divide the earth into two equal halves, the Eastern Hemisphere and the Western Hemisphere. Therefore,

Temperate Zones.

Areas lying between the Arctic Circle and the North Pole in the Northern Hemisphere and the Antarctic Circle and the South Pole in the Southern Hemisphere, are very cold. It is because here the sun does not rise much above

The sun does not rise much above the horizon. Therefore, its rays are always slanting and provide less heat. These are, therefore, called **Frigid**.

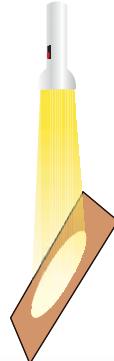
Zones (Very cold).

To fix the position of a place, it is necessary to know something more than the latitude of that place. You can see, for example, that Tonga Islands (in the Pacific Ocean) and Mauritius Islands (in the Indian Ocean) are situated on the same latitude (i.e., 20° S). Now, in order to locate them precisely, we must find out how far east or west these places are from a given line of reference running from the North Pole to the South Pole. These lines of references are called the meridians of longitude.



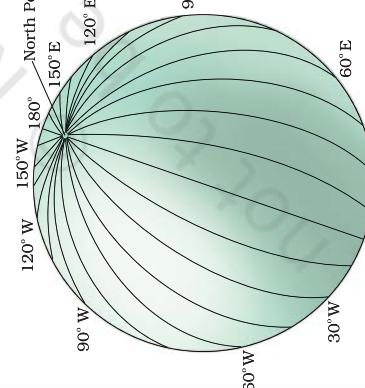
Figure 2.4 : (a)

Torch-light falling on a straight surface is bright and covers a smaller area.

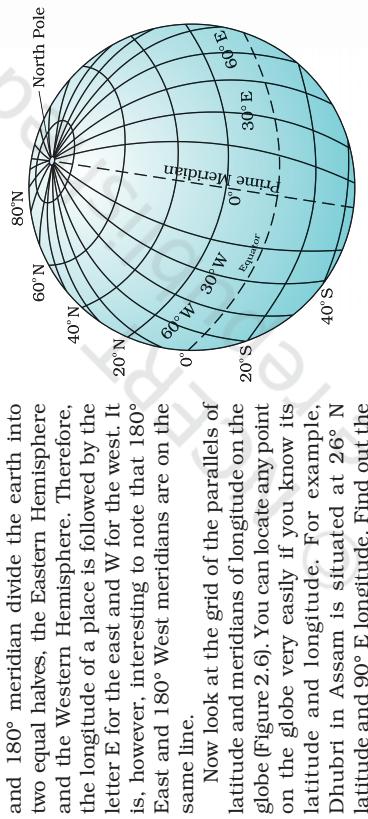


Section 21.(b)

Corch-light falling on a slanted surface is less bright but covers a bigger area.



Tijmro 75 : Latitudes



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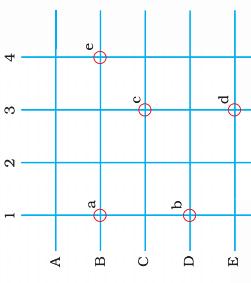


Figure 27

point where a circle touches two lines each once. That point will be the location of Dhubri.

To understand this clearly draw equidistant vertical and horizontal lines on a paper (Figure 2.7). Label the vertical rows with numbers and horizontal rows with letters, draw some small circles randomly on points

where these horizontal and vertical lines intersect each other. Name these small circles as a, b, c, d and e.
Let vertical lines represent East Longitudes and horizontal lines as North Latitudes.

Now you will see that one horizontal line is at Nothern Latitude and 1°E longitude

Find out the location of other circles

LONGITUDE AND TIME

The best means of measuring time is by the movement of the earth, the moon and the planets. The sun regularly rises and sets every day, and naturally, it is the best time-keeper throughout the world. Local time can be reckoned by the shadow cast by the sun, which is the shortest at noon and longest at sunrise and sunset.

When the Prime Meridian of Greenwich has the sun at the highest point in the sky, all the places along this meridian will have mid-day or noon.

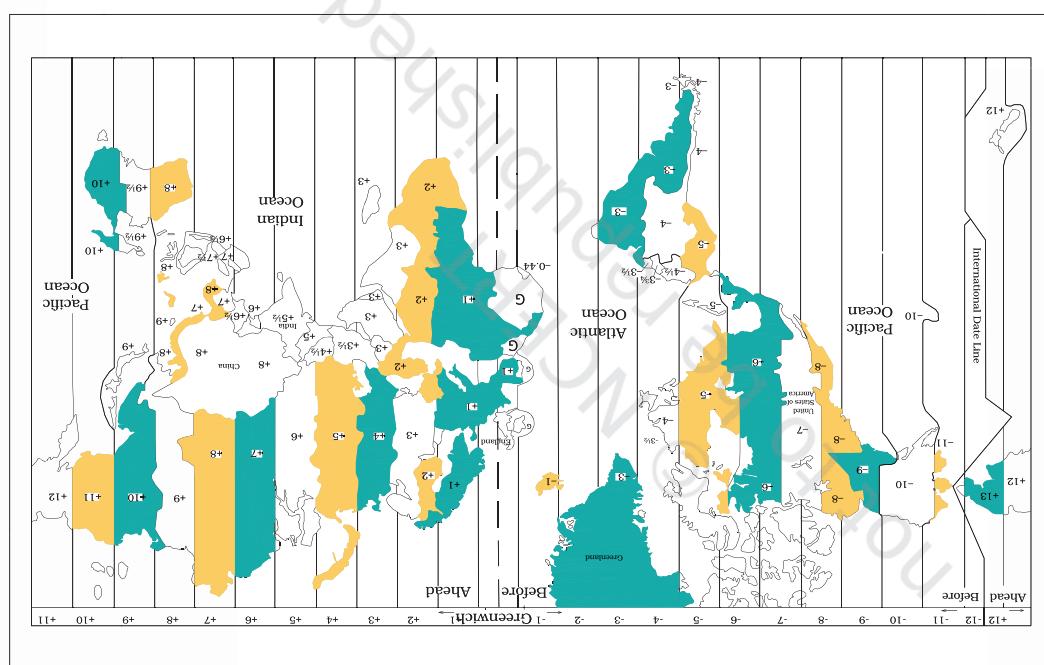
As the earth rotates from west to east, those places east of Greenwich will be ahead of Greenwich time and those to the west will be behind it (Figure 2.8). The rate of difference can be calculated as follows. The earth rotates 360° in about 24 hours, which means 15° an hour or 1° in four minutes. Thus, 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.

At any place a watch can be adjusted to read 12 o'clock when the sun is at the highest point in the sky, i.e., when it is mid-day. The time shown by such a watch will give the local time for that place. You can see that all the places on a given meridian of longitude have the same local time.

WHY DO WE HAVE STANDARD TIME?

The local time of places which are on different meridians are bound to differ. For example, it will be difficult to prepare a time-table for trains which cross several longitudes. In India, for instance, there will be a difference of about 1 hour and 45 minutes in the local times of Dwaraka in Gujarat and Dibrugarh in Assam. It is, therefore, necessary to adopt the local time of some central meridian of a country as the standard time for the country. 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).

Figure 2.8 : Time zones of the World



THE EARTH : OUR HABITAT

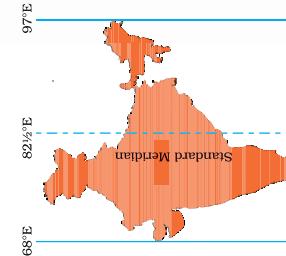


Figure 2.9 : Indian Standard Meridian

Kabeer lives in a small town near Bhopal. He tells his friend Alok that they will not be able to sleep tonight. A day and night cricket match between India and England had started at 2 p.m. in London. This means that the match would begin at 7.30 p.m. in India and finish well into the night. Do you know what is the time difference between India and England?

India located east of Greenwich at 82°30'E is 5 hours and 30 minutes ahead of GMT. So it will be 7.30 p.m. in India when it is 2:00 p.m. noon in London. Some countries have a great longitudinal extent and so they have adopted more than one standard time. For example, in Russia, there are as many as eleven standard times. The earth has been divided into twenty-four time zones of one hour each. Each zone thus covers 15° of longitude.

EXERCISES

1. Answer the following questions briefly.

- What is the true shape of the earth?
- What is a globe?
- What is the latitudinal value of the Tropic of Cancer?
- What are the three heat zones of the Earth?
- What are parallels of latitude and meridians of longitude?
- Why does the torrid zone receive maximum amount of heat?
- Why is it 5.30 p.m. in India and 12.00 noon in London?

2. Tick the correct answers.

- The value of the prime meridian is
 - (i) 90°
 - (ii) 0°
 - (iii) 60°
- The frigid zone lies near
 - (i) the Poles
 - (ii) the Equator
 - (iii) the Tropic of Cancer
- The total number of longitudes are
 - (i) 360
 - (ii) 180
 - (iii) 90
- The Antarctic circle is located in
 - (i) the Northern hemisphere
 - (ii) the Southern hemisphere
 - (iii) the Eastern hemisphere
- Grid is a network of
 - (i) parallels of latitudes and meridians of longitudes
 - (ii) the Tropic of Cancer and the Tropic of Capricorn
 - (iii) the North Pole and the South Pole

3. Fill in the blanks.

- The Tropic of Capricorn is located at _____.
- The Standard Meridian of India is _____.
- The 0° Meridian is also known as _____.
- The distance between the longitudes decreases towards _____.
- The Arctic Circle is located in the _____ hemisphere.

THINGS TO DO

- Draw a diagram of the globe showing the earth's axis, the Equator, Tropics of Cancer and Capricorn, Arctic Circle and Antarctic Circle.



FOR FUN

- Draw and cut out six circles of the same size (approx. 3 cm. radius) from cardboard. Mark diameters (NS, EW) and 23½° angles on each face of the circles as shown on the figure. Place the circle one on top of the other and stick along the line NS. Now there are twelve semi-circles. Let one semi-circle represent 0° or Greenwich Meridian (Prime Meridian). The 6th semi-circle from it will be the 180° Meridian. Between the 0° and 180° there are 5 semi-circles on both sides which are West and East longitudes 30° apart. On two ends of the stapled line stick pins to represent the North and South Poles.

A rubber band around the model touching the EW points will represent the Equator. Two rubber bands touching the 23½° points, South and North of the EW points will represent the tropics.

