The big picture

This chapter is all about rivers, with the River Thames as our example. Here's the big picture …

- A river is water flowing to the ocean, or sea, or lake, or to another river.
- As it flows, it shapes the land – by picking up stones and soil in one place, and dropping them in another.
- We use rivers in many different ways, as they go on their journey.
- When a river overflows its banks, we get floods.
- The River Thames is the longest river in England.

Did you know?
- There are millions of rivers on Earth.
- There are about 5000 in the UK. (Some are very small.)

Your goals for this chapter

By the end of this chapter you should be able to answer these questions:

- What is the water cycle?
- How does the rainfall from the water cycle feed a river?
- Explain what each of these river terms means. (Draw sketches?)
  source *mouth* *tributary* *confluence* *river basin*
  watershed *floodplain* *river bed* *river banks*
- How do rivers shape the land? Use the terms *erode*, *transport*, and *deposit* in your answer.
- How do these get formed?
  V-shaped valley *waterfall* *gorge* *meander* *oxbow lake*
- In what kinds of ways do we use rivers? (At least five.)
- What causes floods? And which factors make flooding more likely? (See if you can give at least three.)
- Where does the River Thames rise, and which sea does it flow into?
- Name some settlements (cities, towns, villages) on the River Thames. (At least six!)

What if...
- …our planet had no rivers?

Did you know?
- The Nile in Africa is the world's longest river.
- It is 6853 km long.

What if...
- …you owned a river?

Why...
- … do rivers keep on flowing?

Why...
- … do we like rivers so much?

And then …

When you finish the chapter, come back to this page, and see if you've met your goals!

Your chapter starter

You are flying over a city at dawn. You look out the window. Page 78 shows the view.

What is that winding ribbon?

Look closely. Do you recognise anything on it?

Which city could this be?

What's the wide bright area at the top of the picture?

5.1 Meet the River Thames

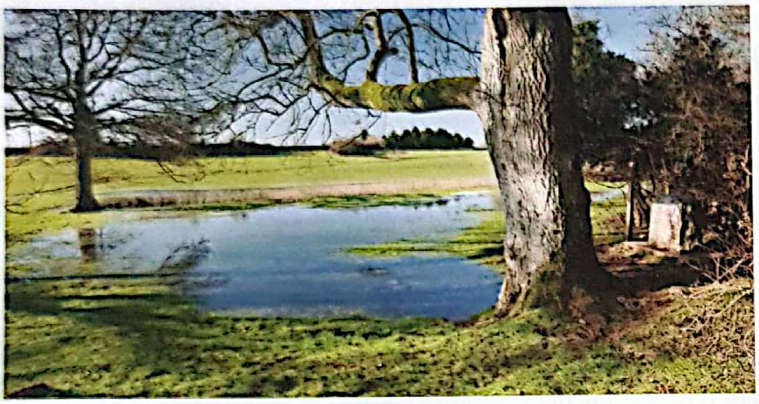
Here you'll learn about England's longest river, and its journey from source to sea.

Did you know?
- The River Severn is the longest river in the UK.

Why...
- ... do we give rivers names?

It starts as a puddle!

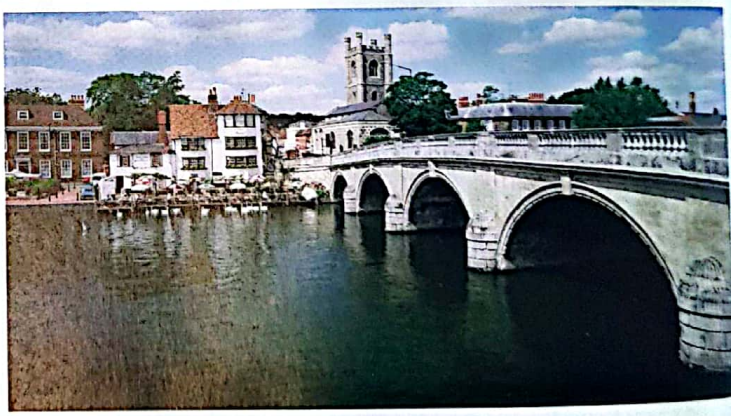
Look at these photos of the River Thames.



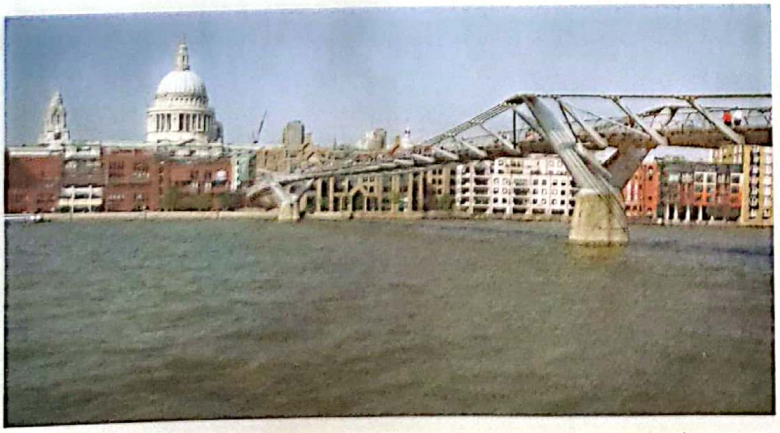
This is the start or **source** of the river: a spring seeping up in a field in the Cotswolds. (Look at the map on the next page.) The site is called Thames Head.

Here is the Thames 20 km later, near Cricklade. It is just a stream, wandering through meadows. But it is on a mission. It is heading for the North Sea, over 300 km away.

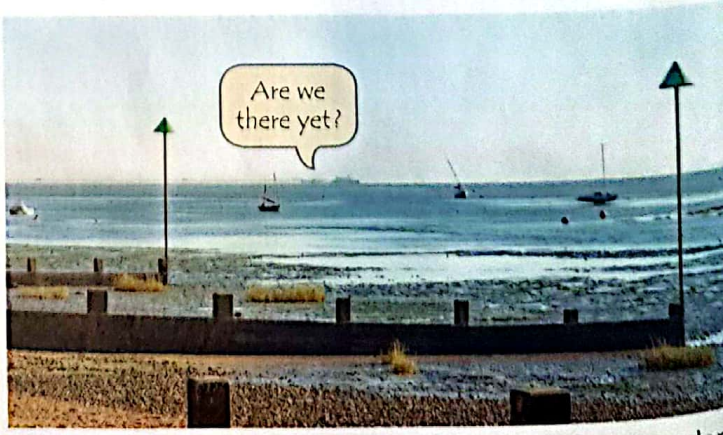
This is it 20 km further on, at Lechlade, on the edge of the Cotswolds. The stream is now a river. It is deep enough for boats and barges.



This is Henley, half way on the river's journey. Between the source and here, fifteen smaller rivers join the Thames. No wonder it has got bigger.



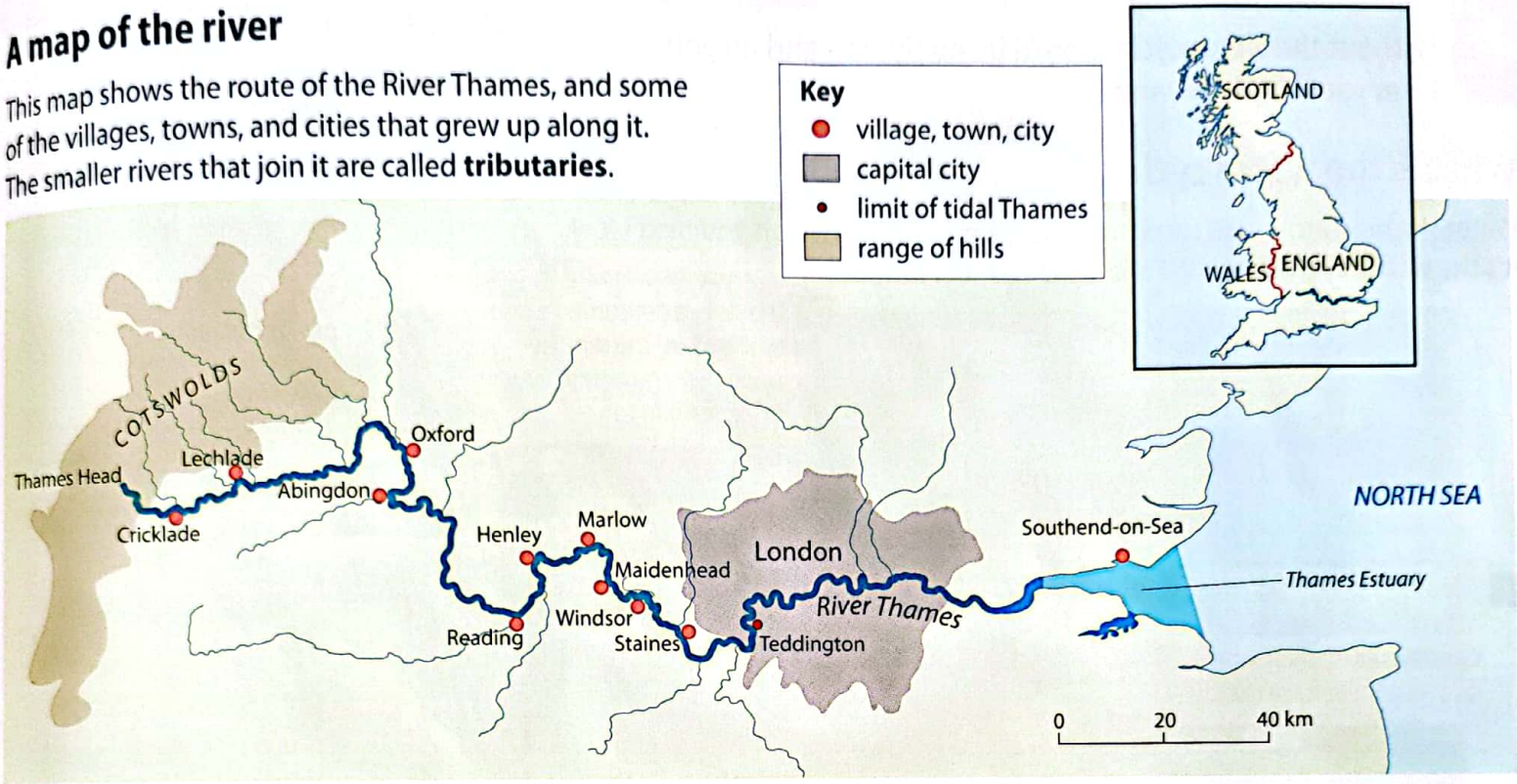
And here it is in London! The Thames flows through the city. That bridge is the Millennium bridge, and the building with the white dome is St Paul's Cathedral.



The journey's end. Over 50 km from the centre of Londor and 346 km from its source, the Thames flows from its wi **mouth** – the Thames Estuary – into the North Sea.

A map of the river

This map shows the route of the River Thames, and some of the villages, towns, and cities that grew up along it. The smaller rivers that join it are called **tributaries**.



The tidal Thames

The photo on the right shows the Thames in London. Find a similar photo on page 80. What do you notice?

Both show the same scene. But the water level is different. That's because the Thames is **tidal**, from Teddington – marked by a red dot on the map above – to the sea.

As the tide rises in the North Sea, sea water moves up the Thames Estuary and through London. The water level in the river rises. As the tide falls, water drains away again.

The water level on the tidal Thames changes non-stop, from high to low tide and back. There are two high tides and two low tides each day.

▲ *Low tide in London. Some river bed is showing. 6 hours from now, the water level will be several metres higher, like on page 80.*

Your turn

1 See if you can give six facts about the River Thames. Include facts about its length, and location in the UK.

2 Now draw a sketch map of the Thames. You do not need to show its tributaries. But mark in and label:
- the Cotswolds, the range of hills where it rises
- at least six settlements (cities, towns, villages) along it
- the Thames Estuary, and the North Sea
- the tidal stretch of the river. (Use a different colour?)

3 What exactly is the Thames Estuary?

4 See if you can explain these facts.
- **a** The Thames has much more water in it by the time it reaches London, than it had at Lechlade.
- **b** The water in the Thames in London is a bit salty.
- **c** The Thames pours over 60 million cubic metres of water into the North Sea per day – and still does not run dry.

5 Do rivers really matter to us? Decide, and give your reasons!

5.2 It's the water cycle at work

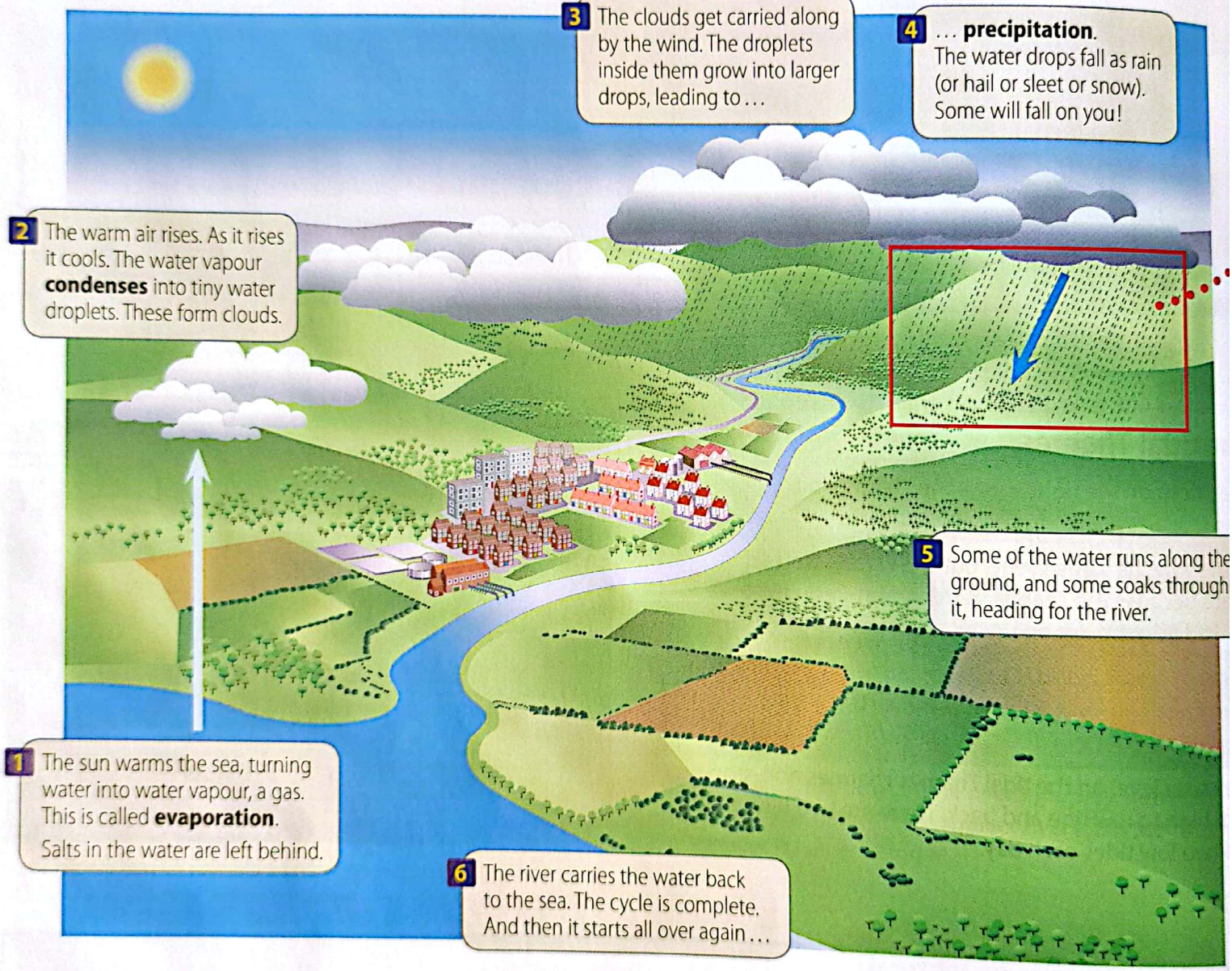
Without the water cycle there'd be no rivers – and no you. Here you'll find out why.

What is the water cycle?

Water sloshing around in the sea this week may rain down on you next week. It's the **water cycle** at work. Follow the numbers …

Did you know?

- The rain that falls on you has fallen millions of times before.
- It may have fallen on a dinosaur.

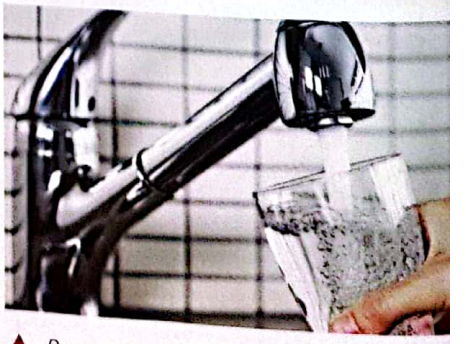


We'd die without the water cycle

We depend on the water cycle. Our bodies need water. There is plenty in the sea. But we can't drink it, because it's too salty.

The water cycle turns salty water into **fresh water**, which we can drink. It scatters it over a large area, as rain. The rain feeds rivers, and underground stores of water. And we take our water from these.

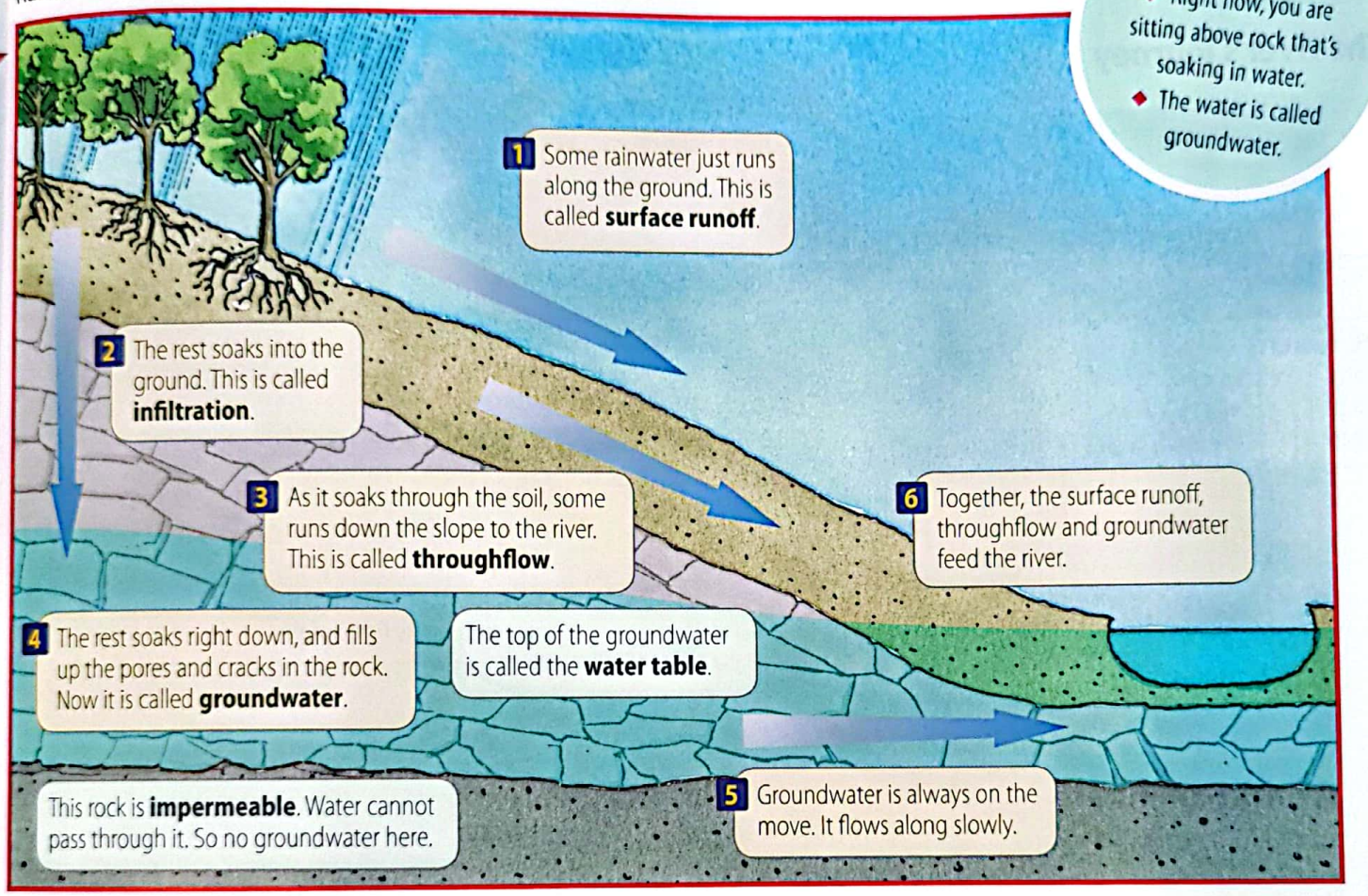
Crops need fresh water too. The rain provides it. No rain, no crops. No crops, no food! So without the water cycle, we could not survive.



▲ Borrowing from the water cycle.

How rainwater reaches the river

Rain makes rivers! Follow the numbers to see how:

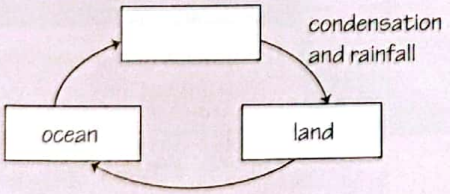


Did you know?

- Right now, you are sitting above rock that's soaking in water.
- The water is called groundwater.

Your turn

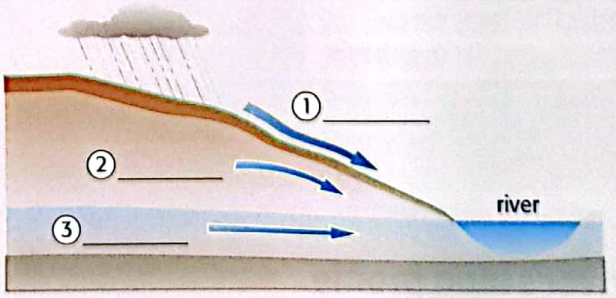
1 a Make a larger copy of this flow-chart for the water cycle.



b Then add these labels in the correct places:
rainwater feeds rivers *evaporation* *atmosphere*

2 A – G below are definitions.
a You have to find the matching words in this unit!
b Then write out the words and their definitions.
- A this water is held in rock, underground
- B the name for water in gas form
- C when water soaks down through the ground (*i*....)
- D a longer name for rainfall
- E the process that turns water into a gas (*e*....)
- F the process that turns water gas into water
- G does not let water pass through

3



Copy this diagram, to show how rainwater reaches a river. Add the missing labels, and a title.

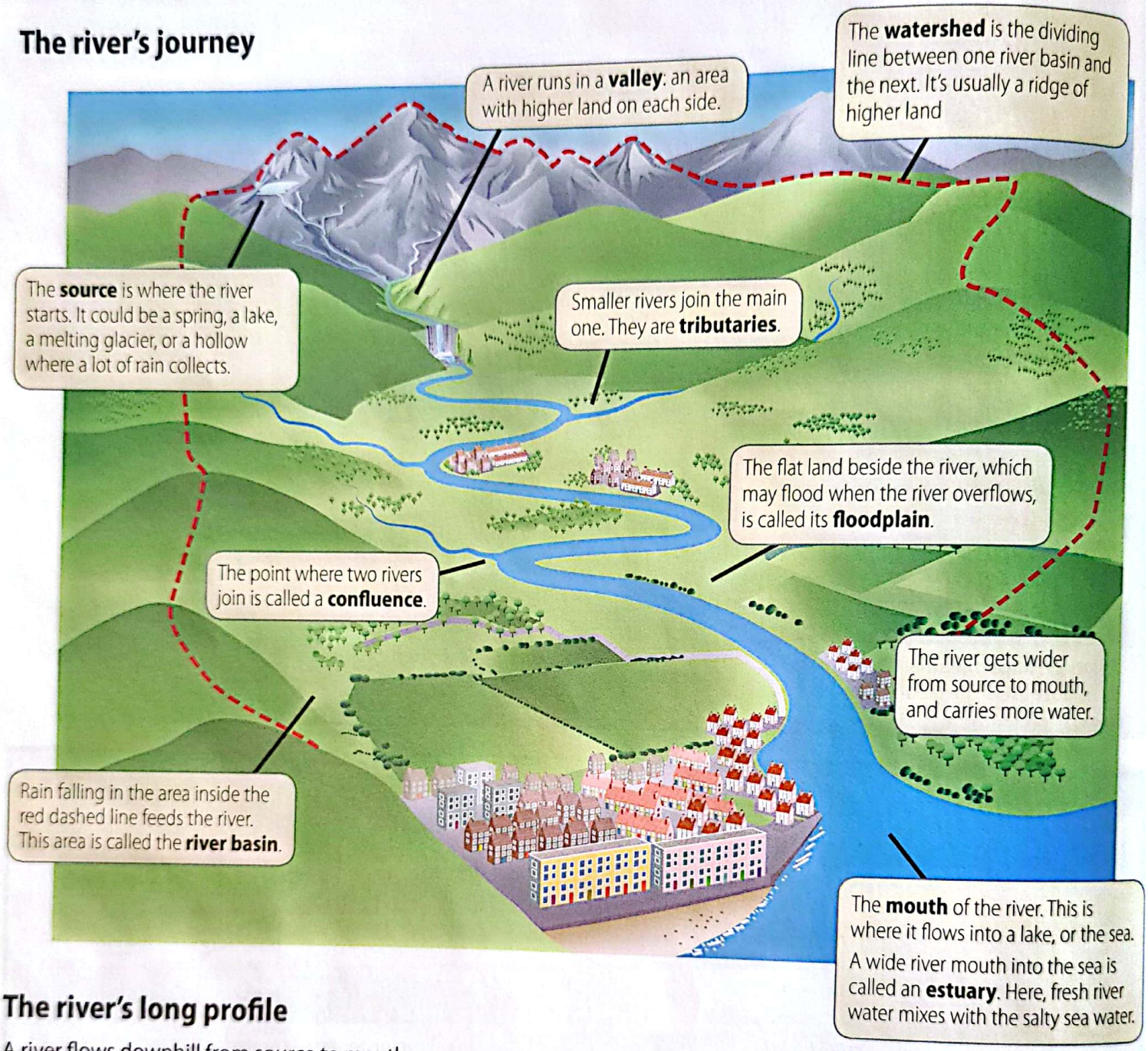
4 See if you can explain why:
a rain does not sink right down to the centre of Earth
b the water level in a river falls, if there's no rain for months
c a river can fill up very fast in very wet weather

5 Suddenly the water cycle stops working. No more evaporation from the ocean! No more rain! And now, two months later, you have to write a news report about how the UK is coping with this big change. Not more than 250 words.

5.3 A closer look at a river

Here you'll learn more about the course of a river – and take another look at the River Thames.

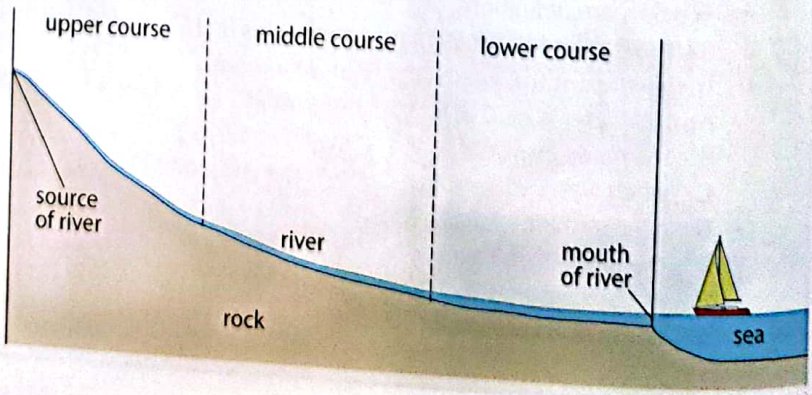
The river's journey



The river's long profile

A river flows downhill from source to mouth. This drawing shows its **long profile** – a side view, showing how the slope changes.

- The long profile curves down like a saucer.
- You can divide the river into three parts:
  - the upper course, where the slope is steepest
  - the middle course, where it is less steep
  - the lower course, where it flattens out.
- This river finally reaches **sea level**.

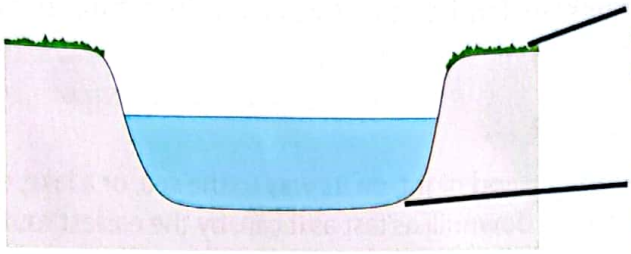


The river's channel

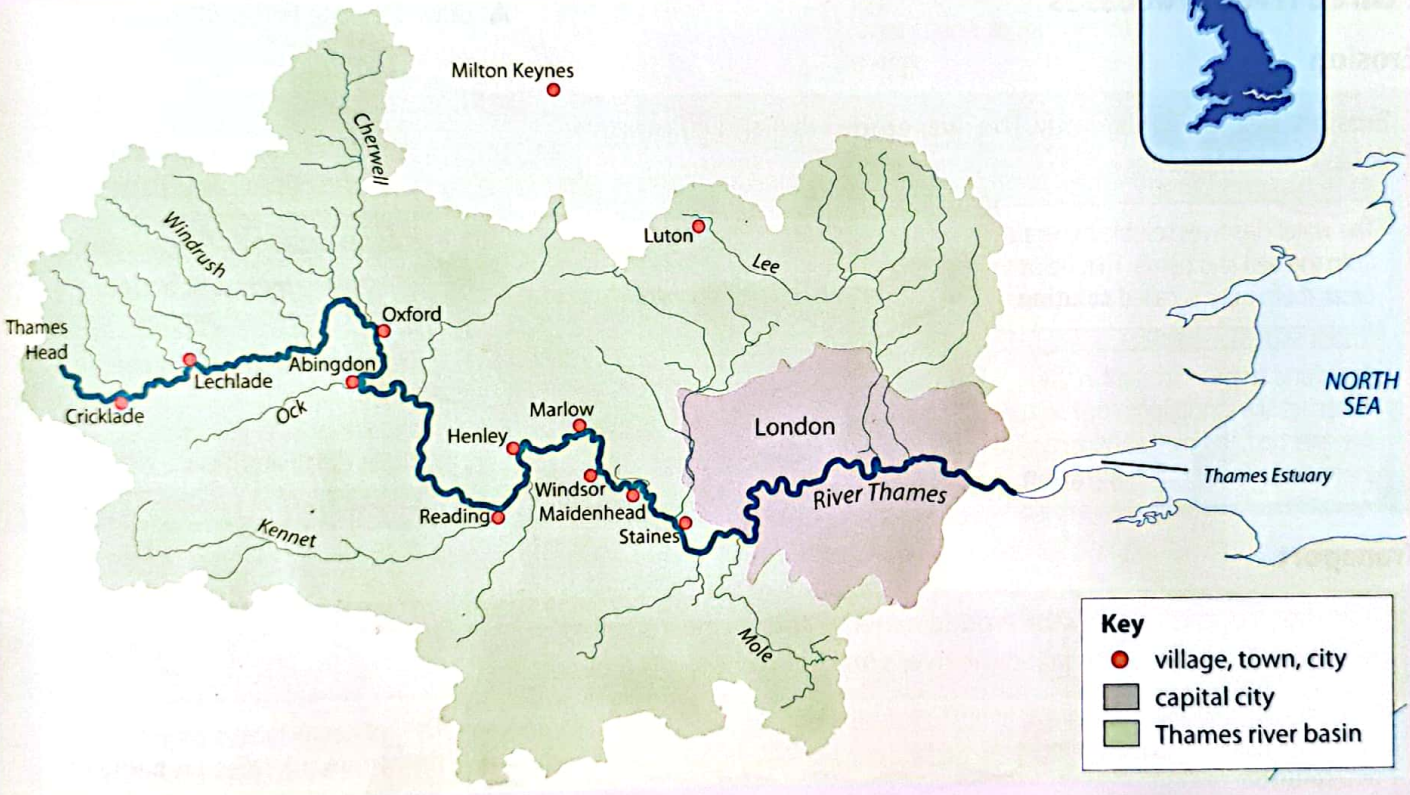
A river carves out a **channel** for itself.

This diagram shows the channel in **cross-section** (as if you'd sliced across it).

Its shape changes along the river, as you'll see later. In the upper course it is shaped like a V.



Your turn



1 Terms **A** – **F** are about rivers. But they are jumbled up!

A crouse **B** tmuoh **C** lavely
D tsyaeru **E** ooldfianlp **F** thareesdw

a First, see if you can unjumble each term.
b Then explain what it means.

2 The map above shows the River Thames and its basin. Some of the tributaries are named.

a Give the names of three tributaries of the River Thames.
b Which tributary joins the Thames at Oxford?
c Which one is shown in the photo on page 32?
d Name the place at the confluence of the Thames and:
i the Ock ii the Kennet

3 Rain that falls at Luton ends up in the Thames – which is at least 40 km away. See if you can explain how this happens.

4 Will rain falling at Milton Keynes reach the Thames? Explain.

5 The first box below gives places on the Thames's journey.

Thames Estuary	*Windsor*
Lechlade	*Reading*
Oxford	*Staines*
Thames Head (source)	

	12 m
110 m	66 m
0 m	29 m
45 m	73 m

a First, list the places in order, from the start of the journey.
b Then beside each place, write its height above sea level, in metres. Use the heights in the second box.

6 Now, see if you can explain why …

a a river grows wider and deeper as it nears the sea
b the biggest settlement (town, city) along a river is often close to its mouth.

5.4 A river at work

A river changes the land it flows over. How does it do that? Find out here.

▲ *Down the slope, by the easiest route.*

Off down the slope ...

A river flows non-stop, day and night, on its way to the sea, or a lake, or to join another river. It flows downhill as fast as it can, by the easiest route.

As it flows, the river changes the land it flows over. It wears it away in some places by lifting material from it. It carries the material along. And then it drops it somewhere else. Let's look at those processes now.

The three river processes

1 Erosion

Erosion means *wearing away*. The river **erodes** the land it flows over. Look how it happens:

The water dissolves soluble minerals from the bed and banks. That helps to break them up. It is called **solution**.

Rocks and stones and sand in the water act like sandpaper. They scrape the river bed and banks and wear them away. This is called **abrasion**.

In a fast-flowing river, water is forced into cracks in the bank. Over time this breaks the bank up. It is called **hydraulic action**.

The rocks and stones wear each other away too. They bang together and knock bits off each other. This is called **attrition**.

2 Transport

Next, the river carries away the eroded material. This process is called **transport**. The material is called the river's **load**. Look how it is moved:

Dissolved material is carried along as a **solution**. You cannot see it.

Small light particles of rock and soil are carried along as a **suspension**. They make the water look cloudy or muddy.

The heavier material is carried along the bottom. It is called the **bedload**. The larger stones and rocks roll along. Sand and small stones bounce along.

3 Deposition

Then, as the river reaches flatter land, it loses energy. As it loses energy, it drops or **deposits** its load. The deposited material is called **sediment**.

The biggest, heaviest, stones and pebbles are deposited first. Then smaller ones. And last, the smallest particles.

But dissolved material stays in the water. It will end up in the lake or sea.

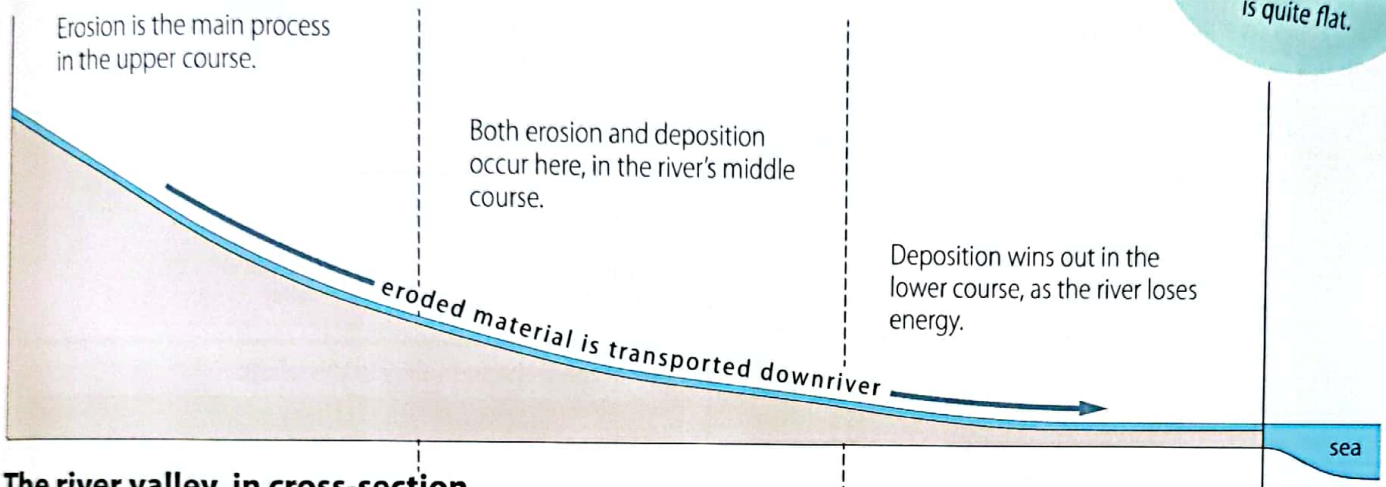
What happens where?

This diagram shows how the balance between the processes changes, as you go down the river. Look how the shape of the valley and channel change too.

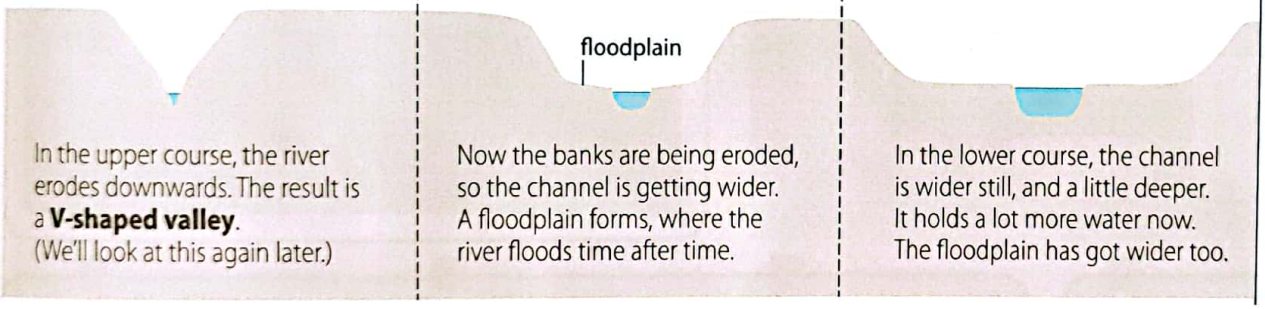
Did you know?

- The Thames rises only 110 m above sea level ...
- ... so its long profile is quite flat.

The river's long profile



The river valley, in cross-section



Your turn

1 **A**

material is carried away
material is worn away
material is dropped

B

erosion
deposition
transport

a List **A** shows the processes that go on in a river. Write them in the correct order.
b Beside each, write the correct term from **B**.

2 Now look at photo **A** on page 86.
a Which is the main process going on here? Explain why you think so.
b What part is being played in this process by:
i the water itself? ii the stones in the river?
Use the correct technical terms in your answers.

3 a Look at photo **B**. What's going on at **X**?
b Do you think the river is flowing quickly, or slowly, at **X**? Explain why you think so.
c Could **X** be in the river's upper course? Explain.

4 You are dying of thirst. Which river would you rather drink from: the one in photo **A**, or the one in photo **B**? Explain.

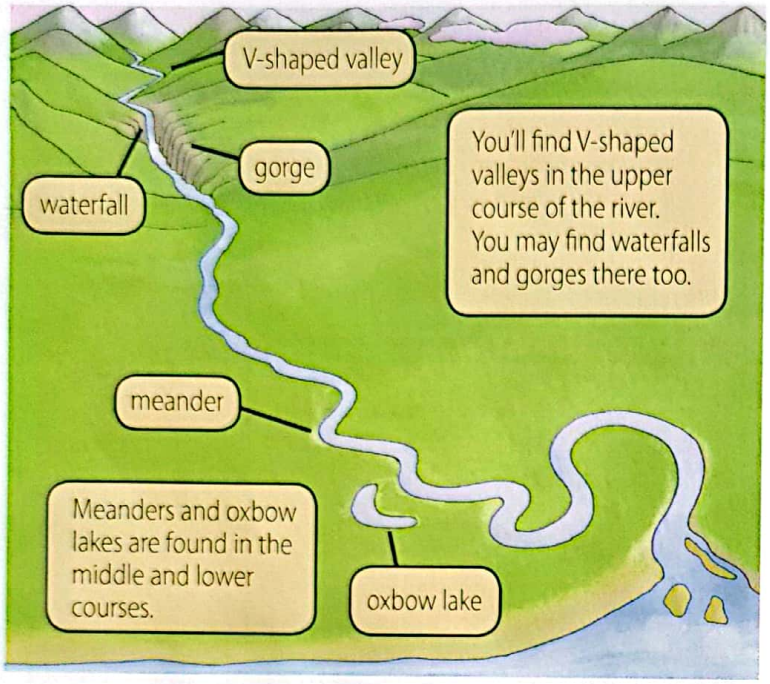
5 Make a copy of the drawing above, showing the long profile and cross-section. Add ONLY these labels, in the right places:
the river's long profile *cross-section through the river valley*
mainly erosion *upper course* *mainly deposition*
both erosion and deposition *lower course* *middle course*
river channel *floodplain* *V-shaped valley*
Then give your drawing a title.

5.5 Five landforms created by the river

Find out about five of the landforms a river may create on its journey.

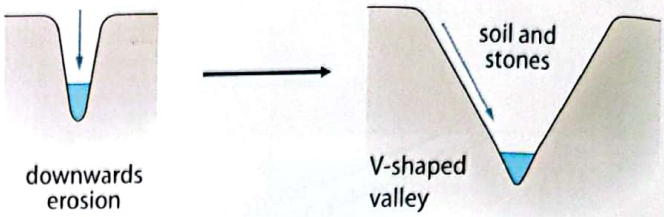
The five landforms

This drawing shows five landforms created by rivers. The boxes will tell how they formed.



A V-shaped valley

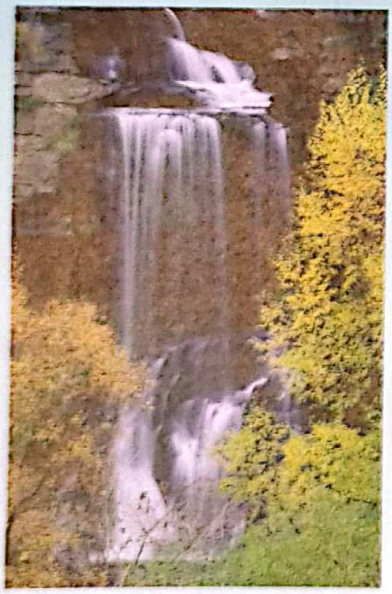
In its upper course, a river erodes sharply downwards, cutting like a knife. This gives a steep valley. Rain washes soil and stones from the sides. So over time, the valley becomes V-shaped.



Look at the V-shaped valley in this photo.

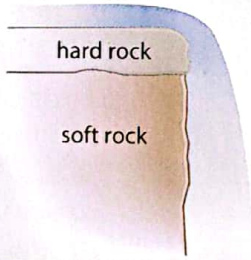
A waterfall

A waterfall is where water tumbles over a ledge of hard rock.

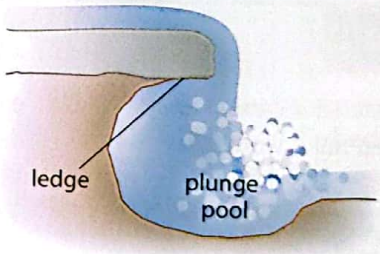


The waterfall forms because there is softer rock below the hard rock, and it is easier to erode.

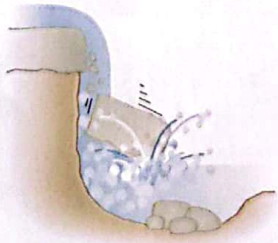
From a waterfall to a gorge



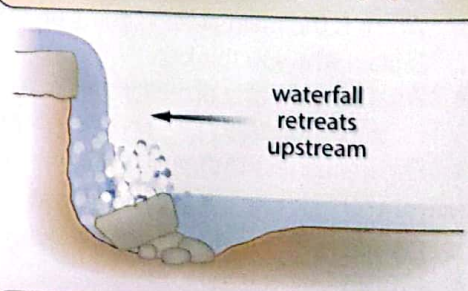
1 The hard rock erodes very slowly. The soft rock below it erodes much faster.



2 Erosion of the soft rock leaves a ledge of hard rock and a hollow called a **plunge pool**.



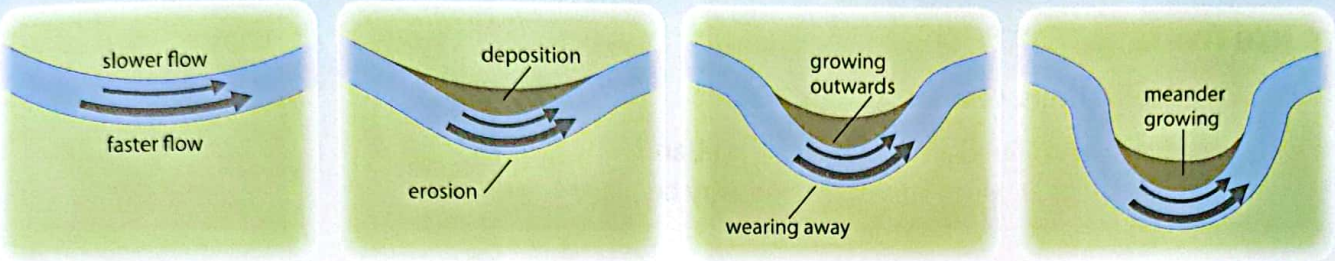
3 In time, the ledge falls into the plunge pool. The debris from it helps to speed up erosion.



4 Steps 1–3 are repeated. The waterfall gradually retreats upstream, carving out a **gorge**.

A meander

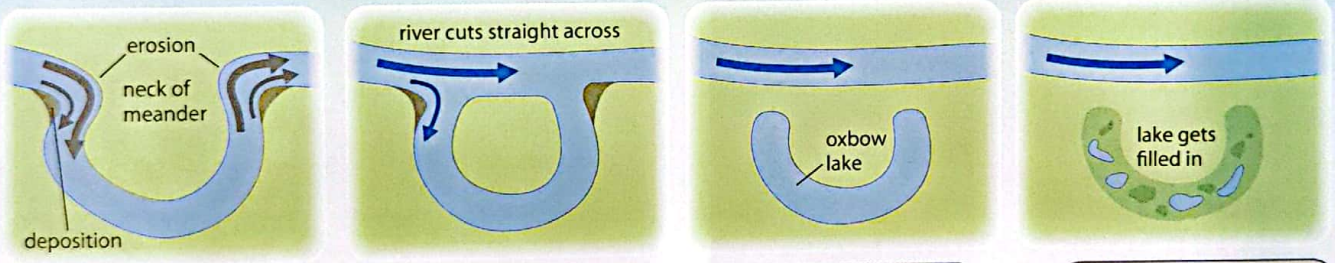
A **meander** is a big bend in a river. It starts as a slight bend. Look how it develops:



1. Water flows faster on the outer curve of the bend, and slower on the inner curve.
2. So the outer bank gets eroded, but material is deposited at the inner bank.
3. As the outer bank gets worn away, and the inner one grows, a meander forms.
4. Over time, as the process continues, the meander grows more 'loopy'.

An oxbow lake

An **oxbow lake** is a narrow U-shaped lake near a river. It's a meander that got cut off.



1. As erosion continues, the neck of the meander is worn away. It gets narrower and narrower.
2. Then, during flooding, the river takes a shortcut – straight across the neck.
3. Soon the loop of the meander gets sealed off. It turns into an oxbow lake.
4. In time the lake will get covered with weeds, and fill with soil, and disappear.

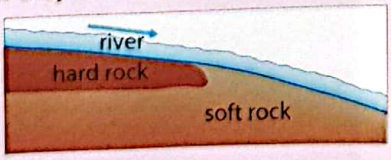
Your turn

1 Make a table like this, and complete it for the five landforms named in first drawing on page 88.

Landform	Created by ...
V-shaped valley	erosion

2 V-shaped valleys are found in the upper courses of rivers. Draw a diagram to show how they form. Label it.

3 Look at this river, flowing over layers of rock. Draw diagrams to show how a waterfall develops.



4 Most rivers have meanders.
- **a** What is a meander?
- **b** Explain how a meander forms. (Use diagrams?)

5 Look at the photo above.
- **a** What is happening: **i** at **A**? **ii** at **B**?
- **b** Draw and label a sketch to show how this part of the river might look 150 years from now, after many floods.

5.6 Rivers and us

Find out how we make use of rivers, with the River Thames as example.

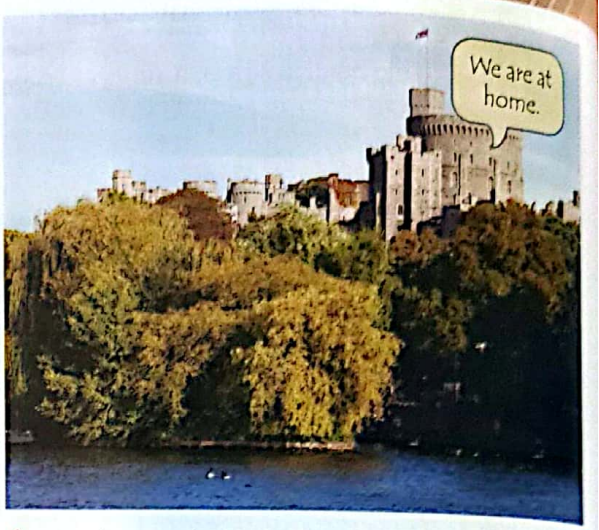
How we use rivers

Think about how wonderful rivers were, for our ancestors.

They gave water, and fish. They offered an easy way to travel, and transport things, if you had a boat. Much later, when industry began, they powered spinning mills and other factories.

So it's not surprising that we chose to live beside rivers. Over 70 **settlements** – villages, towns, and cities – have grown up along the Thames. (And more along its tributaries.)

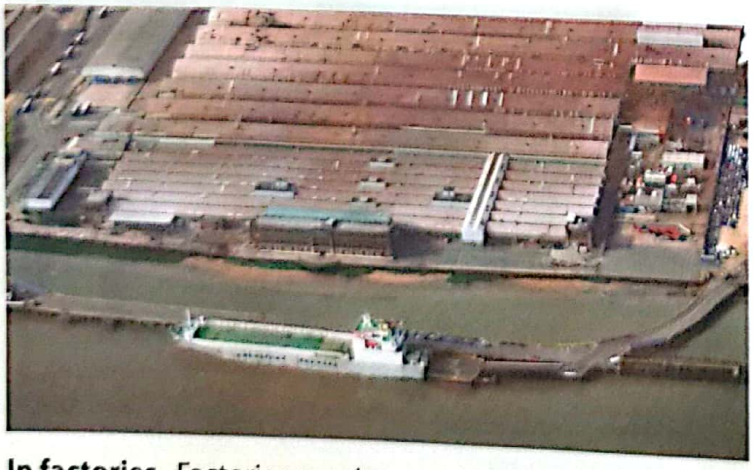
And we still depend a lot on rivers, just like our ancestors.



▲ *Windsor Castle, by the Thames. It's one of the royal homes. Henry VIII is buried in the chapel.*

Making use of the River Thames

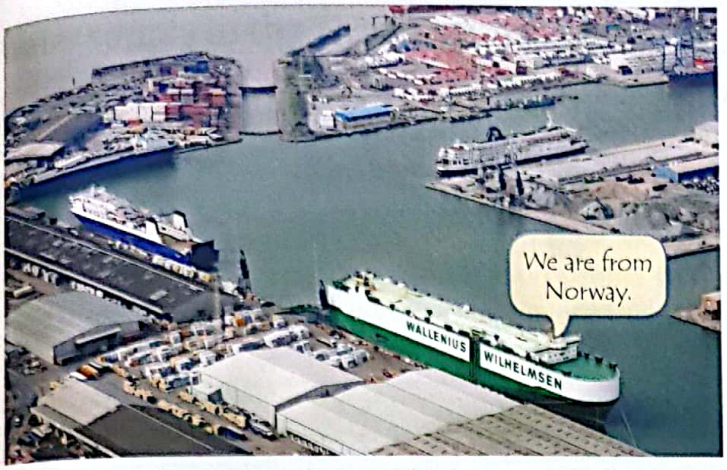
As a water supply. That's the main use. Water is taken from the Thames, cleaned up, and piped to millions of homes. Then the used water is cleaned up and put back in the river. (See page 92.)



In factories. Factories use river water for washing materials, and cooling equipment. This is the Ford factory on the bank of the Thames at Dagenham, east of London. It takes water from the river.

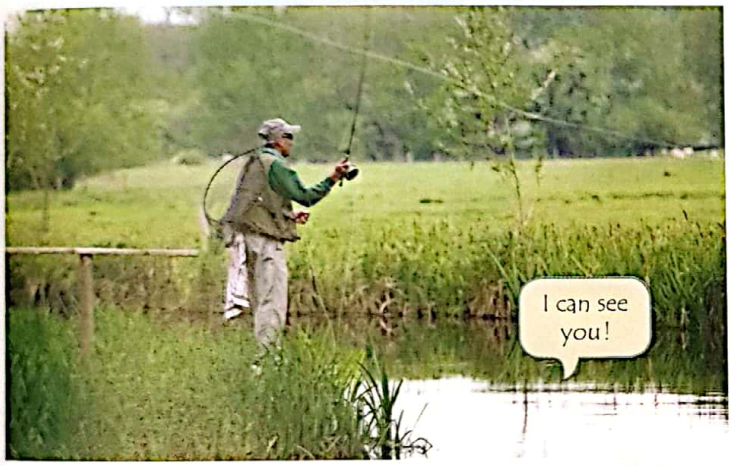
In producing electricity. That's the second biggest use. In power stations, steam drives turbines. River water is then used to cool the tanks of steam. This power station is beside the Thames at Didcot, not far from Oxford.

In farming. For much of its journey, the Thames passes through rural areas, and farmland. Some farmers use river water to spray their crops in dry weather, and as drinking water for their herds.



For transporting cargo. Roman ships once sailed right up the Thames into London, bringing goods from Italy. Today, ships dock at the Port of London, east of the city. (They are too large to go further.)

For transporting people. In London, thousands of people take river buses to work every day. Thousands of tourists enjoy Thames cruises. This shows a cruise boat at Henley, half way along the Thames.

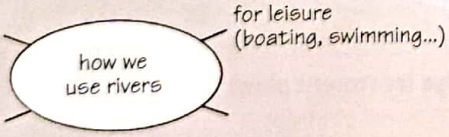


For fishing. People once fished in the Thames for their dinner. Today they still fish – for sport. (Over 250 000 fishing licences are bought every year, for fishing in the Thames and its tributaries.)

For other sport and leisure activities. There's rowing and canoeing. Swimming. Picnics. And river walks. You can follow the Thames Path for 294 km, from the source of the river to London.

Your turn

1 a Show all the ways the River Thames is used. Give your answer as a spider map. You could start like this:



b Now number them in what you think is their order of importance, for people living in the Thames basin. 1 = the most essential for well-being.

2 Choose four uses of the Thames that are *not* likely to apply at Cricklade, near its source. (See the photo on page 80.) Explain your choice.

3 Now choose one use of the Thames that is *not* likely to apply in central London. Again, explain your choice.

4 We use other rivers in the UK too, not just the Thames. See if you can pick out two uses that are likely to apply to *all* rivers. Give your reasons.

5 River water is used in power stations that burn oil and gas, to make electricity. Many fast-flowing rivers produce electricity without burning anything. It is called *h* … ? (Glossary?)

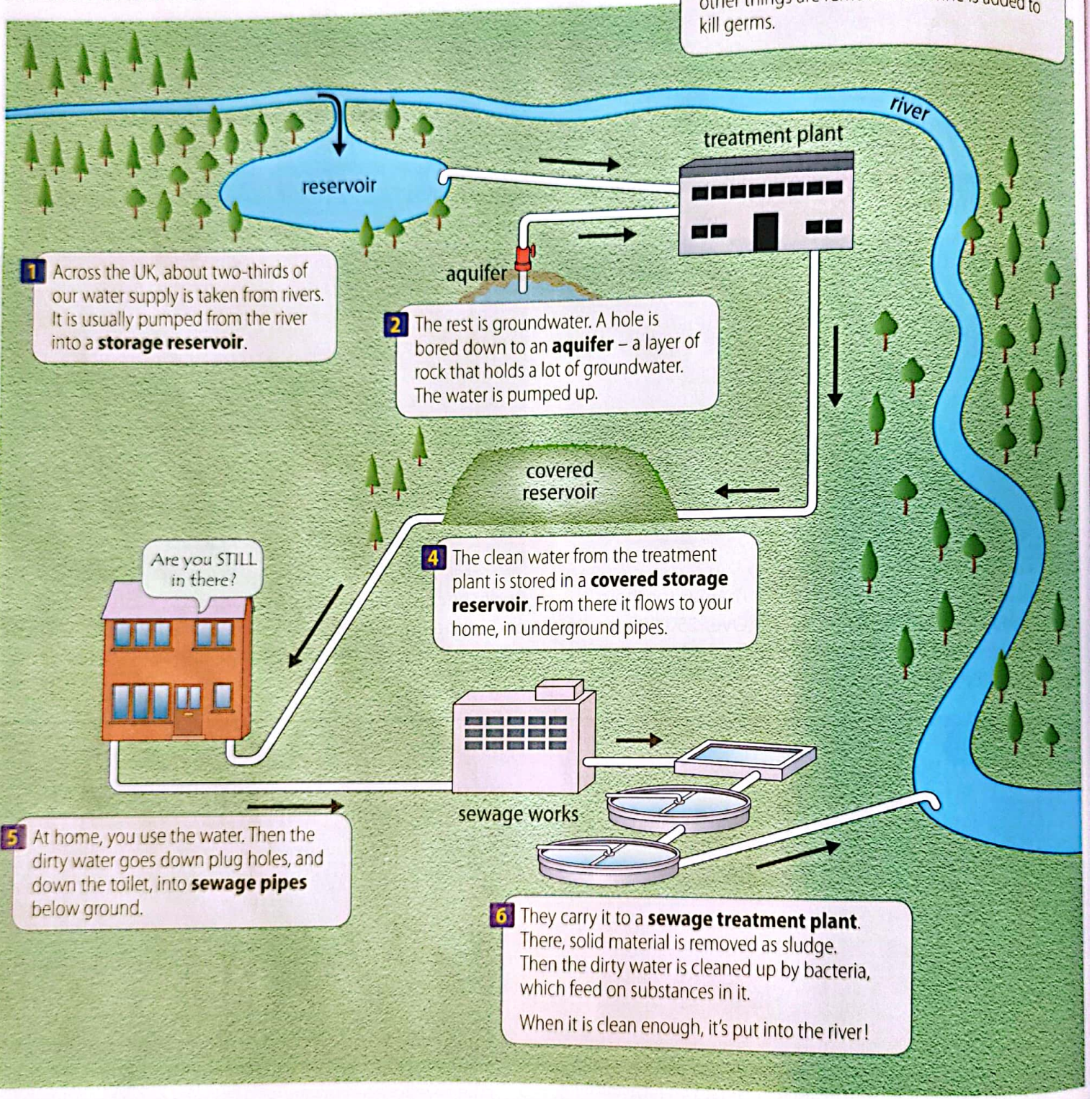
6 Now turn to page 97. The OS map shows Purley-on-Thames, a suburb of Reading. This map has clues about some past and present uses of the Thames. See how many you can find. (The key on page 138 may help.)

5.7 Our water supply

We depend on rain from the water cycle, for our water supply. We pump it from rivers and under the ground. Find out more here.

Where our tap water comes from

Turn on the tap, and out comes water. Magic!
But where does it come from? Follow the numbers.



1 Across the UK, about two-thirds of our water supply is taken from rivers. It is usually pumped from the river into a **storage reservoir**.

2 The rest is groundwater. A hole is bored down to an **aquifer** – a layer of rock that holds a lot of groundwater. The water is pumped up.

3 The water goes to a **water treatment plant** to be cleaned up. Particles of soil and sand and other things are removed. Chlorine is added to kill germs.

4 The clean water from the treatment plant is stored in a **covered storage reservoir**. From there it flows to your home, in underground pipes.

5 At home, you use the water. Then the dirty water goes down plug holes, and down the toilet, into **sewage pipes** below ground.

6 They carry it to a **sewage treatment plant**. There, solid material is removed as sludge. Then the dirty water is cleaned up by bacteria, which feed on substances in it.

When it is clean enough, it's put into the river!

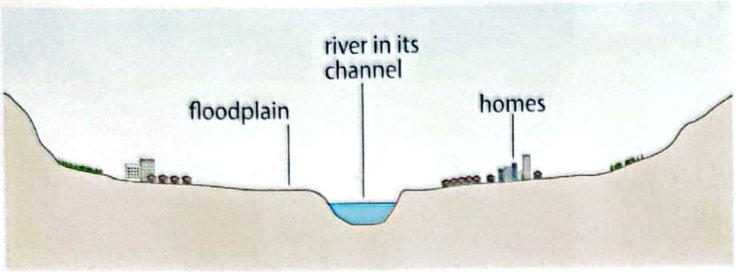
So we just borrow water from the water cycle. We take water from rivers and aquifers, clean it, use it, clean it again, and put it back in the rivers.

5.8 Floods!

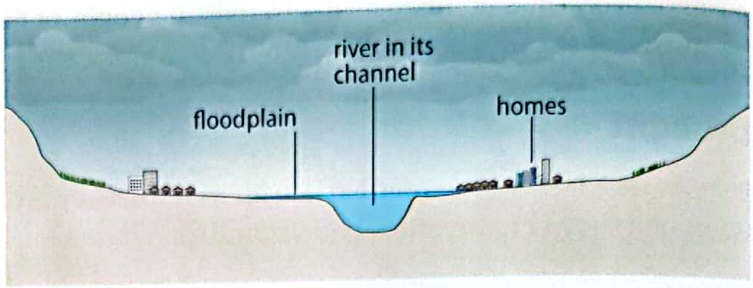
What are floods? And what causes them? Find out here!

What are floods?

Floods occur when water overflows the river's channel. Look:



1 Here the river is flowing in its channel, as usual. Alongside the river is the floodplain, a fairly flat area that is likely to flood. There are people living on it.

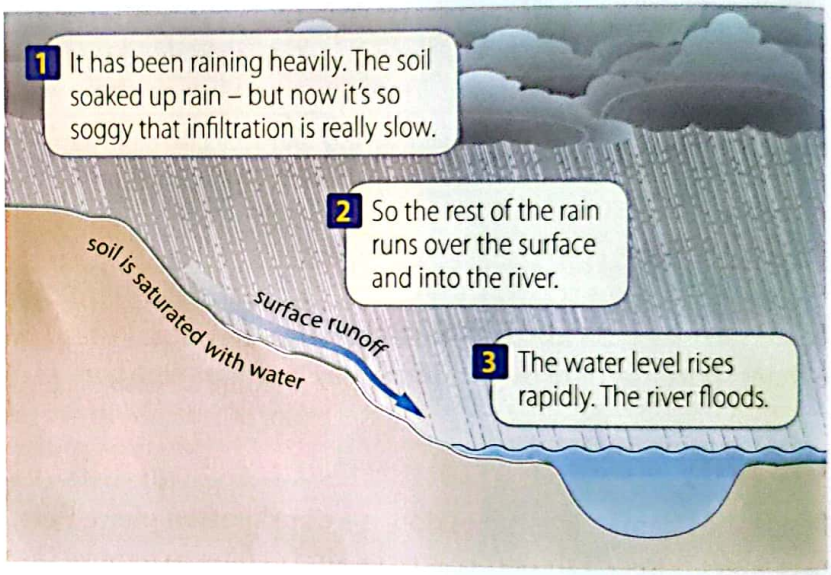


2 It has been raining heavily for weeks. The channel filled right up, and now the water has overflowed. That means trouble for some of those people!

What causes floods?

Heavy rain is the main cause. It quickly finds its way to the river, as this drawing shows. The river's channel overflows.

When there is a lot of snow and it melts quickly, that can cause floods too.



Flash floods

A burst of very heavy rain can cause a sudden flood called a **flash flood**. This happens so fast that people get no warning. They can get trapped, and drown.

Adding to the flood risk

If rain can soak into the soil quickly, there is less chance of flooding. So anything that slows down infiltration, or prevents it, will add to the flood risk. Study the drawing on the next page. Then try these 'Your turn' questions.

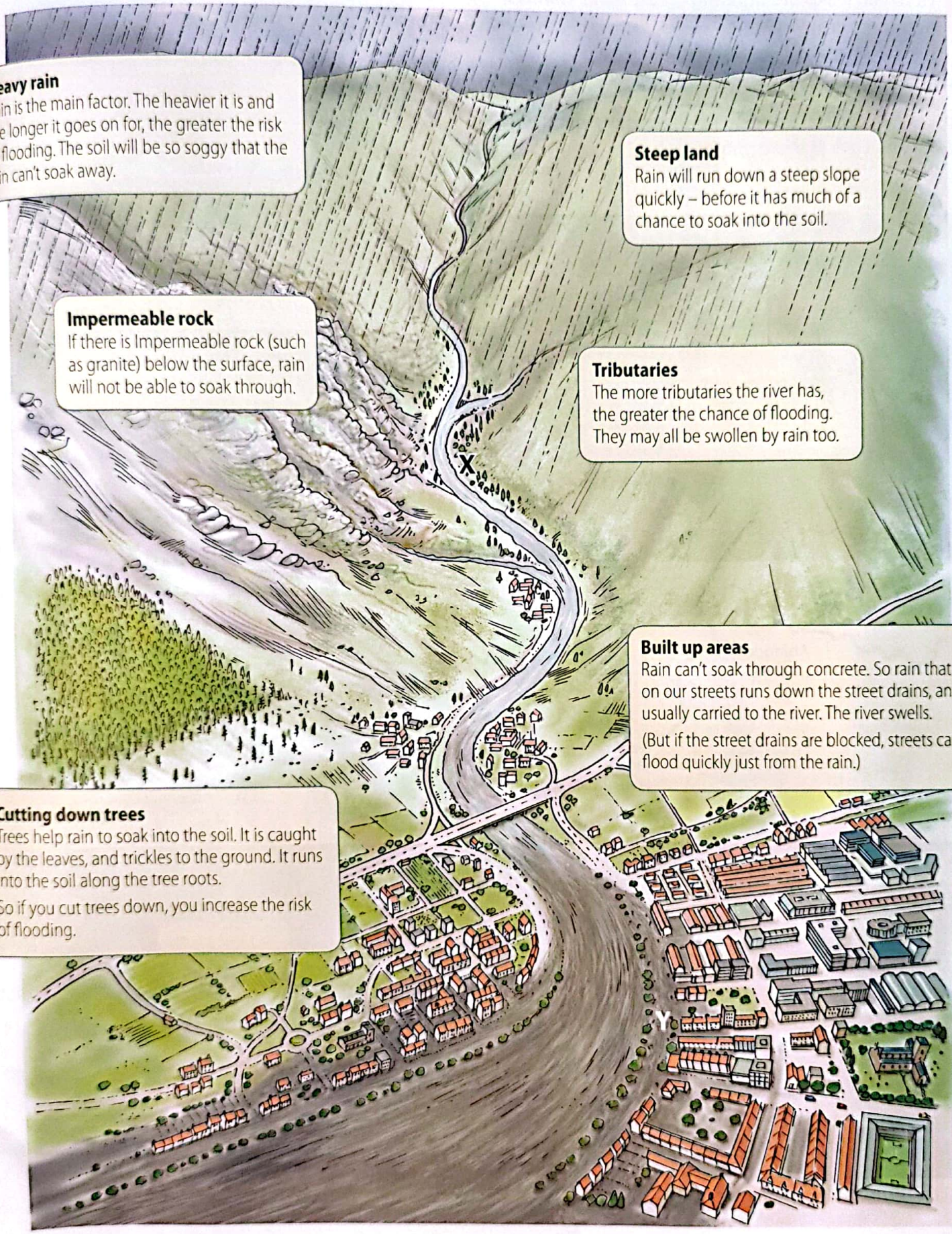
Your turn

1 The sentences below explain how a flood occurs. They are in the wrong order. Write them in the correct order.
- The river fills up with water.
- The ground gets soaked.
- More rain runs over the ground and into the river.
- Heavy rain falls for a long period.
- The water rises over the banks.
- Infiltration slows down.

2 a List all the factors that contribute to flooding.
b Now underline the *natural* factors in one colour and the *human* factors in another.
c Which group of factors can we do something about?

3 a Look at page 95. Why are floods:
i not really a problem, if they occur at **X**?
ii a big problem, when they occur at **Y**?
b How would you stop floods reaching the homes at **Y**?

Factors that contribute to flooding



Heavy rain
Rain is the main factor. The heavier it is and the longer it goes on for, the greater the risk of flooding. The soil will be so soggy that the rain can't soak away.

Steep land
Rain will run down a steep slope quickly – before it has much of a chance to soak into the soil.

Impermeable rock
If there is Impermeable rock (such as granite) below the surface, rain will not be able to soak through.

Tributaries
The more tributaries the river has, the greater the chance of flooding. They may all be swollen by rain too.

Built up areas
Rain can't soak through concrete. So rain that falls on our streets runs down the street drains, and is usually carried to the river. The river swells.

(But if the street drains are blocked, streets can flood quickly just from the rain.)

Cutting down trees
Trees help rain to soak into the soil. It is caught by the leaves, and trickles to the ground. It runs into the soil along the tree roots.

So if you cut trees down, you increase the risk of flooding.

5.9 Flooding on the River Thames

Here you'll explore flooding on the River Thames, and some reasons for it.

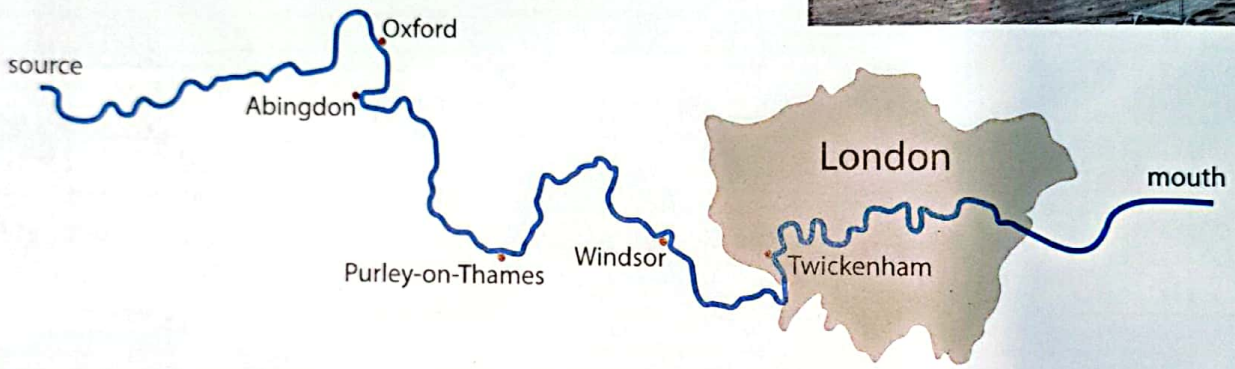
Year after year ...

Almost every year, there is flooding somewhere along the River Thames. Look at these photos.

▼ *Twickenham, 2010.*

▲ *Oxford, 2007.*

▼ *Abingdon, 2007.*



▲ *Windsor, 2003.*

▶ *Purley-on-Thames, 2012.*

Your turn

The graph on the right is for questions 1 – 4. It shows rainfall for each month of 2012, in the Thames basin. The red lines show the *average* rainfall for the month, over the previous 30 years.

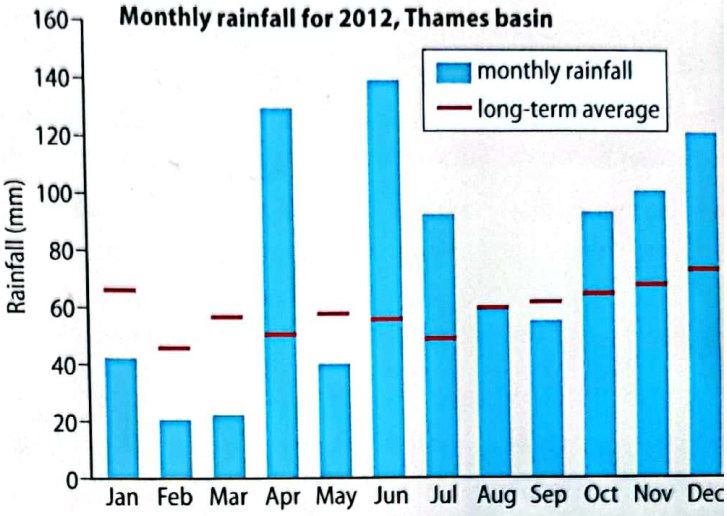
1 a How much rain fell in January 2012? Choose one:
about 26 mm about 42 mm about 65 mm
b Was January wetter or drier than average, that year?

2 In fact there was a hosepipe ban in January – March of 2012, in the Thames basin. See if you can explain why, using the graph and the facts in the blue box.

3 The graph shows that April and June were much wetter than usual. But the Thames did not flood in those months. See if you can come up with a reason. (To do with soil?)

4 a The ground in the Thames basin was really dry at the end of March. But by the end of October it could not hold any more water. It was **saturated**. Explain why.
b The Thames began to flood in November, and flooding continued in December. Explain why.

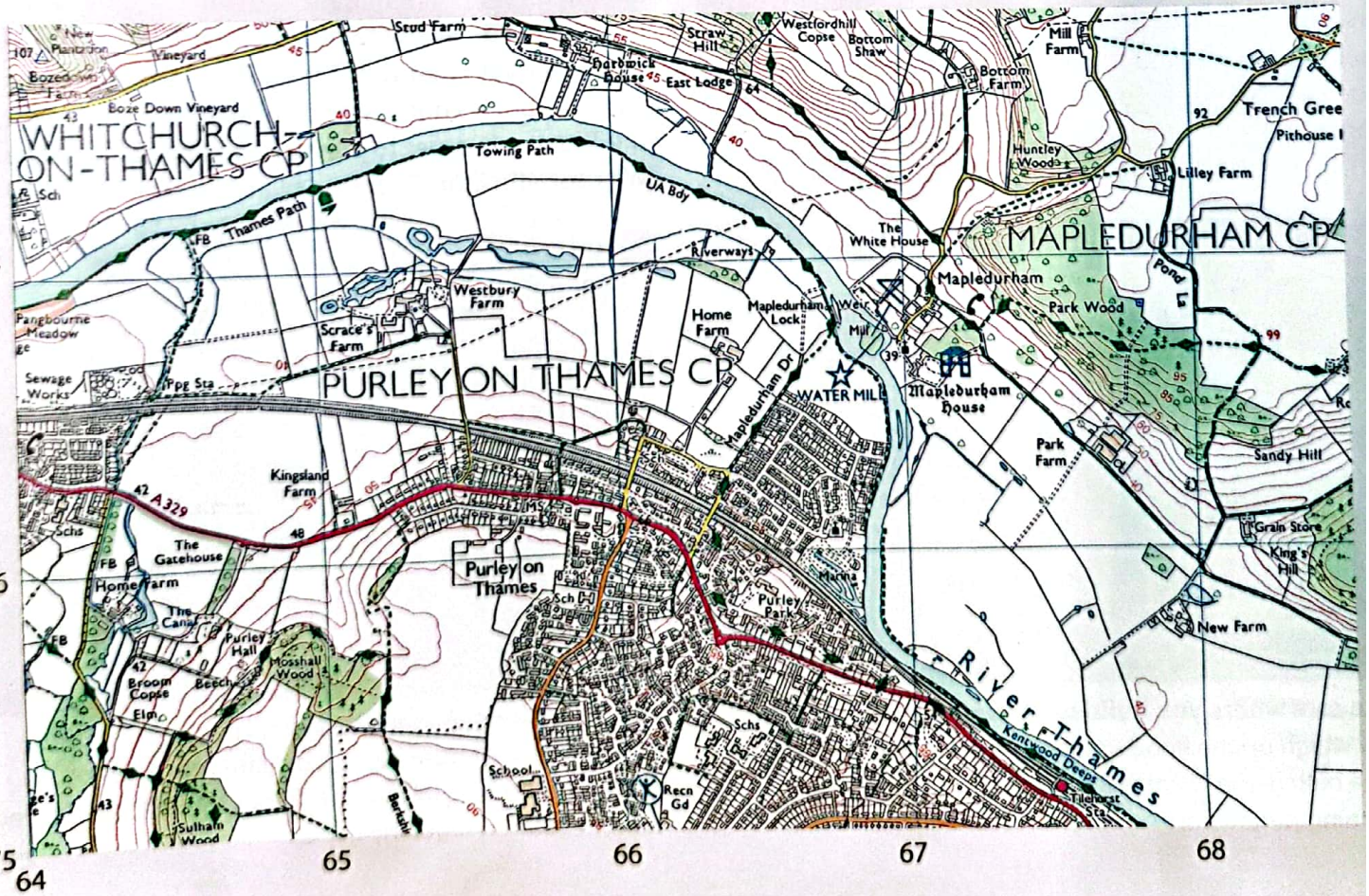
5 Photo **E** shows flooding in Purley-on-Thames, a suburb of Reading, in 2012. Purley is shown on the OS map below.
a How can you tell from the map that Purley lies in the floodplain of the Thames? (Hint: contour lines!)
b Which is more likely to flood: a house at 668764 or a house at 655762? Explain your answer.



The winter of 2011 was unusually dry, in the Thames basin. By the start of 2012, groundwater levels were low.

6 You want to prevent flooding of the houses along the river in square 6676. What will you do? Try to think of something.

7 Choose photo **B** or **C**. What's it like there? What damage has been done? Write a report for a newspaper. (At least 90 words)



Scale 1 : 25 000

Protecting ourselves

Here you'll find out about ways to reduce the risk of flooding, and protect ourselves from floods.

We can't stop floods

Floods can drown us. They ruin homes and businesses. Flood damage can cost a fortune to repair. (For example, over £1 billion in the UK in 2012.)

We can't stop heavy rain. So we can't stop rivers flooding. But we can reduce the risk, and the damage. Below are some ways, with the River Thames as example.

Did you know?

- The world's worst flooding was in China in 1931, when the Yangtze and Huai rivers flooded.
- It's thought that over 3 million people drowned.

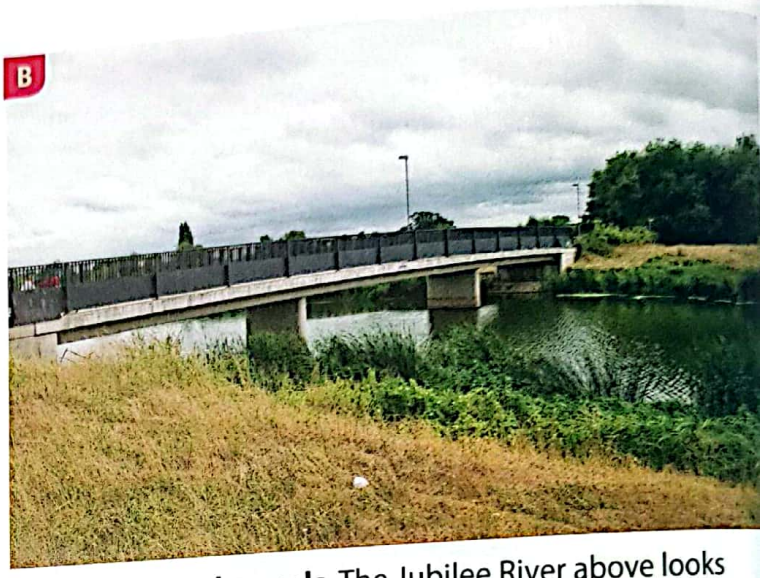
Long-term solutions

'Long-term' means they will last for a long time – we hope!

A

Build embankments (high banks). These embankments along the Thames in London were first built to hold an underground sewage system, and Tube lines. But later, the walls were made higher as flood protection.

B



Dig new river channels. The Jubilee River above looks natural – but it's not! It was dug out to divert water from the Thames, in order to prevent flooding at Maidenhead, Windsor, and Eton. There are plans for others too.

C

Take care where you build new homes. Local councils now weigh up the flood risk, before they allow new homes to be built in the Thames floodplain. They may refuse planning permission.

D

Let nature help. Allow land along the river to soak up flood water, as nature intended. Plant more trees too. This common land beside the Thames in Oxford is called Port Meadow. It regularly floods.

Short-term solutions

When we know floods are on the way, here are some things we can do.

Put up portable flood barriers. This shows them being fitted in Oxford, next to the river, because floods are expected. They'll be taken down later and stored away.

Put anti-flood shutters on homes. You can buy metal shutters like these to stop water coming in through doors and windows. (Or else try sandbags.)

The Thames Barrier

London can also be flooded from the sea. So it has special flood protection: the **Thames Barrier.**

This barrier has a set of giant steel gates below the water. They are raised when there's a risk that high water levels on the Thames will meet high tides coming in from the sea. Their job is to shut the sea water out.

▲ *The Thames Barrier. These piers hold machinery for raising the steel gates, which usually lie flat on the river bed. They swing up to close the gaps between the piers. (Now look for this on page 78!)*

Who decides?

The **Environment Agency** works with local councils in England, to decide what to do about flooding. It gets a grant from the government to install anti-flood structures.

It also keeps an eye on water levels in rivers, and gives out flood warnings.

Your turn

1 This is about the long-term solutions on page 98. You can answer using their picture labels, **A** – **D**.
   - a Which solutions aim to keep flood water in?
   - b Which one aims to *keep us away* from floods?
   - c Which one do you think would cost the least?
   - d Which two are likely to cost most?

2 You are in charge of building a new town near a river. Which solution(s) will you choose, to reduce the risk of flooding? Explain your choice. (Draw a sketch map of the town and river?)

3 How do these help to protect people from flooding? See if you can explain by drawing simple diagrams.
   - a embankments
   - b digging a new river channel
   - c setting aside fields to take flood water

4 The solutions in **E** and **F** are called *short-term*. Why?

5 Do you agree with this person's idea? Write a thoughtful reply.

6 Now see if you can design a flood-proof home. Draw sketches!