A Geography Course
for Secondary Schools

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# WORLD WATCH Geography 3

## TEACHING GUIDE

OXFORD
UNIVERSITY PRESS

# Introduction

*World Watch* is a geography course for the 21st century. It is designed for secondary schools that want to stimulate curiosity, thinking skills, and a love of learning. The course comprises four components: Student's Books, Skills Books, My E-Mate companion website, and Teaching Guides.

## Core features

- It draws its content and skills from international secondary school syllabuses while focusing on Pakistan.
- At all levels, learning is built on students' knowledge; the teacher eliciting what they already know and building on this, not simply loading them with facts.
- The language, content, and tasks are progressively graded according to class levels.
- Each level is split into separate units, each focusing on a different topic.
- High priority is given to independent and critical thinking skills.
- Ideas for discussion are provided to help students to express their own ideas in open-ended tasks.
- Mapping skills are taught in a progressive way that builds on the students' previous learning.
- Diagrams and charts/tables are used to vary the presentation of content.
- Students are encouraged to make connections between the geographical environment and the way people live.

## Student's Books

- The Student's Books form the core of the course. The illustrations, photographs, and maps bring alive the familiar environment and distant places, and both natural and man-made geographical features.
- The 'Contents' page details the learning outcomes for each unit.
- Each unit of the Student's Book consists mainly of reading texts and making observations, followed by assessment questions.
- The 'Overview' at the end of each unit virtually represents the various topics in the unit and how they are interlinked to each other.
- Fact boxes contain interesting information about the relevant topics and key fact boxes at the end of each unit summarize the unit.

## Skills Books

- At each level, there is an accompanying Skills Book.
- The tasks are varied and enjoyable, and include maps, diagrams, charts or tables, crosswords, fill-in-the-blanks, and situational questions.
- Skills Book pages should be introduced in class and can be completed either in class or for homework.
- Students are usually expected to write in the Skills Book.
- There is a brief learning outcome at the top of every page.

## Teaching Guides

Teaching Guides are an invaluable resource for the teacher. It provides a framework for formative assessment of students for each lesson. It has the following features:

- background knowledge
- student learning outcomes
- step-by-step lesson plans
- ideas for further activities and student research
- answers to assessments in Student's Book and solutions for activities in Skills Book

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| **Page 34**<br>**Unit 5**<br>**Pakistan and international trade** | • to introduce ideas about trade with other countries and show the importance of trade to Pakistan's economy<br>• to help students understand the interactions between places and the networks created by the movement of goods | • identify Pakistan's major trading goods and major international trading partners.<br>• explain why Pakistan imports and exports goods and to and from where.<br>• demonstrate knowledge of Pakistan's international trade agreements and arrangements. | export, import, trade, supply, demand, tariff, quota, trade organization, FTA, PTA, trade agreement |
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| | | | |
|---|---|---|---|
| **Page** 50<br>**Unit 7**<br>**Advanced mapping techniques** | • to introduce maps and graphs that impart information about phenomena or activities in certain geographical locations, and explain how to create and interpret them<br>• to introduce students to modern map making and data collection techniques and explain their use in route planning | • interpret thematic maps and explain how and why they are created.<br>• interpret graphs and explain how and why they are created.<br>• discuss modern geographical data gathering and explain its role in interactional maps and planning transport routes. | thematic map, distribution map, dot map, choropleth, isopleth map, proportional symbol map, line graph, bar graph, grouped bar graph, population pyramid graph, composite bar graph, pie graph, compound graph, remote sensing, aerial photography, thermal imaging, radar, lidar, multispectral platform, interactive mapping, GPS, GIS |
| **Page** 59<br>**Unit 8**<br>**Natural disasters** | • to explain how natural disasters occur and their effects on communities | • explain the links between natural disasters, sustainable development, and climate change.<br>• identify ways in which natural disasters have impacted on human activity.<br>• discuss why developing nations suffer more from natural disasters than developed nations.<br>• describe several ways in which humans contribute to natural disasters.<br>• explain what actions can be taken to reduce the risk and impact of natural disasters.<br>• provide specific examples of actions being taken to reduce the risk and impact of natural disasters. | volcano, flood, cyclone, earthquake, forest fire, landslide, desertification, natural disaster, climate change, sustainable development, homelessness, health, economic impact, deforestation, dam, mining |

UNIT 1

# Our regional neighbours

## Background knowledge for the unit

This unit focuses on Pakistan's neighbours, with an emphasis on four countries from the neighbouring regions of South and Central Asia, the Middle East, and China. To this end, it examines the geography, people, and economies of Sri Lanka, Kazakhstan, the United Arab Emirates, and China, and the relationship each of them has with Pakistan. It aims to show that Pakistan, like all nations, shares a great deal with its neighbours, and that it is not self-sufficient, contributing to and relying on its neighbours for certain goods, employment, aid, and expertise.

The neighbours highlighted in this chapter do not necessarily share a border with Pakistan, but have a lot in common with Pakistan due to their regional positions. The countries that make up South Asia are India, Afghanistan, Nepal, Bhutan, Bangladesh, Sri Lanka, and the Maldives. While there are many differences, they share similar lifestyles, foods, and many cultural values, and most of them are a part of the Asian monsoonal region. Islam features as the dominant religion, or a significant minor religion, in many of these countries.

Central Asia is made up of Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan, and Kyrgyzstan. These countries have a shared history and culture with Pakistan as well as a shared religious outlook. Also, the north of Pakistan especially has a terrain similar to many parts of Central Asia. The Karakoram Mountains and part of the Himalayas lie on the Pakistan-China border. The Pamir Mountains and the Tian Shan ranges extend this chain to the west and mark the borders between Kazakhstan, Kyrgyzstan, Uzbekistan, and China.

The countries of the Middle East lie to the west of Pakistan and consist of Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE), and Yemen. Most of these nations share a cultural, historical, and religious heritage with Pakistan. Wars in parts of the Middle East have reduced contact with some countries, such as Iraq and Syria, to a minimum. However, Pakistan has a strong relationship with the Gulf nations from where it sources almost all its oil, and where many Pakistanis live and work.

China is Pakistan's only close East Asian neighbour. During the years of hard-line Communist rule, there was little contact between the countries, but since China opened up its economy in the 1990s, trade and contact has increased enormously, and today China is Pakistan's main trading partner. Western China, near the border of South and Central Asia, is also home to a range of cultural groups, many of whom have cultures and religion in common with Pakistan and other Central and South Asian neighbours. Additionally, as China's growth as a trading nation has increased, Pakistan has become more geographically significant to China as a trade route. A stronger relationship between the two is creating increased infrastructure investment in Pakistan from China.

## Before we proceed

Before beginning this unit, it is important to reacquaint the students with the physical and human geography of Pakistan. In order to evaluate Pakistan's neighbours and the relationships they have with Pakistan, the students need to have a clear idea about their own country. They should have a good understanding of the geography and climate across the different areas of the country. They should know which are the most populous regions and cities, and what kind of work people do in various areas. They should be familiar with the economy of the country, such as its major crops and industries. Many of these aspects of Pakistan are covered in *World Watch Geography* Student's Books 1 and 2, and further information on industry and trade is featured in units 4 and 5 of Student's Book 3.

While this unit covers four countries from the representative neighbouring areas of Pakistan, much of what is touched on here is thematic. That is, we look at these countries through the lens of their geography, climates, people, and economies. With this in mind, while the questions relating to each segment in this unit in the Student's Book pertain to the countries featured here, the questions in the Skills Book address higher order skills and focus on making comparisons across nations and with Pakistan.

Students are expected to make as many links as possible between geography, peoples, and economies. Encourage them to think about these links. For example, does weather affect where people live or what kind of crops they grow? In what ways is water important to communities? Why are so many people moving to cities? Ask them to reflect on Pakistan. How are the changes—both positive and negative—that they see in other countries reflected in their own land? Encourage them to read widely around topics, to research using the Internet, and to read newspaper articles about Pakistan's neighbours and the interactions they have with Pakistan.

## Expected learning outcomes

Students should be able to:

- identify Pakistan's neighbours and locate them and their major geographical features on a map
- discuss the climates, peoples, and economic conditions in neighbouring countries
- describe the relationships between Pakistan and its neighbours
- explain why geographic settings are important
- explain the importance of local alliances for trade and aid

PAGE 2

## *'Pakistan* and *its neighbourhood'*

## Using the Student's Book

Pakistan is a nation in South Asia. It shares borders with India, China, Afghanistan, and Iran, and has a southern coastline of 1046 kilometres along the Arabian Sea. The largest and longest river is the Indus and it supplies about two-thirds of all the water used for irrigation of crops. The Karakoram, Himalayas, and Hindu Kush mountains in the north have Pakistan's highest peaks, but there are also other, smaller ranges in parts of Punjab and Balochistan.

The climate ranges from dry desert in parts of the south, to tropical in other areas, with a mountain or alpine climate in the north. Winter in Pakistan (December to February) is warm with cool sea breezes on the coast. Summer can be very hot and is accompanied by the monsoon season (June to September), which brings a lot of rain to many parts of the country.

Most people live in rural areas in the south, along the River Indus. About 38% of the population lives in cities. The largest of these is Karachi, in Sindh province, and the second largest is Lahore, in Punjab.

Its official languages are Urdu and English, with Punjabi, Sindhi, Pashto, and Balochi among the seventy or so languages spoken in various parts of the country. The main religion is Islam.

Agriculture accounts for about 43% of the economy and produces cotton, wheat, rice, sugar cane, fruits, vegetables, dairy, and meat products. Its major industries, which make up about 13% of the economy, are: textiles and apparel, food processing, pharmaceuticals, construction materials, paper products, and fertilizer. The services industries account for about 44% of the economy, and range from work in food and hospitality to transport, computing, and tourism.

Pakistan has strong trade relationships with China, the USA, the UAE, the European Union (EU), and Saudi Arabia among others. Its top export is cotton and cotton goods. Its top import is oil.

Ask students to read page 2. The first page of this unit gives a basic background of geographical facts and statistics about their own country, which can then be used to compare and contrast with the four neighbouring countries. Talk about some of these facts and statistics. Find out what students already know about their country or remember from previous years. Show them a map of Pakistan and the neighbouring countries. Encourage them to find out more using the Internet.

Ask the students to talk about the region where they live. Ask them to complete some tasks such as finding out the population of the area, town, or city they come from; or to talk about the climate and how the seasons change throughout the year. See if they can list the kinds of goods that are produced in their area. They should note their findings in their notebooks.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that good relationships with neighbours are important for a country.
- I learned that the neighbours of Pakistan also include those countries with which it does not share a border.

PAGES 3–6

***'South Asia: Focus on Sri Lanka'* (all sections)**

## Resources

- Skills Book pages 2–3, 'Locating our regional neighbours'
- Skills Book pages 4–5 'Climate of our regional neighbours'
- Skills Book pages 6 'Cultural make-up of our regional neighbours'

## Using the Student's Book

Sri Lanka is a small island nation in the South Asia region, lying just south-east of the southern tip of India. After reading through the section on Sri Lanka on page 3, look at the map of the region on page 4. Also, ask students to refer to the *Oxford School Atlas for Pakistan* to identify the location of Sri Lanka in relation to Pakistan and any other countries that they can name in the South Asian region. Ask why these countries are grouped together in this way. Ask them what they know about any of the countries.

Ask the students what comes to their mind when they first see the map of Sri Lanka. They should identify the fact that the country is an island with no land borders. Encourage them to look at the elevation in their atlases and talk about Sri Lanka's unique geography with a mountainous area surrounded by plains.

Read about its geography, economy, and relationship with Pakistan. Focus on the weather and the way it affects the island and its vegetation. How is this different from Pakistan? The students should complete Questions A1–4 in class or as homework.

## Using the Skills Book

Ask the students to complete the sections on Sri Lanka on pages 2, 3, 4, and 6.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that Sri Lanka is an island, located in South Asia.
- I learned that Pakistan has a good trading relationship with Sri Lanka.

PAGES 6–9

## *'Central Asia: Focus on Kazakhstan'* (all sections)

### Resources

- Skills Book pages 2–3, 'Locating our regional neighbours'
- Skills Book pages 4–5 'Climate of our regional neighbours'
- Skills Book pages 6 'Cultural make-up of our regional neighbours'

### Using the Student's Book

Kazakhstan is the wealthiest nation in Central Asia, thanks to its oil reserves. It is also landlocked, making it dependent on other nations for transporting its goods in and out of the country. Its wide plains are not suitable for crops and have traditionally been used to graze cattle. It has the lowest population density in the region. Trade between Kazakhstan and Pakistan has been historically low, largely because trade routes between the two countries are not well developed. Years of Russian control meant the country was oriented towards Europe, but since independence there have been moves to work more with Central Asia and other neighbouring Asian regions.

After reading through the section on Kazakhstan, elicit what the students know about the Central Asian region and what they think countries from that area have in common with Pakistan. Look at the maps of Kazakhstan on pages 6–7 and its physical map in the *Oxford School Atlas for Pakistan*. Ask the students to identify the most important features of Kazakhstan. For example, they should mention that the country is landlocked, and while it does have shoreline on the Caspian Sea, it does not have access to the open sea for shipping. They should identify the lowlands and vast areas of plains and grasslands, and where they begin and end, and the mountains in the east. Using the Internet, ask the students to identify what kinds of vegetation grow in these areas, and where the desert zones of the south can be found. They should complete Questions B1–3.

### Using the Skills Book

Ask the students to complete the sections on Kazakhstan on pages 2, 3, and 6 for homework.

### Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that Kazakhstan is a landlocked country and historically, trade relations between Pakistan and Kazakhstan have been weak.
- I learned that trade relationships between Pakistan and Kazakhstan are improving.

PAGES 10–12

## *'The Middle East: Focus on the United Arab Emirates'* (all sections)

### Resources

- Skills Book pages 2–3, 'Locating our regional neighbours'
- Skills Book pages 4–5 'climate of our regional neighbours'
- Skills Book pages 6 'Cultural make-up of our regional neighbours'

### Using the Student's Book

The United Arab Emirates (UAE) was established in 1971 from seven small kingdoms on the northern edge of the Arabian Peninsula. Its terrain is almost all desert, with its wealth coming from vast oil reserves. Despite these reserves, the country is looking to diversify its economy as it realizes the problems of relying on just one product, and the harm that product causes to the environment.

The UAE is home to people from all over the world, with only 20% of its population being Emirati. The connections between the UAE and Pakistan are cultural, social, and economic. The two nations share similar cultural values and the religion of Islam. The UAE is Pakistan's largest source of oil,

which is Pakistan's greatest single import. In return, Pakistan exports metals, rice, wheat, clothing, and a range of other goods to the UAE.

After reading through the section on the UAE, ask the students what they notice when they look at the map of UAE on page 10. They should mention that there are no rivers and that there are few cities, especially in the centre of the country. They should be able to see that the elevation is low across almost all of the country, except for in the very east where there are hills and low mountains. They should know from their reading that the land is mostly desert.

Elicit ideas on how the desert landscape has affected the people who live in the UAE; for example, where they live and what they do. How do the deserts of the UAE differ from the deserts of Pakistan? Is the desert climate of the UAE harsher than Pakistan's? Ask the students to explain what an oasis is and how oases are used in the UAE in terms of agriculture. How does the UAE manage to grow so much food? Which food does it produce most of?

The students should complete Questions C1–4 and finish any unanswered questions for homework.

## Using the Skills Book

Ask students to complete the sections on the UAE on pages 2, 3, 5, and 6 of the Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that the economy of the UAE is based on its oil reserves.
- I learned that many Pakistanis work in the UAE.

PAGES 13–16

# *'East Asia: Focus on China'*

## Resources

- Skills Book pages 2–3, 'Locating our regional neighbours'
- Skills Book pages 4–5 'Climate of our regional neighbours'
- Skills Book pages 6 'Cultural make-up of our regional neighbours'

## Using the Student's Book

China has more than one fifth of the world's population, and is the fifth largest nation by area. Since the 1990s, the nation has transformed itself into an industrial powerhouse and a major exporter and importer of goods. Although it is home to many peoples, the majority are Han Chinese. Traditionally an agricultural nation, like much of Asia and other parts of the developing world, it has become increasingly urban, with about 56% of the people living in cities.

As the country is so vast, it has many different landscapes and climates. Most people live in the fertile and temperate eastern region of the country near the coast or major rivers.

Pakistan has had a long and friendly relationship with China, but in the last few years this relationship has strengthened, especially through trade. China is now Pakistan's main source of imports and its second largest export destination. China is also providing development and infrastructure aid to Pakistan to help establish good road links between the two countries, and to establish a strategic port on the Arabian Gulf.

After reading through the section on China, ask students to look at the map of China on page 13, or display a larger physical map at the front of the classroom. Ask what they notice. They should notice that there are many rivers in the east of the country and that the elevation increases towards the west. The Himalayas and other adjoining ranges boast the highest mountains in the world.

The students should use the Internet to look up the names of some of the mountains in these ranges and their heights. Ask them to locate the Great Wall of China. Ask them to find the names of China's largest cities and to locate them on the map. Are these cities close to major rivers such as the Chang Jian (Yellow River) and the Huang He (Yangtze)? Can they see a relationship between the rivers and the number of Chinese cities? Can they locate China's major ports?

Elicit ideas about what China and Pakistan have in common. What kinds of items do they trade with each other? In what other ways is China important to Pakistan?

They should complete Questions D1–5 and E1–4 and finish any unanswered questions for homework.

## Using the Skills Book

Students should complete the sections on China on pages 2, 3, 5, and 6 of the Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that Pakistan and China have a strong trading relationship.
- I learned that the China-Pakistan Economic Corridor will create numerous job opportunities for people in Pakistan.

## Answers to assessments

A 1. Sri Lanka's closest neighbours are India and the Maldives. India is also a close neighbour of Pakistan.

2. The students should locate the Central Highlands on the map in the *Oxford School Atlas for Pakistan*. The Central Highlands are a good place to grow tea because they have a cool, humid climate.

3. Sri Lanka's rivers are important as they provide water for agriculture and drinking, and the Mahaweli River is dammed in several places to produce hydroelectric power.

4. The main products of Sri Lanka are: tea, rice, sugar cane, grain, pulses, oilseed, spices, vegetables, fruit, coffee, rubber, coconut products, animal hides, beef, and fish. (Any four of these answers are acceptable.)

B 1–2 a) True; Astana was built as a planned city to be the capital of Kazakhstan.

b) False; Russian and Kazakh are the main languages of Kazakhstan.

c) False; although Kazakhstan is a landlocked country, it has many inland lakes which supply water to its people.

d) False; Kazakhstan has a high literacy rate of 99.8%.

3. Most of the land (77%) is used for agricultural purposes.

C 1. Water shapes life in the UAE because there is so little of it. There are no rivers or natural lakes. All fresh water comes from underground and is found only in oases, which are dotted around the country, and from bores that are drilled to capture groundwater in other areas. Dubai and Abu Dhabi, which are by the sea, source almost all their water from desalination plants. These plants remove the salt from seawater to make it drinkable.

2. Oil has brought huge wealth to the UAE. The Emiratis have used it to build modern cities which in themselves have

become tourist attractions. They have promoted their own airlines to bring hundreds of thousands of tourists every year through Abu Dhabi and Dubai. They have extended their school system and encouraged education so that literacy rates are now 95% for males and 92% for females. They have brought in large numbers of workers from overseas, which gives jobs to people from developing countries.

3. There are many overseas workers in the UAE as there are not enough Emiratis to do all the work. The UAE has enjoyed an economic boom for many years, with building and business development. Students will write their own answers about people they know who have worked there and what kind of work they did.

4. Students' responses might include banking, working in oil and gas companies, or employed in services industries, etc.

D 1. The majority of China's population lives in the east of the country for reasons that include: good soil for growing food, reasonably temperate climates, access to water, and being close to work and transport.

2. China has extensive transport networks: they include 4,106,387 km of roads, and 191,270 km of railway. Barges and riverboats travel along rivers and there are many ports on the east coast. Efficient transport is important because China has to move millions of people and millions of tonnes of goods through densely populated areas every day.

3. The Chinese economy has grown a great deal in the last thirty years because the Chinese government has been encouraging people to run their own farms and businesses, and has encouraged foreign trade.

4. Pakistan and China have a strong relationship. China is a significant trade partner of Pakistan. It supplies technology to Pakistan. The China-Pakistan Economic Corridor (CPEC) includes the rebuilding of the Karakoram Highway, the development of Gwadar Port in Balochistan, and the construction of a motorway between Lahore and Karachi. It will benefit Pakistan by strengthening trade and cultural ties with China, improving Pakistan's roads and port infrastructure, and creating many jobs.

5. Pakistan and China share a long history of friendship and cooperation. Apart from being Pakistan's largest neighbour, China is also its most significant trading partner. It is Pakistan's greatest source of imports and its second largest export partner. Also, it provides military support and scientific technology.

E 1. Some of the differences between these countries are geographical. China is a vast country with many different physical features. Pakistan has a coastline, forests, mountains, deserts, rivers, plateaus, and plains. Sri Lanka is an island, while the UAE is a desert, and Kazakhstan is a landlocked country.

2. Some of the differences between these countries are their economies. China's economy is based on its agriculture as well as manufacturing industries; Sri Lanka and Pakistan have agriculture-based economies; the UAE and Kazakhstan have oil-based economies.

3. Students' responses might include China and UAE. This is because Pakistan has a strong trading relationship with both these countries. Many Pakistanis work in the UAE, and China provides technological support to Pakistan.

4 a) The official languages of Kazakhstan are Kazakh and Russian; of Sri Lanka it is English; of UAE it is Arabic; and of China it is Mandarin.

b) Some other languages spoken in Sri Lanka are Tamil and Sinhala; in UAE, Urdu, Hindi, and Persian are spoken; while hundreds of languages are spoken in China.

# Answers to the Skills Book

## Pages 2–3 *'Locating neighbouring countries of Pakistan'*

A 1 a–c) Students should colour code and mark their maps.

| Country (and colour code) | Capital city | Approximate distance from Islamabad |
|---|---|---|
| Iran | Tehran | 2500 km |
| Afghanistan | Kabul | 480 km |
| India | New Delhi | 700 km |
| China | Beijing | 3900 km |
| Sri Lanka | Sri Jayawardenepura Kotte | 3100 km |
| Kazakhstan | Astana | 3200 km |
| UAE | Abu Dhabi | 2100 km |

2.

| country | mountains | deserts | Plains | rivers | ocean shoreline |
|---|---|---|---|---|---|
| Pakistan | √ | √ | √ | √ | √ |
| Sri Lanka | √ | | √ | √ | √ |
| Kazakhstan | √ | √ | √ | √ | |
| the UAE | √ | √ | | | √ |
| China | √ | √ | √ | √ | √ |

3. Some of the ways that physical features, such as mountains or water, might affect relationships and trade between Pakistan and its neighbours include:

- Mountains create barriers between countries for the movement of people and goods. Often roads have to be built specially to connect places. Bridges need to be built over waterways. Building infrastructure such as this may be delayed because it is expensive.
- There is a higher cost to travel or transport of goods between countries because longer or more difficult routes have to be taken to get over or around mountains or cross waterways.
- Travel across deserts can require special vehicles because of the hot, sandy conditions.

## Pages 4–5 *'Climate of our regional neighbours'*

A 1. Students should describe the climate of Pakistan and compare it with other climates in the region.

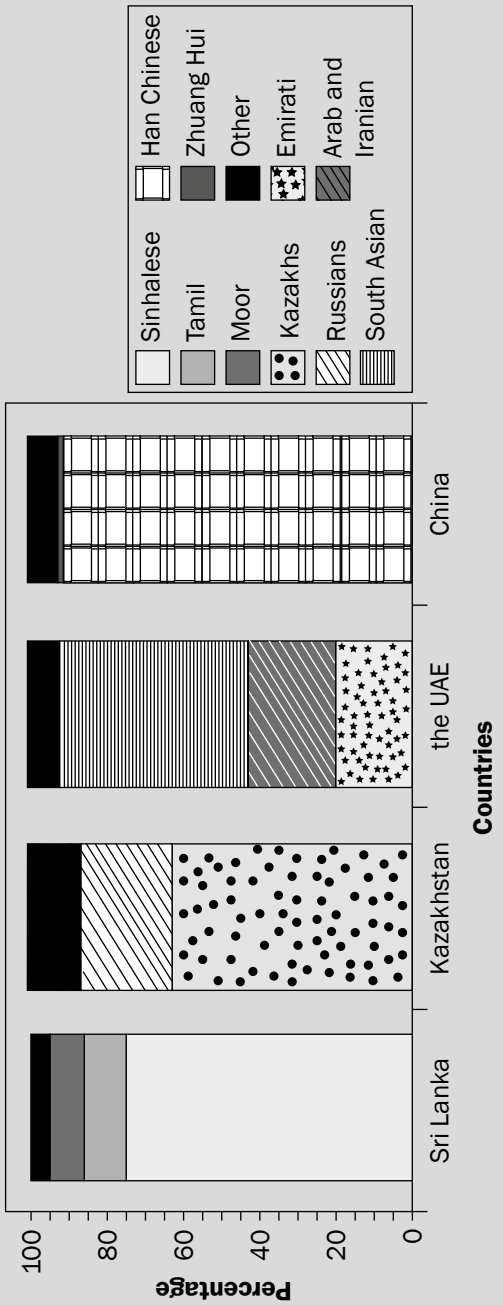
b) The responses should include that climate affects the lifestyle, crops, and even culture of a place. For example, the food and clothing of people living in warm climates will be different from that of people living in cold climates.

2 a) The south-west of Sri Lanka is known as the wet zone as it has high rainfall. This, combined with its humid climate and fertile plains, makes this area good for agriculture. Traditionally, Sri Lanka has been an agricultural country; this is why so many people live in this region.

b) The UAE has an arid desert climate which means that the land cannot support agriculture. Food can only be grown near oases and other underground sources of water. People need to live near water and food sources.

c) People live in the east of China because of the more fertile soil and access to many rivers. Climate plays a role in this. The climates in this part of China are not all the same, but all offer enough rain and temperatures that are moderate enough to make it possible to grow crops.

**Page 6** ***'Cultural make-up of our regional neighbours'***



UNIT 2

# Natural landforms

## Background knowledge for the unit

Landforms are natural features of the Earth's surface. This unit focuses on glaciated, wind-shaped, and wave-shaped landforms, and the way they are formed, where they are located, and their features and characteristics. The land on Earth is formed in many ways. A major focus of the unit is the difference between two of these processes: erosion and deposition. The third major way that landforms are created is tectonic forces, which are covered in *World Watch Geography* Student's Book 1.

The Earth's major erosional and depositional landforms take many thousands, often millions, of years to be formed. Modern dating techniques enable us to understand how, for example, a cliff, has been formed and over what periods of time. These processes never end, making the Earth a moving, malleable, changeable structure, where almost nothing stays still.

Erosional landforms are landforms that have been shaped by water, wind, or glacial movement, or by gravity. The movement breaks down rocks and then carries the particles downstream, downwind, or downhill.

Depositional landforms are landforms that are formed when rock, soil, and mineral particles are transported from one location to another. This occurs when rocks have previously been eroded. Therefore, depositional landforms cannot be formed unless erosion has taken place elsewhere.

## Before we proceed

Before beginning this unit, it is important to reacquaint the students with the concept of weathering. Weathering involves physical or chemical reactions to elements of the environment. Students should also be reminded of some other erosional and depositional landforms they have studied, such as V-shaped valleys, gorges, canyons, waterfalls, potholes, levees, and deltas. These are covered in *World Watch Geography* Student's Book 1.

This chapter explores glaciated, wind-shaped, and wave-shaped landforms across the globe, as well as within Pakistan. Many of the types of landforms discussed can be found in Pakistan. You should encourage students to do some research to identify the major ones; but also keep in mind that there may be examples they have seen close to where they live. In preparation for studying this unit, you could ask the students to note large natural landforms between their homes and school.

Students are expected to learn how these landforms are created and how they affect the environment. Encourage them to think about the Earth as a constantly changing body. Natural landforms that are here today may not be here in the future; other landforms will take their places. Get them to think about how these changes affect the species that live on Earth. Ask them to try to predict future changes based on what has happened in the past.

## Expected learning outcomes

Students should be able to:

- explain that the Earth is constantly changing and that many of these changes take place over thousands, sometimes millions, of years
- identify several types of glaciated, wind-shaped, and wave-shaped landforms
- explain how glaciers, wind, and waves shape the landscape through the processes of erosion, deposition, or both

PAGES 20–21

## *'The internal structure of the Earth' up to 'World's largest glaciers'*

### Resources

- Skills Book page 7 'Location of glaciers and ice masses on Earth'
- Skills Book page 8 'Location of landforms in Pakistan'

### Using the Student's Book

The students learned about the internal structure of the Earth in previous classes. Quiz them about what they know about the layers of the Earth. Remind them about the core, mantle, and crust. Draw a rough sketch of the internal structure of the Earth on the board and ask them to name its various parts. Ask where tectonic plates are located and what events are caused by their movements. They might recall that earthquakes occur due to the movements of tectonic plates. Ask them to read page 20 about 'The internal structure of the Earth' and 'Glaciated landforms'.

Explain that the changes on the surface of the Earth also occur due to external agents like glaciers, wind, and water. Explain that glaciers move downhill due to gravity. Glaciers play an important role in shaping landscapes, particularly at high latitudes and in alpine environments. Their size and force means they can erode, transport, and deposit large amounts of soil and rock. Much of that is over the Antarctic continent. During the last Ice Age, which ended about 10,000 years ago, about one-third of the Earth's land area was covered with glaciers. In fact, during this period, more than 50 million square kilometres of land surface was reshaped by glaciers. Glacial landforms rarely fit a neat geographical pattern as they take the path of least resistance as they move.

Ask your students to read page 20 to find out how glaciers are formed. Refer to the illustration and explain how layers of snow pile up over centuries to form glaciers.

Read 'Where are glaciers found in the world?' and 'World's largest glaciers' on pages 20–21. The map on page 21 shows Greenland and North America where glaciers are found. Show in the *Oxford School Atlas for Pakistan* where glaciers are found in Pakistan. Ask students to complete Questions A1 a–c and D1–3.

### Using Skills Book

Students should complete the activity 'Location of glaciers and ice masses on Earth' on page 7 and 'Location of landforms in Pakistan' on page 8.

### Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that landforms are created by tectonic activity as well as external forces like glaciers, wind, and waves.
- I learned how glaciers are formed.
- I learned where glaciers are found in the world and in Pakistan.

PAGES 22–24

## *'Types of glaciers'; 'Erosional landforms' (all sections);* and *'Depositional landforms'* (all sections)

### Resources

- Skills Book page 9 'Glacial features'

### Using Student's Book

Read page 22 and explain the difference between continental and alpine glaciers.

Continental glaciers are located at the Earth's polar regions, while alpine glaciers are found in mountainous regions. Continental glaciers are much larger than alpine glaciers, and move very slowly, if at all. Alpine glaciers, on the other hand, can move swiftly through mountains, a result of ice melting in the centre of the glaciers and lubricating the ground so friction is reduced.

Explain that glacial-formed landforms are a result of either erosion or deposition. Elicit your students' existing knowledge about the definitions of both these terms.

Refer to the illustration on page 22 of the formation of a U-shaped valley. Read 'Cirques', 'Aretes', and 'Horns' on pages 22–23 and look at the illustration of erosional landforms.

Read 'Depositional landforms' and explain that these are formed from the deposits of materials that have been eroded along the glacier's journey. Point out the illustration of a moraine and show its different parts. Read 'Eskers' and study the photograph on page 24. Ask students to complete Questions C2 a–c.

## Using the Skills Book

Ask the students to complete 'Glacial features' on page 9 of their Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that there are two types of glaciers.
- I learned that U-shaped valleys, cirques, horns, and aretes are erosional glacial landforms.
- I learned that moraines and eskers are depositional glacial landforms.

PAGES 24–26

## *'Wind-shaped landforms'; 'Erosional landforms';* and *'Depositional landforms'*

## Resources:

- sandpaper
- samples of rocks

## Using the Student's Book

Read page 24 and explain that wind-shaped landforms have been shaped by wind erosion. The process of erosion by wind involves soil particles becoming detached from the land and transported by wind. Also, the force of the wind needs to be stronger than the gravitational force or the cohesive forces of soil particles on the surface of the ground.

Explain that in humid areas, water binds soil particles closer together, thereby making it harder for wind to carry them. Ask your students to think of ways to avoid or minimize wind erosion (or carry out some research). They should be able to suggest the following: planting vegetation, mulching the ground, avoiding overgrazing, and planting wind breaks.

You can demonstrate the process of abrasion in the following activity.

## Activity

Explain that sand erodes rock when it constantly rubs against it. For this purpose, bring sandpaper and some rock samples to class. Demonstrate by rubbing the edges of the rocks with sandpaper. Ask a couple of students to come forward and rub them for about 5–10 minutes. They should notice that the sharp edges of the rocks become smoother.

Explain that the speed and force of the wind is the main factor in shaping landforms. Show the photograph of the yardang on page 24 and point out that yardangs are found in areas where water is scarce.

Similarly, the process of deflation occurs in dry regions only, e.g. deserts. Ask students to look at the photograph of the salt pan (Salar de Uyuni) on page 25.

Ask the students to read 'Depositional wind-shaped landforms' on page 25. Explain that when the wind (carrying sediment) slows down, it deposits the sediment. The slowdown in the movement is often caused when the wind moves over or around obstacles such as hills, trees, or rocks. As the wind slows, it deposits the largest particles first.

Look at the illustration of the formation of sand dunes on page 25. Explain that when the wind blows, it carries and deposits the sand farther away. Consequently, the sand heaps up into dunes. Dunes are not a permanent feature as they keep rolling with the wind. Ask the students to complete Questions B1–3, C4 a–c.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that erosional wind-shaped landforms are formed by the processes of abrasion and deflation.
- I learned that sand dunes form due to erosion and deposition of sand from one place to another.

PAGES 26–27

***'Wave-shaped landforms'*** **and** ***'Erosional landforms'*** **(all sections)**

## Using the Student's Book

Wave-shaped landforms have been shaped by ocean or sea waves. These are found along the coasts. The force of the waves, often powered by wind, can wear away rock (erosion) and move tonnes of sand (deposition).

If your school is near the coast, and it is likely that your students have been to a beach, lead a discussion about the force of water. Focus on experiences of being dumped or pushed over by a wave. Also discuss the feeling of standing on sand when waves rush over one's feet and displace the sand. If possible, show a video on the Internet of waves striking the coast.

Explain that it is the energy of the waves that causes erosion, but the wind also plays a part. The stronger the wind, the more powerful the waves. Waves approach the shore at an angle, with the inshore part of the wave reaching shallow water before the rest of the wave. This results in the inshore part of the wave slowing the wave down and causing it to bend. This causes erosion.

Ask students to read about erosional landforms on pages 26–27.

The process of erosion involving caves, arches, stacks, and stumps is one that interests students and can be replicated in the following activity. Guide the students through this activity so that they create the various landforms as they go.

## Activity

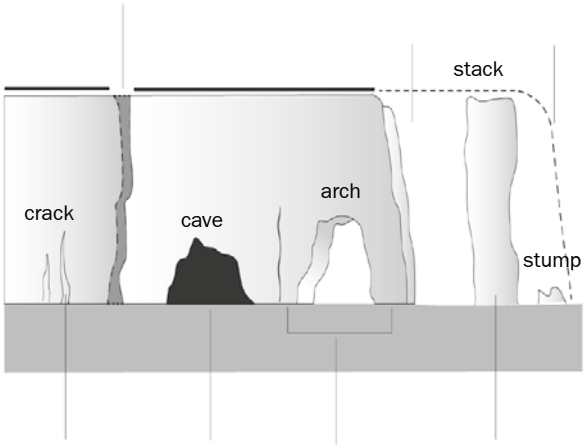
Follow the instructions to show the progression from caves to stumps. (Note: Your actions with the stick/knife are similar to millions of years of erosion by water.)

## Materials required:

- clay (enough to make a small mound)
- a craft stick or a blunt knife
- a card paper
- a pen
- a camera

## Instructions

1. Use all of the clay to create a headland (see illustration). Take a photo of your headland.




2. Use your stick or knife to create the cave. The hole should not go all the way through to the other side. Take a photo of your headland with the cave.
3. Use your stick or knife to turn the cave into an arch. The hole gets bigger and goes all the way through. Take a photo of your headland with the arch.
4. Use your stick or knife to create a crack above the arch so that the arch breaks and a stack is created. The stack should stand alone next to the rest of the headland. Take a photo of your headland with the stack next to it.

5. Use your stick or knife to cut the stack down into a stump. Take a photo of your headland with the stump next to it.
6. Print out your photos and stick them onto the card next to the final model. Your photos show the progression of millions of years of erosion.

Ask students to complete Question B4.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that when waves strike against the coast and other natural features, they change their shape.

PAGES 27–29

## *'Depositional landforms'* and *'Erosional* and *depositional landforms'*

## Resources

- Skills Book page 10 'Shapes of landforms'
- Skills Book page 11 'Depositional, erosional, or both landforms'

## Using the Student's Book

Ask students to read 'Depositional landforms' on page 27. Explain that deposition as a result of waves occurs when waves and other ocean movements slow down enough to deposit on shore the sand and other sediment that have been carried. The smallest particles are carried the farthest and deposited away from the shore. Larger particles are deposited on or close to the beach. Study the illustration on page 28 of the formation of sand spits. Encourage the students to describe this process.

Explain that several landforms shaped by the flow of water are a result of both erosion and deposition. Direct students to the section on these landforms on pages 28–29 of their Student's Book. Ask them to complete Questions B5 and C1 a–c.

## Using the Skills Book

Students should complete the activities 'Shapes of landforms' and 'Depositional, erosional, or both landforms' on pages 10–11.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that beaches, sand bars, and sand spits are depositional wave-shaped landforms.
- I learned that cliffs, channels, and meanders form due to erosion and deposition by waves.

## Answers to assessments

A 1. Students' own answers might include: The last Ice Age occurred between 100,000 and 12,000 years ago (approximately). At its peak, about 30% of the Earth's surface was covered by ice, including large areas of North America, Europe, and Asia.

a) The five largest glaciers in Pakistan are all in the Karakorams. They are: Siachen, Batura, Hispar, Biafo, and Baltoro

b) students' own answers

c) An avalanche is a rapid flow of snow, ice, and rocks down a mountainside. An avalanche occurs when layers of accumulated snow on the side of a mountain are disturbed (either naturally or by human activity), leading to a disturbance of the top layer and a downward rush of a large mass of snow.

B 1. Students' own answers might include:

- Chinook
- Coromuel
- Loo
- Santa Ana
- Sirocco

2 a) sand blasting: a process in which harsh gusts of wind blast against landforms, removing layers of sand and other particles and forming hollows

b) ridge: a long, narrow elevation of land

c) dune: a sand hill or sand ridge formed by the wind and found in desert regions or near oceans

d) silt: tiny bits of soil or sand that are carried by moving or running water and deposited as a sediment

e) windward: the direction from which the wind blows

3 a) A loess is a landform created by wind deposits.

b) A loess is formed when dust, silt, soil, and other particles are deposited in an area over a long period of time, sometimes, thousands, or even millions, of years.

4. Constructive waves are waves that have enough power to wash materials onto the shore but are not so powerful that they wash the materials back into the ocean when they recede. Destructive waves are far stronger and they erode a coastline by washing more materials back into the ocean than they deposit when they hit the coastline.

5. Encourage the students to either name just the major headlands and bays along the entire coastline of Pakistan, or pick a smaller portion of the coastline and identify as many as they can within that area. Examples of major headlands and bays in Pakistan are:

- Gwadar Bay
- Mubarak Goth
- Ormara
- Pisukan
- Sonmiani Bay

C 1 a) A sand spit is a long deposit of sand and other particles that stretches from the coast out to the sea. It is formed when wind blows at an angle to the coastline and therefore causes waves to travel in a zig zag direction, rather than straight to shore.

b) A tombola is a sand spit that connects an island to the shore.

c) A baymouth bar is a sand spit that completely closes the access to a bay.

2 a) Glaciers are able to move because melting ice at the bottom of a compacted glacier creates a slippery surface that facilitates its movement.

b) As snow falls and accumulates over the years, the glacier that starts forming

becomes heavier and heavier and creates a hollow in the Earth that increases in size, as the ice mass gets larger and heavier. The hollow that is formed is known as a cirque.

c) Yardangs are long, narrow ridges of rock that are formed when constant, strong winds coming from the one direction pound a landform down to its bare rock, removing all the sand and other particles.

3 a) Erosion is the process whereby rock, soil, or mineral particles are removed from their location by weathering and other natural processes.

b) Deposition is the process of transporting, and then settling, eroded materials in a different location.

c) Abrasion is the process whereby harsh particles, such as grains of sand, continually rub against a surface until that surface has changed shape or form.

4 a) False; horns are the result of several cirques eroding an entire mountain side.

b) true

c) False; the windward side is the side where the wind blows and pushes material up.

D 1 b) compression

2 c) alpine glaciers

3 a) flat and wide

# Answers to Skills Book

## Page 7 *'Location of glaciers and ice masses on Earth'*

A 1. Students should refer to the physical map of the world in the Oxford School Atlas for Pakistan and colour on the map the regions of the world where glaciers are found.

## Page 8 *'Location of landforms in Pakistan'*

A 1. On this map, students have to mark the locations of the following:

- Gilgit-Baltistan (a region with lots of glaciers)
- Chitral (a region with lots of glaciers)
- Siachen Glacier (the longest glacier in Pakistan)
- Biafo Glacier (a large glacier)
- Hunza Valley
- Jiwani, Pisukan, Gwadar, Rasjaddi, and Ormara (all have headlands)
- Clifton Beach and Hawkes Bay Beach in Karachi, and Gwadar Beach in Balochistan
- Thar Desert (where there are a lot of sand dunes)

## Page 9 *'Glacial features'*

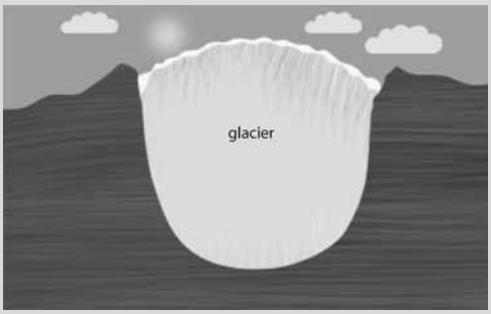
A1. The first illustration is of a continental glacier. The illustration below this is of an alpine glacier.

a) Continental glaciers are huge sheets of ice formed near the Poles by snowfalls over thousands of years. Continental glaciers fall into two categories, ice sheets and ice fields, with ice sheets being much larger.

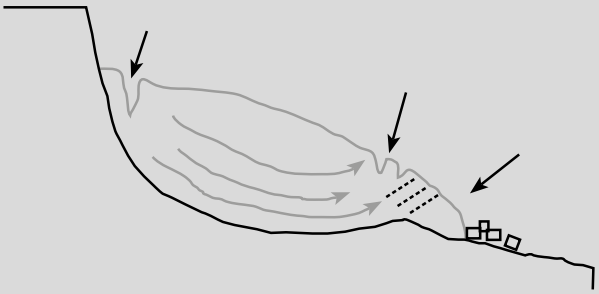
b) Alpine glaciers are large masses of ice that form at the top of mountainous regions and slowly move down and across the land. They form over many years of snowfalls, with each year's fall adding to the mass. Melting ice at the bottom of the ice pack creates a slippery surface that enables the glacier to move.

## Page 10 *'Shapes of landforms'*

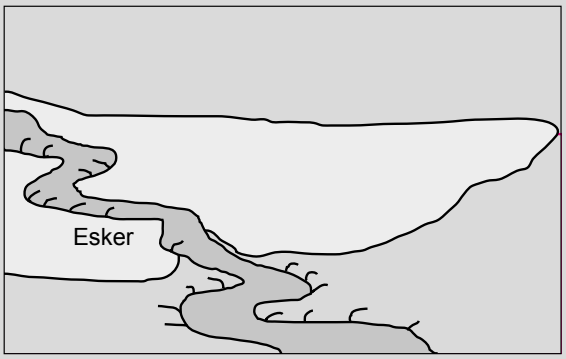
a) A U-shaped valley is the following shape:



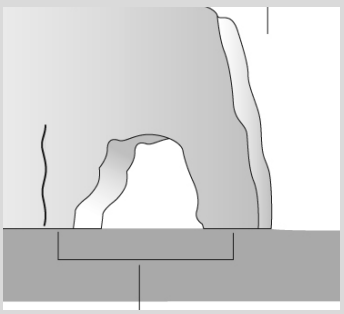

(b) A cirque is the following shape:



(c) An esker is the following shape:




(d) An arch is the following shape:



## Page 11 *'Depositional, erosional, or both landforms'*

A 1.

| Depositional | Erosional | Both |
|---|---|---|
| beach | arete | |
| meander | | |
| esker | cave | cliff |
| loess | cirque | |
| moraine | desert pavement | |
| sandbar | | |
| sand dune | headland | |
| sand spit | horn | |
| | playa lake | |
| | stump | |
| | U-shaped valley | |
| | wave-cut platform | |
| | yardang | |

UNIT 3

# Oceans and seas

## Background knowledge for the unit

This unit looks at the oceans and seas, including their characteristics and features, the structure of the ocean floor, and the movements of water in the ocean. It aims to help students understand the vast area that makes up so much of our planet in terms of its underwater topography and the effects that its waters can have on life on Earth.

Three quarters of the Earth's surface is covered in water. This water is vital for the planet. It helps to regulate climate through evaporation which, through the 'water cycle', falls back to the Earth as rain, and through movement of water around the planet by currents known as the great ocean conveyor belt, which helps to keep the atmospheric temperature even. Increasingly too, the ocean has also absorbed the extra heat and carbon dioxide that has been created by global warming, as this webpage and the accompanying video illustrate: http://climatekids.nasa.gov/ocean/. Additionally, the ocean is home to many plants and animals, all of which belong to environmental ecosystems. These ecosystems are vital to life on Earth, and their breakdown can have far-reaching consequences for life all over the planet, especially as the oceans are also a major source of food for humans.

Oceans are saline (salty) interconnected bodies of water that cover the planet. There are five oceans: the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Arctic Ocean, and the Southern Ocean. Seas are parts of oceans and are defined as being bordered by land on one, two, or three sides. There are well over a hundred seas. Some of them are large, while others are quite small. They include the Arabian Sea, the Dead Sea, the Mediterranean Sea, the Black Sea, the Red Sea, the China Sea, the Tasman Sea, and the Bering Sea. The Caspian Sea, which is landlocked and therefore more like a large lake, is called a sea because of its size.

Each ocean and sea is unique due to the combination of its geography, currents, and levels of salinity. Oceans and seas also have their own special underwater landforms and natural features that have been created by either geological processes or the interaction of sea and land through erosion or the laying down of sediment; or from a combination of any or all of these factors together. Underwater landforms include high mountain ranges created by tectonic plate movements or volcanic activity, and deep trenches that plunge for kilometres under the surface. Natural features are created where land and water meet and include bays, gulfs and bights, straits, isthmuses, peninsulas, and islands.

Ocean waters are in perpetual movement. Currents slowly push water from one part of the planet to another. They work with the weight of cold, salty water, moving warmer, less saline water to the surface of the ocean. Surface currents and waves are created by wind and move water over smaller distances. Tides, caused by the gravitational pull of the Moon, create tidal zones which are home to many unique ecosystems. All of these movements move not only water, but sediment as well, and help shape undersea features and areas of shoreline.

## Before we proceed

Before beginning work on this, explain how the structure of the surface of the Earth under the sea is as complex as the structure of the surface of the Earth on dry land. Like the topography of the continents, the topography of the oceans is also shaped largely by tectonic and volcanic forces, along with erosion. Explain that the discovery of underwater geography and oceanic life is still new and largely unknown. There is much that has not been explored. New mapping techniques, which are discussed in unit 7 of *World Watch Geography* Student's Book 2, have added greatly to our knowledge of the ocean floor. Exploration by government agencies such as the National Oceanic

and Atmospheric Administration (NOAA) and individuals such as James Cameron, using submersible submarines to look into the deep undersea has given humans a new perspective on a world that has previously been hidden. For more information on NOAA, refer to http://www.noaa.gov; and for James Cameron refer to http://www.deepseachallenge.com

## Expected learning outcomes

Students should be able to:

- identify the world's oceans and major seas and describe their main characteristics
- define features of oceans and seas such as bays and islands
- describe the structure of the ocean floor
- explain oceanic movements and their causes

PAGES 32–34

***'Oceans, seas, more'; 'Oceans'* (all sections); and *'Seas'* (all sections)**

## Resources

- Skills Book pages 12–13 'Characteristics of oceans and seas'

## Using the Student's Book

The world's oceans cover about 71% of the world's surface and have a total volume of 1.35 billion cubic kilometres. There are five oceans: the Pacific, the Atlantic, the Indian, the Southern, and the Arctic. Although they are viewed as separate, they are all connected and their waters flow from one to the other. The oceans are all largely defined by the landmasses that border them. The characteristics of each ocean includes its size, its position between landmasses, its place on the globe, and its underwater features. Other characteristics include salinity, water temperature, and the sources of its water. Seas are subsections of oceans. They are smaller and usually located around coastlines, and at least partially enclosed by land, which can include islands.

In the first lesson, introduce the concepts of oceans and seas. Read the text on pages 32–34. Explain the difference between oceans and seas and talk about the characteristics of the five oceans and some of the seas. Project or pin a detailed oceans map onto the board, or ask the students to refer to one in the *Oxford School Atlas for Pakistan*. After reading the section, ask them to observe the shape of each of the oceans and where they are defined. Ask them to look at the elevations in the areas they are looking at and draw conclusions about how shallow or deep various parts of the oceans and seas are. Ask them to find the widest and narrowest sections of the oceans and the deepest parts on the map. Ask about their general impressions of the seas from looking at these maps. Which ocean is closest to Pakistan and how might it influence life in this country? Use Questions A1–4 in the Student's Book to reinforce their learning.

## Using the Skills Book

Ask the students to complete 'Characteristics of oceans and seas' on pages 12–13 about the locations and characteristics of the oceans and seas for homework. Encourage them to use the Internet or an encyclopaedia to expand their knowledge.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that oceans are large bodies of water and seas are subsections of oceans.
- I learned about the characteristics of oceans and seas.

PAGES 35–37

***'Ocean features'* (all sections)**

## Resources

- Skills Book pages 14 'Ocean features where it meets land'

## Using the Student's Book

Many features form where land and sea meet. In this section, the students are introduced to gulfs, bays, bights, straits or channels, peninsulas, isthmuses, and islands. However, there are many more features which can be touched on here, such as sounds, inlets, headlands, beaches, caves, lagoons, estuaries, and more. The purpose of this section is not to list every feature, but to introduce the idea of these features, and explain how to identify them and how they might have been formed.

Read pages 35–37 and talk about the concepts of gulfs, bays, and bights. You can also mention sounds, lagoons, and caves as being of different sizes or depths. It is important to mention that while each of these geographical shapes has a definition, these are not always fixed, meaning that, for example, while gulfs are meant to be larger than bays, the Bay of Bengal is larger than any gulf in the world. Ask the students to speculate about why that might be. Talk about straits, peninsulas, isthmuses, and islands and define them. What do these features have in common? Ask the students to look at the illustrations on pages 35–37 and ask them to identify as many of these features as they can. How do these features relate to each other geographically? Complete Questions B3 a–b in class.

## Using the Skills Book

Ask the students to complete the 'Ocean features where it meets land' on page 14 for homework to reinforce the concepts. Encourage them to use the Internet or an encyclopaedia to expand their knowledge.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about some of the features of oceans and seas like peninsula, bays, bights, gulfs, straits, etc.
- I learned about the differences between these features.

PAGES 37–39

# *'The structure of the ocean floor'*

## Resources

- Skills Book page 15 'Structure of the ocean floor'

## Using the Student's Book

The structure of the ocean floor introduces the students to undersea topography as well as explaining how the geographical features that are found in the oceans have been created. This section aims to show the students that the environment below the surface of water is as complex as the environment above it; and that this environment has been shaped in similar ways to that on dry land with the action of water largely replacing the action of the wind.

Read through page 37 with the students. Project or display a large map or cross section of the ocean floor to refer to as you progress with the lesson. Talk about how various parts of the ocean floor have been formed. For example, by plate tectonics, volcanic activity, and sediment. Explain briefly how plate tectonics work. A good explanation can be found at: My E-Mate companion website. Using the information they have just learned, ask the students to answer Questions B1–2, B4, and C1.

## Using the Skills Book

Ask the students to complete the questions on 'Structure of the ocean floor' on page 15 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that the structure of the ocean floor is shaped by tectonic activity, volcanic activity, and deposition of sediment.

PAGES 40–41

## *'The movement of the ocean'; 'currents'; 'waves';* and *'tides'*

## Using the Student's Book

The waters of the ocean are in perpetual motion. This movement has deep effects on the sea, and the planet as a whole. Waves, tides, and currents all move water from place to place. Waves and tides cause erosion that reshapes features at the edge of the sea, as well as helping to displace sediment into the ocean. Currents have a strong effect on the temperature of the sea and the atmosphere.

Read through the section on currents and discuss the role of currents in the movement of water around the planet. Ask the students to discuss Question C2 in the Student's Book. Ask what overall effects these currents might have.

For the second half of the lesson, turn to the sections on waves and tides. Discuss the kinds of effects that they might have on the ocean's features and through erosion. Ask them to complete Questions C3–4 in the Student's Book. The following activity can be undertaken in class to illustrate the role wind plays in making waves.

## Activity

How does wind affect the size of waves?

## Resources

- one shallow plastic tray
- sand or pebbles
- portable desk fan
- paper and pen to record findings
- Warning! Do not let the fan touch the water or it could cause an electric shock.

## Instructions

1. Make a small beach at one end of the tray with sand or pebbles. Fill the tray with about 3 centimetres of water.
2. Place the fan at one end of the tray, opposite to the beach end. Aim the fan so that the air will hit the water at a 45 degree angle.
3. Turn the fan on low speed and leave it running for 3 minutes. Record your observations of the water. Then turn it off and allow the water to become calm.
4. Turn the fan on medium speed for 3 minutes. Record your observations of the water on the table. Allow the water to become calm again.
5. Ask students to predict what will happen to the water when you turn the fan on for 5 seconds at high speed.
6. Turn it on for 5 seconds and record your observations.
7. Ask students to predict what will happen to the water when the fan stays on for 10 seconds at high speed.
8. Ask the students to use their observations to talk about the link between wave size and wind. Ask them to talk about what they see in relation to wind speed, wind duration, and fetch.

   For homework, students should complete Question D1 a–c.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that the water in the oceans and seas is continuously in motion.
- I learned that waves and tides erode the land features where the sea comes into contact with land.

## Answers to assessments

A 1. The oceans are important to life on Earth in several ways, including: being a source of food, being home to many animals and ecosystems, and being a regulator of climate.

2. Oceans are large interconnected bodies of water that cover the Earth. Seas are parts of oceans. There are more than 100 seas and they are characterized as being bordered or partially enclosed by land.

3. Some characteristics of the oceans are:

| | | | |
|---|---|---|---|
| The Pacific | largest ocean, with an area of 156,000,000 sq km | dotted with atolls and other islands | home to deepest location on planet, 11,033 metres (Challenger Deep, Mariana Trench) |
| The Atlantic | second largest ocean, with an area of 77,000,000 sq km | the most saline ocean | a maximum depth of 8605 metres (Puerto Rico Trench) |
| The Indian | third largest ocean, with an area of 69,000,000 sq km | The Red Sea and Persian Gulf are considered to be a part of the Indian Sea. | a maximum depth of 7258 metres (Java Trench) |
| The Southern | fourth largest ocean with an area of 20,000,000 sq km | The ocean's northern boundary is with the Pacific, Indian, and Atlantic Oceans. | a maximum depth of 7235 metres (Sandwich Trench) |
| The Arctic | fifth largest ocean with an area of 14,000,000 sq km | The Arctic is the coldest ocean and is often covered in floating ice. | a maximum depth of 5000 metres (Amunsden Basin) |

4. Some characteristic of seas are:

| | | | |
|---|---|---|---|
| The Arabian Sea | covers 3.9 million sq km | It is bordered by India, Iran, the Maldives, Oman, Yemen, Somalia and Pakistan. | It is a part of the Indian Ocean. |
| The Baltic Sea | covers 386,000 sq km | It is linked to the North Sea to the east. | It is a part of the Atlantic Ocean. |
| The Black Sea | covers 444,000 sq km | It is connected to the Mediterranean Sea by a small channel. | It is a part of the Atlantic Ocean. |

B 1. In subduction, one tectonic plate moves slightly under another. This forms deep trenches.

2. Volcanic activity shapes the ocean floor by producing seamounts which are single mountains with steep sides. Sometimes these rise above the surface and become volcanic islands. When they are eroded they are called guyots. Volcanic activity often takes place where tectonic plates meet, and strings of volcanic islands are produced along the edges.

3 a) Features created where land and sea meet include gulfs, bays, bights, straits, peninsulas, isthmuses, and islands.

b) A gulf is a deep inlet of ocean or sea with one narrow opening to the wider ocean. A bay is a body of water connected to an ocean and partially surrounded by a curved piece of land. A bay is usually smaller and less enclosed than a gulf, but some bays

can be very large. A bight is a little like a bay, but longer and more open to the sea.

4 a) true

b) False; mid-ocean ridges are a connected chain of mountains that run throughout the world's oceans along tectonic plates. They are thought to be between 50,000–80,000 kilometres long in total.

c) False; trenches form in the deepest parts of the ocean and occur as a result of tectonic plate movements in a process called subduction, when one plate slides slightly under another.

d) true

C 1. A continental shelf is submerged land at the edge of a continent. It can extend from 30 to 300 kilometres out to sea.

Continental slope begins at the edge of the shelf and drops more rapidly. It can extend up to 100 kilometres and drop by about three kilometres.

The continental rise is at the end of the slope and consists of thick sediment that has built up from the shelf and slope. The rise can extend up to 1000 kilometres.

2 a) There are two types of currents in the ocean. The first are wind-driven currents that affect the surface water of the sea. The other type of currents are global currents known as thermohaline circulation which extends through all the oceans.

b) Wind-driven currents move in large circular patterns called gyres. They affect some areas of water to about 200 metres in depth. Thermohaline circulation moves water in large quantities in a rolling and forward motion that exchanges warm surface water for cold, salty, deep water. It also slowly moves this water along circulation routes known as the great ocean conveyor belt which shifts the water slowly around the planet.

c) Deep currents are called thermohaline circulation. They move water all around the world in what is called the great conveyor belt, constantly mixing warm and cold water together. The wider effect on the planet is that by moving cold water to warmer places and warm water to cooler places these currents keep the temperatures of the Earth and its atmosphere balanced.

3. The highest part of a wave is called the crest. The lowest part of the wave is called the trough. The distance between the tops of two consecutive waves is the wavelength.

4 a) The Moon influences the oceans by causing tides. A tide is the rising and falling of the sea on the coastline every six hours.

b) The force behind this effect is gravity.

D 1 a) Students should research using the Internet. Their descriptions should follow a similar pattern that outlines sizes, oceans of which they are a part, depths, capacities, neighbouring countries, temperatures, salinity, etc.

b) Check students' illustrations of the ocean basin and their labelling of mid-ocean ridges, abyssal plains, and trenches against the diagram in the Student's Book on page 37.

# Answers to Skills Book

## Pages 12–13 *'Characteristics of oceans* and *seas'*

A 1. Check that the names and borders for oceans correspond with those in the text or on an atlas, and correct where necessary.

2. The Pacific Ocean is the largest. The Pacific Ocean has the deepest point. The Arctic Ocean is the shallowest. Parts of the Atlantic contain the most saline water. Parts of the Pacific contain the least saline water. The Arctic is the coldest ocean. The Indian Ocean is the warmest.

3 a) Students should look up the names and depths of the seas on the Internet.

b) Oceans are large bodies of saline water that cover more than 70% of the planet. Seas are parts of the oceans, defined as being partially bordered or enclosed by land.

4 a) The Indian Ocean

b) The Arabian Sea

c) These bodies of water are important to Pakistan for food from fishing; and for trade and travel as they enable Pakistan access to the world's waterways.

## Page 14 *'Ocean features where it meets land'*

A 1 a) F

b) F

c) T

d) T

e) F

f) T

g) T

h) T

2.

| | |
|---|---|
| a) strait | a narrow waterway that flows between two landmasses and connects two larger water bodies |
| b) peninsula | a section of land that is connected to a mainland and is surrounded on three sides by water |
| c) isthmus | a narrow piece of land separating two bodies of water and connecting two larger bodies of land |
| d) island | a piece of land surrounded on all sides by water |

3 a) island b) strait

c) isthmus d) Peninsular

## Page 15 *'Structure of the ocean floor'*

A 1. The labelling should match that on page 38 of the Student's Book.

2. Sediment is matter that settles to the bottom of watery environments. It is found all over the ocean floor. Some sediment is carried along rivers down the continental shelf and continental slope and then deposited on the continental rise. It is believed that the underwater canyons that often lie offshore from river mouths are carved out by the movement of this sediment. Sediment is found across the abyssal plains in the deeper parts of the ocean basin. Some of this sediment is made up of soil and sand that is carried along the rivers from the land. Some of it is dust and ash that comes from volcanic eruptions. Some of it comes from marine life and is made up of small shells and the remains of dead sea organisms. The abyssal plains on the ocean basin appear flat because they are covered in sediment, with only small rises, called abyssal hills, being visible.

UNIT 4

# Industrialization

## Background knowledge for the unit

This unit focuses on the notion of industrialization: what it is; when and how it started; its impact on individuals, communities, and countries; and where the main areas of industrialization are within Pakistan and the rest of the world. A major focus of the unit is a comprehensive look at the cotton industry, Pakistan's largest industry.

Industrialization is the transformation of a predominantly agricultural society to a more industrial-based society where the manufacturing and services sectors play a dominant role. Two of the key characteristics of this transformation are the move from manual labour to mechanized production, and the introduction of assembly lines rather than a reliance on people with specialized skills.

This process is said to have begun in Britain in the late 1700s, with the real impact coming from the mid-1800s onwards, in a period known as the Industrial Revolution. This was the time when the first factories were built, and both mechanical and steam-powered mechanisms were introduced into the production system. It was possible to produce goods for far less per unit than before, which meant far greater profits for the factory owners, and more money to invest in more labour and equipment in order to produce further profits.

Industrialization is seen as a system for wealth creation and improving the living standards of a nation's population. China is a great example of a nation that was slow to embrace industrialization, but through this process it has become a powerhouse economy.

Of course, there are downsides to industrialization that have to be managed. These include economic inequality and exploitation, geographic dislocation, and environmental damage.

## Before we proceed

Before beginning this unit, it is important to ensure that students are introduced to some basic terms such as industrialization, globalization, means of production, consumption, and services. You could ask your students to find out the definition for each from their Oxford Dictionaries. Here are definitions that their responses should resemble:

- industrialization: the process by which an economy is transformed from being mainly agricultural into one based on the manufacturing of goods
- globalization: involving all the countries of the world
- means of production: the raw materials and non-human labour (i.e. equipment, technology, etc.) that are used to produce goods
- consumption: using a resource
- services: non-tangible products that are bought and used

This unit identifies the main industrial regions of Pakistan and examines the types of industries found in these regions. Before the students read the unit and conduct some research, lead a discussion about the types of industry in your region. This will provide you with an idea of how much background knowledge the students have.

Here are three examples of questions you could ask:

- Which goods and services are produced in this region?
- Which industries do your family members work in?
- Are there any factories or other places of production between your house and school? If so, what do they produce?

Note the students' responses and check how similar they are to the research they conduct.

The cotton industry of Pakistan is a major focus of this unit. In preparation, ask your students to check the labels on their clothes at home and work out what percentage of their clothing contains cotton. Also, ask them to identify other cotton products around the house. This will give them an insight into how important cotton is to the economy of Pakistan.

## Expected learning outcomes

Students should be able to:

- define the term industrialization
- identify where and when industrialization started
- identify the major industrial regions of Pakistan and of the world
- explain how the textile industry works in Pakistan
- outline the pros and cons of industrialization

PAGES 44–46

***'What is industrialization?'; 'History of industrialization';* and *'The world's major industrial regions'***

## Resources

- *Oxford School Atlas for Pakistan*
- Skills Book page 16 'Agriculture in Asian countries'

## Using the Student's Book

Begin the unit with a discussion about the progress made in the world as a result of industrialization. Explain that the economies of those countries which earn through their industries are stronger than the economies of those that earn through the agricultural sector. Before reading 'What is industrialization?' elicit answers to this question. Then read this section on page 44 and explain that the shift from small-scale industries to large-scale industries indicates the progression of a country's economy.

Continue reading 'History of industrialization'. Encourage the students to compare modern-day fast trains like bullet trains with the steam engine trains used in the past. Ask for more examples of products used before industrialization.

Read 'The world's major industrial regions' on pages 44–45. On the political map of the world in the *Oxford School Atlas for Pakistan* show them the industrialized countries in North America (the USA and Canada) and in East Asia (Japan, Hong Kong, South Korea). Ask them to locate the other industrialized countries listed in the table on pages 45–46.

Ask them to complete Questions A1–2.

## Using Skills Book

Ask students to complete 'Agriculture in Asian countries' on page 16.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that industrialization means shifting an economy based on agriculture to one based on industry.
- I learned that the Industrial Revolution began in Britain in the nineteenth century.

PAGE 46

***'Service industries'***

## Using the Student's Book

Service industries are a major part of global economics. Explain that service industries are those in which businesses and consumers receive something intangible, i.e. something that cannot be held and exchanged. For example, when they have a haircut, they pay for the service. Similarly, if their computer, TV, or another machine is not functioning properly, they seek the services of respective professionals to fix them.

To explain the difference between services and goods, conduct the following activity.

## Activity: Services v Goods

Ask your students to keep a diary for a week in which they record the number of goods that they

purchase and consume, as well as the number of services they purchase and consume. They could include their parents in this activity by asking about purchases for the household.

Remind them that goods include: food, computer equipment, clothes, petrol, and books; services include: education (going to school), medical attention (going to the doctor), computer repairs, transportation, etc.

Ask them to complete Questions A3–5.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that service industries are important for the economy of a country.
- I learned about some of the service industries in the world.

PAGES 46-48

***'Industrial regions of Pakistan'* and *'Important industries of Pakistan'***

## Resources

- *Oxford School Atlas for Pakistan*
- Skills Book page 17 'Important industries in Pakistan'

## Using the Student's Book

Explain that Pakistan mainly earns through its agricultural products. Most of its industries depend upon the raw materials obtained from its agriculture. Refer to *the Oxford School Atlas for Pakistan* and look at the map of the cotton growing regions in Pakistan. Then look at the map of the textile industry of Pakistan and elicit that most of the textile industries are located in the same regions where cotton is grown. But to increase its industrial production, Pakistan has to import raw cotton from other countries.

Ask students to read 'Industrial regions of Pakistan' on pages 46–47 and look at the map. Now discuss the various industries of each region of Pakistan.

Ask students to read 'Important industries of Pakistan' on page 48 of their Student's Book and discuss the main agricultural, manufacturing, and service industries.

## Using Skills Book

Ask students to complete 'Important industries in Pakistan' on page 17.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that the main industries are located in Punjab and Sindh, while some are also located in Balochistan and Khyber Pakhtunkhwa.

PAGES 48-49

***'Industries in other countries of the world'***

## Resources

- Skills book page 20 'Major industries around the world'

## Using the Student's Book

In this section, students will learn about the industries of Germany, Nigeria, and Kuwait. Point out the map on page 49 which shows the locations of these countries.

Lead a discussion in which students talk about other things they know about these countries. For example, they may be aware that Germany produces some of the best cars in the world. Nigeria is the largest oil-producing country in Africa, and Kuwait, a Middle Eastern country, is also known for its huge oil reserves.

After reading page 48, ask them to list the major industries of each of these countries and then discuss with a partner how the economies of these countries are different from each other.

## Using Skills Book

Ask students to complete 'Major industries around the world' on page 20.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the industries of Germany, Nigeria, and Kuwait.

PAGES 49–52

***'The textile industry in Pakistan'; 'The cotton industry in Pakistan' up to 'Problems faced by the cotton industry in China'***

## Resources

- Skills Book page 19 'Stages of production of cotton fabric'

## Using the Student's Book

The textile industry of Pakistan contributes greatly to the economy of Pakistan. Ask them to read page 49 of the Student's Book and elicit an explanation of the main processes of producing textiles. Ask students to look at the bar graph on page 49, and elicit that the production of cotton increased between 2012 and 2016.

Read about 'The cotton industry of Pakistan' and identify and discuss the different stages of cotton production. Read 'Problems faced by the cotton industry'. Explain that the farmers depend upon their crops to make their living. If their crops fail, they will suffer heavy financial loss. Explain that the agricultural land is irrigated by the wide network of canals in Pakistan. Due to increased salinity (saltiness) in the soil and water pollution, the yield of cotton is adversely affected.

Read 'Cotton industry in China' on page 51. Elicit reasons why cotton is produced at a cheaper rate in China than in Pakistan. Read 'Problems faced by the cotton industry in China' on page 51. The students should be able to compare the problems faced by the cotton industries in Pakistan and China. Ask them to complete Questions B1–5.

## Using the Skills Book

Ask students to complete 'Stages of production of cotton fabric' on page 19.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the textile industry of Pakistan.
- I learned about the similarities and differences between the cotton industries of Pakistan and China.

PAGE 52

***'The cottage industry in Pakistan'* and *'Advantages* and *disadvantages of cottage industries'***

## Using the Student's Book

Read these pages and discuss how a cottage industry is different from a large-scale manufacturing industry. Students might mention that there are fewer workers in a cottage industry. If necessary, explain that there are some other differences including:

- the method of producing the goods (hand versus machines/powered equipment)
- location of production (home versus factory)
- number of people involved in the enterprise (10–100 versus up to several hundred or more)

Students could make a list of household items that were made in cottage industries. For example, carpets, furniture, handicraft items, etc.

Read 'Advantages and disadvantages of cottage industries'. Hold a class discussion about this. Explain that many people in Pakistan, especially those living in rural areas, are associated with cottage industries and it is a great way of keeping their cultural traditions alive. They are taught their skills by one generation and pass them on to the next. Their handmade products are valued for their

simplicity and uniqueness. Students should complete Question B6.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that cottage industries are important for the economy of a country.
- I learned that cottage industries are small-scale industries run from homes.

PAGES 52–53

## *'Impact of industrialization'* (all sections)

## Resources

- Skills Book page 18 'Different aspects of industrialization'

## Using the Student's Book

Before reading this section, elicit ideas from the students about the positive impact of industrialization. They might mention that industrialized countries are richer and provide better job opportunities for people. Elicit ideas about its negative aspects. They might mention increased environmental pollution. Read pages 52–53 and ask them to complete Questions C1 a–c, B1–3, and E1–5 in class or as hiomework.

## Using Skills Book

Ask students to complete 'Different aspects industrialization' on page 18.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that industrialization has a positive as well as a negative impact on society, cultures, and the environment.

## Answers to assessments

A 1. Some of the inventions that should be discussed include the steam engine trains, cotton gin, telegraph, sewing machine, and railways.

2. The Asian countries on the list are Hong Kong, Japan, and South Korea. Among the reasons for their inclusion in the list are: an increase in the size of their service industries; massive investment in technology in their manufacturing sector, including robots and other high-tech mechanization; and free trade agreements that increase the size of their markets.

3 a) industrialization: the change from having an economy reliant on agriculture to one based on the production of goods and the provision of services

b) service industry: an industry in which businesses and consumers receive something other than goods that can be held and exchanged

c) GDP: the monetary value of all the goods and services produced within a country

4. North America, Western and Central Europe, Russia and Ukraine, and Eastern Asia

5. Young people move from small towns to large cities in search of jobs.

B 1. iron, steel, aluminium, textiles, cement, chemicals, toys, electronics, railway carriages, ships, aircraft

2. The cotton industry plays a vital role in the growth of Pakistan's economy. It is termed as white gold because it earns a lot of revenue for the country. It is also important because it provides numerous job opportunities for the people, particularly those living in rural areas who can work on the farms to make their living.

3 a) Harvesting involves the picking of cotton.

b) Ginning is the process of separating the cotton fibres from the seeds.

c) Spinning is the process of producing yarn from cotton.

d) Weaving is the process of producing cloth from cotton.

Note: Further detail can be found on page 50 of the Student's Book.

4. from October to February

**Problems faced by China**

5. • water supply
   • water pollution
   • environmental factors
   • climate change altering the conditions in which cotton can be grown
   • large number of very small cotton growing farms that are unable to make enough money, or attract enough investment, to improve the quality of their crops

**Problems faced by Pakistan**

• inadequate supply of water from the Indus
• increasing use of pesticides that harm the environment
• climate change altering the conditions in which cotton can be grown

C 1 a) False; it is Eastern Asia.

b) False; it has decreased from about 50% to about 20%.

c) true

D.

1 b) Britain
2 d) tourism
3 a) Khyber Pakhtunkhwa
4 in homes/residential areas

E 1. The responses obviously depend on the region in which your school is located.

2. The responses obviously depend on the experiences of the people who are interviewed.

3. Responses will be similar to the notes on page 52 of this guide in the section titled 'Impact of industrialization'.

4. Items that may be discussed include television set (aids communication and helps inform about the outside world), refrigerator (keeps food for longer), telephone (enables instant communication), computer and Internet (speeds up work-related and leisure activities and informs about outside world), washing machine (frees up time and less labour intensive).

5. This responses obviously depends on the industry chosen by the students.

# Answers to Skills Book

## Page 16 *'Agriculture in Asian countries'*

A 1. Please ensure that the map is completed so the following countries are coloured as follows:

- India (red)
- Japan (red)
- South Korea (red)
- Pakistan (yellow)
- Bangladesh (red)
- Vietnam (red)
- Laos (yellow)
- Cambodia (yellow)

## Page 17 *'Important industries in Pakistan'*

A 1. Please ensure the map below is completed with the following industries pinpointed in the following regions.

Balochistan (coal, gas)
Gilgit-Baltistan (agriculture)
Khyber Pakhtunkhwa (agriculture, cement)
Punjab (agriculture, cement, coal, gas, textiles)
Sindh (agriculture, cement, coal, gas, petrol)

## Page 18 *'Different aspects of industrialization'*

A 1. Some of the responses from the person on the left could include:

- The country is becoming wealthier because it is exporting more goods.
- The agricultural and manufacturing sectors are becoming more efficient.
- More goods are available to consumers.
- Cheaper goods are available to consumers.
- Standards of living have increased for most people.
- There are now incentives to develop and introduce technology.
- There are more job opportunities.

Some of the responses from the person on the right could include:

- Increased carbon emissions through large-scale manufacturing are bad for the environment and people's health.
- The extensive use of non-renewable energy resources means these resources will one day run out.
- Pay is low for physically demanding work.
- The possible decline in cottage industries means people in these industries will lose work and money.
- The loss of cottage industries may lead to the loss of cultural identity.

## Page 19 *'Stages of production of cotton fabric'*

A 1. In describing each stage of production, the students should write something like the following:

- Harvesting takes place from October to February. The picking of cotton is done by hand, often by women. There are about 500,000 female cotton pickers in Pakistan and they are usually paid less for their work than male cotton pickers. They can pick up to 35 kg of cotton per day in a year when the harvest is good.
- Ginning is the process of separating the cotton fibres from the seeds. This is done by machines in ginneries. First, the cotton is dried to reduce moisture. Then all foreign materials are removed from the cotton. The cotton is then pulled through narrow slits, which the seeds are too big to pass through. The cotton is then compressed into a bale.
- Spinning is the process of producing yarn from cotton. It is done on machines in mills. Spinning involves a machine pulling, stretching, and twisting cotton into yarn. Pakistan produces far more yarn than it uses domestically, so much of the yarn is

exported, providing much of the nation's wealth.

- Weaving is the process of producing cloth from cotton. This usually takes place on a loom. The cloth that is produced in Pakistan comes in many forms, including denim; other clothing fabrics, fabrics for home furnishings, towelling, knitwear, and canvas.

## Page 20 *'Major industries around the world'*

A 1. The responses in this section will depend on the countries chosen. To check on responses and to lead further discussion, two good websites for the necessary information are:

- World Bank Group (www.worldbank.org)
- CIA fact book (www.ciaworldfactbook.us)

UNIT 5

# Pakistan and international trade

## Background knowledge for the unit

In this unit we look at Pakistan's international trade, examining the goods Pakistan produces and exports, and those that it imports from other countries. The unit begins with imports and exports in general, and the history of trade in present-day Pakistan. It then focuses on one export product and one import product as a way of investigating the movement of goods between countries. The final part of the unit covers international trade organizations and the agreements and arrangements made between Pakistan and other nations that encourage and support trade.

Pakistan has a long history of trade. Since ancient times, the area that is known as Pakistan today has been part of the Silk Road route, a network of trading routes that connected East Asia and Europe via South and Central Asia. The geographic location of Pakistan facilitates the movement of goods and people via its numerous air, land, and sea routes to different countries of the world.

Then, as now, trade satisfied the need to supplement everyday life with goods that were not produced locally; at the same time it presented a way to deal with any surpluses of their own products. Trade has always been a complex combination of supply and demand, where the buyers and sellers are reliant on each other to make sure products are available or sought after. The challenge in a modern world is that trade must be actively pursued on a world stage. Countries compete heavily with one another to buy goods that are scarce, or to sell goods for which the market is limited, or that are already in oversupply. Changes to countries' capacities can come in the shape of natural disasters and financial crises that can affect both buyers and sellers.

This unit does not delve into the complexities of trade or economics, but a basic understanding of some key terms and ideas is important in order to give the subject context and enable the students to move to a new level of understanding in the forthcoming years of education. The terms supply and demand, and surplus and deficit can be discussed with the students, along with the ideas of balance of trade and balance of payments. Tariffs and quotas also need to be outlined, and the ideas behind them—such as offering protection to local producers—should be touched on.

Most of the above terms can be found in the Student's Book's glossary. Two more advanced terms, the balance of trade and balance of payments, can be explained as follows. The balance of trade is the difference between the value of goods and services exported out of a country and the value of goods and services imported into the country. When exports are greater than imports, there is a trade surplus, or favourable trade balance. When the value of imports outweighs the value of exports, there is a trade deficit, or unfavourable trade balance. Balance of payments is the account of all the monetary transactions conducted by a country with other countries, usually within the span of a year. When a country spends more than it earns, this is called a deficit.

## Before we proceed

At the beginning of this unit, talk about the ideas behind trade. Students should be able to see the links that trade has in their lives, in the kinds of goods they use every day, or the way they live their lives. For example, the vehicles they travel in, the appliances they use, or the energy they consume. They should have a clear understanding of why trade is important to any nation, and how, in our global world, trade has become much more important than ever before. They should understand that trade has the capacity to help nations grow economically: for example, the import of machinery or energy sources to help industries produce more and better goods, which can in turn be exported. At the same time, nations engaging in a lot of importing have to be careful not to become so indebted that they spend

everything they earn on paying off their debt rather than developing enterprises.

Before beginning the unit, it is good to alert students to the fact that finding solid figures for the economy can sometimes be difficult. This is because different authorities might gather or interpret figures in different ways. Sometimes it is hard to compare between years because different groups of products or figures might be counted at different times. Thus they will sometimes find figures that do not always match others they have been given. However, if this happens, they should still be able to see general trends in decline or growth in particular areas.

## Expected learning outcomes

Students should be able to:

- identify Pakistan's major trade goods and major international trading partners
- explain why Pakistan imports and exports goods, and to and from where
- demonstrate knowledge of Pakistan's international trade agreements and arrangements
- explain how trade can shape a country's economy

PAGES 56–60

***'What is international trade'*** **(all sections)**

## Resources

- Skills Book pages 21–22 'International trading partners of Pakistan'

## Using the Student's Book

For several decades following independence, Pakistan had fairly low levels of trade. This began students should read pages 57–60 and look at photograph ad diagrams to change in the 1980s. At that time, the government, realizing that Pakistan could become wealthier through trade, relaxed import regulations and encouraged farmers and manufactures to produce greater amounts of higher quality goods for export.

In the nation's early years, raw cotton made up the largest share of exports, followed by cotton goods. By 2014–15, value-added goods, such as textiles, cotton cloth, cotton yarn, and manufactured clothing, made up the top 54.5% of exports. Other key export items included rice, and leather and sports goods.

At the same time, imports of electronic equipment and industrial materials were important in the 1950s and 1960s. In recent years this has changed, and now industrial raw materials make up roughly 60% of imports, electronic equipment 26%, and consumer goods 14%. Of these, it is crude oil, petroleum, and petroleum products that are the largest imports.

As of 2014, the major nations to which Pakistan exports goods are the USA, China, the UAE, and Afghanistan countries. Those from which it imports goods are: China, Saudi Arabia, the UAE, and Indonesia.

After reading through page 56, talk about the nature of Pakistan's imports and exports. Ask the students to look around and identify any imported goods, for example, the electrical appliances in the classroom; or to think about items that they have at home, or they see on the way to and from school. Ask what life would be like if they did not have imported goods. Are there some particular goods that they, or their country, simply could not do without? How does importing products enable a country to do things it could not otherwise do? For example, what does the import of machinery that can process certain goods, or energy sources that can power machinery, do for an economy? Talk about what imports and exports do in general for the economy. Also discuss the nature of debt and what happens when a person—or nation—has spent more than it has earned. In Pakistan, some revenue also comes from overseas remittances from workers living in other countries. However, in order to pay for much of its overseas borrowing, Pakistan has to take out loans which have to be paid back with interest.

Students should read pages 57–60 and look at the photograph and diagrams. Identify the goods that Pakistan produces and where they go to. Talk about why the countries that Pakistan exports to now may be different from those it exported to a decade or more ago. Encourage the students to think about why these relationships might have changed—or

the types of goods sent to varying places might have changed. In the same way, talk about imports and ask them to note changes in their composition and where particular imports come from.

They should discuss questions in class with each other. Students should complete Questions A1–4 and B1.

## Using the Skills Book

Ask the students to complete 'International trading partners of Pakistan' on pages 21–22. Encourage them to use the Internet or an encyclopaedia to expand their knowledge. A good source for import/export statistics can be found at: www.pbs.gov.pk

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that Pakistan's international trade has grown manifold since its independence.
- I learned that Pakistan has several trading partners, including the USA, China, the UAE, Saudi Arab, Indonesia, etc.

PAGES 61-63

***'Pakistan's top export: cotton'* and *'Pakistan's top import: fossil fuels'***

## Resources

- Skills Book page 23 'Trading networks of Pakistan'

## Using the Student's Book

Explain that although Pakistan imports and exports many goods from many countries, it is heavily reliant on one main export and one main import. Its top, and overwhelmingly largest, export, is cotton in forms that range from raw cotton, through to household linens (bedding, tablecloths, etc.) and clothing. Its largest import is fossil fuels, mostly in the form of oil and petroleum products.

Pakistan's cotton agriculture sector employs over a million and a half people and takes up 15% of the nation's land. Its textile sector, which pivots around cotton production, accounts for around 40% of the industrial labour force. This means that cotton is not just important in terms of its value as an export, but is an essential component of the Pakistani economy. In terms of its place as an export, cotton in its varying forms makes up more than 50% of the country's exports.

Fossil fuels are the nation's most significant import. They account for almost a third of all imports and cost the country billions of dollars each year. As Pakistan has modernized and urbanized, the country has become more and more reliant on fossil fuels to generate power for everyday living. Half of Pakistan's electricity is consumed domestically.

Read through this section of the unit with the students and talk about these two import and export commodities. Ask if they know people engaged in the cotton industry in some way. Do they think relying on one export in such a way is a problem? Elicit what they know about this industry. Encourage them to think about and discuss the ways trade links Pakistan with the rest of the world; and where Pakistan cotton is exported to.

Similarly, the students can reflect on how problematic it is to rely heavily on one import. Are fossil fuels especially problematic when many other countries in the world are moving away from their use, even countries that produce them, such as the UAE?

Refer the students to Questions B2–4. They can work individually or in groups and present their answers at the end of the lesson. Encourage them to seek more information on the Internet.

## Using the Skills Book

Ask the students to complete 'Trading networks of Pakistan' on page 23, either in class or for homework, to reinforce concepts about how trade links countries.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that cotton is the main export product of Pakistan and its export is a great revenue earner.

- I learned that fossil fuels are the main import product of Pakistan and it is mainly imported to meet the energy requirements of the country.

PAGES 63–65

## *'International trade organizations'* (all sections)

## Resources

- Skills Book pages 24–25 'International trade agreements of Pakistan'

## Using the Student's Book

Read page 63 and explain that belonging to trade organizations has many benefits for its members, including promoting and regulating trade between their member nations. As well as being a member of the WTO, Pakistan belongs to the regional trade associations SAFTA and ECO. SAFTA covers the South Asian area and its aim is to reduce trade barriers between member countries so that it becomes cheaper to trade with those countries than with others for similar goods. ECO, based in Central Asia, has a similar agenda, as well as an objective of sustainable development for the region.

Reinforce what the terms 'PTA' and 'FTA' stand for. Explain that PTA stands for Preferential Trade Agreement and FTA stand for Free Trade Agreement. Pakistan has a number of agreements between individual countries including FTAs with Sri Lanka, China, and Malaysia. FTAs encourage trade by cutting tariffs and quotas between the participating nations. For example, if Pakistan wanted to import coconut products, those coming from Sri Lanka would attract very low or no tariffs (or taxes) compared with those coming from other nations that have similar products. Pakistan also has PTAs with Indonesia, Tajikistan, Iran, and Mauritius which also promote preferential trade and lower tariffs. These agreements make it more attractive for these countries to do business with each other.

When you have read through this section in class, talk about trade organizations and agreements and what they bring to a country. Ask the students to find out more about ECO and SAFTA. Some information on the associations can be found on their websites at:

http://www.tradeeco.org/AboutECO/BriefIntroduction/tabid/55/Default.aspxAsk

http://saarc-sec.org/areaofcooperation/detail.php?activity_id=5

Explain that these organizations are broader than just trade organizations and also seek to promote development throughout the regions.

The students should complete Questions C1–2 and D1–4 in class or as homewrok.

## Using the Skills Book

Students should complete pages 24–25 as homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that international trade organizations facilitate trade between different countries.
- I learned that Pakistan has signed PTAs and FTAs with several countries.

## Answers to assessments

A 1. International rade helps Pakistan's economy by giving the nation a better income from the goods they are able to sell overseas than it would otherwise have. Importing allows access to goods that can in turn improve the country's economic output, such as machinery and vehicles.

2 a) This large difference means that there is a trade deficit for Pakistan. Essentially, it has spent more than it has earned, although it may be able to make this up to some degree in other ways, such as by using overseas remittances from workers living in other countries, or through loans.

b) When countries have to take out loans to pay off their debts, they often get stuck in a debt cycle of having to pay off their loans, plus interest, and never being able to use the money to buys goods outright.

3 a) Pakistan's exports are largely cotton based. Other goods include rice, leather, carpets, surgical instruments, and sports goods.

b) In the early years, Pakistan exported a lot of raw goods, such as cotton and sugar. Now it exports cotton goods, such as household linens and clothing. In the 1980s, the Pakistani government opened up export markets by lowering tariffs and relaxing regulations around what could be imported and exported; and it encouraged businesses to produce better quality products with the aim of exporting them.

4 a) refined petroleum, crude petroleum, palm oil, scrap iron, cars, and telephones

b) Pakistan now imports a large amount of fossil fuels, fertilizers, and food that it did not import fifty years ago. A growing population, modernization, and urbanization have led to more use of fossil fuels for energy, heating, and cooking. Population growth has put a strain on food supplies. More is grown with the help of fertilizers; however, much has to be imported now as well.

B 1. Pakistan sometimes imports raw cotton from countries because it has a shortfall in its own cotton supplies. This can happen because of crop failure (bad weather) or because it sold more of its supply that expected and has run out.

2 a) Cotton became a major export product for Pakistan because it had historically been an area that produced cotton and there was no incentive for farmers to diversify.

b) The advantages of having one major export product such as this are that if prices for your goods are high, profits will also be high. However, the disadvantages far outweigh the advantage most of the time. Disadvantages are that if crops fail, competition becomes too fierce, or if markets dry up, there is little to fall back on in terms of other exports.

3. Pakistan could potentially develop its manufacturing and service economies in similar ways to Sri Lanka or Kazakhstan.

4 a) Oil is used in Pakistan to generate electricity. Although it produces some of its own oil, it is not enough to run power plants.

b) This large import is very costly. Although Pakistan does not use huge amounts of electricity by world standards, it uses more than it can afford and uses it domestically rather than in a way that boosts the economy. Refined petroleum cost US$89.1 billion in 2014.

5 a) Most of Pakistan's oil energy is used in people's homes.

b) Pakistan's reliance on oil could be lessened through use of renewable energy, such as solar and wind.

C 1 a) Free Trade Agreement; Preferential Trade Agreement

b) The barriers to trade, mostly quotas and tariffs, are dropped (FTAs) or lowered (PTAs). The advantages of belonging to a trade organization include preferential trade deals with the countries that are part of the organization, and access to larger markets. Trade organizations also try to promote cooperation in other areas such as the environment, energy use, education, and the alleviation of poverty.

c) Sri Lanka, China, Malaysia (FTAs) Indonesia, Tajikistan, Iran, Mauritius (PTAs)

2 a) Tajikistan (US$7.42 million)—sugar, fermented milk products, and packaged medicines

Malaysia (US$255 million)—rice, cotton goods

USA (US$ 3.57 billion)—household linens, cotton goods of many kinds

Australia (US$195 million)—household linens, cotton goods, rice, and leather

b) Some of the reasons that the value of trade is so different are to do with the value of the exports in different countries. (Wealthier countries can afford to pay more.) Wealthier or larger countries will buy different kinds of goods and more goods than poorer countries. There is a larger demand for some goods in particular countries due to that country's geography and economy.

D 1. The economic impact would be huge if Pakistan stopped importing goods and commodities. Pakistani's would have very little fuel and would not be able to grow as many crops, therefore many people could not survive. There would only be old vehicles and machinery to run factories.

2. The students should describe three or four ways in which imports affect their lives.

3 a) The greatest challenges that Pakistan faces in terms of the future of its export economy is to diversify its products, so that it is not reliant on cotton, and to ensure that it is always competitive, but without making goods so cheap that people are not paid properly for producing them.

b) The greatest challenges for Pakistan in terms of the future of its import economy is to be able to import fewer energy-focussed goods.

4 a) Quotas are restrictions on the number or amount of items or products that can be imported into a country. They affect trade by reducing imports since importers have to pay high taxes on amounts of imports that exceed the quota.

b) Tariffs are taxes that have to be paid on goods. They affect trade between countries by making the goods more expensive, and therefore less attractive, than local goods.

c) Countries impose tariffs and quotas to keep their own industries safe by making local goods cheaper; or to make money from taxes on items that are imported.

## Answers to Skills Book

### Page 21 *'International trading partners of Pakistan'*

A 1. Check that the students have marked the correct countries on the map. The ten largest import partners (where most imports come from) are: China, UAE, Saudi Arabia, Indonesia, India, Japan, USA, Kuwait, Germany, Malaysia.

The ten largest export partners (where most exports go to) are: the USA, China, the UK, Afghanistan, Germany, the UAE, Spain, Bangladesh, Italy, France.

2 a)

| **Trading nation** | **Percentage of overall exports by Pakistan to these nations** | **Main export goods** |
|---|---|---|
| The USA | 17 | household linens, knitwear, and clothing |
| China | 8 | cotton yarn and fabric, rice, metals |
| The UK | 8 | household linens, knitwear and clothing, leather, rice |
| Afghanistan | 7 | wheat flour, rice, sugar, clothes, cement |
| Germany | 5 | household linens, cotton knitwear and clothes, leather goods, sports goods |
| The UAE | 4 | rice, household linens, clothing, refined petroleum, jewellery |
| Spain | 4 | household linens, cotton knitwear and clothes, rice |
| Bangladesh | 3 | cotton, household linens, cotton fabric and clothes |
| Italy | 3 | household linens, cotton knitwear and clothes, leather goods, rice |
| France | 2 | household linens, cotton knitwear and clothes, leather goods, sports goods, rice |

| **Trading nation** | **Percentage of imports by Pakistan from these nations** | **Main import goods** |
|---|---|---|
| China | 27 | electronics, machinery, fertilizers, yarn |
| The UAE | 12 | refined petroleum, crude petroleum, scrap iron, |
| Saudi Arabia | 6 | crude petroleum, chemicals |
| Indonesia | 5 | palm oil, yarns, nuts |
| India | 4 | raw cotton, chemicals, foods and spices |
| Japan | 4 | cars, trucks, machinery, iron |

| | | |
|---|---|---|
| The USA | 4 | electronics, machinery, scrap iron, medicines |
| Kuwait | 3 | refined petroleum, chemicals |
| Malaysia | 2 | palm oil, refined petrol, electronics |

## Page 23 *'Trading networks of Pakistan'*

A 1. Place a number (1–8) next to the text to show the correct order.

3 a)

7 b)

1 c)

6 d)

8 e)

2 f)

4 g)

5 h)

2. As cotton is exported in many different states, the networks between countries can be very different. For example, Pakistan exports raw cotton to Indonesia which in turn processes it into thread, fabric, and garments, creating a whole new industry in that country. To other places, e.g. China, Pakistan mainly supplies fabric or thread where these supplement the local manufacturing industry. Ready-made goods make up the bulk of what is supplied to Europe and the USA, creating retail jobs in those locations.

## Pages 24–25 *'International trade agreements of Pakistan'*

B 1 a) SAFTA: Pakistan, Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka

b) ECO: Pakistan, Afghanistan, Azerbaijan, Iran, Tajikistan, Turkey, Turkmenistan, Uzbekistan, Kazakhstan, and Kyrgyzstan

c) (Check students' colouring of the countries.)

2. The advantages to Pakistan of forming neighbourhood trading groups are: increased access to more trading partners and larger populations to sell goods to; better relationships with countries with whom they trade; more regional cooperation on a range of matters from industry to infrastructure.

3. Check students' marking of FTAs or PTAs on the map.

4 a) FTAs remove barriers such as quotas and tariffs between countries when they trade with each other.

b) PTAs give countries special terms when they trade with each other, such as reduced tariffs.

UNIT 6

# Transport and its importance

## Background knowledge for the unit

This unit focuses on transport: how it has developed through the ages; how it affects countries and their economies; where the main transport routes are within Pakistan and throughout the world, and what the future might hold. The movement of both people and goods is covered, with the section on the movement of people divided into three reasons for movement: tourism, migration, and work.

Transport is a critical factor in the working of all communities and countries. Advances in transport have improved standards of living, changed the ways in which communities function, and greatly influenced the development of nations. Today, transport plays a role in people's work, home, and leisure activities.

Transport also plays a vital role in the economics of societies. One area of economics is the production, distribution, and consumption of goods and services. Transport is a critical factor in each of these steps: communities lacking modern infrastructure for transport suffer economically because they are unable to transport the goods they produce, or import the goods that they need. It is not just goods that need to be transported: communities relying on tourism for their economic benefit need to have an infrastructure that enables large numbers of people to travel to their areas. A lack of transport infrastructure also affects the delivery of the health and education services that are critical to a community's overall wellbeing.

Transport also plays a role in the physical development of communities. It is no coincidence that many of the world's largest and busiest cities are located on the coast, with harbours that facilitate the docking of large ships; or along large rivers that connect to these harbours. These cities developed before trains, planes, and motor vehicles were invented, when sea routes were the most efficient way to transport goods for trade. Today, few major cities lack access to airports, efficient railways, and motorways.

## Before we proceed

There is a direct link between economic growth and proximity to transport routes. Major cities around the world, including those in Pakistan, all have access to major sea, road, rail, or air routes (sometimes all of them). Perhaps start the exploration of this unit by asking students what they know about the proximity of Pakistan's major cities to transport routes.

Finally, it should be pointed out that little in the area of transport stays still. Both the means of transport and the infrastructure that supports them are constantly changing in a bid to make things more efficient and economically beneficial.

## Expected learning outcomes

Students should be able to:

- recount a brief history of transport through the ages
- list the main reasons why people move around the world
- explain how goods are transported around the world
- identify the main air and sea routes around the world
- identify transport links in and around Pakistan
- explain how efficient transport helps the economy
- discuss possible future trends in global transport

PAGE 68

## *'Transporting people* and *goods around the world'* and *'A brief history'*

### Using the Student's Book

This section starts with a brief history of transport, with a particular focus on how civilizations and cultures remained separate until developments in transport brought increased contact. The most dramatic changes have come since the mid-1700s, many of which are associated with the Industrial Revolution. Ask your students to identify some of the major changes in transport since the mid-1700s. You should expect responses such as the invention and development of:

- the steam engine, which led to steam-powered trains and ships
- the combustion engine
- the aeroplane
- satellites
- spacecraft
- Internet technology

Lead a discussion about how these modes of transport, and others that your students think of, evolved. Does technology drive the development or does human-need drive the development? Is it a bit of both? Students could bring a collection of photographs of vehicles of the past and discuss how these have changed over time, and ponder why they changed. They could compare the modes of transport of the past with those currently in use.

Following this discussion, the students should complete Question A2 from the Student's Book.

### Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that the first major development in transport began with the invention of the wheel.
- I learned that through advancements in transport, satellites gather universal data and expand our understanding of the universe.

PAGES 69–70

## *'Movement of people'* (all sections)

### Resources

- *Oxford School Atlas for Pakistan*.

### Using the Student's Book

This section looks at the movement of people and divides this movement into three types: tourism, migration, and work. Before reminding students what these three reasons are, ask them to complete Question A3 from the Student's Book.

Elicit responses about how their parents travel to their workplaces. Explain that apart from using private means of transport, many people use public transport for this purpose. You can refer to the London underground trains and other such mass transit systems around the world that are used by people for fast and efficient travel to their workplaces.

Ask your students how and why developments in transport have changed the nature of tourism. Their main responses should include the fact that technological developments have made aircraft faster, cheaper, and more efficient, meaning more people can afford to travel by air without being away for too long.

Following this discussion, the students should complete activity Question A1 from the Student's Book.

The students learned about migration in *World Watch Geography* Student's Book 1. Remind them that people migrate using different modes of transport. In 1947, millions of people migrated across the border of Pakistan and India, mostly by train.

When discussing migration (on page 69) as a reason for people to move long distances, ask the students to share any migration stories from their own family. Perhaps an uncle or aunt or cousin has left Pakistan and is now living in another country; or someone has migrated from one city to another city in Pakistan. If so, ask those students to complete the following activity.

## Activity:

**A family member's migration journey**
**What to do:**

1. Ask the students to draw on a map the starting and finishing points for their family member's journey.
2. Now ask them to label the journey with the means of transport that took them along each leg.

Note: To complete this task the students may have to conduct some research by talking to family members. When discussing work as a reason for people to move from place to place, use the map of Pakistan's industries in the *Oxford School Atlas for Pakistan* and ask your students to locate the main industrial cities of Pakistan to which people from different parts of Pakistan migrate.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that people require transport for different reasons: work, migration, and tourism.

PAGES 70–71

## *'Movement of goods'*

## Using the Student's Book

Students should read pages 70–71. Discuss in class how the ancient Silk Route was developed to facilitate the movement of goods to and from far distant places. Give examples of products imported into Pakistan from other countries, like cars, machines, food products, etc. Explain that efficient and reliable transport is required for the movement of goods. When people migrate to other countries to settle, they might transport their household goods by air or sea cargo. The time taken and costs of transporting goods by air and sea are different.

Perhaps the students could have a class discussion about the vehicles used for the movement of goods, e.g. trailers, lorries, containers, etc. They might have noticed these particularly on the highways or motorways. Explain that goods are transported inland by these vehicles.

Similarly, people living in coastal areas, like the fishing villages on the coastal belt of Pakistan, rely on their boats and ships for the movement of goods and people. Discuss the role of seaports regarding the movement of goods on a greater scale.

Following this discussion, the students should complete Questions B1 a–c, B3, and C1–2 from the Student's Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that goods are transported around the world via land, air, and sea.

PAGE 71

## *'Transport* and *information technology'*

## Resources

- Skills Book page 30 'Public Transport'

## Using the Student's Book

Explain that technology is having a more dramatic effect on transport today than ever before. Make sure your students are familiar with some of the latest technology driving these changes, such as the global positioning system (GPS), cameras, sensors, and online booking and tracking systems.

Bring to the class a printout of an interactive online map showing the route between any two places. Show your students that information technology has made it very easy to locate places and navigate using online interactive maps.

Discuss how information technology has affected tourism. Tourists can make use of the online maps, travel guides, tips, trekking routes, location and availability of train and bus stations, etc. and plan their journeys accordingly.

Students should complete Questions D1–3 from the Student's Book.

## Using the Skills Book

Students should complete 'Public transport' on page 30 in their Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that information technology has transformed the ways in which people travel and goods are transported around the world.

PAGES 71-72

***'Transport routes'; 'Air routes';* and *'Sea routes'***

## Resources

- Skills Book page 26 'Seaports of the world'.
- Skills Book page 27–28 'Global sea passages'.
- Skills Book page 31–32 'Planning a holiday'.

## Using the Student's Book

Students should become familiar with some of the world's major transport hubs and routes. Use a map of the world to help, ask the students to pinpoint: the two most popular domestic air routes in the world (Seoul–Jeju and Sapporo–Tokyo); the two most popular international air routes (Taipei–Hong Kong and Jakarta–Singapore); the five busiest sea ports (Shanghai, Singapore, Shenzhen, Hong Kong, and Ningbo–Zhoushan); the following important sea passages: Panama Canal, Suez Canal, Strait of Hormuz, Strait of Malacca, Strait of Magellan, Strait of Dover, Sunda Strait, and Taiwan Strait.

In addition, students should complete Question B2 from the Student's Book.

## Using Skills Book

Students should complete 'Seaports of the World' on page 26, 'Global sea passages' on pages 27–28 and 'Planning a holiday' on pages 31–32 in their Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that there are thousands of air and sea routes around the world.
- I learned that apart from sea routes, there are global sea passages that facilitate the movement of people and goods.

PAGES 72-75

***'Transport in* and *around Pakistan'* (all sections) and *'Major international routes of Pakistan'* (all sections)**

## Resources

- Skills Book page 33 'Sending goods around the world'.
- *Oxford School Atlas for Pakistan*.

## Using the Student's Book

This section explores the transport links between Pakistan's provinces, cities, villages, towns, ports, industrial centres, agricultural land, and remote areas, as well as between Pakistan and its major neighbours and trading partners.

Explain that agriculture products are transported to cities mainly along the road network. People living in rural and remote areas travel to cities for better healthcare facilities. Similarly, food and other products from the cities are distributed all over Pakistan by railway, road, and air.

Elicit responses from students about any air or sea journeys that they have taken within Pakistan. Alternatively, encourage them to research the transport routes to any two cities/towns/villages/resorts in Pakistan where they would like to go. They can have a class discussion about it based on their findings.

Students should now complete Questions C2a–b, C5–6 from the Student's Book.

The next section, on page 74, is on Pakistan's major international routes. Ask students to locate these on the map of Pakistan in their *Oxford School*

*Atlas for Pakistan*. Pakistan is linked to many countries around the world through its air routes.

After reading this section, students should complete Questions/activities B3b, B5, and C4 from the Student's Book.

## Using the Skills Book

Students should complete 'Sending goods around the world' on page 33 in their Skills Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the transport routes within Pakistan that link different towns, villages, and urban areas to each other.
- I learned about the international routes that connect Pakistan with other countries.

PAGE 75

# *'Transport* and *industry' and 'China-Pakistan Economic Corridor'*

## Resources

- *Oxford School Atlas for Pakistan*

## Using the Student's Book

Begin the lesson by discussing how transport is important for the development of industry. You could lead this discussion. The responses you receive should include: faster and cheaper movement of goods and people, the creation of more jobs, greater productivity through people spending less time travelling (and therefore more time is spent on working), and increased economic activity from the extra employment and tourism.

The example provided in this section is the China-Pakistan Economic Corridor (CPEC). Read page 81 and then, using the *Oxford School Atlas for Pakistan*, locate Xingiang in north-east China and Gwadar in the south of Pakistan. Explain that the CPEC will create many job opportunities for the people of Pakistan and China.

Students can hold a class discussion on the importance of building the CPEC. How will it help develop Gwadar port and promote trade between Pakistan and China? Students could prepare for this discussion a day ahead using the Internet and then discussing their findings in class.

Students should complete Questions C3 a–b.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that transport plays a major role in the development of the economy as goods are transported to the markets along transport routes.

PAGE 75

# *'Routes of the future'*

## Using the Student's Book

Governments, companies, and community leaders are constantly trying to improve transport infrastructure as they recognize the economic benefits that flow as a result.

Explain that planning routes for the future depend on many factors, like a growing population, a massive increase in the number of cars and vehicles, etc. Traffic jams are becoming a huge problem, particularly in urban areas. Hence the future of transport infrastructure depends on these factors.

Your students can take on the role of futurists by completing Questions E1–4 from the Student's Book.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that transport is evolving and it has a direct impact on the economies of countries.

## Answers to assessments

A 1. First, transport options were minimal and therefore relatively expensive: second, only the wealthy had the opportunity to stop work for long enough to visit other places.

2. The years provided may differ from student to student because different people are credited with different stages of development of the various technology. However, among the key developments that should be included on the timeline are: steam engine (late 1600s/early 1700s), steam train (early 1800s), motor vehicle (late 1800s/early 1900s), aeroplane (early 1900s), satellites (1950s), and manned spacecraft (early 1960s), Internet (1980s—although development can be traced back to 1960s). Encourage your students to make their timeline as extensive as possible and to provide details of their sources.

3. tourism, migration, and work

B 1 a) the intended destination, cost, urgency, and the length of time the goods can last without deteriorating

b) either because they are required in a hurry or because they are perishable and would not last in their ideal state if sent more slowly by sea

c)

| | **Ship** | **Air** |
|---|---|---|
| **Advantages** | cheaper because large volumes can be sent at once, and fuel costs are relatively low | much faster delivery |
| **Disadvantages** | takes longer and there are limited places that ships can travel from and to | relatively small volumes can be carried at once; limited places that aircraft can travel to and from |

2 a) infrastructure: the system and services that enable a community/country to operate (e.g. roads, ports, and airports)

b) migration: the movement of people from one place to another

c) freight: goods that are being transported

3. Transport has made travel faster and cheaper. It has facilitated the movement of people and goods so that global trade and travel has increased manifold. With the development of the transport industry, many jobs have been created.

C 1 a) Students should mention some/all of the following:

- Ships provided the first global movement of goods.
- Large, fast aircraft have facilitated the faster movement of goods.
- Cargo ships with refrigerated compartments have enabled perishable goods to be transported farther at a reasonable cost.

b) Students should mention some/all of the following:

- Efficient, affordable transport means goods made in one country can be sold to countries all over the globe, boosting economic activity in the country of origin.
- Investment in transport infrastructure enables developing nations to trade goods more easily and therefore raise the living standards of their populations.
- Towns and villages that previously lost young members of the community because they sought jobs in cities can retain this vital resource because improved transport options make these places more economically viable.

2 a) Hamburg, Germany: The three nearest seaports to Hamburg are Stade, Butzfleth, and Gluckstadt, all in Germany.

b) Seattle, USA: The three nearest seaports to Seattle are Tacoma in the

United States, and Victoria and Cowichan Bay in Canada.

c) Los Angeles, USA: The three nearest seaports to Los Angeles are Long Beach, El Segundo, and Huntington Beach, all in the United States.

d) Sydney, Australia: The three nearest seaports to Sydney are Botany Bay, Port Kembla, and Newcastle, all in Australia.

e) Shanghai, China: The three nearest seaports to Shanghai are Jiading, Chongming, and Chuansha, all in China.

3 a) Students should mention some/all of the following:

- create more than 700,000 jobs
- boost economic growth of Pakistan
- enable China to send goods to Europe, Africa, and the Americas much more quickly than is currently possible
- upgrade transport infrastructure within Pakistan
- enable more goods to be exported from Pakistan to China

b) Help the students find Gwadar on the map of Pakistan and trace the closest sea routes. Among the countries that could be named are Oman, United Arab Emirates, Qatar, Bahrain, Kuwait, Iran, and India.

D 1. The first part should elicit responses such as: making journeys faster, and more efficient; makes it easier and quicker to book the movement of both people and goods. The second part should elicit responses such as: it facilitates quicker, cheaper, and more efficient movement of goods and people, which boosts economic growth; it encourages relationships between countries that had previously had little contact with each other; it exposes countries to new ideas that can prove more innovative than ones they are currently implementing.

2 a) The Pakistan Post Office (www.pakpost.gov.pk) has details of the costs of sending parcels.

b) Response should include some of the following: The Silk Road was a series of routes that ran through Asia to the Middle East, Africa, and into Europe. Construction of the route started more than 2000 years ago. Silk was the main commodity traded, but other goods included jade, textiles, art work, paper, and spices. Religious and philosophical ideas also spread from culture to culture along the Silk Road.

3. DHL, TNT, and Pakistan Post Office offer quotes for parcel delivery. According to DHL the cost should be between US$50–$60.

E 1 a) There are no correct responses to this question but you could lead a discussion based on the responses of some of the students.

b) There are no correct responses to this question but you could lead a discussion based on the responses of some of the students.

2 a) There are no correct responses to this question, as each student will differ in his/her response.

b) The response will depend on where your town/city is located. Use a map to check that students are correct. This activity could be done in pairs or small groups to encourage cooperation.

3. The response will depend on where your town/city is located. Use a map to check that students are correct. This activity could be done in pairs or small groups to encourage cooperation.

4. The Indus Highway links Karachi and Peshawar. The Karakoram Highway links Hasan Abdal in Pakistan with Kashgar in China.

## Answers to Skills Book

### Page 26 *'Seaports of the world'*

A 1. The students' maps should be marked showing Shanghai (China), Singapore, Shenzhen (China), Hong Kong (China), and Ningbo-Zhoushan (China).

### Pages 27–28 *'Global sea passages'*

A 1. The photos and labels of the following should be located on the map: Panama Canal, Suez Canal, Strait of Hormuz, Strait of Malacca, Strait of Magellan, Strait of Dover, Sunda Strait, and Taiwan Strait.

### Page 29 *'Transporting goods in Pakistan'*

A 1. Responses to this activity will depend on the location of your town/city. Help the students locate both their location and Khyber Pakhtunkhwa on their map and ensure that major towns/cities along the road and rail routes are identified. This is an activity that could be done in pairs or small groups.

### Page 30 *'Public transport'*

a) Finchley Road, Swiss Cottage, St John's Wood, Baker Street, Bond Street, Green Park, Westminster, Waterloo, Southwark, London Bridge, Bermondsey

b) Paddington, Green Park, Waterloo, Southwark, Euston, Kings Cross St Pancras, Farringdon, Bank, London Bridge, Tower Hill, Liverpool Street

c) Along the Central Line from Bond Street to Tottenham Court Road, and then on the Northern Line from Tottenham Court Road to Leicester Square; or along the Jubilee Line from Bond Street to Waterloo, and the on the Northern Line from Waterloo to Leicester Square.

### Pages 31–32 *'Planning a holiday'*

A 1. Information that will help you assess the students' responses should include the fact that the closest airport to Gujranwala is Sialkot and it has flights directly to Malaysia. The students may decide to catch either a ferry or a plane between Malaysia and Singapore. Remember, they do not have to visit the relative on the way home, so they can fly directly from Singapore to Sialkot. Again, this is an activity that could be done in pairs or small groups.

### Page 33 *'Sending goods around the world'*

A 1–2. The students' responses will depend on their location and the destination they choose.

UNIT 7

# Advanced mapping techniques

## Background knowledge for the unit

This unit builds on the information and mapping techniques presented to the students in *World Watch Geography* Student's Book 1. It introduces the students to thematic maps and line, bar, and pie graphs, as well as to the role of modern geographical data-gathering in making interactional maps and planning transport routes.

Maps and graphs are a useful way of conveying types of geographical information visually. Thematic maps show information about the distribution of particular features or occurrences in an area. Graphs are a simple way to show data that represents quantities of phenomena (amounts of things) and can compare their changes over time or their numbers in comparison to other phenomena. The beauty of maps and graphs is that they present this information in a way that can be absorbed immediately. This unit aims to familiarize students with these types of maps and graphs so that they are able to extract data from them. It will also help them to understand which maps and graphs are best to create when they want to represent or convey particular kinds of information as clearly and concisely as possible.

The second part of the unit is concerned with modern map-making and how the geographical data that forms modern maps is collected and used. Electronic data gathering, along with the use of modern computer systems, means that an enormous amount of geographic data can be stored, processed, and made available to help work out anything from simple, single-journey route planning to complex route planning and timetabling for large transport systems.

Raw data can be collected on all aspects of a geographical area. This includes an area's topography, vegetation, man-made features, and infrastructure—such as roads and buildings; its human geography—such as people living in a certain area, or the users of particular transport; and weather conditions. Physical data is collected using sensing techniques that employ light, heat, and sound to create maps of the Earth and its features. Maps made from this physical data can be used with specific statistical data about populations and transport use, to plan anything from new roads to shipping and aeroplane routes.

## Before we proceed

Before beginning work on this unit, take a little time to reacquaint the students with mapping fundamentals, which are covered in unit 3 of Student's Book 1. Remind them/elicit that maps should have a title, the north sign, symbols and key, a scale, and grid lines. The students should know how to read features of maps and how to use them when creating their own. The first maps were created in order to help people get from place to place, and many maps are still used in exactly this way today. These basic reference maps also help to orientate the user by showing the physical features of a place, for example, hills and valleys, rivers, and metropolitan areas.

The maps that are looked at in this chapter move away from depicting what is on the ground in any one area to illustrating what happens in that area. Talk about how maps can offer layers of information that can help to give a rounded picture of a place or a phenomenon in a place. For example, by overlapping a physical map and a thematic disease map, the reader might be able to see disease patterns that occur in particular places—perhaps near rivers, or in certain parts of a city. Introduce the idea that graphs can add further information by providing a quick snapshot of data that supplements the information provided on a map or in a text. Both maps and graphs are often better and simpler ways of demonstrating a particular situation than explaining that situation in words.

Learning about modern geographical data-gathering and use adds another layer to this kind of knowledge. Students will not be expected to create

their own data or systems, but they will be introduced to the ideas behind modern map-making. In the course of the unit they should develop an understanding of how the kinds of maps they use on their phones or the GPS in their vehicles are created, and how advanced mapping techniques are used to work out the best routes for mass transport by looking at terrain and use.

## Expected learning outcomes

Students should be able to:

- interpret thematic maps and explain how and why they are created
- interpret graphs and explain how and why they are created
- discuss modern geographical data-gathering and explain its role in interactional maps and planning transport routes

PAGES 78–79

***'Thematic maps'* and *'Types of information'***

## Using the Student's Book

Read page 78. Explain that thematic maps are also called distribution maps because they show the distribution, or numbers of occurrences, of a phenomenon in an area. As the students already know, physical and reference maps depict the landscape or topographical features of a place. Thematic maps can tell the reader a story about the instances of something in particular that happens in that place, such as the occurrence of a disease, voting patterns, numbers of different language speakers, types of crops grown, or climate types. These maps allow the reader to observe patterns or to compare changes over time.

However, there is no one type of map that can express all types of phenomena, which means that different types of information are conveyed using different mapping techniques. The thematic maps that are introduced in this chapter are dot maps, choropleth maps, isopleth maps, and proportional symbol maps. Each one can be used to represent different kinds of data.

Prepare for this unit by finding a range of examples of the map types that are featured in this section—dot, choropleth, isopleth, and proportional symbol maps. Read through the section on thematic maps to get a good overview of this part of the unit. Talk about the ideas behind thematic maps and how they differ from physical or reference maps, then ask for examples of phenomena that might be represented on a thematic map to gauge students' understanding. Introduce the idea of quantitative and qualitative differences to get students thinking about different types of information that need to be conveyed. Students should complete Questions A1–2.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that thematic maps are also called distribution maps.
- I learned that thematic maps can tell us what is happening in a particular place in relation to a specific factor, e.g. deforestation.

PAGES 80–82

***'Types of thematic map'* (all sections) and *'Creating thematic maps'* (all sections)**

## Resources

- Skills Book pages 34–35 'Thematic maps'

## Using the Student's Book

Read page 80. Beginning with dot maps, which represent quantitative data, show how they can be used to show the occurrence of a phenomenon. Explain that a dot map is useful for phenomena with an exact location. For example, the first disease maps of cases of yellow fever in New York used dots to show where those cases occurred and this helped researchers to see a pattern in the spread of the disease. While not all dot maps have to be so specific in their locations, they should always indicate where occurrences of events happen. Thus they are perfect for creating small specific maps, or

for indicating more general numbers in general areas on a larger map. The downsides to these types of maps, discussed in the Student's Book, can also be looked at in class, and the questions in the text can be explored further.

Choropleth maps can be used for both qualitative and quantitative data. These maps often show fairly large areas, such as districts or states, with a colour or shade representing a value or type of occurrence across that area. Talk about the examples in the Student's Book and ask if they can think of other examples of both qualitative and quantitative data that could be shown using choropleth maps.

Elicit the disadvantages of these maps.

At this point, students do not need to know how to create isopleth maps and proportional symbol maps, but they should know what they are and how to read them. Isopleth maps tend to be used mostly for climate and elevation over a large area. Look at some examples of isopleth maps. Ask students why a lot of data might be required to create them. Proportional symbol maps are a more complex version of dot maps. Look at some examples of proportional symbol maps. Ask what the symbols add to dot maps and when they might be appropriate to use.

Read the section on 'Creating thematic maps' on page 82. The students should complete Questions A3 a–c and refer to the Skills Book to complete relevant activities as homework.

## Using the Skills Book

The exercises on pages 34–35 in the Skills Book, 'Thematic maps' can be done during class or for homework, depending on time, and if there is an emphasis on map-making.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that thematic maps give information about geographical distribution of particular features.
- I learned that thematic maps give two types of information: qualitative and quantitative.

PAGES 83–88

# *'Graphs'* (all sections)

## Resources

- Skills Book page 36 'Using line graphs'
- Skills Book page 37 'Using grouped bar graphs'

## Using the Student's Book

This section introduces the students to graphs as a way of conveying geographical data in an easy-to-read visual form. The graphs that will be looked at are: line graphs, bar graphs, and pie graphs (also known as pie charts). Students will learn to recognize quickly the information in these graphs as well as to understand which graphs are best to display information.

Prepare for this lesson by finding a range of examples of these three types of graphs to add to those already provided in the Student's Book. Read the section through with the students. Beginning with line graphs, talk about how these graphs need to be set up with a name or label, an x and y axis, and sets of values to describe what is being shown (the variables). Care needs to be taken too, with making sure the values are presented in uniform measurements (units of 1, 10, 20, or 100, for example) so that the viewer can clearly see uniform rates of change. Using examples, show the students how line graphs can show a change or trend in something, usually over time. This can be measured as hours, days, or years, or it can be something that is measured by time, such as age or year level at school. Time is almost always shown on the x axis, so that the reader can see the progression of the phenomenon being measured.

Read page 84. Explain that bar graphs are also shown on x and y axes, with the x axis showing the type of data to be measured and the y axis showing the measurement or volume of each one. On page 84 of the Student's Book, we see examples of this in the form of temperatures in different months of the year, and oil production in a range of countries. The first example, on page 84 is a simple bar graph, while the second, on page

85, is a grouped bar graph which enables the reader to make a comparison.

Elicit what information they can get from looking at these two bar graphs. Pyramid and composite bar graphs can also give multiple levels of information in one graph. Talk about the way the x-axis is set up differently from the y-axis for a pyramid graph and what kind of information this enables this graph to give. What does the changing shape of the pyramid bar graph on page 85 tell the students? What information can they obtain from the composite bar graph on page 86.

Pie graphs show percentages of a whole using a circle that can be divided into multiple segments. Pie graphs are easy for students to understand and draw, although care needs to be taken with the percentages of each component. Students must carefully work out mathematically how big each piece should be. Composite bar graphs can sometimes be used instead, especially if there are not too many segments and a comparison between two or more cases is required.

Finally, compound line and bar graphs can be combined to show different factors together in a clear way, such as minimum and maximum temperatures, and rainfall.

Discuss the pros and cons of each type of graph as outlined in the Student's Book.

Refer the students to Questions B1–4 in the Student's Book and refer to the activities in the Skills Book.

## Using the Skills Book

Ask the students to complete 'Using line graphs' on page 36 and 'Using grouped bar graphs' on page 37 of the Skills Book for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that data can be visually represented and compared with other data using graphs.
- I learned how to create different types of graphs, e.g. line graph, bar graph, and pie graph.

PAGES 88–91

# *'Modern map-making* and *data collection'* (all sections)

## Resources

- Skills Book pages 38–39 'Gathering information for route planning'

## Using the Student's Book

Today, map-making employs a range of technologies. Modern maps are frequently interactive. They are created using modern sensing technologies that range from photography to laser imaging, which record the physical and man-made features of the Earth; they can then be combined with other social and statistical data that provide the user with a wide range of information about an area.

Read through the section on page 88 with the students. This section is concerned with the ways in which information for map-making is gathered. It covers a number of remote sensing technologies, including aerial photography, thermal imaging, radar imaging, laser imaging, and satellite imaging. Aerial photography and thermal imaging are both passive sensing techniques; that is, they rely on sensing the reflected light or the heat from the Sun as it is emitted from the ground.

Radar and laser images are sound and light waves that are generated by a machine and bounced off the ground. Satellite imaging can employ a mixture of some or all of these techniques to gather as much information as possible on the largest scale possible. Each technique has its strengths in terms of mapping certain terrains. Ask the students to break into smaller groups to research one of the remote sensing technologies on the Internet. Towards the end of the lesson the groups can report their findings.

Students should complete Questions C1–3.

## Using the Skills Book

Students should complete the activity 'Gathering information for route planning' on pages 38–39 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that modern technologies, like remote sensing, aerial photography, and thermal and laser imaging are used for map-making.

PAGES 91–93

***'Modern mapping* and *route planning'* (all sections) and *'Planning transport routes'* (all sections)**

## Using the Student's Book

Modern mapping techniques give us detailed maps and access to information about what is on, and even under, the ground. These maps can be combined with information about people and communities to create extremely informative interactive maps. Interactive maps, real time maps, and GPS all rely on a mix of these sources of information, depending on what they are describing. These maps are used by individuals each day to find resources or to work out the best way to get from one place to another. They can be used to look at building new infrastructure, such as roads or other public amenities like hospitals. They are also used to plan small- and large-scale transport routes, and can be utilized to make quick adjustments to routes when there are problems, such as adverse weather.

After reading through this section on page xx, talk about the kind of maps the students use on the Internet, on their phones, or in cars. Ask them to give examples of interactive maps that they might commonly use and that are useful to them. Ask what kinds of useful maps could be made with GIS data, such as maps that give flood risk warnings.

Students should complete Questions D1–4 in their notebooks.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that interactive maps are developed by GIS which stores information gathered from remote sensing and other means.
- I learned GPS devices receive radio signals from satellites to work out locations and to indicate the user's position on the GPS map.
- I learned that road, sea, and air routes are planned using GIS technology.

## Answers to assessments

A 1. Thematic maps are important for telling us about what is happening in an area. Information can be obtained about activities in those areas, such as types of farming, climate etc. and quantities of phenomena found in an area, such as number of people, houses etc. It is possible to plot where diseases occur, or where most people live. It is possible to see how one region compares with another on different measures, such as health and education or production of certain goods.

2. A physical map shows the features of a place, while a thematic map shows the kinds of phenomena that exist in a place. Some of the phenomena that can be shown on thematic maps are: population numbers, usage numbers (such as cars or bicycles), diseases, farming types, climate types, and voting patterns in elections.

3 a) Check students' maps to see that they have printed off a map showing the correct area and that the data they have collected is reflected correctly on the map.

b) The students should be using a dot map for this exercise.

c) Distribution should probably show that more students live closer to the school than farther away, thus indicating that the students are centred around the school. But there may be other reasons for the way the dots are distributed, which can be investigated by the students.

B 1. A line graph is used to show changes over time: for example, the increase in the height of a child over a two-year period. A pie graph is used to show percentages of a whole: for example, the population of each of the states of Pakistan.

2 a) Boys' and girls' exam results over one year could be compared with two bar graphs. If you are looking over a number of years, a grouped bar graph would be best.

b) The literacy rates in each state can be compared on a bar graph.

c) The growth of imports into Pakistan over a five year period can be represented on a line graph.

d) Check the students' responses to why these answers are best. If they have answered incorrectly, ask them to read through the section again and reconsider.

3 a) Maps give a general picture of a phenomenon, while graphs can show more specific quantities. Dot maps provide ways to look at numbers across a large area, or show instances of an event. Choropleth maps are good for showing changes of measurement across areas and describing use. Isopleth maps show linked data over a large area. Proportional representational maps specify larger occurrences of data at certain points, rather than just giving an average over a larger area. Line graphs show changes over time or area. Bar graphs highlight quantities or amounts, and the composition of something can be shown on a pie graph or a composite graph.

b) An example of thematic maps and graphs used together to give a more detailed picture of a phenomenon is a climate map, which shows the kind of climates across a country alongside a line graph showing average yearly daytime temperatures for each province or the largest cities of that country.

4. A line graph is the best way to show trends over time, such as changes in temperature throughout the year. But if you want to show quantities then bar graphs, are the best choice. If you want to show the make-up of something,

such as the numbers of people with different coloured cars in your neighbourhood, pie graphs are a good option.

C 1 a) Aerial photography (photos of the ground) are taken from a plane. These show features such as coasts and rivers accurately. The photos can be measured to find distances between various features.

Thermal imaging relies on infrared technology which measures the warmth of the ground below. Different temperatures of land below surface objects and buildings are mapped out in different colours, such as red, yellow, and blue.

Radar takes pictures by bouncing radio waves off objects, and calculates distance by measuring the time it takes for the signal to return to the radio transmitter.

b) GIS stands for geographical information system. It is a computer-based system that captures, stores, sorts, analyses, and presents all kinds of geographical data. A GIS enables users to put all kinds of information together. For example, if you wanted to build a road, data on the geographical location, plus any hidden underground problems, could be used with statistical data on the use of current roads, and the growing numbers of people and cars in the area etc. Putting these statistics together could also lead planners to decide that putting a good public transport system in place might be a better alternative and would stop the proliferation of cars and cut down on pollution.

c) A GPS, or global positioning system, gives directions along a route according to a pre-programmed destination. The GPS receiver in a car sends signals to a satellite that inform the satellite of its presence on the road. The satellite sends the GPS receiver information about where it is in relation to other objects and traffic on the road. This information is transferred into the GPS's memory and shown on its map display. Phones and other electronic equipment can have similar devices, which are often partially assisted by telephone networks.

2. Planners need physical information on the terrain, on the buildings and existing roadways, and on any underground features (natural and man-made). They need statistical information about the population of an area and nearby places, the predictions for population growth, the movements of people each day for work, what routes are currently used, and how convenient they are. They also need to know how many cars are on the road and how many more could be on the road; the numbers of lanes that would need to be built to take new traffic, and where to site on and off ramps for ease of access to major roads.

3 a) (iii) b) (ii) c) (iv)

D 1. Remote sensing has greatly increased our geographical knowledge about things and objects with which physical contact is not possible. There are satellites in space which use this technology to take pictures of the Earth.

2. Geographical information (GIS) is stored in computers. There are many different GISs and they all have different computer programmes to store and run them.

3 a) When planning a new road between towns, you would need to know the quickest route, but also what features might obstruct that route. If there are mountains, rivers, or valleys; if there are buildings or farms to move around. You might want to see where most people live along the route and curve the road towards population zones if they are not directly between.

b) GIS systems have information about terrain, populations, and use. A specialized GIS system can be

assembled with all the data relevant to a project so that planners can put all this together.

4 a) Radar and laser imaging are both good for looking at hills and mountains as they can determine size and shape. Laser can be used to measure the heights of objects.

b) Physical features such as coastlines and cities can be seen clearly through aerial photography (as long as the weather is fine) and photogrammetry can be employed to measure and plot their exact positions.

c) Laser imaging can be used to find vegetation as it can pick up minute changes in shape, height, and density.

d) Thermal imaging provides a picture of temperatures on and below the ground and can locate dark and inaccessible areas such as caves.

## Answers to Skills Book

### Pages 34–35 *'Thematic maps'*

A 1 a) Thematic maps are sometimes called distribution maps. They provide information about geographic distribution of a particular event or phenomenon in an area. Thematic maps display quantitative information, which tells us about the numbers of something in an environment. An example of this is a population map. Thematic maps can also give us qualitative information which describes what is happening in a particular area. An example of this is a climate map.

b) Types of thematic maps include dot, choropleth, isopleth, and proportional symbol maps. Dot maps show occurrences of phenomena. They can tell us how many objects/events are in a particular area and how widely spread, or distributed they are. Choropleth maps are good for showing a change of density or for describing amounts of a feature or activities. Isopleth maps are good for showing continuous data that is not grouped together in one place, such as climate/rainfall/precipitation, or elevations. Proportional symbol maps use symbols of different sizes to represent (an amount of) data that occurs in certain places, such as the number of people in cities.

2 a) The students can choose any colours; they just have to make sure they correspond correctly with the state. For example, areas not named white, Khyber Pakhtunkhwa light blue, Punjab mid-blue, and Sindh and Balochistan dark blue.

**Key**

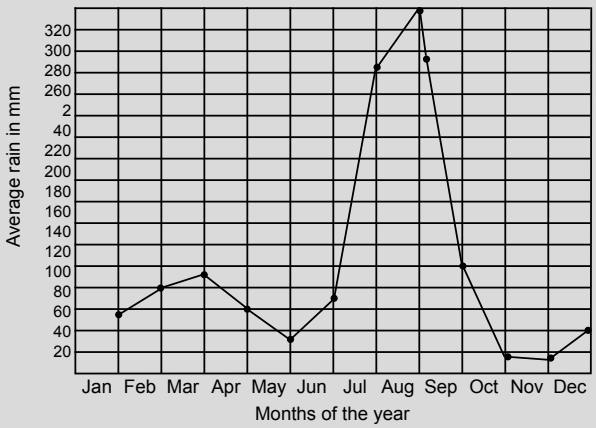
| | |
|---|---|
| White | zero |
| light blue | 0–500,000 |
| mid-blue | 500,000–1,000,000 |
| dark blue | 1,000,000–1,500,000 |

b) This map shows at a glance that Sindh and Balochistan produce 1–1.5 million tonnes of coal, while Khyber Pakhtunkhwa produces less than 500,000 tonnes, and Punjab between 500,000 and a million tonnes.

c) The map does not give specific numbers, so that you cannot tell who produces the most coal and you cannot tell how great the differences between the different areas are.

## Page 36 *'Using line graphs'*

A 1 Title: Yearly average rainfall in Karachi

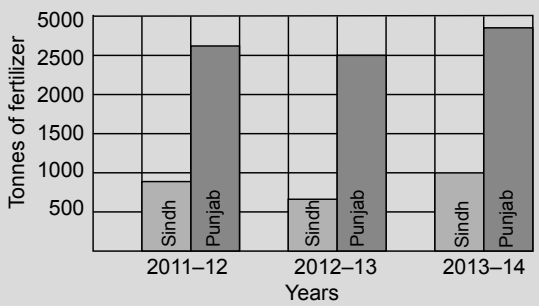



a) This information could also be shown on a bar graph.

b) You could have two lines comparing Karachi with another city, say Islamabad. It could be useful for seeing which has the most rain at which time of year. This could be helpful for planning drainage or what kinds of plants to grow in a particular place.

## Page 37 *'Using grouped bar graphs'*

A 1 a) Title: The use of fertilizers in Punjab and Sindh 2011–2014

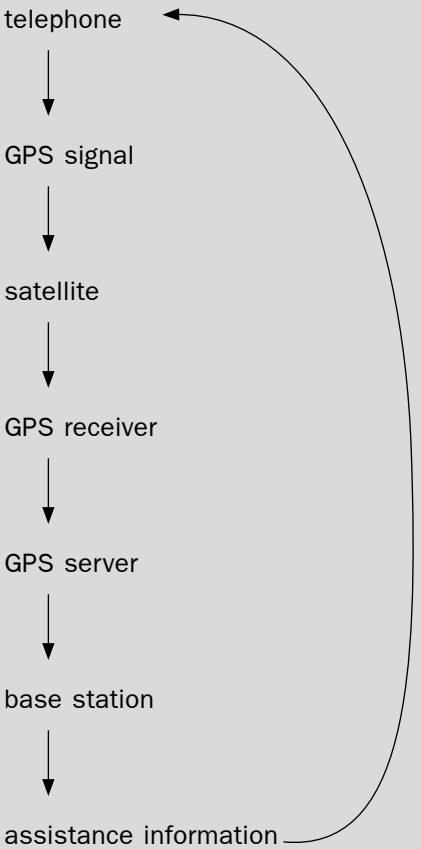



b) This information could be compared to other states, or other countries, in other columns next to the first two.

## Page 38 *'Gathering information for route planning'*

A 1. Check that the students have printed the correct map for their area and that it encompasses all the elements they wish to include, and check that they have plotted their routes correctly.

2. **Flow chart**



UNIT 8

# Natural disasters

## Background knowledge for the unit

This unit focuses on natural disasters: how they occur, how human activity increases their frequency and ferocity, and their impact on humans and the landscape. Special consideration is given to an exploration of why developing nations suffer more from natural disasters than developed nations, and how people can prepare for natural disasters.

While natural disasters can occur anywhere, the Asia–Pacific region experiences among the most frequent and most disastrous natural disasters. These include earthquakes, volcanic eruptions, cyclones, monsoons, floods, and fires. This region is also home to many developing countries, which exasperates the problem because evidence shows that the vast majority of people killed or otherwise badly affected by natural disasters come from developing countries.

The impact of natural disasters is not necessarily associated with the force and scale of the event, but the vulnerabilities within the area it hits. For example, an earthquake that hits a city in a developed nation that has strong, enforced building codes, will most likely prove far less of a disaster than an earthquake of the same magnitude hitting a city in a developing nation where there are usually no strictly enforced regulations for buildings and infrastructure. The capability of governments and emergency services to respond to disasters is also a factor in the final assessment of the scale of a disaster. Governments and aid organizations conduct risk assessments and make plans to deal with natural disasters. However, allocating resources is not as simple as it seems. After all, governments and organizations have limited resources.

It has been established that human-induced activity is changing the Earth's climate. As a result, evidence suggests that natural disasters have become more frequent and extreme, and will continue to do so. The ramifications are enormous. Increased temperatures and heatwaves will lead to drought conditions in some parts of the world; while other areas will suffer from more potent floods due to increased rainfall. Cyclones/ hurricanes have increased in intensity and they also cause flooding.

## Before we proceed

Before beginning this unit, you should reacquaint students with some of the types of natural disasters such as volcanoes, cyclones, earthquakes, forest fires, landslides, desertification, and floods that were covered in Student's Book 3. Also reacquaint them with the notion of climate change, particularly the production of greenhouse gases from the burning of fossil fuels. Climate change was discussed in Student's Book 2. The difference between renewable and non-renewable resources could be one focus of this discussion.

It would also help if students are aware of the differences between developed and developing countries. These are covered in detail in unit 10 of this book, but reading the introduction to that section will provide them with the background knowledge they require.

Perhaps start the study of this unit by asking students if they are aware of any natural disaster that has occurred recently. They might have learnt about it from the news (TV, newspaper, Internet, etc.) This leads nicely into the area of the unit dealing with natural disasters.

## Expected learning outcomes

Students should be able to:

- explain the links between natural disasters, sustainable development, and climate change
- identify ways in which natural disasters have impacted on human activity

- discuss why developing nations suffer more from natural disasters than developed nations
- describe several ways in which humans contribute to natural disasters
- explain what actions can be taken to reduce the risk and impact of natural disasters

PAGES 96–97

## *'What is a natural disaster?'* and *'Climate change* and *natural disasters'*

## Resources

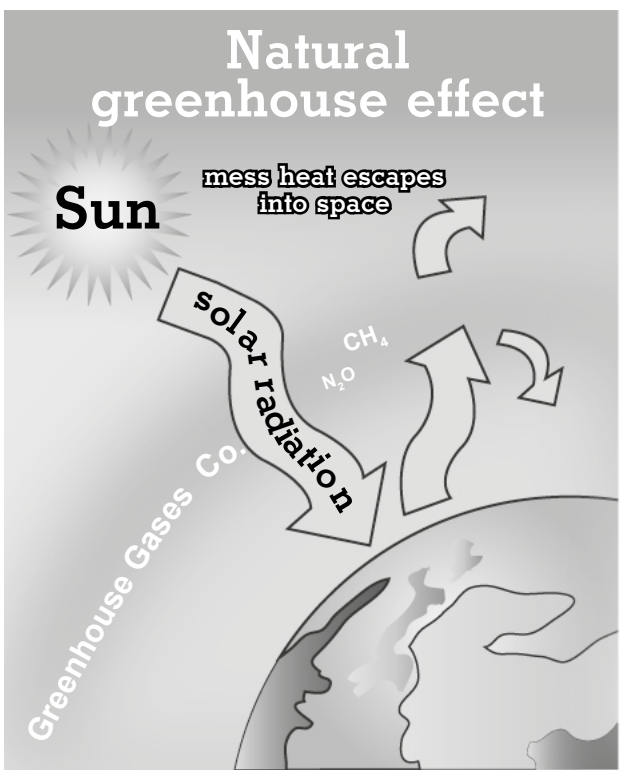
- *Oxford School Atlas for Pakistan*
- Skills Book pages 40–41 'Comparing magnitudes of earthquakes'

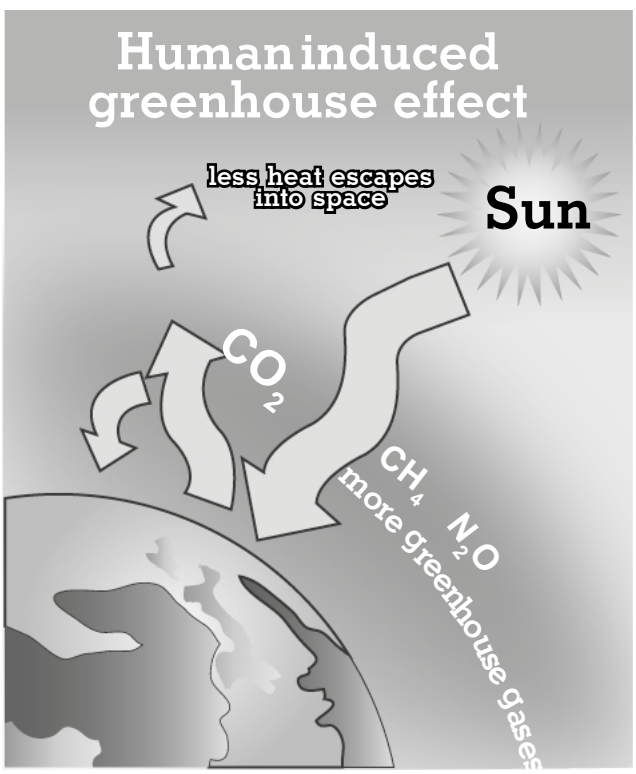
## Using the Student's Book

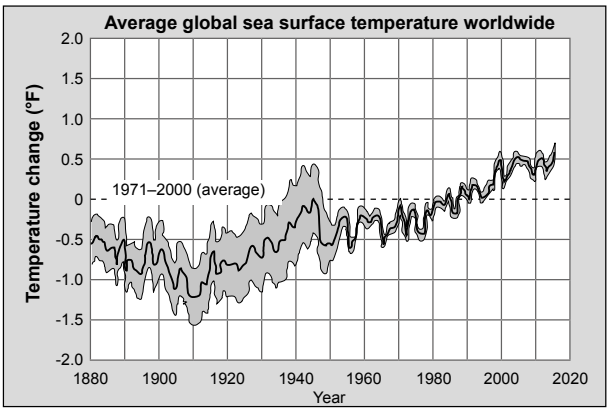
Students should read pages 96–97. This section starts with an explanation of natural disaster and climate change and the relationship between the two. In discussing greenhouse gases, it is worth pointing out that the greenhouse effect can be both natural and human-induced. The following image helps to show this.

Students may be wondering what the connection is between climate change/greenhouse gases and natural disasters. The example of Tuvalu is discussed on page 97 of their Student's Book. Read through this with the students. Now ask them to research and write a paragraph on floods in Vietnam and/or tsunamis in Japan, focussing on how they affect life, property, and the economy.

This image (from https://www3.epa.gov/climatechange/kids/impacts/signs/oceans.html) shows how the oceans have warmed over the past 125 years. Showing this to your students will help to illustrate how oceans have warmed. It is worth pointing out that the wide-scale emission of human-produced greenhouse gases started during the Industrial Revolution, near where this graph starts. It took about 30 years for the greenhouse effect to increase the temperature of the oceans, but since then the trend has been a steady rise.






## Activity: Tuvalu

Tuvalu is an island in the Pacific Ocean. Rising water levels have made this island very vulnerable.

## What to do:

1. Ask your students to find Tuvalu on a map.
2. Ask them to research climate change in Tuvalu and find out how much the sea levels are rising around the island. (Answer: about 5mm per year)
3. Ask the students to write down some of the ways the rising sea levels are already harming Tuvalu. (Answer: contaminating fresh ground water and therefore putting at risk the supply of clean drinking water; destruction of important crops; changes to ecosystem of the sea life around the island, threatening the fishing industry) Students should complete Question A3 as homework.

## Using the Skills Book

Students should complete Question A3 as homework. Students should complete the activity 'Comparing magnitude of earthquakes' on pages 40-41 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned how natural disasters are caused and how the damage they cause.
- I learned that there is a direct relationship between climate change and the occurrence of natural disasters.

PAGE 98

# *'Climate change* and *sustainable development'*

## Using the Student's Book

All nations, but particularly developing nations, face a dilemma in pursuing development in a way that does not harm their economies. However, pursuing development in the cheapest way possible has ramifications for the environment, climate change, and natural disasters. Give examples of burning coal to generate electricity. Remind the students of what they learned about coal mining in Student's Book 2. Germany and other European countries have closed down their coal mines because of environmental hazards, while Pakistan and other developing countries are still relying on coal to produce energy.

Talk about alternative energy/renewable energy options, like solar, tidal, and wind, being used in the world.

Lead a discussion about the pros and cons of pursuing development using cheap non-renewable energy sources instead of renewable sources that may be more expensive.

## Examples:

- non-renewable—pros: cheap; infrastructure already exists; easily transportable
- non-renewable—cons: harm the environment; will leave future generations without an energy source
- renewable—pros: clean, so good for the environment; will never run out; easily available (once infrastructure exists)
- renewable—cons: not reliable 24 hours a day; difficult or impossible to transport

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that climate change is triggered by social and economic developmental activities.

PAGES 98–100

## *'The impact of natural disasters'* (all sections)

## Resources

- *Oxford School Atlas for Pakistan*

## Using the Student's Book

Natural disasters can leave individuals, families, and communities devastated in many ways. Start by explaining that the effects of a natural disaster can be divided into two categories: primary effects and secondary effects.

Ask your students for examples of each (they are covered on pages 98–100 of the Student's Book). Their responses should include: primary: human casualties, destroyed buildings, and collapsed infrastructure; secondary: psychological damage, spread of disease, and permanent loss of communities.

Give the example of the floods in Bangladesh in 2016 during the monsoon season. The water level rose dangerously, affecting the lives of more than 3.7 million people in one way or another. Ask what the primary and secondary effects of these floods might have been on the affected people.

## Activity: Tracking a tsunami

On 26 December 2004, an earthquake in the Indian Ocean, near Indonesia, caused a tsunami that killed more than 200,000 people throughout Asia and as far away as the coast of Africa.

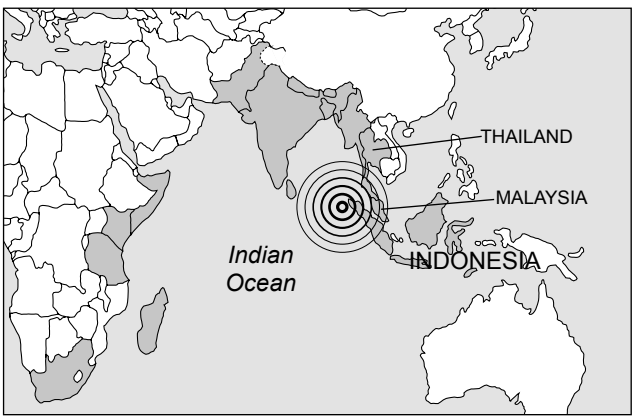
## What to do:

(Note for teachers: This can be a whole class activity using one large map or individual activity where each student is given his/her own copy of a map.)

1. Use a map of the world, or one that at least covers Asia and the East coast of Africa.
2. Start by asking the students to conduct research and find and mark the epicentre of the Earthquake.
3. Ask the students to highlight the countries where casualties occurred as a result of the tsunami

Their map should show the following countries highlighted:

- Indonesia
- India
- Somalia
- Sri Lanka
- Thailand
- Myanmar
- Maldives
- Malaysia
- Tanzania
- Seychelles
- Bangladesh
- South Africa
- Yemen
- Madagascar




## Activity: Case study of a disaster

This activity is a research project into the effects of a natural disaster.

## What to do:

1. Ask each student to do some research into a particular natural disaster. They can all pick different ones or the whole class can choose the same one.
2. Ask them to respond to the following questions, either on paper or in discussion:

   What sort of disaster was it?

What happened during the disaster? (How did people respond?)

How many people were affected?

How was property affected?

How was the environment affected?

What was the government response?

How did aid agencies respond?

The students should complete Questions/activities A1 and C1–4 from the Student's Book as homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the impact of natural disasters on the life and property of individuals.
- I learned about the economic and psychological impacts of natural disasters.

PAGES 100–102

***'Natural disasters* and the *developing nations';* and *'How do human activities contribute to natural disasters?'* (all sections)**

## Resources

- Skills Book page 43 'Natural disasters in Pakistan'

## Using the Student's Book

Explain that developing nations suffer more from natural disasters because they do not have adequate resources to cope with them. Read page 100 and explain that the governments of developed countries have enough resources to evacuate and resettle the people of disaster- stricken areas to safer places.

Ask students to complete Question A2. Explain that the term 'natural disaster' is not really an accurate description. Human activity can contribute to natural disasters too. The main activities that do so are covered on pages 101–102 of the Student's Book and are: deforestation, overgrazing, building dams, and mining and drilling.

Discuss the issue of deforestation in Pakistan. (Punjab is the region with the worst deforestation, followed by Sindh, then Balochistan, and Khyber Pakhtunkhwa.)

Also discuss overgrazing, particularly in northern Pakistan.

Ask students to research where Pakistan's ten largest dams are. (They are Mangla Dam, Tarbela Dam, Hub Dam, Mirani Dam, Sabakzai Dam, Gomal Zam Dam, Allai Khwar Dam, and Duber Khwar Dam.) Explain that while dams are important for the production of hydroelectricity, they may threaten the surrounding areas with a natural disaster like an earthquake.

Ask students to research Pakistan's mining activity and discuss how it may induce a natural disaster. Students should complete Questions B1–2.

## Using the Skills Book

Students should complete the activity 'Natural disasters in Pakistan' on page 43 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that developing nations suffer the most from natural disasters because they do not have adequate resources to cope with their aftermath.
- I learned that activities like deforestation, overgrazing, building dams, mining and drilling can cause natural disasters.

PAGES 102–103

***'Dealing with natural disasters'* (all sections)**

## Resources

- Skills Book page 42 'Preparing for a natural disaster'
- Skills Book page 44 'Evacuation plan'

## Using the Student's Book

Read page 102 and explain that being prepared for a natural disaster is the best way to minimize casualties and damage. Engage your students in a discussion on how communities can prepare for natural disasters. Topic points should include:

- being aware of escape routes
- having survival kits packed and easily accessible (They should contain food, water, and first aid materials.)
- having sand bags nearby (in case of floods)
- carrying out controlled burnings (in places where forest fires occur)
- ensuring communication channels are known and working (to alert all members of the community)
- recognizing warning signs

Elicit responses about the importance of school evacuation/fire drill. The objective is to train people how to take safety precautions in case of fire, earthquake, etc. Give example of Japan, where regular earthquake drills take place. Also mention that earthquake-proof buildings are constructed in Japan, as the region is prone to earthquakes.

## Activity: Which natural disaster is most likely?

1. Ask your students to do some research into natural disasters in their local area so they can determine which natural disaster is most likely to occur close to their homes. For example, if they live near the coast, they should be aware of the possibility of storms, cyclones, typhoons, tsunamis, etc. They should look at local newspapers from the past, and other local historical records, as well as ask older members of the community.
2. Ask them to make a list of things they can do to prepare for such a disaster. (The responses will differ depending on the type of disaster they have identified.)

The students should complete Questions D1–4 and E1–3.

## Using the Skills Book

Students should complete the activity 'Preparing for a natural disaster' on page 42, and 'Evacuation plan' on page 44 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned that risk management and mitigation are the effective ways to deal with natural disasters.
- I learned that preparing for a possible natural disaster makes it lot easier to cope with a natural disaster.

## Answers to assessments

A 1. Students' answers should include the following: loss of jobs and income; destruction of infrastructure that needs rebuilding; disruption to trade and commerce.

2. Their answers should include the following:
   - Buildings are not strong enough to withstand natural disasters.
   - Cities are overcrowded.
   - Health services are not adequate to cope.
   - The supply of water, electricity, food, and medicines is unreliable.
   - Governments do not have adequate funds for rebuilding or providing financial support to those affected.

3. It increases the amount of water vapour in the atmosphere. As water vapour condenses and forms clouds, it releases an enormous amount of latent heat. This warms the surrounding air, which also begins to rise and thus creates instability in the atmosphere. As the surrounding warm air rises and its water vapour condenses, the cloud continues to grow, and eventually produces a storm. When a higher amount of latent energy is released from the condensation of water vapour, the intensity of the storm increases.

B 1. Deforestation can lead to droughts through the removal of moisture from the forest. Forests naturally store moisture that evaporates and forms clouds. These clouds then provide rainfall. Without the trees there is no moisture. The trees also provide shade, which allows moisture to remain longer in the atmosphere, so by removing trees, moisture is also removed from the atmosphere, which leads to drier weather conditions. As a result, droughts occur and it is harder to grow crops.

2. Fracking is a form of mining that is linked to earthquake activity. Fracking involves drilling into the earth and directing a high-pressure water mixture against the rocks to release the gas inside. Drilling into the earth can make already unstable underground rock structures even more unstable. The injecting of waste water into underground wells, which often occurs in mining operations, has the same effect as water leaking from dams.

3. Controlled burning involves setting fire to grass and other dry materials, under strict supervision, in the weeks and months ahead of the fire season. This land is then no longer a threat during the fire season.

C 1 a) natural disaster: a devastating event caused by a natural phenomenon; it results in extensive damage to property, and a large number of deaths and serious injuries

b) sustainable development: developing a country in a way that preserves the resources of the Earth for future generations

c) deforestation: the destruction of forests through the cutting down of trees to make the land available for other uses, such as agriculture or human habitation

d) overgrazing: when animals eat all the grass and other pasture plants over a long period of time

2. Earthquakes and floods; earthquakes occur because the boundary between the Eurasian and Indian Plates runs along the region where Pakistan is located; floods occur because of the monsoon rains that are a feature of the region.

3. Advantages are that water can be stored for use when rainfall is low; and water can be released according to when it is required by farmers and communities. Disadvantages are that rivers are not able to cope with larger-than-normal flows of water; and water that leaks from dams can damage the earth beneath the surface and cause earthquakes.

4 a) Primary effects are those that are noticeable immediately, such as human casualties, destroyed buildings, and

collapsed infrastructure. Secondary effects are those that become apparent later, such as psychological damage, the spread of disease, and permanent loss of communities.

b) (i) health

Responses should include: extreme high and low temperatures can result in deaths of vulnerable members of a community, e.g. the elderly; excessive rainfall and unnatural average temperatures can increase the spread of diseases such as malaria.

(ii) food security

Responses should include: extreme temperatures can result in crop and livestock loss; rising food prices means poorer communities lose access to affordable nutritious food.

(iii) energy security

Responses should include: the closure of non-renewable energy facilities (e.g. coal mines) decreases options for cheap energy sources which particularly affects developing nations; developing nations have less capacity to invest in infrastructure for renewable energy sources and are therefore at the mercy of other countries for their energy.

D 1. Responses will differ depending on the location of the student and the types of human activity taking place.

2. Responses will differ depending on the research undertaken.

3. Responses will differ depending on the research undertaken.

4. Responses should include the following:

- first part of report focussing on cause, which was earthquake off the coast of Indonesia, near Aceh
- second part of report focussing on spread of the tsunami throughout Asian coastal areas as far as the east coast of Africa, with overall casualties of more than 200,000
- third part of report focussing on precautions such as the establishment of tsunami early warning systems to alert people across Asia/Pacific

E 1. Responses should include:

- knowing where escape routes are, and practicing the routes
- knowing where the nearest medical assistance and facilities are
- having links with other governments and international agencies that can provide urgent assistance
- evacuating people as soon as a natural disaster is known about
- having warning systems such as those for tsunamis
- taking precautionary measures such as controlled burning in areas prone to forest fires.

2. Responses will differ depending on the research undertaken.

3. Responses should include tips such as: know escape routes; have survival packs ready; know communication channels; know where medical assistance is.

# Answers to the Skills Book

## Pages 40–41 *'Comparing magnitudes of earthquakes'*

A 1. The students' graphs should look like this:

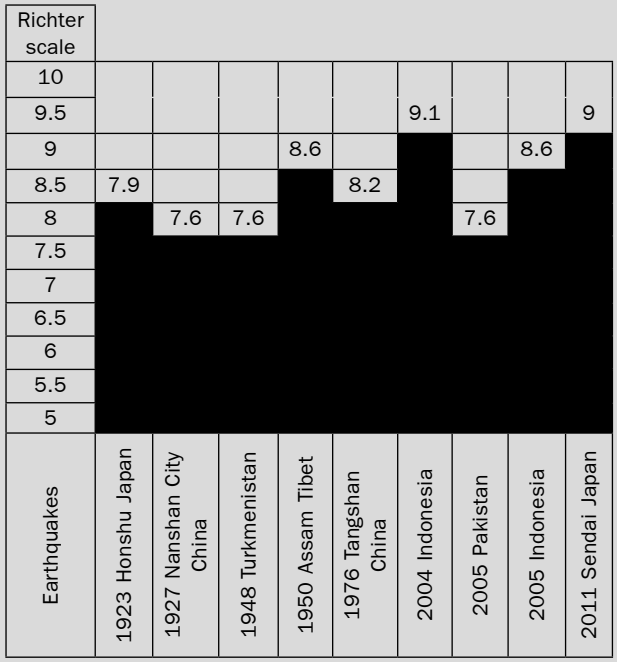
a)

| | |
|---|---|
| Island of Honshu: | 7.9 |
| Nanshan City, China: | 7.6 |
| Turkmenistan: | 7.6 |
| Assam, Tibet: | 8.6 |
| Tangshan, China: | 8.2 |
| Indonesia: | 9.1 |
| Muzaffarabad, Pakistan: | 7.6 |
| Sumatra, Indonesia: | 8.6 |
| Sendai, Japan: | 9 |

b) The 2004 earthquake in Indonesia has the greatest magnitude (9.1). It triggered the Indian Ocean tsunami and killed and displaced thousands of people.

The earthquakes of Nanshan in China, Turkmenistan, and Pakistan have the lowest magnitudes (7.6).

c)




## Page 42 *'Preparing for a natural disaster'*

A 1 Responses should be similar to:

(i) An earthquake: They are hiding under a table to protect themselves from falling rubble and other materials.

(ii) A forest fire: They are taking precautions to minimize damage to their property from a fire.

(iii) A volcano: They are staying inside so they are not impacted by lava and other dangerous elements from a volcanic eruption.

(iv) A flood: They are sandbagging houses to stop floodwater entering.

## Page 43 *'Natural disasters in Pakistan'*

A 1. Students' answers will vary.

## Page 44 *'Evacuation plan'*

A 1 a) The students' responses will depend on the layout of their homes.

UNIT 9

# Environmental pollution

## Background knowledge for the unit

Pollution is the introduction into the environment of substances that cause harmful effects. Pollution can come in the form of contaminated air, water, and land, as well as excessive or unwanted light and noise. It is a leading cause of ill health and environmental degradation, and contributes to greenhouse gases and global warming. This unit looks at these five different forms of pollution and how they affect people and the environment. It finishes with an overview of global warming and how that is changing the climatic conditions and threatening to alter permanently the environment of the Earth.

Pollution poses a great danger to our planet both in the short- and long-term. The effects of air, soil, and water pollution affect the health and life of humans, other animals, and plants, and causes the death of key parts of ecosystems. This in turn leads to the death of the ecosystems themselves. Additionally, many of the pollutants are fossil-fuel based and are long-lasting and hard to eradicate from the environment. They travel from one part of the environment to another; for example, from the air to the water and soil, or from the water into the soil, and from the soil into the water. They also travel through food chains. Because of this, it is far easier to try to stop pollution than to try and clean it up once it has occurred. Whilst the effects of light and noise pollution can also have lasting effects, they tend to be less devastating, and it is possible to see immediate benefits when these forms of pollution are reduced.

Pollution's long term effects are also felt through the build-up of greenhouse gases released by burning fossil fuels. These gases effectively trap more heat around the planet, warming not just the air, but also the vast tracts of oceans that cover the Earth. This warming also has the effect of destroying ecosystems as animals and plants increasingly struggle to survive in warmer temperatures than those for which they are adapted. The absorption of carbon dioxide into the water, along with melting ice caps, raises sea levels. The growing warmth also causes more evaporation, which leads to more and sudden downpours of rain and other extreme weather events.

## Before we proceed

The effects of pollution might often go unnoticed. As a primer, while reading through this unit, talk to the students about their knowledge of pollution. How do they define it? What do they think it is? Where might it come from? Where does it go to? Do they play a role in causing pollution? How serious is the problem of pollution for society and for the planet? Although some forms of pollution are discussed separately in this unit, they are all interlinked, and where there is one form there is more than likely another form. Discuss why this might be the case.

Do the students think Pakistan has more problems with pollution than other countries, and if so, what might they be? Ask them to look at environmental statistics on the Internet that compare rates of pollution between countries, on the Internet.

Talk about how pollution is linked to growing economies and industrialization. Do they think a growing economy and pollution go hand in hand? How have other nations dealt with the need for growth alongside protecting their environment.

## Expected learning outcomes

Students should be able to:

- identify and define pollution in its different forms
- explain the causes and effects of pollution
- explain global warming and its causes and effects
- describe how changes can be made to reduce pollution

PAGES 106–108

## *'Environmental pollution'* and *'Air pollution'* (all sections)

### Using the Student's Book

Air pollution is the contamination of the air by substances that include vehicle and industrial emissions, burning rubbish, and from natural sources such as forest fires and volcanic ash. As well as harming humans, air pollution can damage animals, crops, and the environment in general. The air we breathe is made up of 78.09% nitrogen, 20.95% oxygen, small quantities of other gases, and a tiny amount of dust particles called particulates. For most of the history of our planet, this balance has been maintained and checked by natural forces such as photosynthesis and weather movements like rain and wind. However, over the past fifty years or so, large increases in population in many developing countries, along with the rise in the use of motor vehicles and industrialization, have led to a sharp increase in air pollution that has been difficult for nature to rebalance. This is especially true in large cities in the developing world where growth has been rapid, but planning and legislation to cope with the negative impacts of this growth have failed to keep pace.

Pakistan is a nation which suffers from poor air quality, especially in its largest city, Karachi, one of the most populous in the world. However, it is not just outdoor emissions that pose a danger in Pakistan. Indoor air pollution, mainly from the burning of biomass and fossil fuels for indoor heating and cooking, is also a health threat to many families throughout the country. Some of the impacts of indoor and outdoor pollution on humans are chronic health problems such as asthma, through to cardiovascular diseases, and cancer. Broader problems with air pollution and acid rain, which is when pollutants such as sulphur and nitrogen oxides form an acid mixture when mixed with rain, affect animals and plants and lead to the pollution of soil and water.

After reading through the section on air pollution, talk about some of the instances of air pollution near where the students live. Ask if they notice the poor quality of air. Is it visible as smog? Can they smell or taste the pollution in the air? Talk about where the pollution comes from. Do they see pollution being emitted, for example from vehicles or factories? Do they, or people they know, suffer from frequent respiratory illnesses? Talk about the kinds of illnesses caused by air pollution. Ask how animals and plants can be affected, and what that could mean for the environment.

Encourage the students to read more widely about this issue on the Internet.

Refer the students to Questions A1–2. These should be completed in class or given as homework.

### Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the different forms of environmental pollution.
- I learned how pollution affects the health and life of humans, other animals, and plants.

PAGES 108–111

## *'Water pollution'* (all sections)

### Resources

- Skills Book pages 45–46 'Water pollution'

### Using the Student's Book

Water pollution is the contamination of water with sewage, toxic chemicals, metals, and other substances. Water pollution can affect surface water such as oceans, lakes, and rivers, or groundwater, which is water stored in porous soils and rocks under the Earth's surface. With only about 3% of the water on the planet available for human consumption, the quality of water is of grave importance to us all.

Most water pollution is caused by household sewage and factory waste. Water can also be affected by air pollution and soil pollution that falls or seeps into waterways. As in many developing countries, a major source of pollution in Pakistan is sewage. It comes about because untreated waste from domestic and industrial sources is frequently discharged directly into waterways. In cities in the developed world, sewage is treated in large treatment plants which separate the water from the waste. Water is cleaned and recycled as drinking water, while waste is reduced to bio-solids that can be used as fertilizers or fuel. In Pakistani cities it is estimated that only about 8% of waste is treated.

Releasing pollutants into waterways results in pathogens and poisons in the water that cause illness and death in humans, and the destruction of water ecosystems. This destruction leads to a lack of food for humans and other animals. It also has a longer-term snowball effect on other ecosystems, with the potential to lead to a loss of biodiversity across the planet.

After reading through this section, talk about the waste that goes into waterways and how dangerous this is. Do they see this waste in local waterways? Does it affect the quality of the water they drink? For more information about drinking water worldwide see: http://www.who.int/mediacentre/factsheets/fs391/en/

Show the students examples of other places around the world where water is efficiently treated and recycled. To see the process of water treatment in Melbourne, Australia, refer to:

http://www.melbournewater.com.au/whatwedo/treatsewage/etp/Pages/Sewage-treatment-process.aspx

For the treatment of waste materials, see:

http://www.thefuturescentre.org/articles/6058/world-s-largest-wastewater-treatment-plant-pump-sewage-power

Talk to students about the importance of waste treatment. Why is so little waste treated in Pakistan? What measures need to be put in place for waste to be better dealt with in Pakistan, and for water and waterways to be made safer?

Refer the students to the Questions A3–4 for reinforcement of learning about water pollution and its effects.

## Using the Skills Book

Ask the students to complete the exercises on 'Water pollution' on pages 45–46 in the Skills Book for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned how water pollution affects ecosystems.
- I learned how pollutants enter water bodies due to human activities.

PAGES 111–113

***'Land pollution'*** **(all sections)**

## Resources

- Skills Book page 47 'Pesticides and fertilizers'
- Skills Book page 50 'Noise and light pollution'

## Using the Student's Book

Land pollution is largely caused by pollution from rubbish and landfill, and from industrial and farm waste. Some contamination also comes from air and water pollution. Land pollution is a huge problem in many countries because of its toxic effect on humans, other animals, and crops in both the short- and long-term, and the difficulty in properly identifying and cleaning soil that has been polluted.

In Pakistan there are few municipal (town or city) landfill sites to deal with household and business waste. It is estimated that only about 25% of rubbish is dealt with formally. Most waste, which includes everything from food scraps to glass, plastic, and oil, is dumped in open sites which are not managed—except informally by rubbish pickers. As well as harbouring diseases, these sites leach toxic chemicals into the ground, affecting groundwater and soil. Other randomly dumped rubbish and discarded items also affect the soil as both 'foreign objects' and items that have the

potential to leach toxic substances. Plastic, for example, does not biodegrade, but can break up into small pieces that can affect soil quality, or enter into the bodies of animals and birds. Other toxic waste comes from dumped chemicals, metals, and plastics from industries, and from agriculture, where the excessive use of fertilizers and pesticides poisons the soil.

After reading page 112, discuss the notion of land pollution. Do they see a lot of land pollution around them? Ask them to give examples from their lives of the pollution they see every day. How does this pollution affect the environment? How could it best be cleaned up? Do they think land pollution has long-term effects on their health?

According to a news report, a government study showed that solid waste generation in Pakistan was about 20.024 million tonnes a year, or 59,000 tons per day. The annual growth rate of solid waste generation was 2.4%. With population increases, the amount of waste produced in Pakistan would double in ten years to 4.29 kg per household per day.

There are moves in Pakistan to improve recycling and rubbish reduction.

Ask the students to research examples of initiatives like this in Pakistan.

Do they think enough is being done? Can they see gaps? If they were to set up their own recycling companies, what areas would they target?

Refer the students to Questions A5–6 and B1–4 for extra classroom activities or for homework.

## Using the Skills Book

Refer the students to the activities on 'Pesticides and fertilizers' on page 47 and 'Noise and light pollution' on page 50 for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned how land pollution is caused by dumping rubbish, landfill, and industrial and farm waste.
- I learned how pollution from air and water contributes to land pollution.

PAGES 113–115

# *'Other forms of pollution'; 'Light pollution';* and *'Noise pollution'*

## Using the Student's Book

While not as obvious as many other types of pollution, noise and light pollution, defined as excessive amounts of noise and light, can cause severe harm to humans and the environment. Both can be highly stressful for humans and other animals, preventing them from resting and sleeping adequately, which in turn can lead to serious health consequences. These two forms of pollution can also alter the natural rhythms of plant and animal life, upsetting ecosystems.

Light pollution ranges from over illumination, or the over-use of artificial lights, to sky glow, which is the diffuse glow that is found around cities at night. As well as health consequences, the cost of lighting is high, and the overuse of electricity is a negative for the environment. Noise pollution is defined as certain levels of noise for certain environments. When these noise levels are exceeded, they not only cause irritation for those present, but can also cause lasting hearing loss. Both these forms of pollution are rife in larger cities in Pakistan.

After reading through this section of the unit with the students, ask if they had considered excessive light and noise to be forms of pollution before. How do these forms of pollution compare to air, water, and land pollution in terms of their effects on people and the environment? Are they easier to fix than these other forms of pollution? Demonstrate in class the effects of noise pollution by turning on music or a noisy appliance and then talking to students. Can they hear what you are saying? Is it a strain for them to hear you? How would this noise affect communication and hearing long-term? Do they know people that suffer from light and noise pollution on a regular basis, or do they suffer from it themselves? Does it surprise them that there can be serious health issues associated with them? Can they see any changes in the

environment around them from the effects of excessive light or noise?

Ask the students to complete Questions C1–3 in class or as homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about some other forms of pollution e.g. light and noise, and how they affect our environment.

PAGES 116–117

## *'Global warming'* (all sections)

## Resources

- Skills Book page 49 'Recycling around the world'
- Skills Book page 51 'Recycle and reuse'

## Using the Student's Book

Global warming is the term used to describe an increase in the average temperature of the Earth and its atmosphere and oceans. Evidence from the data collected since temperature measurements were first taken about 150 years ago, shows that the Earth is warming more quickly than before. Most scientists agree that this rise has been caused by man-made activities, especially the burning of fossil fuels. This releases a large number of gases into the atmosphere which exacerbate Earth's natural greenhouse effect, trapping excess heat in the atmosphere around the planet. Global warming is linked to rising temperatures, rising sea levels, and extreme weather conditions, all of which will contribute to the destruction of environments, habitats, and ecosystems across the planet—and of which humans are a part.

As you read through this section of the Student's book on pages xx-xx, talk about the greenhouse effect so students understand the mechanics of global warming and the contribution of fossil fuels to this phenomenon. Pakistan is ranked 16th on the world's vulnerability to climate change list.

www.climateemergencyinstitute.com/uploads/global_warming_and_its_impacts_on_Pakistan.pdf

Talk about the effects of global warming. How do they think global warming will affect them personally? Good information for deeper discussion can be found at: http://climate.nasa.gov and www.ucsusa.orcontaminationg/global_warming/science_and_impacts/impacts/global-warming-rain-snow-tornadoes.html#.V8-qKmWJVdk

Given the threats to the planet, it is important for humans to find new ways to interact with the environment. While a lot of damage has already been done, there are still many changes that can be made to slow warming. These range from switching to low emissions or alternative power sources, to reusing and recycling a huge range of materials. Talk about the possibilities for the future. This includes small and large changes that can be made that will contribute to the planet's cooling and to the reduction of pollution overall.

Refer the students to Questions D1–2, and E1–3 for homework.

## Using the Skills Book

The sections 'Recycling around the world' on page 49 and 'Reuse and recycle' on page 51 can be completed in class or for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned how greenhouse gases contribute to global warming.
- I learned the causes and effects of global warming.

## Answers to assessments

A 1 a) The main causes of air pollution come from the by-products of burning fossil fuels like oil, natural gas, and coal. These are variously used to run cars, factories, and provide heating and cooking fuel for homes. Pakistan also uses oil to fuel electric power stations. Industrial pollution and burning rubbish are also sources of air pollution.

b) Humans can develop chronic and acute respiratory illness, skin rashes, and eye problems. Long term exposure to air pollution can cause cardiovascular diseases, lung diseases, and cancer.

2 a) Causes of indoor pollution are the burning of biomass fuels such as wood, animal dung, and crop waste, or fossil fuels such as oil, coal, and tobacco smoke.

It is a problem because all of these sources give off a lot of particulates which can irritate people's skin, eyes, noses, and mouths, and enter the human body to block or irritate the lungs, heart, and blood vessels.

b) This problem could be solved by supplying cleaner fuels for homes, energy-efficient stoves and heaters, and better ventilation; or the introduction of small-scale renewable energy such as solar or wind in more remote areas.

3. Students should name the forms of pollution in their areas. For example, air pollution, which makes them cough; water pollution which means they must boil their drinking water or buy bottled water.

4. Pollution can be reduced by recycling more materials and using items for longer. For example, use electronic equipment until it breaks down, and even then have items repaired rather than buying new models. Encourage the use of solar and wind power instead of fossil fuels. Use a bicycle instead of a motor bike or car.

5. Air pollution: dust, smoke, chemicals, and other particulates can fall to Earth and affect the soil and water. Water pollution can affect land, and land pollution can affect the water. Many of the same substances, such as gases and particulates from fossil fuels, pesticides, chemicals, and metals can pollute air, water, and soil at different times.

6 a) T

Pollutants can be substances that are discharged into waterways, or that come from air pollution and make their way into surface water. They can also seep through the soil and into ground water from rubbish dumps, toilets, materials discarded in the environment, and from fertilizers and pesticides uses on crops.

b) F

All ecosystems are damaged to some degree by water pollution. Any substance that affects the health or food supply of plants or animals will change the balance of the ecosystem within which they exist.

c) T

Pathogens include bacteria and viruses such as hepatitis and cholera. Worldwide, between 500,000 and 800,000 people die from waterborne diarrhoeal diseases each year and they account for about 9% of all deaths of children under five.

d) F

Metals can kill or cause disease in water life. They can also accumulate in the flesh of fish causing long-term toxic effects on the fish and their offspring, as well as any other creatures or humans who eat them.

e) F

Algal bloom results when ecosystems become upset by too many nutrients in the water, which causes a proliferation of plankton, making them 'bloom'. This bloom sits on top of the water, feeding on oxygen and light, and blocking their use by other life forms in the same area.

B 1. Check that the students have completed their household rubbish journey essay adequately.

2. Steps to reduce pollution begin at home with separating rubbish into reusable items, recyclables, and non-recyclables. Food scraps can be composted. Reusable items can be washed and reused, for example, jars and bottles. Once the rubbish leaves the house, a good recycling programme would take paper, glass, metals, etc. to separate plants where they could be recycled and made into new objects. Things that cannot be recycled can be disposed of properly in a good waste management programme at a landfill site that has been engineered to be as safe as possible.

3. Rubbish dump sites are dangerous because they attract vermin and insects and harbour disease; they produce methane, which is liable to explode; they leach toxic chemicals into the soil, which affects soil and groundwater.

4. It is the overuse of fertilizers and pesticides that makes it difficult for plants to grow. They can alter the levels of salinity in the soil and destroy good bacteria and earthworms that are needed to keep the soil fertile.

C 1 a) Over-illumination means that everything is too bright all the time and this over-stimulates the senses, making it hard to rest and sleep.

Glare is over brightness that can irritate eyes and even cause temporary blindness.

Light-clutter is too many lights together which can cause confusion and lead to accidents.

Light-trespass is unwanted light, which can cause sleeplessness and irritation and lead to other health issues

Sky-glow is the diffuse glow around cities which can also cause over-stimulation and sleeplessness.

b) Light pollution affects the daily rhythms of animals and plants, and can interfere with bird migration, as lights confuse birds' flight paths. Plants can fail to distinguish seasons and grow, or fail to grow, at different times of the year.

2 a) Excessive noise in cities is caused by traffic, building machinery, loudspeakers, and outdoor music and festivals.

b) Excessive noise can distract and agitate people and keep them awake at night. This impacts on health by raising the blood pressure. It can also cause short- and long-term hearing loss.

3 a) All humans, other animals, and plants, are part of an ecosystem. If the health of a substantial number of humans, other animals or plants in an ecosystem is affected, as it can be by pollution, then this has a flow-on effect to other parts of that ecosystem. For example, the health of birds affects the number of insects. Fewer birds means more insects. More insects means more crop damage. More crop damage means not as much food for animals and humans.

b) Ecosystems are often linked to other ecosystems, so if one fails, others may follow.

D 1 a) The greenhouse effect is a natural effect by which the Earth's atmosphere traps radiation from the Sun, which is then absorbed and stored in the Earth as heat. This helps to keep the planet at an even temperature, and enables plant and animal life to exist comfortably.

b) Global warming occurs when carbon dioxide, methane, and other air pollutants collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the Earth's surface. These pollutants, which are called greenhouse gases, add to the Earth's natural greenhouse effect, trapping extra heat, and causing the

planet to become hotter than it would be under normal conditions.

c) The gases that add to the greenhouse effect are pollutants and are by-products of burning fossil fuels, which also cause other forms of pollution.

2 a) Rising temperatures, melting ice-caps and glaciers, rising sea levels, and extreme weather conditions are all results of global warming

b) The effects on Pakistan could be: rising sea levels at the Arabian Sea coast and possible flooding of Karachi; melting of glaciers in the northern mountains and flooding along the Indus and other rivers; extreme rains and flooding; drought in some regions. All of this could lead to loss of places to live and the inability to grow crops in many areas.

c) The students' own responses may include the fact that global warming may cause many more extreme weather events, leading to loss of homes, loss of food supplies, ill-health, and death.

E 1. Pakistan faces threats to its ability to grow crops because of lack of water and good soil. Humans, other animals, and plants face loss of homes and ill-health and possibly death due to land, air, and water pollution.

2. Student's answers will vary.

3. Responses will differ depending on the research undertaken

# Answers to Skills Book

## Pages 45–46 *'Water pollution'*

A 1 a) sewage

b) industrial waste

2 a) Water pollution can affect water systems by making plants and animals sick or by killing them. It can either be a sudden or a slow process. It could start with one species being affected, which then affects another. For example, if a fish's food supply runs out, it will either die or have to move to a new area. If it moves to a new area, it starts to take food from other fish, causing problems in the new area as well. All ecosystems are delicately balanced: when even small things change, this can lead to much greater changes.

b) Algal bloom is the rapid growth of microscopic algae and appears as coloured scum on the surface of water that is connected to pollution in two ways. First, it comes about when excessive nutrients are dumped into waterways, causing a rapid growth or bloom of plankton. Secondly, it becomes a form of pollution itself, stopping further growth and creating a toxic sludge in waterways. Log on to: https://www.epa.gov/nutrientpollution/harmful-algal-blooms for further information.

## Page 47 *'Pesticides and fertilizers'*

A 1. fertilizer and pesticide → cow → steak and/or milk

fertilizer and pesticide → wheat crop → bakery products

Pesticides eaten by animals lodge in their body systems. These in turn are eaten by humans as meat or milk products. Pesticides are absorbed by plants and are retained when the plants are processed into food like bread. These animal and plant foods are eaten by humans and enter their body systems.

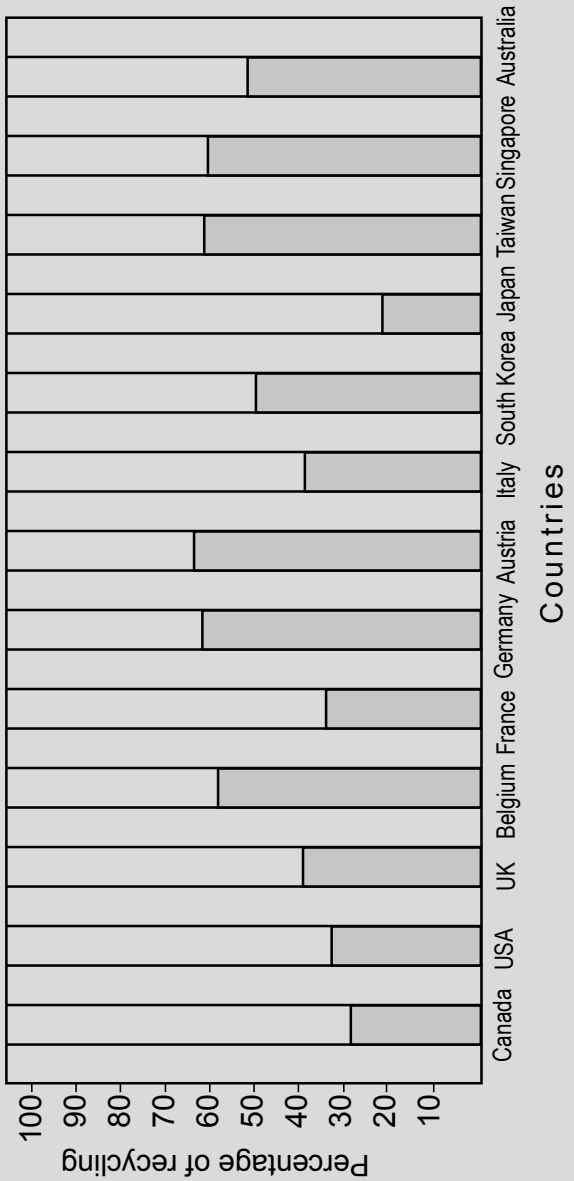
## Page 48 *'Air quality in the developed world'*

A 1.

| Name of the city | Highest level | Lowest level |
|---|---|---|
| Oslo | 61 | 18 |
| Kristiansand | 22 | 8 |
| Greenland | 46 | 17 |
| Tromsø | 52 | 17 |
| Bergen | 36 | 7 |

## Page 49 *'Recycling around the world'*

A 1 a) Bar graph




2 a) Austria, Germany, Taiwan, Singapore

b) Japan, Canada, the United States, France

## Page 50 *'Noise and light pollution'*

A 1. Students can write about any form of pollution. Their ideas may include the fact that light pollution affects the daily rhythms of plants and animals, and can interfere with bird migration, as lights confuse flying birds. Plants can fail to distinguish seasons and grow or fail to grow at different times of the year. Noise can stop animals from resting and can damage their hearing. All plants and animals are part of ecosystems. When any part of an ecosystem changes, the whole of it changes. This can lead to the loss of parts or all of an environment.

2. Students should draw the objects that make noise in their homes.

## Page 51 *'Reuse and recycle'*

A 1 Student should make their own plant holders.

UNIT 10

# Measuring development

## Background knowledge for the unit

This unit focuses on the process of development throughout the world. Developing countries like Pakistan are still in the process of development.

Among the key features of developed countries are:

- mass industrialization
- consistent economic growth
- high employment levels
- high life expectancy
- free education
- universal, affordable healthcare

On the other hand, key features of developing countries are:

- reliance on the agriculture sector
- little or no manufacturing industry
- low economic growth
- high unemployment levels
- low literacy rates
- lack of basic healthcare
- low life expectancy

However, it should be noted that the term 'development' has a western bias, affirming positive features of western nations, while not considering positive features of non-western countries. In addition, the world is changing in ways and at a pace not foreseen several decades ago, with economic, political, and social changes causing constant rethinking about the way countries are perceived. Nevertheless, if one considers development to be closely associated with economic factors, then it is clear that the economies of the world are not equally developed.

Rising up the development 'scale' is not an easy task. There are cultural, economic, and political barriers in the way. These barriers include:

- lack of local investment
- lack of infrastructure
- lack of technology
- unskilled workforce
- unstable political system
- lack of natural resources

As the above factors are put into place, the economy grows, and prosperity is expected to flow to the wider population through stable employment and higher wages. However, political and cultural conditions in some countries can inhibit this.

## Before we proceed

Before beginning this unit, you should make sure students are familiar with some of the main terms associated with development. For example, the terms GDP and GNP are ways to measure economic activity and growth within a country, so ensure your students can define each of them as below.

- GDP stands for gross domestic product. It measures the value of goods and services produced by a country. However, the overall value is not as important as the value of goods and services in relation to the size of the country's population (known as per capita).
- GNP is the gross national product. It is the GDP plus income earned by local residents from their overseas investments, minus the income from non-residents living within the country.

  Students should also be aware that particular continents are home to more developing countries than others, particularly Asia, Africa, and South America.

## Expected learning outcomes

Students should be able to:

- define key terms related to development
- identify which nations are considered developed and which are considered developing

- explain how development is measured
- describe the key characteristics of developed and developing nations
- learn about key economic and human factors of development

PAGES 120–123

***'What is meant by development?'; 'Measuring development'; 'Economic indicators*** **(all sections); and *'Human indicators'* (all sections)**

## Resources

- Skills Book page 55 'Group discussion'
- Skills Book page 52 'GDP of different countries'

## Using the Student's Book

This section provides an introduction to the process of development and how it is measured.

Read page 121 about measuring development and explain that it is quite complex to measure development. An international organization called the Organization for Economic Cooperation and Development (OECD) takes into account the various factors that affect development and provides support to these countries.

## Activity: Debate

Organize a debate among your students—three on each team. The others can act as adjudicators and vote on which team provided the most persuasive arguments.

1. The topic is: 'Developed countries should provide assistance to developing countries'.
2. The affirmative team could raise arguments such as:
   - Developed countries have enough money to help others.
   - Developed countries use cheap labour from developing countries and therefore have a duty to help them.
   - If developing countries become more prosperous, they will want to purchase more goods and services from developed countries, thereby helping the economies of the developed countries even more.
3. The negative team could raise arguments such as:
   - Developed countries have their own internal problems that are a higher priority.
   - Developing nations may be in the position they are because of bad decisions and waste—therefore it's their own fault.
   - Developed countries benefit from low labour costs in developing nations so why would they want to lose this opportunity by helping the economies of developing nations.

Introduce the economic factors of development. Read page xx and elicit responses about the meaning of wealth inequality. Explain that if there is a wide gap in the wealth status between the citizens of a country, it means that some people have access to all utilities and necessities of life, while most of them are deprived of them. Encourage them to talk about this topic in class. They can share their views about the disparity they might have noticed in their own society.

Explain that inflation, or an increase in the price of everyday items, can reduce the purchasing power of the citizens. For example, if the price of an item is Rs 1000, 5% inflation would increase its price to Rs 1050.

If a great number of people in a country are unemployed, it reflects an insufficient employment sector where jobs cannot be created. Unemployed people become a burden on a country's economy. They should read pages 122–123.

Elicit the types of industries the students know about. They may name agriculture, manufacturing, textiles, banking, etc. Explain that countries like Pakistan, whose economies are based on agriculture, are not as developed as countries like the United States, which has large manufacturing and service-based industries.

Explain the human factors of development, for example, healthcare. Elicit responses about the importance of healthcare in a country. Explain that developed countries spend a huge amount of their budget on providing healthcare facilities to its citizens. However, in developing countries there are very few healthcare facilities for the people. Many

people cannot afford expensive private hospitals, while the facilities in public hospitals are not sufficient to cater for many people. Moreover, in the far-flung areas of Pakistan, like the remote villages and towns, not even basic healthcare facilities are available.

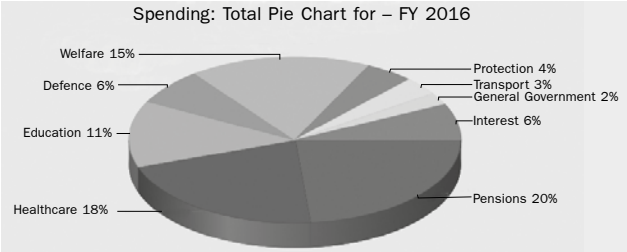
You could also give a comparison of literacy rates between developed and developing countries. The literacy rates of developed countries like Canada, Australia, Germany, and Japan are approximately 99%, whereas those of developing countries, according to the United Nations Educational, Scientific and Cultural Organization (UNESCO), are: Afghanistan 32%, Bangladesh 60%, India 69%, Mauritania 46%, and Pakistan 55%.

Explain why the infant mortality rate is an important factor to consider when measuring development. If this rate is high, it reflects the poor healthcare system of a country, the spread of epidemics, and the inability of the government to provide healthcare to infants. Also emphasize that the infant mortality rate influences the human resource potential of a country.

Elicit ideas about the effects of poor sanitation on people's health. Encourage them to think about the places in their city where this problem exists. Explain that the governments of developing countries do not have sufficient funds to address problems like sanitation. Inform students that many people have little access to clean water. Discuss the effects of consuming water containing impurities.

Elicit ideas from the students about the role of technology in the development of a country. Draw comparisons between developed and developing countries regarding the differences in technologies, for example, the technology of public transport systems. Developed countries have faster trains, and efficient mass transit systems, etc.

Also discuss the allocation of the budget of a developed country like the UK. Show them this pie chart and explain that it allocates 18% of its annual budget to healthcare and 11% to education. Each country allocates budget to various areas in a different way Ask students to complete Questions A–C.




## Using the Skills Book

Complete the Skills Book activity on page 55 'Group discussion'. The students can then note down their responses in their Skills Books.

The activity 'GDP of different countries' on page 52 can be completed for homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the process of development and how it is measured.
- I learned about the economic and human factors that influence development.

PAGES 124-125

***Case study: 'Australia—a developed country'* and *'Case study—Nepal, a developing country'***

## Resources

- Skills Book page 53 'Unemployment: an important human indicator'
- Skills Book page 54 'Comparison of human indicators for measuring development'

## Using the Student's Book

Development can best be studied when two case studies are compared and analyzed. Read page 124 including 'It's a fact!'. Explain that developed countries like Australia provide the basic necessities of life to its citizens, including free education and healthcare. People from other

countries migrate to Australia and other developed countries for a better quality of life.

Read the case study of Nepal on page 125. Also study the comparison graph on page 125 and discuss why it is important to have adequate numbers of doctors for a country. Point out that even in Pakistan, which is a developing country, there are eight doctors for every 10,000 people. People living in far-off places have to travel to urban areas to receive medical treatment.

## Activity: Case study

There are two case studies in this section of the Student's Book: Nepal and Australia. They contain information about economic and non-economic indicators of development.

## What to do:

Ask your students to choose another country, developed or developing, and research and write a similar case study. Their responses will obviously depend on the countries they choose.

To display the case studies, paste a map of the world onto a large piece of cardboard and display the case studies around the map, drawing arrows from each country to its case studies.

You can sum up the lesson by giving the students these statistics for Pakistan. Its annual GDP is about US$270 billion, which works out at about US$1150 per person. The total figure ranks Pakistan at 45 out of all the countries in the world. The services sector provides the highest amount towards the GDP, followed by the agriculture sector.

Wealth inequality is a major problem in Pakistan. The 18 million richest people in Pakistan consume 1.5 times more than the 72 million poorest people. Among those worst affected are people who live in rural areas, and women. Education is seen as a way of escaping poverty and wealth inequality, but far fewer poor children go to school than those from richer families, which indicates that progress for them will be slow or even non-existent.

Pakistan's annual inflation rate is around 2.5%. This is much lower than Pakistan's average over the past two decades, but is still above the world average. Pakistan's unemployment rate is around 6%, which is close to Pakistan's average over the past two decades. This amount is relatively low for a developing country and is even lower than in some developed countries.

According to the World Bank, Pakistan spends around 0.9% of its GDP on healthcare, which is one of the lowest percentages in the world. As a result, is has higher infant mortality rates and lower life expectancy than other countries in the region.

According to the World Bank, Pakistan spends around 2% of its GDP on education, which is less than half the world's average. The literacy rate of people over 15 in Pakistan is 56%, but fewer than half of females over 15 are literate. Life expectancy at birth in Pakistan is 67.7 years, which is among the lowest in the world and reflects the lack of money spent on healthcare.

Ask students to complete Questions D1–6.

## Using the Skills Book

Ask the students to complete 'Unemployment: an important human indicator' on page 53, and 'Comparison of human indicators for measuring development' on page 54 as homework.

## Discussion and review

Ask the students what they have learnt in this lesson. They could make a note of this, summarizing the lesson, for example:

- I learned about the economic and human factors of development in Australia, a developed country.
- I learned about the factors based on which Nepal is considered to be a developing country.

## Answers to assessments

A 1. Inflation is the measure of the increase in the prices of goods and services.

2. Response should include the following: to promote policies that will improve the economic and social well-being of people around the world; to measure the economic state of countries, and to provide advice on how governments can improve their rates of development.

3. The key considerations are:

- the population's access to medical care (including number of patients per doctor);
- the quality of available healthcare;
- the cost of available healthcare;
- the rate of spread of diseases

B 1. It was created to emphasize that factors other than economic growth should be considered in determining a country's state and rate of development.

2. Response should include: keeps the population in touch with each other and with the latest news; enables companies to produce goods and services more efficiently.

3. Response should include: developed nations tend to have more service industries, while the less-developed nations are more reliant on agriculture. In developed countries, manufacturing and agricultural industries have access to technology that makes it more efficient to produce goods.

4. For comparison, students' responses should include some or all of the key points.

### Developed countries:

- mass industrialization
- consistent economic growth
- high employment levels
- high life expectancy
- free education
- universal, affordable health care

### Developing countries:

- reliance on agriculture sector
- little or no manufacturing industry
- low economic growth
- high unemployment levels
- low literacy rates
- lack of basic healthcare
- low life expectancy

C 1. Responses will differ according to each student's opinion of what is important.

a) (Note: Values might vary with each passing year.)

| Country | GDP |
|---|---|
| Australia | US$1340 billion |
| Indonesia | US$862 billion |
| Italy | US$1815 billion |
| Canada | US$1550 billion |

b)

i) GDP: the gross domestic product measures the value of goods and services produced by a country.

ii) GNP: the gross national product is the GDP plus income earned by local residents from their overseas investments, minus the income from non-residents living within the country.

iii) OECD: The Organization for Economic Cooperation and Development measures the economic state of countries and provides advice on how governments can improve their rates of development.

iv) ODA: Official Development Assistance is money that helps with the development and welfare of developing countries.

v) per capita: for each person

2. Response should include: unemployed people are less likely to be able to buy basic goods and services, which reduces the amount of revenue and profits companies can earn; governments may have to provide welfare payments to the unemployed. Also mention that unemployed people

can offer great human resource potential, which is wasted due to lack of job opportunities.

D 1. Response should be similar to the following: the greater the level of education, the more likely the population will be to engage in higher-pay, higher value work; greater education leads to innovation that can boost both industry and government; low education levels lead to higher unemployment and a less skilled workforce.

2. The manufacturing and industrial sectors are important because they provide job opportunities for many people. The country can export products manufactured by its industries and thus earn money.

3 a) Responses will depend on the countries selected by the students.

b) Responses will depend on the students' country, but assuming it is Pakistan, the answer is developing.

4. For responses, see notes in activity titled 'Debate' on page X of this book.

5. Responses will depend on the countries selected by the students.

6. Responses will depend on the country selected by the students.

## Answers to the Skills Book

### Page 52 *'GDP of different countries'*

A. The students' graph should look like the one at the bottom of this page.

### Page 53 *'Unemployment: an important human indicator'*

### Answers:

A 1.

i) a: 3% (Hong Kong)
b: Hong Kong is considered a developed economy, though it is now part of China, which is a developing nation.

ii) a: 3.7% (Norway)
b: Developed

iii) a: 3.5% (Japan)
b: Developed

iv) a: 6.5% (Denmark)
b: Developed

v) a: 6.8% (Brazil)
b: Developing

vi) a: 13% (Egyptian)
b: Developing

vii) a: 16% (Albania)
b: Developing

viii) a: 16%.5 (Iraq)
b: Developing

ix) a: 26% (Lesotho)
b: Developed

| GDP | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | 72% | | | 70.5% | | | 69.1% | | | 72.2% | | | | | |
| 70 | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | 62.4% | | |
| 60 | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | 34.1% |
| 35 | | | | | | 28.9% | | | 30.2% | | | | | | |
| 30 | | | 23% | | | | | | | | | 26.2% | | | |
| 25 | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | |
| 10 | | 5% | | | | | | | | | | | | | |
| 5 | | | | | 1.6% | | | 0.7% | | | 2.9% | | | 3.5% | |
| 0 | | | | | | | | | | | | | | | |
| | Arg. % GDP Serv. | Arg. % GDP Agri. | Arg. % GDP Indus. | Canada % GDP Serv. | Canada % GDP Agri. | Canada % GDP Indus. | Germ. % GDP Serv. | Germ. % GDP Agri. | Germ. % GDP Indus. | Japan % GDP Serv. | Japan % GDP Agri. | Japan % GDP Indus. | Mex. % GDP Serv. | Mex. % GDP Agri. | Mex. % GDP Indus. |

## Page 54 *'Comparison of human indicators for measuring development'*

A 1 a) i) India ii) China iii) Nigeria
iv) Indonesia/Pakistan

b) Students should draw a line graph based on the statistics obtained from the Internet.

## Page 55 'Group discussion'

A 1

Q. What does GDP stand for and what does it measure?

A. GDP stands for gross domestic product. It measures the value of goods and services produced by a country.

Q. What is Pakistan's per capita GDP?

A. Approximately US$1150

Q. What does OECD stand for?

A. Organization for Economic Co-operation and Development

Q. Which sector of industry plays a major role in the development of a country?

A. Economic sector plays a major role in the development of a country.

# NOTES

# NOTES

# NOTES