The Physical Environment: Location, Topography and Climate

The location of Pakistan and its administrative areas and cities, the landforms, rivers and deserts, and the climate and its effect on people and the economy.

Location of Pakistan

Position

- Pakistan lies in **South Asia**, between about **24°N and 37°N** and **61°E and 77°E**. It covers about **796,000 km²**.
- The **Tropic of Cancer** (23½°N) lies just **south** of Pakistan's southern tip.
- Key lines to find on a map: **30°N** (near Multan and Quetta), **36°N** (north, near Gilgit and Chitral), and **64°E, 70°E, 76°E**.

Neighbours

Direction	Neighbour
east	**India**
north-east	**China** (the Xinjiang region, via the Karakoram)
north and west	**Afghanistan** (the **Durand Line**); the narrow **Wakhan Corridor** separates Pakistan from **Tajikistan**
south-west	**Iran**
south	the **Arabian Sea**

Pakistan connects **South Asia, Central Asia and the Middle East**, so it has strategic importance and could be a **trade route** between them.

Administrative areas

Provinces: Punjab, **Sindh**, **Khyber Pakhtunkhwa** (formerly NWFP), **Balochistan**. **Other areas: Gilgit–Baltistan**, **Azad Jammu and Kashmir**, and the **Islamabad Capital Territory**. (The former **FATA** merged with Khyber Pakhtunkhwa in **2018**.)

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Main cities to locate

Province or area	Cities
Capital Territory	**Islamabad** (the capital); **Rawalpindi** and **Murree** nearby
Punjab	**Lahore**, **Faisalabad**, **Multan**, **Gujranwala**, **Sialkot**
Khyber Pakhtunkhwa	**Peshawar**, **Chitral**
Gilgit–Baltistan	**Gilgit**
Sindh	**Karachi** (the largest city and main port), **Hyderabad**
Balochistan	**Quetta**, **Gwadar** (a deep-sea port on the Arabian Sea coast)

The natural topography, including drainage

Landform regions

Region	Features
Northern and western mountains	the **Himalayas**, **Karakoram** and **Hindu Kush** ranges. The **Karakoram** includes **K2** (8,611 m, the second-highest mountain in the world). **Safed Koh** is on the border with Afghanistan, with the **Khyber Pass**. Steep slopes, deep valleys, **glaciers** and snow
Sulaiman Range	mountains on the west of the Indus plain (between the plain and the Balochistan Plateau), including **Takht-e-Sulaiman**
Potwar Plateau and Salt Range	a **plateau** (about 300–600 m) between the **Indus and Jhelum**, cut by **gullies** (a badland landscape); the **Salt Range** is a line of hills on its southern edge, with **rock salt**
Balochistan Plateau	a **dry**, rocky, high plateau (**1,000–2,000 m**), with scattered mountains and deserts
The Indus Plain (the **floodplain**)	a **flat**, fertile lowland made of **alluvium** laid by the **Indus** and its tributaries. The most densely populated area
Deserts	the **Thar** (south-east Sindh, a sandy desert reaching into India), the **Thal** (between the Indus and Jhelum in the Punjab), and the **Kharan** (a desert in Balochistan)

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The northern mountains: key facts

Range	Key facts
Karakoram	the highest concentration of **big peaks and glaciers**: **K2** (8,611 m), and the glaciers **Siachen**, **Baltoro**, **Biafo**, **Batura** and **Hispar**. Passes: **Khunjerab** and **Karakoram** (to China)
Himalaya	**Nanga Parbat** (about 8,126 m) is the main peak in Pakistan; the lower ranges (Siwaliks, Pir Panjal) include **Murree** and **Nathia Gali**
Hindu Kush	**Tirich Mir** (about 7,700 m), near **Chitral**; passes include **Lowari** and **Shandur**
Safed Koh	on the Afghan border south of the Kabul River; the **Khyber** and **Kurram** passes; peaks usually snow-covered
Sulaiman range	west of the Indus plain, with **Takht-e-Sulaiman** (about 3,500 m); the **Bolan Pass** leads to Quetta

Importance of the northern mountains: they are the source of the **glacier and snow-melt** that feeds the Indus; they hold timber, minerals and fruit; they act as a **barrier** against the cold winds of Central Asia; they give **tourism**; and the passes link Pakistan to **China and Afghanistan**.

Rivers

- The **Indus** (about 2,900 km) rises in **Tibet**, flows through **Kashmir**, **Gilgit** and the Punjab and Sindh, and enters the **Arabian Sea** near **Karachi** (at its **delta**).
- **Tributaries on the east:** the **Jhelum**, **Chenab**, **Ravi** and **Sutlej** (the name **Punjab** means "land of five rivers"). On the **west:** the **Kabul River** joins the Indus near **Attock**.
- The **Hab** (on the Sindh–Balochistan border, flows into the Arabian Sea near Karachi) and the **Dasht** (in **Makran**, Balochistan) are **small, seasonal** rivers in the **south-west** that flow only after rain.

Describing landforms

Landform	Description
mountain	high, steep land, a peak or ridge, thin soil, glaciers and snow at the top
plateau	high, **flat-topped** land with steep sides, often cut by rivers
floodplain	a flat area on both sides of a river, formed by flooding and deposition of **silt**, fertile
desert	an **arid** area with **little rain** (under 250 mm), sparse vegetation, sand dunes or stony ground

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The influence of topography on human activities

- **Steep slopes** are **hard to farm** and to build on: used for **grazing**, **forestry** and **terrace** farming; **flat land** (the Indus plain) is used for **crops** and **settlement** and is easy to irrigate.
- **Mountains and deserts** make **roads and railways expensive** and difficult to build, and keep populations **isolated** (the **Karakoram Highway** needed extreme engineering and is often blocked by landslides). The **plains** have a dense network of **roads and rail**.

Climate

Seasons

Season	Months	Features
Cool, dry winter	**December–March**	cold in the north and mountains (snow); mild in the south; **western depressions** bring some rain and snow to the north and Punjab
Hot, dry summer	**April–June**	very **hot** (**over 45–50 °C** in Sindh and southern Punjab); dust storms; **thunderstorms** before the monsoon
Monsoon	**July–September**	**heavy rain** in the north-east (Murree, Sialkot, Lahore), less in the west and south; **floods** can occur
Post-monsoon (retreating monsoon)	**October–November**	dry and warm, a **transition**

The causes of the monsoon

In **summer** the **land** of **South Asia** heats up much more than the sea, creating an area of **low pressure** over the land. **Moist south-west winds** from the **Indian Ocean and Arabian Sea** (where the pressure is higher) are drawn in, bringing **heavy rain** as the air rises over the land and the mountains. In winter the pattern reverses: cold, dry air flows from the land (the **north-east**) out to sea.

Why monsoon rainfall in Pakistan is small and unreliable. The monsoon winds first cross India and Bangladesh and lose most of their moisture, so only the **tail end** reaches Pakistan. The rain therefore varies a lot from year to year and is heaviest in the north-east, close to the mountains.

Other weather

- **Depressions** (low-pressure systems from the west, in winter) bring **rain and snow** to the north, the Potwar and Balochistan.

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- **Thunderstorms** and **convectional rain** occur in summer after intense heating.
- **Cyclones (typhoons)** form over the **Arabian Sea**, mostly in **May–June and October–November**, and may strike the **Sindh and Balochistan coast** with high winds, storm surges and heavy rain.

Climate regions

Region	Where	Characteristics
Arid	most of **Sindh** and **Balochistan**, the **Thar**, **Kharan** and south Punjab	**hot summers**, **cool winters**, **very little rain** (under about 250 mm), big temperature range; **Jacobabad** is among the hottest places on earth
Semi-arid	much of the **Punjab plains** and the **Potwar**	hot summers, cool winters, **moderate rain** (about 250–500 mm, mostly in the monsoon); irrigation is needed
Humid	the **sub-mountain areas** and the north-east (**Murree**, **Sialkot**, **Rawalpindi**, Islamabad)	the **highest rainfall** (over 750 mm, up to 1,500 mm), **cooler** and wetter
Highland	the **mountains** of the north and west	**cold**, **snow** in winter, **cool** summers, temperature falls with altitude; **permanent snow** and glaciers on the highest peaks

The influence of latitude and longitude

- **Latitude:** Pakistan is in the **sub-tropics**, so summers are hot and winters mild in the south; **day length** varies more in the **north** (longer summer days and shorter winter days) than in the south. **Temperature** falls from south to north.
- **Longitude:** it decides **local solar time**: places further **east** see the sun earlier. All of Pakistan uses one **standard time** (**UTC+5**). Climate depends more on **distance from the sea**: the **interior** has a **continental climate** (hotter summers, colder winters, a bigger range) than the **coast**, which is **moderated** by the sea.

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The effects of climate on the economy and people

Climate factor	Benefits	Problems
rain and monsoon	water for **crops** and rivers; **hydroelectric** power	**floods** damage farmland, roads, homes and industry (for example **2010** and **2022**); stop transport
heat and sunshine	long **growing season**; **solar power**	**heat waves**; high **evaporation** raises salinity
low temperature, ice and snow	**glaciers feed the rivers**; **tourism** (skiing, Murree, Swat)	in the mountains the **cold** limits farming; **roads blocked**, villages **isolated**; **avalanches**; people need shelter and fuel
drought and water shortage		**crop failure**, **less hydroelectric power**, **shortage** for industry (textiles), and the **migration** of people from dry areas

Causes of floods: heavy monsoon rain; fast **snow and glacier melt**; **deforestation** in the foothills (more run-off); weak or low **embankments**. **Causes of drought:** the **unreliable monsoon**; low rainfall in the arid south and west; **deforestation** and **overgrazing**; poor **water management** and disputes over the sharing of water. The **coast** is about 1,000 km long (about 770 km in Balochistan and 270 km in Sindh), and the sea keeps the coastal climate milder and more humid.

NOTE

Figures such as temperatures and rainfall are **approximate**. Use the figures in your textbook or class notes when an exam question gives a table or graph; the key skill is to **describe** and **explain** the pattern.

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