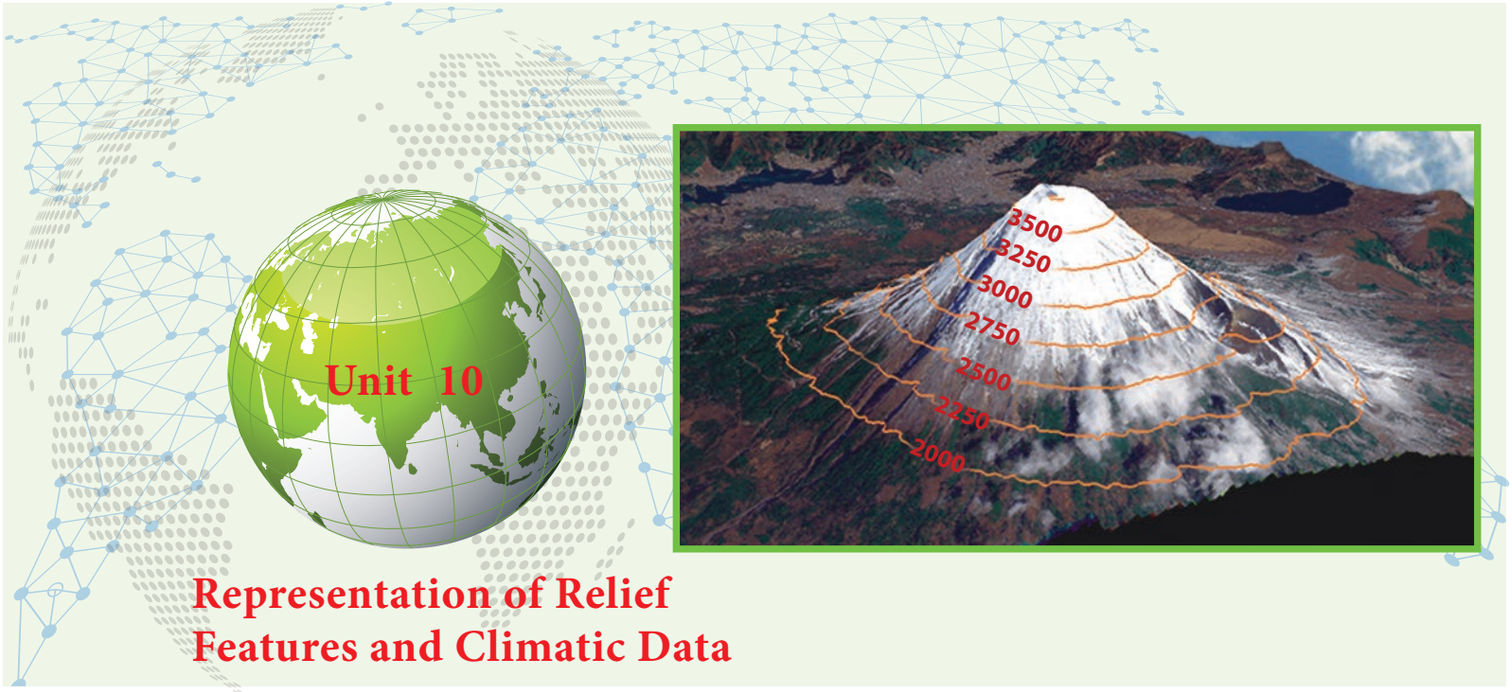


Representation of Relief Features and Climatic Data

Chapter Outline

8BGMIU

Learning Objectives:

- *Understand how to identify different landscapes.*
- *List types of measuring landscapes*
- *Draw cross section of contours and identify landforms.*

10.1 Introduction

A map gives all the information about a place according to the scale and projection used for mapping. A two dimensional map is capable of representing the third dimension - relief (elevation and slope) by various methods which has been in practice from ancient times.

10.2 Methods of Representing Relief Features

The important methods of representing relief features are hachures, contours, form lines, spot heights, bench marks, trigonometrical points, hill shading, layer-colouring, and so on. Each method has its own merits and demerits in depicting the relief of the land.

Hachures are small lines drawn to represent slopes. The lines are drawn thicker to represent steeper slopes and thinner for gentle slope. The slopes above 45° is depicted completely in black colour.

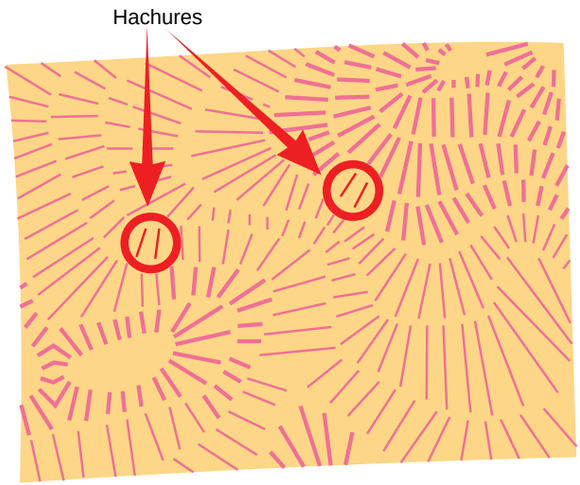


Figure 10.1 Hachures

Contours are imaginary lines connecting places having same elevation above mean sea level. They are drawn in brown colour.

Form lines are like contours representing features that are not actually surveyed. They are shown by broken lines.

Spot heights are heights of places surveyed and they denote the actual height above mean sea level. They are shown in maps as dots with their respective values written beside it.

Bench marks represent the actual height of a tall structure like a tall building, pillar, bridges or any other object of permanent nature. They are marked with the letters BM with the respective height.

Trigonometrical Stations are points included in the triangulation survey and

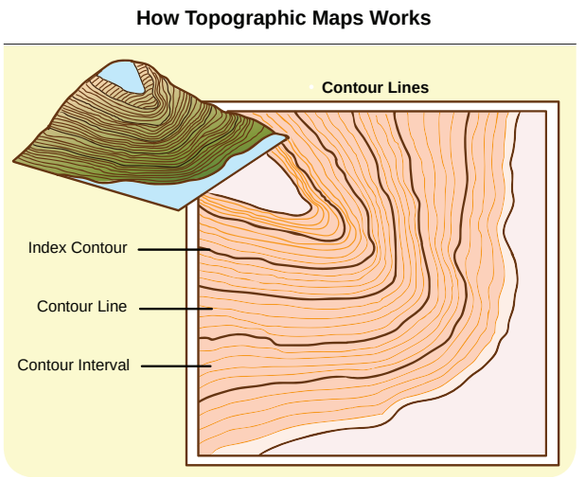


Figure 10.2 Contours

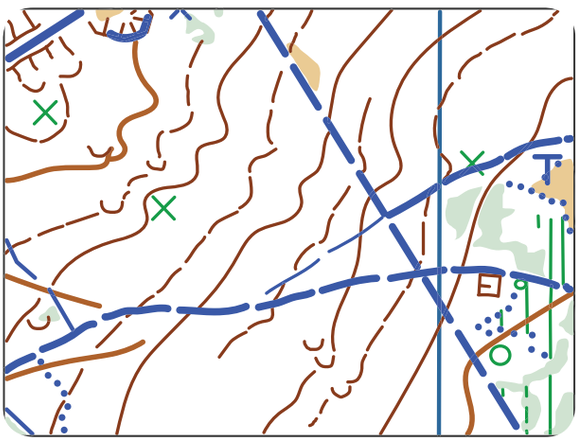


Figure 10.3 Form lines

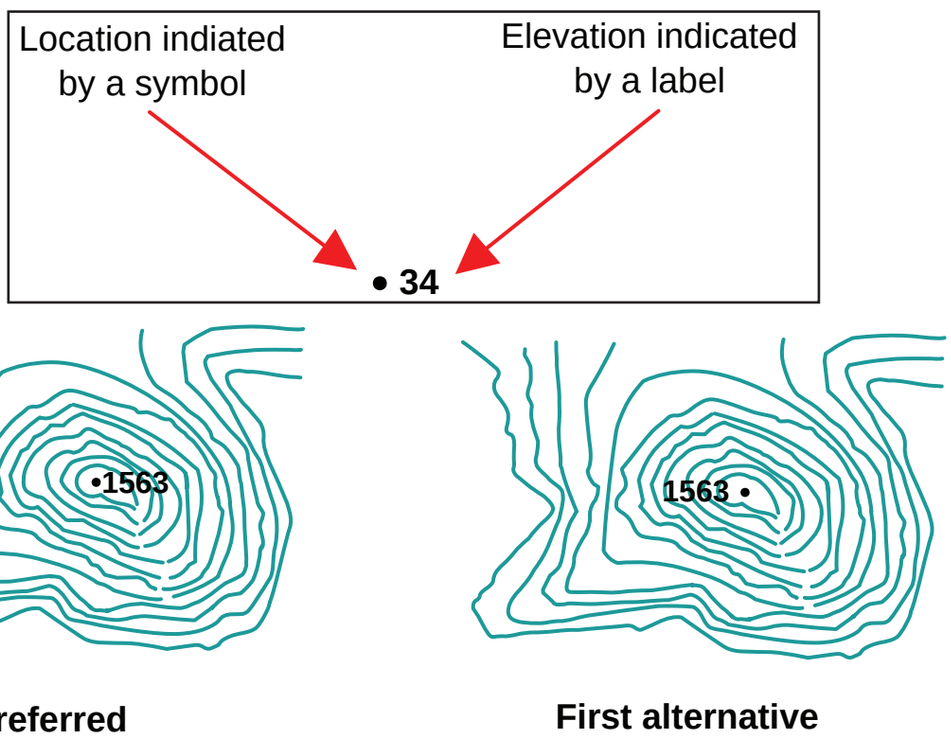


Figure 10.4 Spot heights

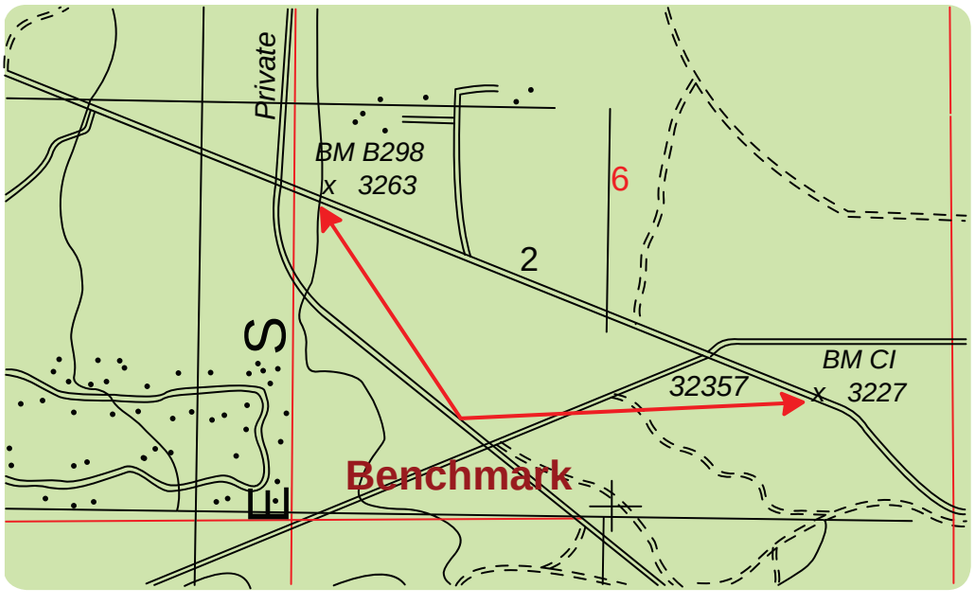


Figure 10.5 Benchmark

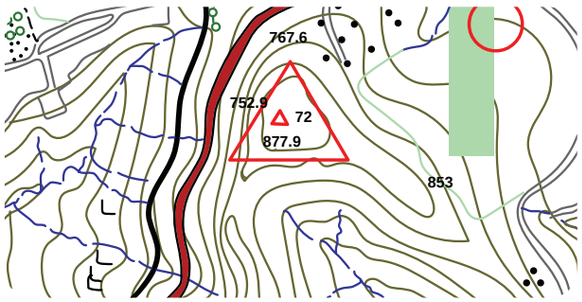


Figure 10.6 Trigonometrical Stations

are marked in the map with a triangle with the actual height of the place.

Hill Shading (levels of gray) is a method of representing relief on a map by depicting the shadows that would be cast by elevated areas if light was shining from a certain direction.

Layer Colouring is a method showing relief in layers and each layer is given a different colour. Physical maps in atlas and wall maps use this method to show relief features. Ocean depth is also shown in various shades of blue. There is an international recognition for colours used in these maps. Accordingly blue represents water bodies, green for plains, various shades of brown for highlands and white for snow covered peaks.

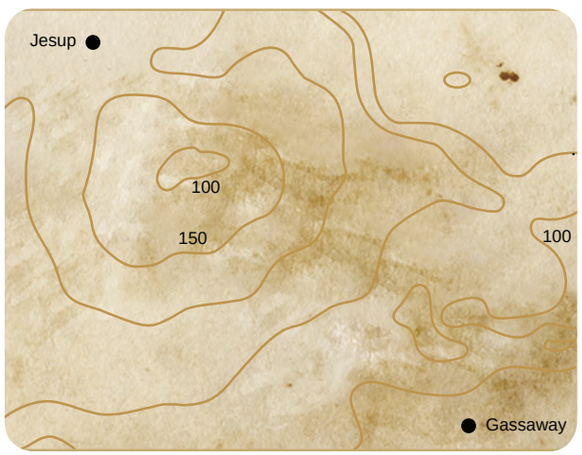


Figure 10.7 Hill Shading

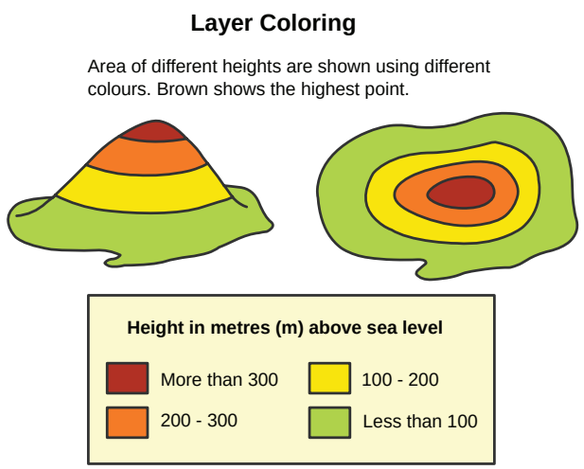


Figure 10.8 Layer colouring

Contours

Contour is universal method to show the relief. The unit of measurement of contour is generally metres above the mean sea level. Contour has an advantage that it does not hide the other features drawn on the toposheet. Reading contours is a skill that helps us to understand the actual landscape. The skill can be obtained by understanding the salient features of contours. They are as follows:

1. Contours are drawn at regular intervals in brown colour. Generally 20m interval is followed in 1:50,000 and 100m interval in 1:250,000 toposheet.
2. Every fifth contour is a dark line to enhance map reading.
3. The value of contour is printed by breaking the contour line andalso given at the edge of the toposheet.
4. Generally contours never cut or cross each other. In case of water fall and cliffs contours almost touch a same point or a line. In over hanging cliff the contours cut each other.

Figure 10.10 gives the general features shown by contours.

Drawing Cross Section from Contours

The following figure shows the way two adjacent hills are shown by contours.

a) Two adjacent hills shown by contour

Drawing cross section of the contours allows one to know the exact landform

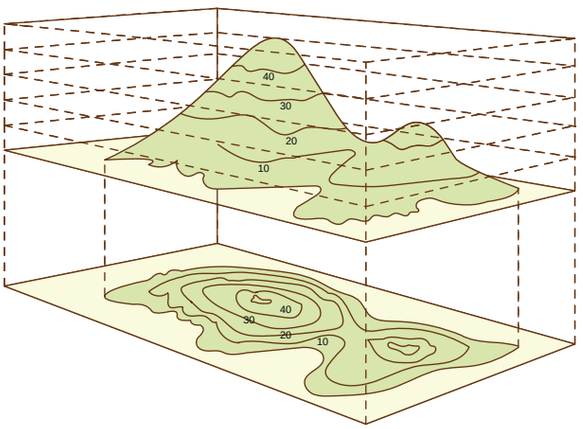


Figure 10.9 Two adjacent hills

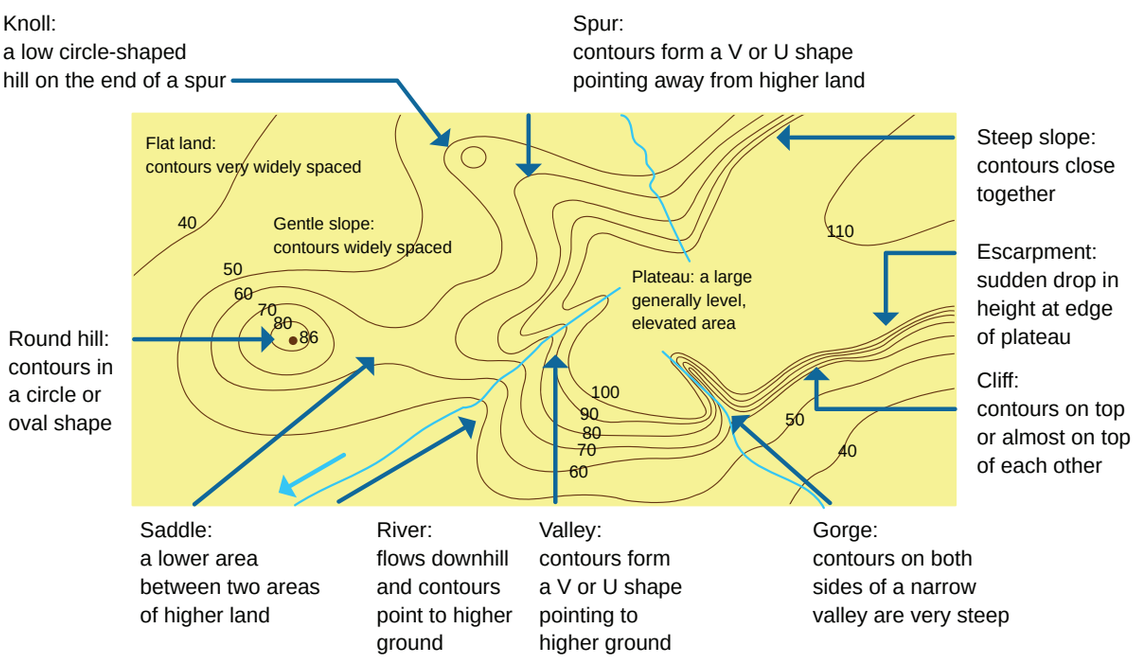


Figure 10.10 Contours of different land features

depicted in the toposheet. Drawing cross section involves selecting a section within the portion of the contour, marking the intersections of these selected contours on suitable vertical scale and joining these points to indentify the land form. Generally closely spaced contours indicate that the slope is steep, and widely spaced contours indicate that the slope is gentle. (Figure 10.11 and 10.12)

Steps to be followed in drawing cross section:

1. Draw the contours in brown colour.
2. Draw a line AB for which the cross section has to be drawn.
3. Below the contour draw required number of horizontal lines of equal distance and interval (2mm) to represent all the contour values given in the diagram
4. Write the value of all the contours in such a way that the lowest value of the contour forms the base line and the values increase according to the contour interval given in the diagram.
5. Draw vertical lines from each intersection point on the line AB with the contours to the horizontal line representing its value.
6. Join all these points to identify the feature shown.
7. Shade the feature in black to complete the cross section.

General instruction to identify features shown in contours:

- **A hill** is shown by circular contours with height less than 1,000 m.
- **A plateau** is an elevated land represented by inner most contour roughly rectangular in shape and closer outer contours. The height may generally vary from 300m to 600 metres. If a plateau is enclosed by mountains, it is called intermontane plateau and when it is formed in the foot hills it is called piedmont plateau.
- **A ridge** is an elongated and steep sloped high mountain with two or more peaks shown by elliptical contour lines. A narrow low depression between two peaks is called **Col**. Saddle is similar to a col but higher, broader and gently sloping from peaks of a ridge.

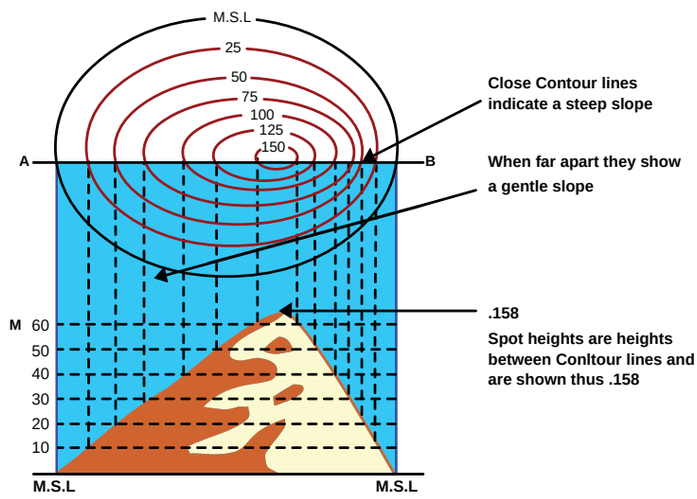


Figure 10.11 Hill

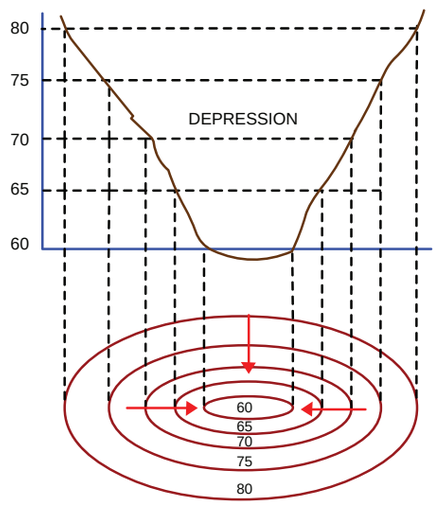


Figure 10.12 Valley

- **A valley** is a long depression with steep slope formed by the vertical erosion of the river within the stretch of upland. The contours bend sharply across the river in a 'V' shape with the apex pointing towards higher elevations.
- **Spurs** are projection of land from higher to lower ground. Contours bend smoothly with the apex of the 'V' pointing towards lower ground.
- **A waterfall** occurs when there is a sudden difference in height of the river valley.A **waterfall** is a place where water flows over a vertical drop or a series of steep drops in the course of a stream or river. It is represented by contours meeting at a same point on the hill slope. The difference between the value of the highest and the lowest contour touching the same point gives the height of the waterfall.
- **A cliff** is a steep sloped exposure of a valley or coast. If it is near sea we call it sea cliff.
- **Gorge** is a very steep valley at higher elevations formed by river erosion. It can be identified by closely converging contours in the river course.
- **A volcano** is represented by closed contours with the innermost contours having lesser values than the surrounding, denoting the crater depression.

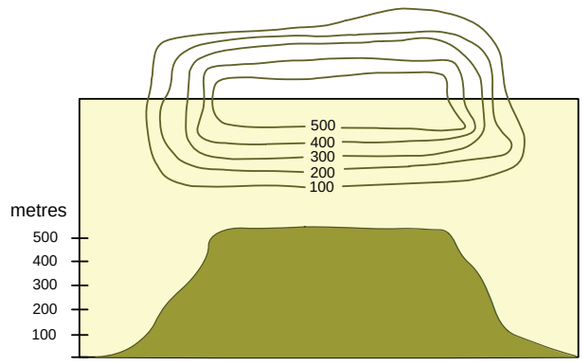


Figure 10.13 Plateau

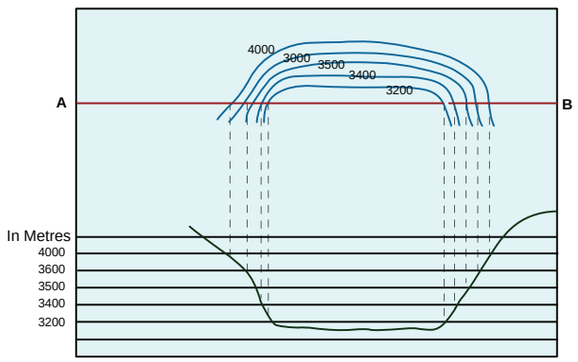


Figure 10.14 Inter montane plateau

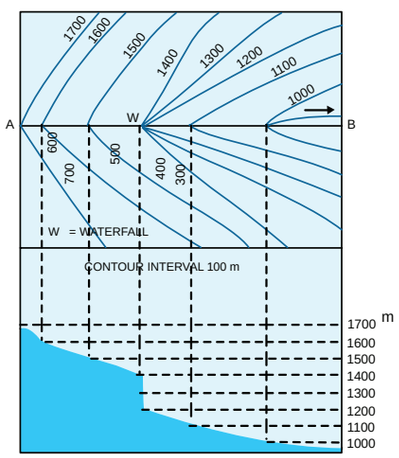


Figure 10.15 Waterfall

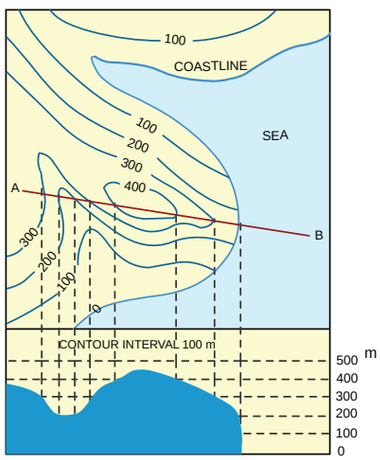


Figure 10.16 Sea cliff

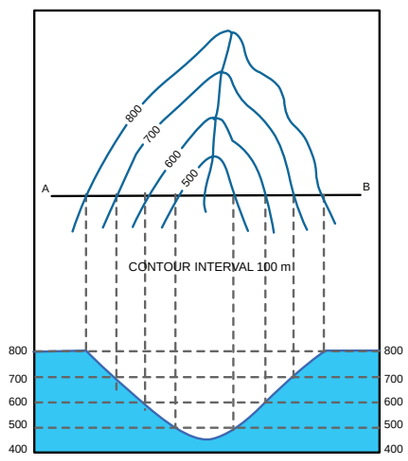
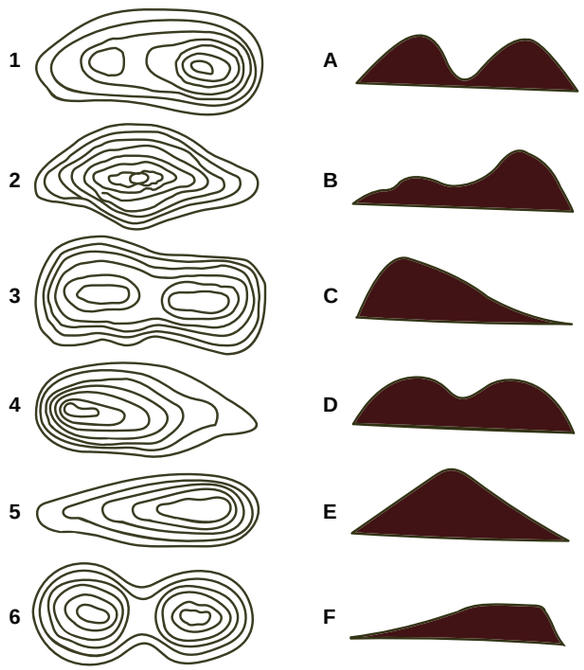


Figure 10.17 V-Shaped valley

Exercise 1

Match the following



10.3 Climatic Diagrams

Climatic diagrams show specific weather element for a specific station for a specific time. Graph, bar charts, combination of graph and bar and wind roses are few climatic diagrams drawn to represent climatic data. Mean monthly temperature of stations can be shown in simple graph. Comparison of maximum, minimum temperature with mean monthly temperature can be done by drawing a multiple graph. Generally rainfall is shown as bar diagram for individual station. Special climatic diagrams combine both bar and graph to show the climatic variations among stations.

Example 1

1. Draw graph to show the average maximum and minimum temperature for Chennai city.

In the x axis,mark the months of the year.
1 cm = one month

In the y axis, mark the temperature after selecting suitable scale considering the lowest and highest temperature of the station. (1 cm = 2 degrees Celsius)

Temperature / Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Maximum Temperature in °C	29.3	30.9	32.9	34.5	37.1	37.0	35.3	34.7	34.2	32.1	29.9	28.9
Minimum Temperature in °C	21.2	22.2	24.2	26.6	28.0	27.5	26.4	25.9	25.6	24.6	23.1	21.9

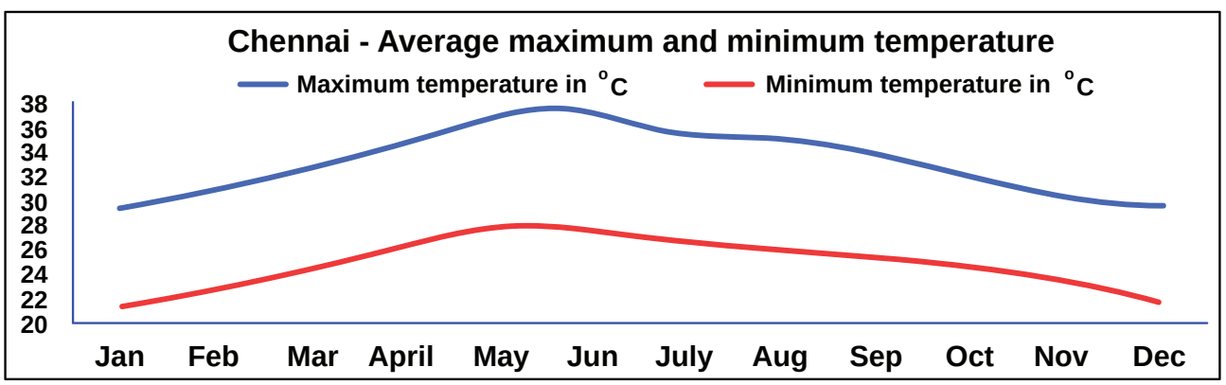


Figure 10.18 Chennai - Average maximum and minimum temperature

Example 2

Draw climatic diagram for the following station.

Station: Cuddalore												
Month	**Jan**	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Rainfall mm	15.54	10.44	12.48	20.96	57.1	41.24	64.4	99.28	147.17	204.22	165.07	133.76
Temp. °C	25.3	26.58	28.46	30.61	31.32	30.75	30	29.34	29.03	27.89	26.45	25.36

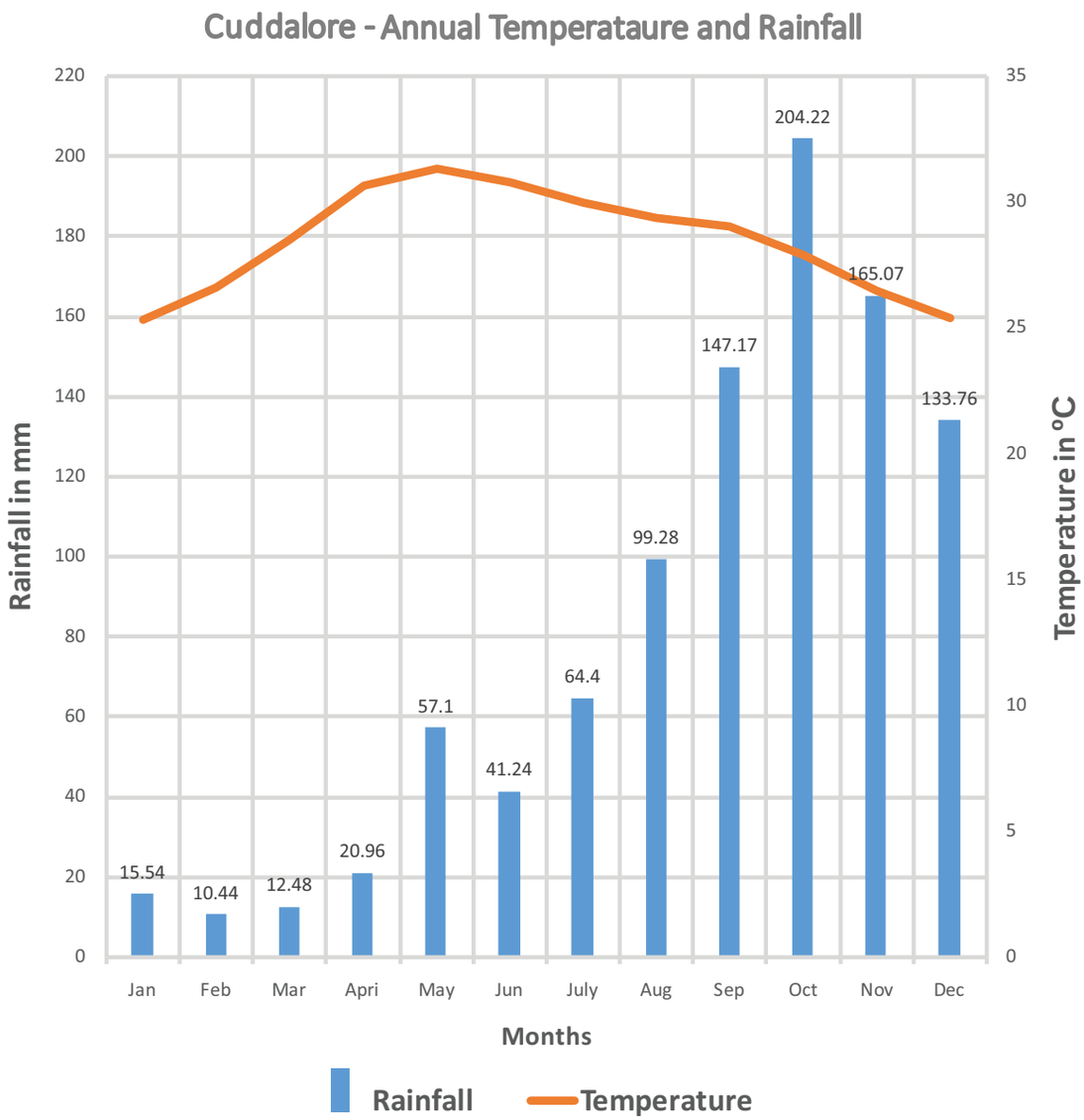


Figure 10.19 Cuddalore - Average temperature and rainfall

Exercise :

Draw climatic diagram for the following station.

Month	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Coimbatore												
Rainfall mm	7.56	13.34	23.04	85.78	178.47	481	492.64	315.2	202.82	263.57	153.53	44.03
Temp. °C	25.4	26.43	27.89	28.77	28.06	26.37	25.55	25.68	26.17	26.21	25.99	25.29
Karur												
Rainfall mm	8.14	16.72	23.73	62.44	96.94	90.68	122.52	106.8	144.68	213.49	135.09	67.64
Temp. °C	23.2	24.4	26.06	27.41	27.17	25.75	25.06	24.96	25.22	24.74	23.91	23.01
Tirunelveli												
Rainfall mm	14.9	31.45	24.32	85.27	128.5	195.7	147.82	118.9	116.18	203.96	163.37	68.79
Temp. °C	21.1	21.63	22.44	22.95	22.7	21.64	21.19	21.15	21.46	21.3	21.24	21.13
Vellore												
Rainfall mm	4.64	9.91	10.58	28.44	94.3	71.28	96.26	122.3	172.47	195.62	122.08	58.25
Temp. °C	23.2	25.08	27.46	29.69	30.04	28.51	27.56	27.11	26.92	25.9	24.33	23.07

Source: India Water Portal | Safe, sustainable water for all. www.indiawaterportal.org/

10.4 Wind Rose Diagram

Wind rose diagrams show wind data for a particular station. It is in the form of star shape so it is also called star diagram. Wind rose diagram is used to depict the wind direction and average frequency for a particular site. Wind data are generally collected at 10 m above ground and if required at various height for specific purposes. They can be prepared for month-wise, season-wise or yearly as needed. Wind velocity can also be shown within this diagram. Sometimes they even include air temperature information. Wind rose diagram is vital for constructing runways in airports. The run way is generally oriented towards the prevailing wind. Wind rose diagram is an essential inclusion in pilots chart and sailing charts. Architects and builders need to analyse the wind rose diagram for proper ventilation. The concept of simple wind rose diagram is given below.

Example

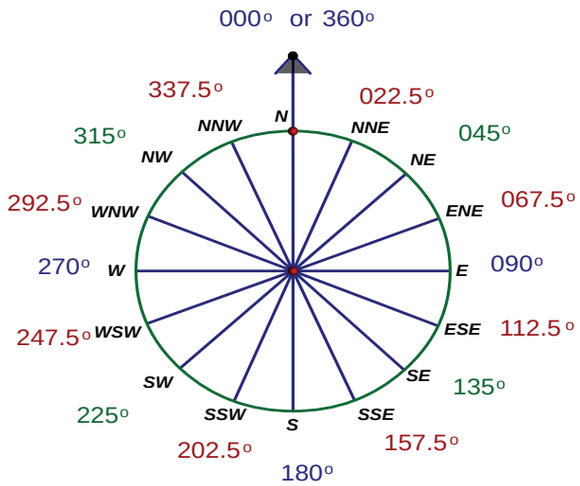
Wind Direction	Percentage of Days Wind Blowing from this Direction
North	27
North east	9
East	8
South east	14
South	10
South west	7
West	6
North west	15
Calm	4

Step 1: Select a suitable scale (in this case 1 cm = 10%)

Step 2: Draw a circle to represent the calm for this scale.

Step 3: Mark the directions in this circle using a protractor as shown in the figure. (considering 0° for north, 45° for NE, 90° for East, 135° for South east, 180° for

South, 225° for South west, 270° for West and 315° for North west.



Step 4: Draw a bar with suitable with equal to the length of 2.7 cm in northern direction, 0.9 cm in the north eastern direction and so on to complete the diagram.

Step 5: Mention the calm in the centre, mention the scale chosen to draw the diagram and name the directions as instructed above.

Wind Rose Diagram
Percentage of days wind blowing from various direction.

1 c.m = 10% of days
(4 c.m diameter)

Activity

Know about the wind rose diagram and its interpretation in this web site: https://www.envitrans.com/how-to-interpret-a-wind-rose.php

Exercise

Draw wind rose diagram for the following stations.

Direction of Wind / Wind Blowing Days	Percentage of days wind blowing from this direction from the Stations			
	Kota	Delhi	Cuddalore	Cochin
North	10	4	6	2
North east	15	4	30	10
East	15	10	20	10
South east	10	8	8	6
South	2	4	6	25
South west	2	6	6	25
West	2	29	6	5
North west	4	3	6	7
Calm	40	10	12	10

References

1. Singh R.L. and R. Singh (2001) Map Work and Practical Geography, Central Book Depot, Allahabad.
2. Singh L.R. (2013) Fundamentals of Practical Geography, ShardaPustak-Bhavan, Allahabad.

Web References

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2. https://www.slideshare.net/bala1957/use-of-toposheets-in-civil-engineering-projects