

**Lesson
Four**

Rivers and Valleys

Aims

The aim of this lesson is to learn the techniques of describing the main features of:

- river valleys
- the rivers and streams which occupy these valleys

Context

You should now be able to indicate the shape of a river valley by means of an accurate cross-section. You also need to be able to look at a map and describe a river in terms of the direction of flow, tides and drainage pattern. At this stage we are concerned with how to recognize these on maps. Module One will look at River Environments in more detail. The next lesson will look at the effect of glaciation on a landscape and how this is shown on a map.



Oxford Open Learning

Introduction

This lesson introduces you to **topography**: the science or practice of describing a particular place, city, town, parish or tract of land. Topography is the accurate delineation or description of any locality. The map included in your course folder is a topographical map.

We will first look at a model of a river and its valley — in the form of an ideal **long profile** from source to mouth. This will give you an overview of features to be looked for on a map. The model summarises typical changes in the course of a stream and its valley from source to mouth.

As with all models, it is a simplification of reality, but it does show the main features of a drainage system which can be identified from an Ordnance Survey map.

Upper Course

RIVER — Irregular gradient with rapids and waterfalls. Few streams have tributaries.

VALLEY — V-shape, steep sides, interlocking spur.

Middle Course

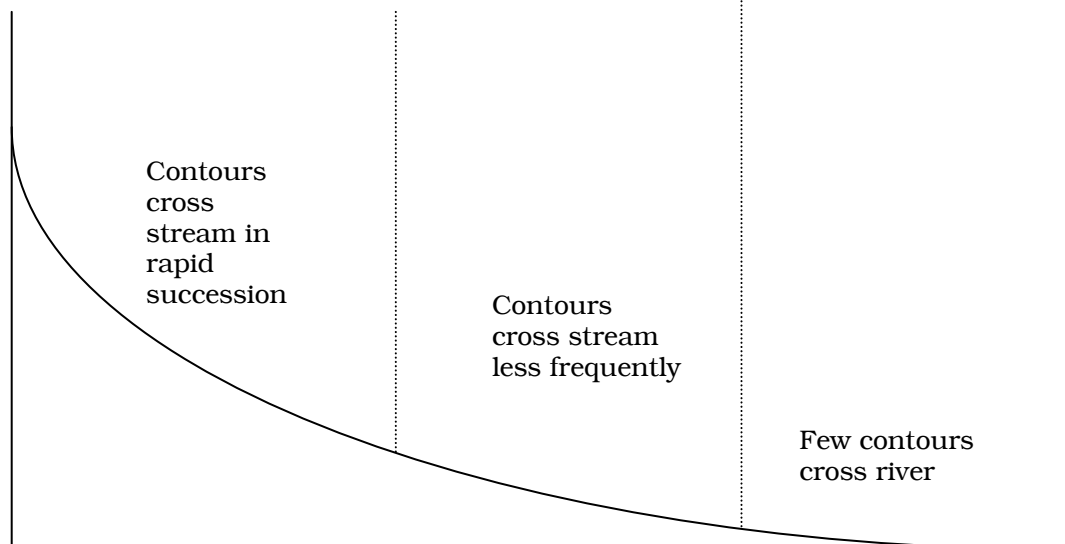
RIVER — More tributaries, meanders and flood plains start.

VALLEY — widens downstream with valley sides becoming straighter.

Lower Course

RIVER — Large meanders, Ox-bow lakes. Levees, very low gradient.

VALLEY — Much wider than meanders but sides very flat. Much artificial drainage.

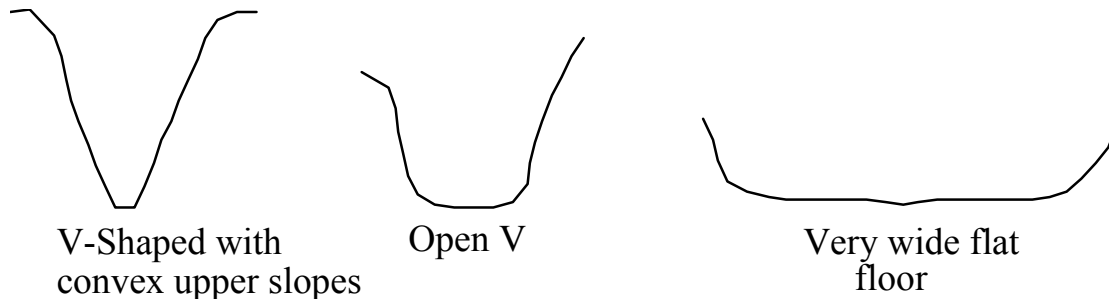


The Description of a Valley

In Lesson Three you saw that you can pick out the nature of a valley's sides by looking at contour patterns.

Drawing sketches of cross-sections of valleys is a technique that will help reinforce your written descriptions of valleys. As shown in Lesson Three, you need to choose a line of cross-section in the valley of your choice and estimate the contour spacing which will give you an appropriate angle of slope.


Here are some examples of sketch cross-sections of valleys which bring out the essential features of each.



The Description of a River

We will now learn how to describe the following:

- **direction of flow:** this can be worked out from the height value of contour lines crossing the stream. Spot heights also give another clue. As water cannot flow naturally uphill, it will flow down from the higher contour lines and spot heights to those that are lower.
- **speed of flow:** this cannot be readily interpreted from map evidence because water velocity is governed by factors which are more important than gradient — whether the channel is **straight** or **meandering** and whether part of the river has been **cut off** to form **ox-bow lakes**. Higher than normal amounts of precipitation will also affect speed of flow.
- whether the river is **tidal** along part of its course. You can tell this by examining the channel sides on the map. On 1:50,000 maps the banks are marked in black when the river is tidal but blue when the river is non tidal.

Activity 1	Describe the course of the River Aire (a tributary to the Ouse) shown in the map extract.
	

Drainage Networks

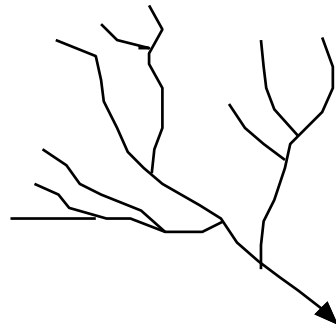
Introduction

So far, we have been considering individual rivers and their valleys. The patterns of **drainage networks** (i.e. a number of streams joining together) can be studied in definite areas called **drainage basins**. This is an area of land drained by its main stream and its **tributaries** (i.e. smaller streams which flow into the larger stream). Drainage basins are separated from each other by **watersheds**. A watershed is the ridge or area of higher land which divides the flow of surface water between neighbouring drainage basins. (Lesson 12 includes a diagram of a drainage basin.)

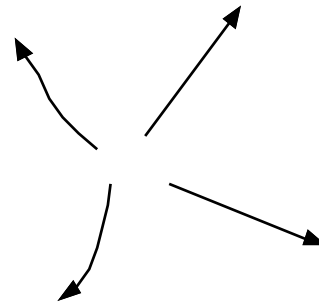
Drainage Patterns

Rivers can form almost any pattern which is shown on a map. However, there are several recognisable patterns which are described by their distinctive shapes. Here are some obvious examples:

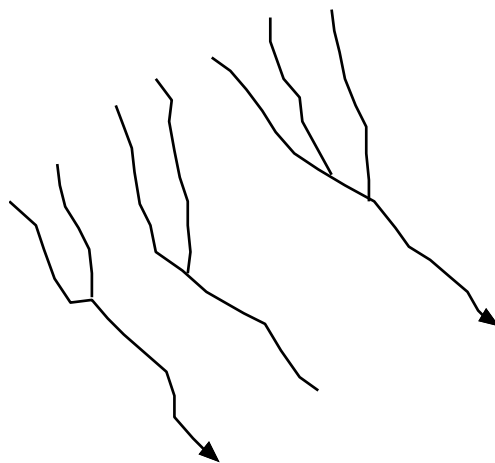
1. Dendritic



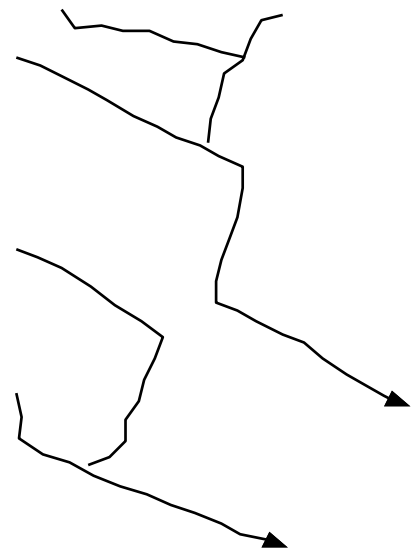
2. Radial



3. Parallel



4. Rectangular



You will find that most river networks have some resemblance to these examples. Let us now do an activity to see if we can distinguish drainage patterns on the map included in your course folder.

Activity 2

What can you say about the configuration (or arrangement of parts) of the river(s) from the evidence of the map? Describe some of the essential features of the configuration. Include a labelled sketch as part of your description.



Human intervention

Maps can also show us how humans have influenced rivers. This may be through affecting their course, flooding control, modifications for transport, e.g. locks, bridging or canalization.

Look at the map key and the map of the Goole area, provided for you at the start of the folder. What evidence can you see of human intervention? You might write a short paragraph to summarise your findings, including specific reference to map evidence, e.g. named features, locations and the grid references for these.

Revision

Revise the features of both valleys and the streams which occupy them. Also, go back to Lesson Two and make sure that you can recognise the features of valley side slopes.

Summary

You have now learnt how to describe the relief features of:

- a river valley in terms of straightness; width; shape of cross-section; and gradient.
- the river channel with reference to its width, shape in plan, tributaries and other distinguishing features.
- drainage basins in terms of scope.

Suggested Answers to Activities

Activity One

The river flows eastwards in a series of meanders of varying size. (You can tell that the river is flowing eastwards as it forms a tributary of the River Ouse.)

Activity Two

What we are seeing is the lower reaches of a major river, not long before it reaches the sea. There are a number of meanders and an extensive floodplain, especially before it reaches the town centre of Goole. At 723261, we see the confluence of a tributary (the Aire), into the main stem, or parent river (the Ouse). (Tributaries do not flow directly into the sea.)

The River Ouse is tidal (how do we know this? Check back to find out). The Dutch River is not natural. (How do we know this? Look at your map section for the answer.)

A sketch might help to show the essential features asked for in the question such as the direction of flow of the main streams; the names of any tributary streams (Aire, Dutch River); the pattern of the river network; the speed of flow as indicated by the river course: slower as it is near the sea. Be sure that you insert an approximate scale.