

11. Contour Maps and Landforms

In Standard V, you have gathered some information about how height and relief are shown on a map. Now carry out the following activity on the same topic under the guidance of your teacher.



Try this.

(For the teacher: Carry a few large potatoes to the class. Make groups of the students and distribute the potatoes among the groups.)



- ❖ Take a large oblate shaped potato and other required items as shown above.



- ❖ Observe how a potato appears when seen from the front and when seen from above? Draw an outline of the potato in your note book.



- ❖ Cut the potato into two parts so that each part has a flat base.



- ❖ Rest the cut half on its flat base and measure its height in millimetres.





- ❖ This is our 'potato hill'. The tapering side of the potato is the hill top.



- ❖ Draw two circles, each going round the hill, one near the top, and the other close to the base. Keep sufficient distance between the circles. The circle near the top will be smaller.



- ❖ Now the teacher will slice the potato on these circles.



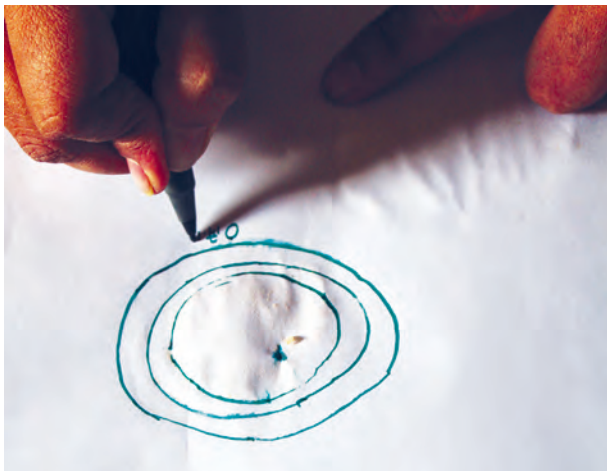
- ❖ Do not separate the slices. Insert a toothpick or a piece of pointed stick through the slices vertically.



- ❖ Without removing the toothpick, place the sliced potato on a piece of paper. Moving a pencil along the edge of the lowest slice draw its outline. It will be nearly circular in shape.



- ❖ After drawing the outline, pull the toothpick upwards. Remove the lowest slice delicately and keep it aside. Repeat the same procedure for the other two slices.

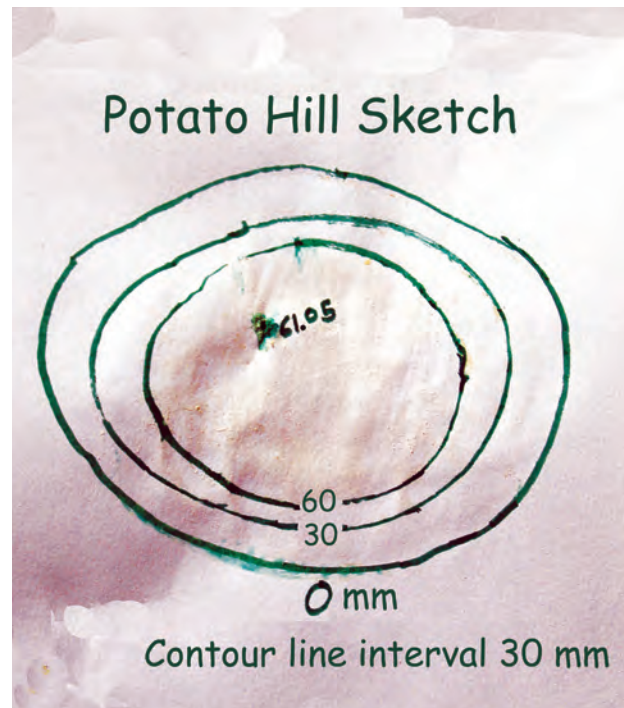


- ❖ Observe the figure that is formed after the exercise is complete. You will note that you have drawn three concentric circles.

Write the height of the potato that you had measured earlier in the centre of the innermost circle. Measure the thickness of all the slices you have kept side. Give value '0' (zero) to the outermost circle. How will you give the values to the other lines? Think about it. Do you think that the thickness of

each slice that you have measured can help you?

After assigning values to each circle, our sketch of the potato hill will be complete.



Think about it.

- 👉 What did we achieve in this activity? We have transferred a three dimensional object – the potato – into a two dimensional picture.

In reality it is not possible to make the slices of a mountain or any other landform and place them on paper or on the ground to draw a two dimensional picture of that landform. For this, mathematical and survey methods are applied. You will learn about these methods if you study Geography as a special subject at a later stage.

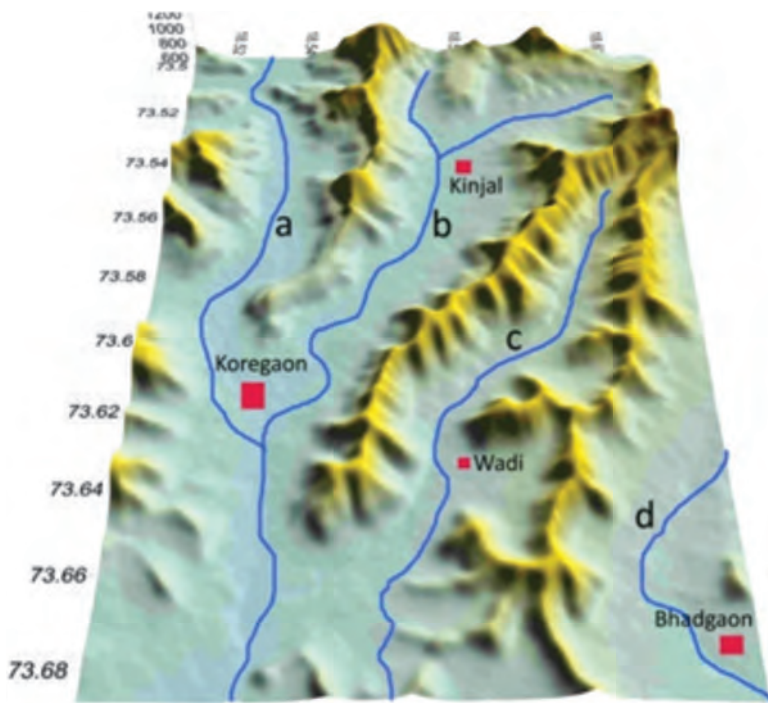


Figure 11.1 a : A model of the earth's surface

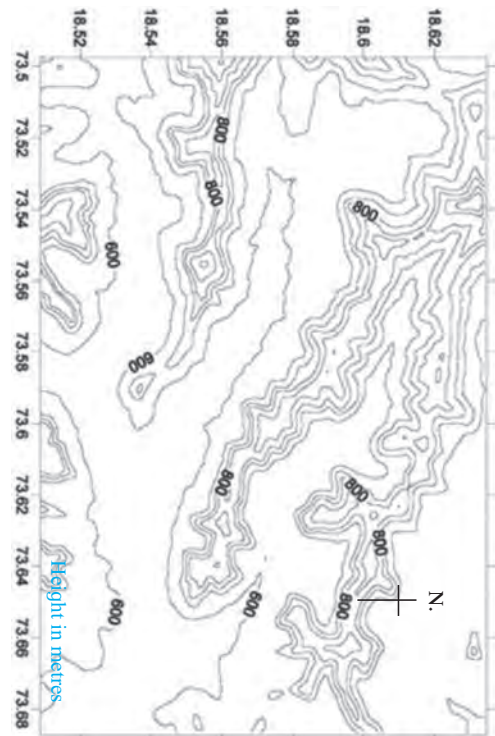


Figure 11.1 b : Contour line map

A model of the relief in an area is shown in fig 11.1 (a) given above. Observe it carefully and answer the following questions.

- Which landforms do you observe in the model?
 - Which colours have been used on them?
- Observe the map given in fig. 11.1 (b) and answer the following questions.
- What all do you see in the map?
 - What is the general direction of the ranges shown in the map?
 - Towards which direction is the flat land located in the map?
 - What are the maximum and minimum values of the lines in the map?
 - What do these values indicate?
 - Do you find any similarities in the map and the model in fig. 11.1(a)? What are those?
 - Which figure gives us more information and what is that information?
 - Is there any similarity between this map and the sketch map of the potato hill?

Geographical explanation

While studying different landforms on the surface of the earth, one has to take into consideration various facets of landforms like altitude, relief, slope, direction of slope and the drainage. For this, maps prepared using particular methods are used. These are known as contour maps. These maps help us to understand the above characteristics of the landforms. These maps are of immense use to mountaineers, trekkers, soldiers, defense officers, etc. These maps prove to be of great use in the planning for a region too.



Use your brain power !

When one sees a landform on a contour map, what is the observer's position with respect to the landform? (For example, a hill is shown with the help of contours on a map. From where do you think you are looking at it?)



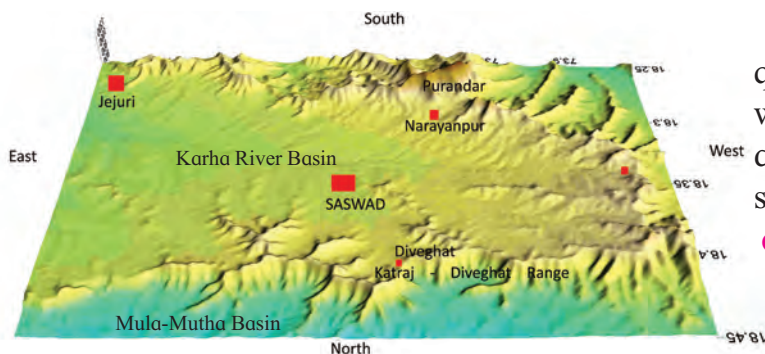


Figure 11.3 a : A model of the Karha river basin, Saswad

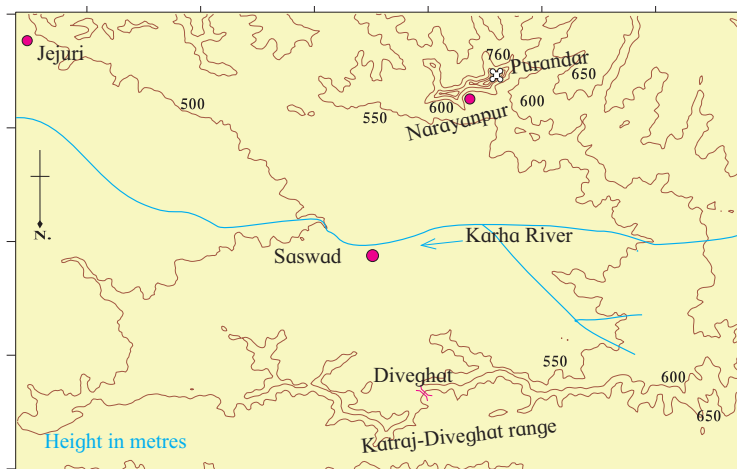


Figure 11.3 b : A map of the Karha river basin, Saswad

A 3D model is given in fig. 11.3 (a). The northern part of the model shows the basin of the rivers Mula-Mutha. To its south is the Katraj-Diveghat range extending from the west to the east. Beyond that some portion of Karha basin is seen.

(Observe this model and the map (fig. 11.3 (b)) given below it and answer the following questions.)

- In which direction does fort Purandar lie?
- What is the direction of flow of the river Karha?
- In which parts are the hill ranges not observed?
- Which part of the map is not seen in the model? Why?
- In which direction does the altitude of Katraj-Diveghat range decrease?
- In which direction are higher hill ranges located?

While finding answers to these questions, you will become familiar with the contour lines and you will be able to identify major landforms shown by the contour lines.

- Find the altitude of your place above mean sea-level (in metres).

You have to draw contour lines from mean sea-level to your place. The interval of the contour should not be more than 50 m. Determine how many lines you will draw for this.

- Friends, consider you have gone for mountaineering. You have to conquer a peak on the hill 'A'. A map of this hill is given (figure 11.4). Studying the contour lines in the map, find the side from which you will reach the peak safely and easily. Mark your path on the map with a pencil.

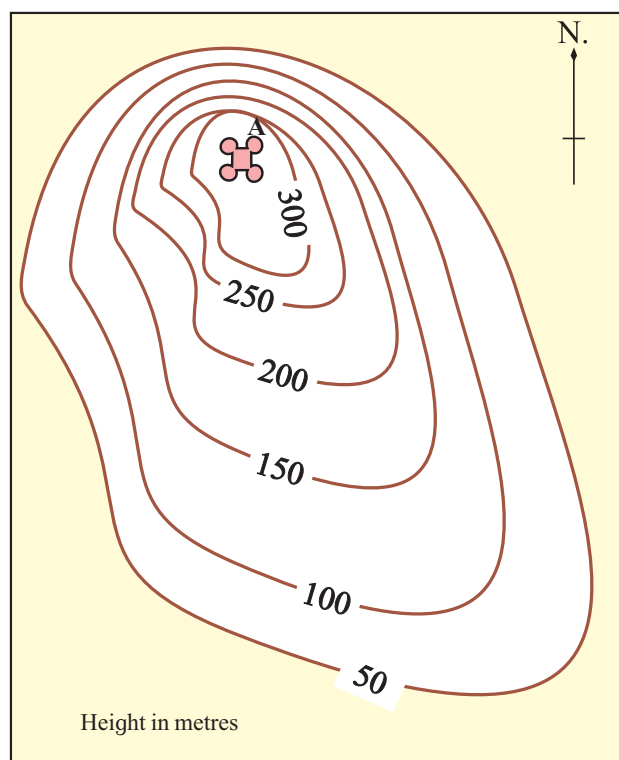


Figure 11.4 : Contours (Hill)



Always remember–

Contour lines join places with the same altitude on a map. Therefore, generally they do not cross each other.



Look for me elsewhere!

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Exercises



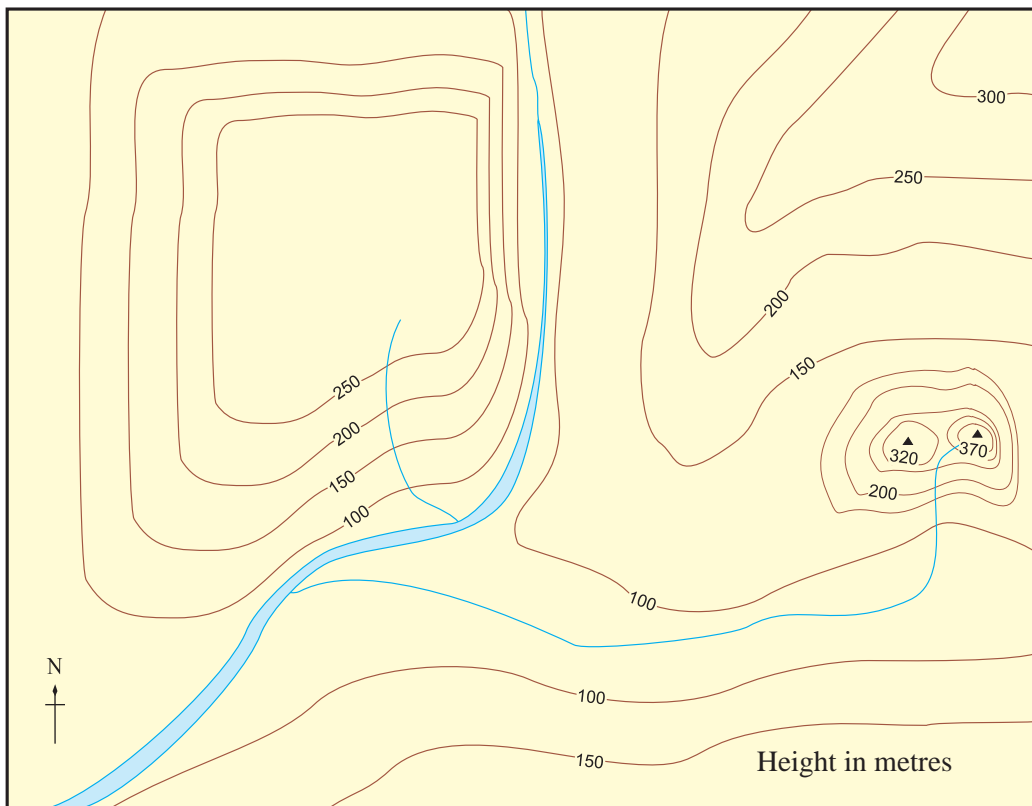
Q.1. Answer the following questions.

- (1) How can the distribution of the height and landforms in a region be shown?
- (2) To whom are the contour maps useful?
- (3) What do you understand by observing contour lines?
- (4) How will a contour map be useful for a farmer?

Q.2. Fill the blanks with appropriate words.

- (1) If the contour lines are closer to each other, the slope is
- (2) The contour lines on the map represent
- (3) The slope can be understood from the distance between the
- (4) If the distance between two contour lines is more, the is gentle.

Q.3. Identify the landforms in the following map.





GLOSSARY

- **Agent:** A person acting as a link between a producer and a consumer. The consumers of any product are not located in one region. They are scattered over a vast area. In such situation it is difficult for the producer to reach the consumers. Therefore, it becomes necessary to have a link between the producers and consumers. The agents are this link.
- **Agriculture:** Agriculture is a comprehensive term. It includes farming and many allied occupations. Animal husbandry, dairy farming, pisciculture, sericulture, nursery, etc. come under the scope of the term agriculture.
- **Agro-tourism:** In this form of tourism, the most important aspect is to obtain the information about agricultural activities by actually visiting a farm or a meadow. People are curious about knowing how the food they consume is produced. It is out of this curiosity that agro-tourism has developed. It is the first experience for most visitors especially for youngsters. For a few decades, agro-tourism has become popular in India. Agro-tourism Development Corporation works for the spread of this form of tourism. By 2014, around 214 centers for agro-tourism in rural settlements have been started in Maharashtra.
- **Air pressure:** Air has weight and any object or material having weight exerts pressure on the thing / material that lies below it. Air exerts pressure on the lower layers of atmosphere and the earth's surface. Air pressure is measured in millibars. The air pressure at the sea level is 1013.2 mb.
- **Annular eclipse:** The sun disc does not get totally covered by the moon if the moon is in its apogee position (at the farthest distance from the earth). Moon's shadow does not reach up to the earth. As a result in such a situation only the rim of the sun disc remains visible from a very narrow portion of the earth. This illuminated rim appears like a ring. Hence this type of solar eclipse is called annular solar eclipse.
- **Anti-cyclone:** At times, the air pressure in a region increases more than the surrounding areas. Under such conditions, winds blow from the central high pressure areas towards the low pressure in the surrounding areas in a circular manner. Such winds moving outwards from the central regions in a circular manner are called anticyclones.
- **Antipodal point:** A point that is located diametrically opposite to a given point. Such a point is fixed with reference to an imaginary line in the form of the diameter of the earth. For any or every point on the surface of the earth, there exists an antipodal point on the earth's surface.
- **Aphelion:** A position of the earth on its elliptical orbit when it is at the maximum distance from the sun. This position occurs in the month of July.
- **Apogee:** A specific position of the moon on its orbital path with respect to the earth. In this position the moon is at its farthest distance from the earth.
- **Autumnal equinox :** One of the positions of the earth on the orbital path, relative to the sun. This position occurs on 23rd September. In this position both the poles of the earth are equidistant from the sun and the sunrays are perpendicular at the equator. The duration of nighttime and daytime are equal all over the earth.
- **Barometer:** An instrument used to measure air pressure. Air pressure is measured in millibars. There are different types of barometers in use. In some barometers, vacuum boxes called aneroids are used. Air pressure suppresses the aneroids and this pressure is expressed on a plate with markings by an indicator.
- **Bedouin People:** A nomadic tribe from the Arabian Desert.
- **Catchment area:** Area of a river basin. The area from where the water gets collected into a river is called the catchment area of the



river. This term is also used with reference to a dam or a bund indicating the area from which water gets collected in the reservoirs.

- **Centrifugal force:** A force that leads to the movement away from the center. The particles in rotating objects develop a tendency to move away from the centre. Such a force which leads to outward motion in an object is called centrifugal force.
- **Circle of illumination:** Sunlight divides the Globe into an illuminated and a dark part. The line separating the two parts is the circle of illumination. This is not an imaginary line, it exists on the surface of the earth all the time. The circle of illumination is a great circle. Due to the rotation of the earth, its position seems to change all the time.
- **Contour line:** These are isolines of height. These are drawn by joining the places of equal altitude. These help in identification of landforms, determine the amount of slope and help us understand the type and direction of slope. They also help in the analysis of intervisibility between any two points on the map.
- **Contour trench:** In order to reduce the erosion of soil, trenches are dug out in the direction perpendicular to the slope of the land and trees are planted along such trenches. While digging out such trenches care needs to be taken to maintain the level.
- **Cyclone:** A condition of lowering of air pressure in a region. Under such a condition, the air from the surrounding regions rushes to the central low pressure area in a circular manner. This leads to the formation of a system of whirling winds that moves from one place to other under the influence of prevailing regional winds.
- **Dakshinayan :** March of the sun towards the south. This starts from 21st June and every day the sun appears to be moving southwards slowly. The southward march of the sun comes to an end on 22nd December when it starts moving towards the north. In reality, the sun does not move but due to the revolution of the earth and the inclination of its axis, the sun appears to be moving towards north or south.
- **Doldrums:** The belt extending from 5° N to 5° S parallels. As the temperatures in this belt are high, the heated air starts ascent. This gives rise to a low pressure belt. Winds in this zone are not very effective and hence this region becomes a region of calm and it is called doldrums.
- **Easterlies:** Winds arriving from the east. These are the planetary winds blowing towards the equatorial low pressure belt from the mid-latitudinal high pressure belts in both the hemispheres.
- **Eclipse:** A condition of the sun disc getting covered by the moon OR the moon disc getting shadowed by the earth. Solar eclipse occurs when the moon is positioned between the earth and the sun and covers the sun disc. Lunar eclipse occurs when the moon passes through the shadow of the earth. This situation becomes possible if the sun, the moon and the earth come in one straight line. Such a situation occurs only on the full moon or new moon days. However as the planes of the orbits of the moon and the earth intersect each other at an angle of 5°, the eclipses do not occur on every full moon or every new moon day.
- **Economics:** the science of financial management. It is needed at all levels – from individual to national.
- **Equinox:** Specific situation of the earth's location on its orbital path with respect to the sun. In this situation, both the ends of the earth's axis face the sun and are equidistant from the sun. This situation is observed on two days in a year. On these two days, the circle of illumination coincides with the meridional great circles. This situation is observed on 22nd March and 23rd September. On these days, sun rays are perpendicular at the equator. The duration of daytime and nighttime is the same and it is of 12 hours.
- **Fortnight:** A period of 15 days from new moon day to full moon day (and from full moon day to new moon day).



- **Gravitational force:** In any two objects, there exists an attraction towards each other. This is called gravitational force. The gravitational force depends on the mass of the two objects and the distance that separates them. The planets revolving around the sun along their specific orbits is the combined effect of the gravitational force of the sun and the centrifugal force associated with the planets. The value of gravitational force is computed as $M_1 M_2 / D^2$, where M_1 and M_2 represent the mass of object 1 and 2 and D represents the distance between them.
- **Greenhouse:** This is a house constructed using sophisticated technology for the growing of vegetables and flowers. The walls and roof of this house are made up of transparent materials—mostly glass. Conditions conducive for the growth of plants are controlled under such structures. The temperature inside the greenhouse is considerably higher than the temperature outside during the day. With the help of various instruments the temperature, relative humidity, air pressure etc. are controlled in greenhouses.
- **Height above sea-level (ASL):** Height above mean sea-level. This is known as altitude. Considering the mean sea-level to have zero height, the heights of all other locations is measured as above or below sea-level.
- **High tide and low tide:** The rise or fall in the level of sea waters caused by the combined effect of centrifugal force associated with sea water and the gravitational pull of the moon and the sun. The rise in the level is called high tide and the fall is called low tide.
- **Horizon:** A line where it appears that the sky and the land are meeting. In reality, it is the plane of a tangent line assumed to be drawn at a given place. 'N' number of such tangents to the earth surface can be assumed. When the celestial objects like the sun become visible above this line, we say it is a sunrise. When it moves below this tangent line it is said to be Sunset.
- **Horizontal distribution:** The values of different elements of climate are not the same at various places on the earth. As a result, the values of temperature, air pressure, rainfall etc. differ from place to place near the earth's surface. This distribution of climate elements in a horizontal direction is called horizontal distribution.
- **Horse latitudes:** A region in both the hemispheres between 25° and 35° parallels. This is the region of high pressure belt from which the air moves outwards. The region is generally quiet. Due to historical reasons it is called horse latitudes.
- **Humus:** Organic substances in the soil. Residues of plants, litter, roots etc. get decomposed and mixed in the soil. Such decayed organic material increases the fertility of soils.
- **Irrigation:** Making water available for the crops, besides the rains, is called irrigation. Water is essential for the crops. At times, it becomes difficult to depend on rains for the crops. Under such situations, the water from canals, lakes, wells, reservoirs is supplied to the crops. This is called irrigation.
- **Isobars:** Lines joining the places of equal air pressure on the map. Isobars show the distribution of air pressure in the atmosphere.
- **Khubz:** It is a staple dietary item of Arabian people. It is in the form of thick flat bread like roti.
- **Knots:** A unit used to express the wind velocity. When the wind is blowing at a velocity of 1 nautical mile (1.853 km) per hour, it is said to have velocity of one knot. (1 statute mile = 1.609 km). The word knot also indicates 1 minute arc distance along equatorial circumference.
- **Land use:** Land as a natural resource is used for different purposes. The analysis of the purposes for which the land from a region is used is the subject matter of land use studies. Forest, agriculture and settlements etc. are the purposes for which the land is used. Land use in a region gives rise to particular patterns.
- **Leaching:** It is a type of chemical weathering. This process is dominant in the areas of high



rainfall and humid climate. The salts and other soluble minerals are washed out of the rock water in a dissolved form by the percolating.

- **Linear settlement:** If the growth of settlement has taken place with respect to a linear element, the houses in such a settlement also appear to have been arranged in a linear manner. Settlements with such patterns are called linear settlements. Such settlements are found along roads, canals, rivers or sea coast.
- **Local winds:** Winds which blow in some restricted areas in different parts of the earth. These are known by different names.
- **Marketing management:** The finished products produced by the producers have to reach markets in order to be available to the consumers, clients, partners and the entire society. All the processes involved in taking the finished products from the production areas to the markets are covered under the term marketing management. Marketing is useful for generating clients, maintaining and satisfying them.
- **Measurement of time:** A day, a month and a year are the basic units of the measurement of time. A day and a year are the results of the axial and the orbital motions of the earth respectively. The month is a result of the revolution of the moon around the earth.
- **Mixed farming:** A type of farming. This type of agriculture has a wide scope. It includes the farming and allied occupations like dairy, poultry etc. This term is also used for inter-cropping. Allocation of land for different crops in a season is also considered to be a form of mixed farming.
- **Neap tide:** The range of tides is lowest on the first and third quarter days. On these days the sun and the moon are positioned at right angle to each other with respect to the earth and hence the forces of their attraction do not complement each other.
- **Nucleated settlement:** The pattern of settlements mostly depends on geographical factors. If the buildings / houses are concentrated around a specific point in a settlement such a settlement is called nucleated settlement. There can be different reasons for such a concentration. The most important is the source of water. Defense / protection is also one of the reasons for the settlement to get nucleated.
- **Parent rock:** The major rock type in a region. Soil forming processes start with the weathering of rock in the region. As a result of weathering, the rock is reduced to a powdery substance. The parent rock is the largest constituent of any soil by weight.
- **Partial eclipse:** A type of solar or lunar eclipse when a part of the sun disc is covered by the moon or part of the moon disc is shadowed by the earth.
- **Pattern:** An arrangement of objects. The assembly of various factors that emerges in a space or over a time period forms a pattern. While such an arrangement is emerging, the factors individually or collectively are influenced by geographical conditions. Drainage pattern is an example of spatial pattern whereas crop pattern is an example of temporal pattern.
- **Perigee:** A specific position of the moon on its orbital path with respect to the earth. In this position, the moon is at its nearest distance from the earth.
- **Perihelion:** A position of the earth on its elliptical orbital path at the minimum distance from the sun. This position occurs in the month of January.
- **Period of waning moon:** The fortnight from the full moon day to the new moon day. In this period, the illuminated portion of the moon appears to be getting progressively reduced as observed from the earth.
- **Period of waxing moon:** The fortnight from the new moon day to the full moon day. In this period the illuminated part of the moon keeps on increasing every day as observed from the earth.
- **pH:** The acidity or alkalinity of a substance is determined with the help of pH value. This scale ranges from '-1' to 14. The pH value of



'7' indicates neutrality whereas the values lower than '7' indicate acidity and if the value is more than '7' the substance is considered to be alkaline. For example, the lemon juice that contains citric acid has pH of 2. The seawater that tastes salty has an average pH value equal to 8. The water of Great Salt Lake has pH value of 10.

- **Phases of the moon:** The illuminated portion of the moon disc observed from the earth that keeps on changing every day within a lunar month.
- **Resources:** The materials and energies available in nature and the assets created by man and used for making human life easier and more comfortable are called resources. All the constituents in nature that are used by man are resources.
- **Sea-level:** The level of sea waters keeps on oscillating due to the tides, waves, etc. The mean of high and low tide determines the mean sea-level at a place in coastal area. All height values in the region are measured with reference to the mean sea-level. As the tidal range of different places can vary the mean sea-level of a selected station is taken as the standard mean sea-level for the region. For India mean sea-level at Chennai is considered as the standard mean sea-level.
- **Seasonal winds:** Winds which blow during specific periods and in limited areas. For example, the monsoon winds.
- **Soil degradation:** Lowering of the soil quality. This occurs due to the reduction of humus content of the soils. The mixing of unnecessary chemical substances in the soil particularly as a result of excessive use of chemical fertilizers leads to degradation of soils. Use of chemical fertilizers, insecticides, pesticides, weedicide etc. causes the degradation of soils.
- **Soil erosion:** Removal of the top layers of the soils due to the work of the running water and the wind is called soil erosion. Top layers of soil contain high proportion of humus. The removal of top layer also causes loss of humus that leads to lowering of fertility of soils.
- **Solar eclipse:** If the moon gets positioned between the earth and the sun and if these three are in a straight line, the shadow of the moon falls on the earth. As a result the sun becomes totally or partially invisible in the shadow zone. This condition is called solar eclipse.
- **Solstices:** Specific positions of the earth on its elliptical orbital path. These positions occur on two days— 21st June and 22nd December. These are the solstice days. On 21st June, the north pole of the earth records maximum inclination i.e., 23° 30', towards the sun. On this day, the sunrays are perpendicular at the Tropic of Cancer. On 22nd December, the south pole of the earth records maximum inclination, i.e., 23° 30', towards the sun. On this day, the sunrays are perpendicular at the Tropic of Capricorn. 21st June and 22nd December are summer and winter solstices respectively. 21st June is the longest day in the northern hemisphere whereas 22nd December is the longest day in the southern hemisphere.
- **Spring or vernal equinox:** One of the positions of the earth on the orbital path relative to the sun. This position occurs on 23rd March. In this position both the poles of the earth are equidistant from the sun and the sunrays are perpendicular at the equator. The duration of night time and day time are equal all over the earth.
- **Spring tide:** The high or low tide occurring on the full moon and the new moon days. As the sun and the moon are on the same side of the earth on this (new moon) day, maximum tidal range is observed. The tidal range on full moon day is also high but it is somewhat less than that on new moon day.
- **Subcontinent:** A part of a continent that is geographically and culturally different from the rest of the continent. The region in South Asia that lies south of the Himalayan ranges is called the Indian Subcontinent. This includes countries like India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka.
- **Total eclipse:** A type of solar or lunar eclipse when the sun disc is completely covered by



the moon or the moon is completely shadowed by the earth.

- **Tsunami:** Huge sea waves generated as a result of earthquakes occurring below the sea bottom. Tsunami waves cause tremendous loss of life and property in the coastal region where they strike.
- **Tourism :** A service occupation. Various services needed by the tourists in a region are provided as a part of this. These include lodging facilities, hospitality, transport, communication, etc. as also maintenance of tourist places.
- **Uttarayan:** March of the sun towards the north. This starts from 23rd December and every day the sun appears to be moving northwards slowly. The northward march of the sun comes to an end on 21st June when it starts moving towards the south. In reality, the sun does not move but due to the revolution of the earth and the inclination of its axis, the sun appears to be moving towards north or south.
- **Vertical distribution:** Distribution in vertical direction. Temperature and air pressure vary in horizontal as well as vertical direction. The variation caused due to height is called vertical distribution.
- **Westerlies:** Winds arriving from the west. These are the planetary winds blowing from the mid-latitudinal high pressure belts towards the sub-polar low pressure belts in both the hemispheres.
- **Winter:** A period of low temperature in a year. Due to decreasing duration of sun light and also due to the slant nature of the sun rays, the heat received is less during this period and hence the temperatures are low. The northern hemisphere experiences winter from 23rd September to 22nd March while the southern hemisphere experiences winter from 22nd March to 23rd September.

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