2

ECOSYSTEMS

Learning objectives

By the end of this unit, pupils will have achieved a greater understanding of the following concepts:

- the principle characteristics and components of an ecosystem
- how populations, communities and ecosystems are structured
- how organisms adapt to their habitat.

Competences

This unit covers the following competences:

- Linguistic competence
- Mathematical and basic competences in science and technology
- Digital competence
- Learning to learn
- Cultural awareness and expression

Key vocabulary

Abiotic factors: air quality, climate, non-living, rock, soil, sunlight, temperature, water

Ecosystem: abiotic / biotic factor, adapt / adaptation, artificial, community, fauna, flora, habitat, individual, living, natural, physical environment, population

Ecosystem types: aquatic, arctic, coniferous, coral, deciduous, desert, forest, freshwater, grassland, marine, Mediterranean, pond, rainforest, savannah, shoreline, temperate, tropical, tundra, urban

Cambridge English Qualifications practice

You will find ***A2 Key for Schools*** activity types in the following exercises:
Pupil's Book, Page 22 – Listening Part 2
Pupil's Book, Page 28, Activity 2 – Speaking Part 2, Part 1
Pupil's Book, Page 28, Activity 3 – Speaking Part 2, Part 2
Activity Book, Page 13, Activity 11 – Reading and Writing Part 3

Throughout this unit, you will find the following ***A2 Key for Schools*** vocabulary:
airport, area, autumn, body, building, camel, desert, city, fat, forest, lake, look-out, park, river, sea, store, suit, variety

Throughout this unit, you will find the following **B1 Preliminary for Schools** vocabulary:
Antarctica, lack, natural, northern, ocean, stream, suggest, protect, thick, waves

Materials needed for *Find out more*

- butter
- cold water
- ice cubes
- large bowl

Materials needed for other activities

- A4 card
- activated charcoal
- clean, airtight jar with lid
- coloured paper or paint
- creative materials for ecosystem
- moss or slow-growing plants
- photos and pictures of different ecosystems
- photos of organisms from chosen ecosystem
- printed world map, one per pupil
- rocks
- sand or gravel
- shoe box
- soil
- water
- world map

Explore

The *Explore* project encourages the pupils to research and present an ecosystem from a different continent. The different *Explore* stages focus on the following skills:

- autonomous research
- organising information using graphic organisers
- producing oral descriptions
- preparing and giving a presentation.

Other resources

- Interactive activities
- Flashcards: *Ecosystems*
- Song: *Ecosystems on Earth*
- Video documentary: *Amazing adaptations*

UNIT 2
PAGES 18–19

Objective

Pupils will be introduced to different ecosystems and compare and contrast the features of each.

Key vocabulary

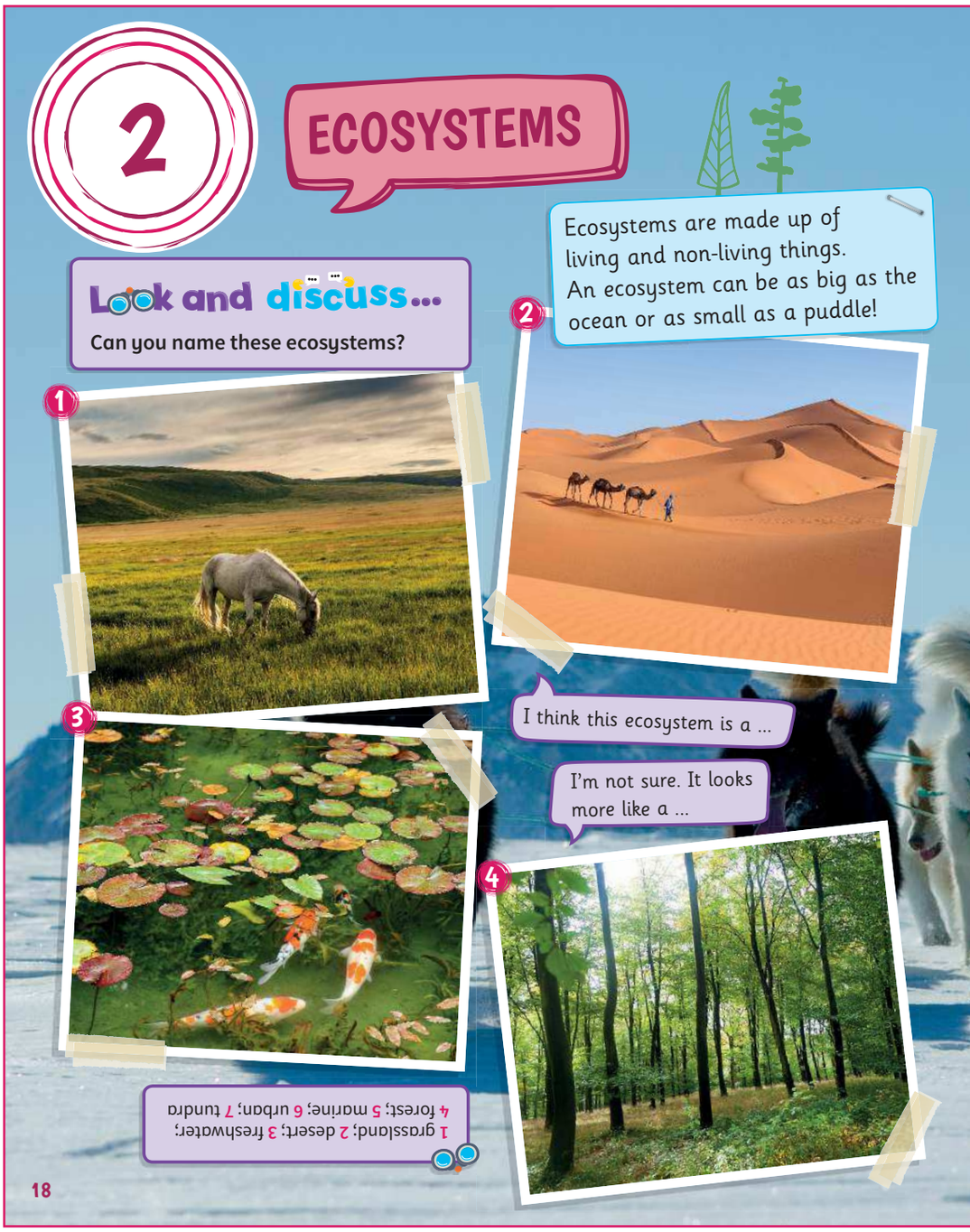
adaptation, climate, desert, ecosystem, forest, freshwater, grassland, living, marine, non-living, tundra, urban

Warm up

- Write *ecosystem* on the board in big letters. Create a word cloud to stimulate pupils' previous knowledge.

Main concepts

- What does *ecosystem* mean? Break it into two words: *eco* + *system*. Tell pupils the prefix *eco-* comes from a Greek word meaning house. Can they recall what a *system* is from Unit 1?
- Discuss the photos using the linguistic support features to help.
- Choose two ecosystems from the page. Create a list on the board outlining the similarities and differences between the two. Encourage a discussion of the living and non-living parts of each ecosystem. Pupils then repeat this with two other photos. Focus on the appropriate use of comparatives.



Pupils should find similarities and differences related to landscape, living things, climate, location and man-made elements.

For next lesson… activated charcoal, airtight jar with lid, moss or slow-growing plants, rocks, sand or gravel, soil, water

Learn more

- Pupils choose an ecosystem and write a short description of what it would be like to visit. Encourage them to think about the weather and what they would need for their trip.

Song
This song focuses on different ecosystems found on Earth. It can be used as a review at the end of the unit (pages 28–29).

Documentary
The documentary explores the evolution of organisms and how they have adapted to their environments. It can be used on page 25. You could include discussion activities alongside the video and encourage further research of adaptations.

UNIT 2
PAGES 20–21

Objective

Pupils will learn about the components of an ecosystem and distinguish between biotic and abiotic factors, understanding the concepts: *individual, population, community* and *habitat*.

Key vocabulary

abiotic / biotic factor, air quality, climate, community, ecosystem, fauna, flora, habitat, individual, living, physical environment, population, rock, soil, sunlight, temperature, water

Warm up

- Scramble the words *sunlight*, *temperature*, *climate* and *water* on the board. Ask pupils to identify the words and discuss what they all have in common. Name more abiotic factors and explain their importance in an ecosystem.

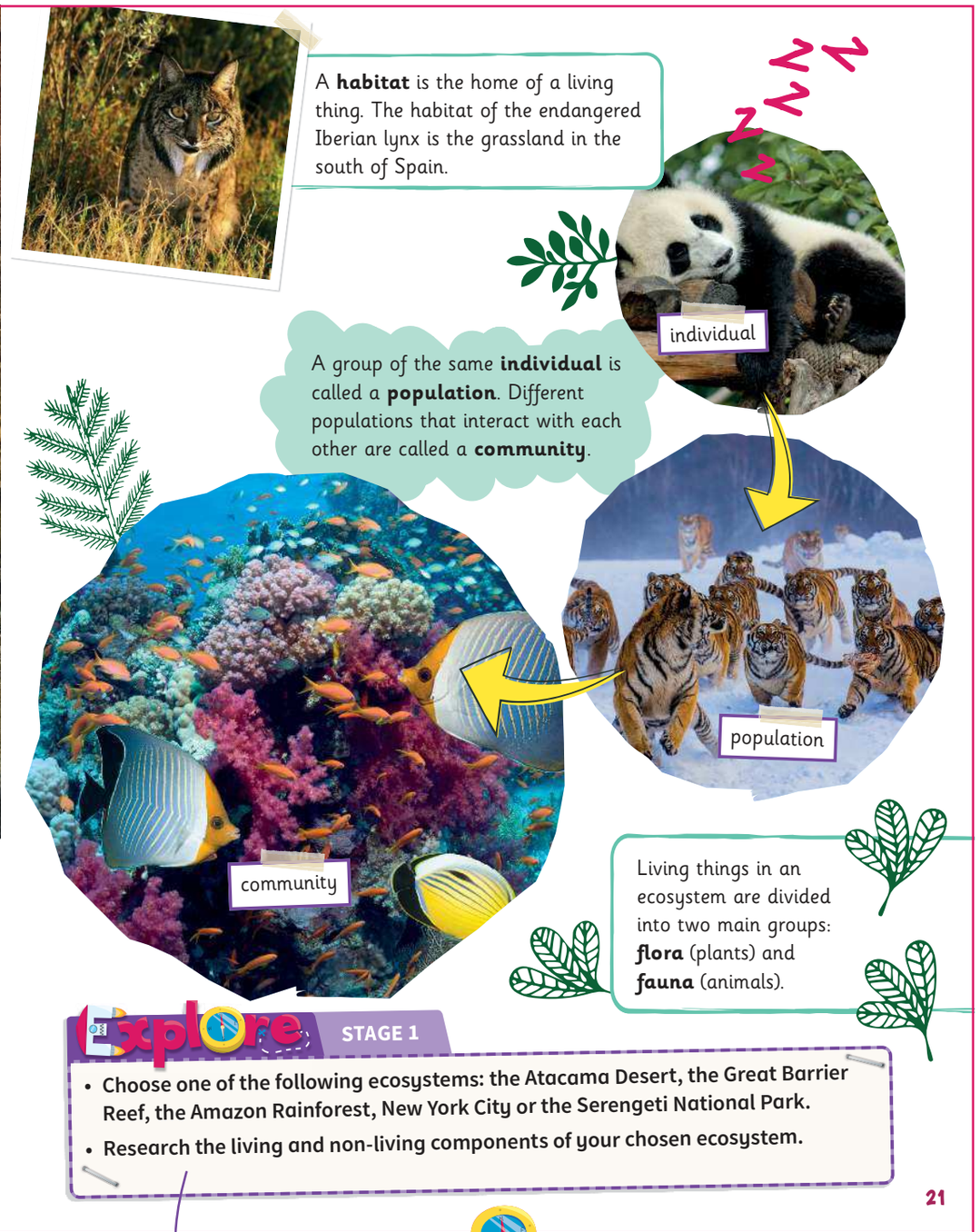
Main concepts

- Show photos and pictures of different ecosystems, one at a time. Pupils have two minutes for each picture to list as many biotic and abiotic factors as they can.
- Pupils can write definitions and illustrations in their notebook for *ecosystem*, *habitat*, *individual*, *population* and *community*.

The community of living things and the physical environment surrounding them (biotic and abiotic factors).

Monera, Protist, Fungus, Plant, Animal

Biotic factors



Pupils can research the living and non-living components at home or at school. This could be set out as a table in their notebooks.

Learn more

- Pupils research how each abiotic factor influences different living things.
- Pupils create an ecosystem in a bottle using a clean, airtight jar with a lid, sand or gravel, activated charcoal, rocks, soil, moss or slow-growing plants and water.
- Alternatively, pupils can choose an organism and draw it in a comic strip, showing its population, community and habitat.
- Pupils look back and identify the ecosystems from Unit 1.
- Alternatively, they can think about and draw their favourite natural space, describing the biotic and abiotic factors.

Tip

You may want to further explore the habitats of different organisms, focusing on the abiotic and biotic factors.

UNIT 2
PAGE 22

Objective

Pupils will learn about the characteristics of grassland ecosystems and the organisms that live there.

Key vocabulary

grassland, savannah, temperate, tropical

Warm up

- Ask pupils to close their eyes and imagine a flat area covered in grass. Elicit volunteers to describe the animals they imagine might live there and what the weather might be like.

Main concepts

- Explain that savannahs and temperate grasslands are similar, but not the same. On a map, show pupils where each is located. Ask pupils to describe the climatic differences.
- You may want to treat pages 22 and 23 as a double spread in order to compare and contrast grasslands with forest ecosystems.

Learn more

- Pupils write a short text explaining in which of the two grassland ecosystems they would rather live. Encourage them to give reasons for their choice. They can share their texts with the class.

A grassland ecosystem

A climate with mild temperatures

A2 Key for Schools Listening Part 2
Savannah; elephants, zebras, giraffes

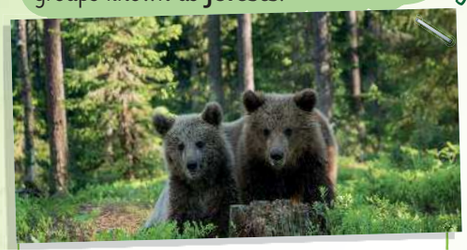
Pupils' own answers, focusing on the second conditional (*If I …, I would …*)

In coniferous forests

WHERE DO BROWN BEARS LIVE?

Discover...
the different types of forest.

Rainy places allow trees to grow in large groups known as **forests**.



Coniferous forests are located in the colder zones of the northern hemisphere. Brown bears, reindeer, moose, wolves and weasels live among evergreen trees.

Deciduous forests are dominated by trees whose leaves change colour and fall off each autumn. You can find deer, squirrels, beavers, foxes and wild boar here.

We can find over half the plant and animal species on Earth in **tropical rainforests**. Located near the equator, the temperature is high, but there is lots of rain.

Like their name suggests, **Mediterranean forests** are found near the Mediterranean Sea. Typical flora includes oak trees, rosemary and thyme.

Explore STAGE 2

- **Find out about the climate and location of your chosen ecosystem.**
- **Make a spider diagram showing the information you have found out so far.**

23

Demonstrate a spider diagram on the board with one of the forest ecosystems to ensure understanding. Pupils can complete the research at home.

UNIT 2
PAGE 23

Objective

Pupils will learn about the characteristics of forest ecosystems and the organisms that live there.

Key vocabulary

coniferous, deciduous, forest, Mediterranean, rainforest, tropical

Warm up

- Draw a table with the headings *Forest* and *Location*. Under *Forest* write: *deciduous*, *coniferous*, *tropical*, *Mediterranean*; and under *Location* write: *southern Spain*, *equator*, *northern Spain*, *Canada*. Pupils match the words in each column. Correct after pupils have read the page.

Main concepts

- Focus on the words *deciduous* and *coniferous*, explaining the meanings.
- Discuss why forests are important for the Earth and why they are known as the Earth's lungs. *Trees use carbon dioxide for photosynthesis and release the oxygen that we breathe.*

Learn more

- Pupils make a chart with the headings: *Forest name; Types of trees; Animals; Location; Climate.*
- Pupils can find examples of how animals have adapted to living in forests.

UNIT 2
PAGE 24

Objective

Pupils will learn about the characteristics of desert ecosystems and the organisms that live there.

Key vocabulary

desert, fauna, flora

Warm up

- Explain that it may look like nothing lives in the desert, but lots of organisms have adapted to living there. Ask pupils for ways that they keep cool when it is hot outside.

Main concepts

- Ask pupils where most deserts are found and why. They stick a world map in their notebooks, colouring in the deserts.
- Pupils write the desert adaptations in bullet form in their notebook and research additional ones.
- Pupils can compare and contrast life in a desert with life in the tundra.

Learn more

Call and answer game: Shout out a desert adaptation. Pupils respond with the benefit. For example: Teacher – *Snakes are nocturnal*. Pupil – *It's cooler to hunt at night*.

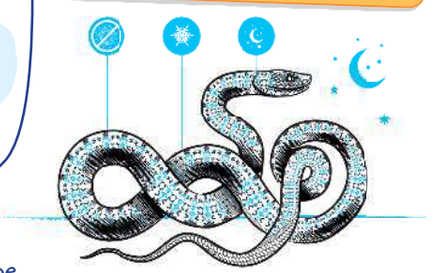
They store nutrients in their humps and don't lose much water. They can go for long periods without food and water.

The Sahara Desert in northern Africa is the largest non-polar desert in the world

HOW DO CAMELS SURVIVE IN THE DESERT?

Discover...
how organisms have adapted to high temperatures and little water.

Deserts are the hottest and driest places on Earth. During the day, temperatures can reach up to 50 °C, but can drop to 0 °C at night. Living things have adapted to the changes in temperature and the lack of water.



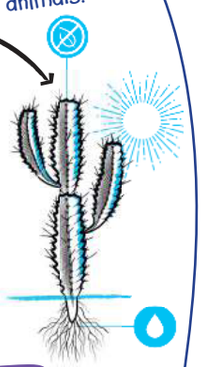
What is the largest desert in the world? Where is it found?

When it is scorching hot outside, what better way to beat the heat than to sleep all day? Many desert animals are **nocturnal**. They are only active at night when it is cooler.

Find examples of nocturnal animals.

Camels **store nutrients** in their humps and lose hardly any water through sweating or urination. This means they can go for a long time without having a drink or a snack!

A cactus can **store water** for long periods of time. They have got a thick waxy layer and **spines** instead of leaves, which reduces water loss. The spines also protect the cactus from animals that might want to eat it!



Explore STAGE 3

- **Research the flora and fauna of your ecosystem. What are the adaptations needed to live in this ecosystem? Think about food, water, predators, prey and climate.**
- **Add the information to your diagram from Stage 2.**
- **Tell a partner what you discovered.**

I found out that …

I discovered that …

24

Pupils can research the flora and fauna of their chosen ecosystem at home, but discuss the adaptations with a partner during class time. Focus on special qualities of the plants and animals when discussing adaptations.

Example answers: badger, bat, cougar, coyote, hamster, leopard, mouse, owl, porcupine, raccoon, scorpion, skunk, wombat

The layer of fat acts as an insulator against the cold.

Here's the hidden object!

WHY DO POLAR BEARS NEED TO BE FAT?

Find out more...

Discover...
how some animals can survive in very cold temperatures.

Background: Some animals that live in very cold temperatures have got a thick layer of fat, called blubber.

Hypothesis: If you had more fat on your body, would you notice the cold as much? Why? / Why not?

Materials: large bowl, water, ice cubes, butter

Step 1: Get a bowl large enough to fit both hands in. Fill it with water and ice cubes. Leave it for five minutes.

Step 2: Put both hands in the bowl and count to ten. Take your hands out and warm them for a few minutes. This is the **control**.

Step 3: Now, rub butter over one hand. Put both hands back in the water and count to ten.

Step 4: Wash your hands with warm water and soap.

Reflect 1
How does each hand feel in the water? Do both hands feel the same?

Reflect 2
How does each hand feel this time? Do both hands feel the same?

In conclusion, ...

Conclusion: What did you find out? Do you think extra fat on your body would keep you warmer? Why?

Animals in colder climates need ...

25

Both hands should feel the same (cold).

The hand with the butter should be less sensitive to the cold.

UNIT 2
PAGE 25

Objective

Pupils will understand the importance of adaptation to a cold habitat through experimentation, using the scientific method.

Key vocabulary

Arctic, Antarctic, tundra, adapt

Warm up

- Ask pupils to name animals that live in cold areas. Ask what adaptations these animals might need to survive in the tundra. Locate Arctic and Antarctic areas on the map.

Main concepts

- Explain that fat is an insulator, which means it keeps heat in and cold out. Read the introduction as a class.
- Pupils explain their reasoning for their hypothesis before carrying out the experiment.

Learn more

- Talk about adaptations to Arctic conditions, like fur, slow movement and camouflage. Ask pupils which they think is most effective for surviving in the cold.
- Lead a discussion comparing the adaptations in the documentary and encourage further research.

UNIT 2
PAGE 26

Objective

Pupils will learn about the characteristics of aquatic ecosystems and the organisms that live there.

Key vocabulary

aquatic, coral, freshwater, marine, pond, river, shoreline

Warm up

- Before reading the page, ask pupils to name different bodies of water and list these on the board.

Main concepts

- Ask pupils to explain the difference between *marine* (salty) and *freshwater* (without salt). Refer to the warm up and label the bodies of water as marine or freshwater.
- Explain that some abiotic factors do not affect aquatic ecosystems. However, sunlight and temperature play a very important role. Discuss the reasons why as a class.

Learn more

- Remind pupils about the water cycle. They can research how it affects the organisms that live in freshwater ecosystems.
- Ask pupils to describe a day at the beach to a partner, focusing on the biotic and abiotic factors.

Living organisms (flora and fauna), abiotic factors (soil, rocks, water, sunlight, temperature, air, climate). Pupils should use *because of* + noun, or *because* + subject.

Peregrine falcon

WHICH BIRD OF PREY LIVES IN NEW YORK CITY?

Discover...
the natural and artificial elements of an urban ecosystem.

Instead of adapting to ecosystems, humans have adapted ecosystems to suit them. These are known as **urban ecosystems**. They have got many **artificial elements**, but also contain **natural elements**.

Artificial elements include buildings, airports, parks and bridges.

What are the natural elements of an urban ecosystem? Discuss.

The natural elements include ...

Animals can survive here because ...

New York City has got a higher **peregrine falcon** population than most places on Earth. All the skyscrapers make a great habitat for these birds of prey. They provide an ideal look-out point, in the same way cliffs do, for prey such as pigeons and blackbirds.

Explore STAGE 4

- **Now that you have studied the different types of ecosystem, you can add this information to your diagram. What characteristics define your chosen ecosystem?**
- **Does your ecosystem contain any artificial elements? Find out and make a list of the consequences of human interference.**

27

Pupils can prepare Stage 4 at home or at school. You can spot check some pupils' information as a class.

Extra Activity, page 91:
Pupils choose an ecosystem and make a three-dimensional book.

UNIT 2
PAGE 27

Objective

Pupils will learn about the characteristics of urban ecosystems and the organisms that live there, and understand the difference between natural and artificial elements.

Key vocabulary

artificial, natural, urban

Warm up

- Pupils name the animals and plants they have seen in nearby cities and towns.

Main concepts

- Pupils list the natural and artificial elements in their local area and then discuss how the animals and plants have adapted. Pupils can draw their neighbourhood, circling the natural elements in one colour and the artificial ones in another.
- As an alternative to the Extra Activity on page 91, pupils could create a model of an ecosystem using a shoe box. They should label the biotic and abiotic factors.

Learn more

- *Give one, get one* game: Pupils write a fact about an ecosystem on a piece of paper. They walk, exchange their fact, then review how many facts they can recall.

UNIT 2
PAGE 28

Language Review answers

1 a better

b more diverse

c less extreme

d more effectively

e more easily

2 Focus on developing a conversation and using connectors. Pupils should comment on what their partner says. For example: *Both pictures show a city landscape. However, in this picture the city looks clean, with better air quality. What's more, it has natural elements, like the park with trees. Also, there are probably lots of habitats. In the second picture, there are only artificial elements, and there seems to be a lot of pollution. There can't be many habitats here because the city has probably caused habitat destruction.*

This activity gives pupils practise of *A2 Key for Schools* Speaking Part 2, Part 1.

3 Pupils should state which they prefer, then give reasons why. For example: *I prefer urban environments because … there is more to do / there are more shops / more people live nearby / it's easier to get to places. I think rural environments are more enjoyable because … there is less noise and pollution / I love nature.*

This activity gives pupils practise of *A2 Key for Schools* Speaking Part 2, Part 2.

Encourage pupils to revise the unit content using the techniques from Pupil's Book page 81.

Content Review

1 **Unscramble the letters to make words. Use some of the words to complete the sentences.**

eceosstmy svaahnsna dpaat oulpoatipn htbaiat sderte

a ..... are a type of grassland found in tropical areas.
b A ..... is the home of a living thing.
c An ..... is made up of a community of organisms and the abiotic factors in an area.
d Living things ..... to their natural surroundings.

Assessment link
For more Unit 2 activities go to page 80.

2 **Look at the photos and identify the ecosystems. Write down two characteristics of each ecosystem.**

a

b

Explore FINALE

- **Prepare and carry out a presentation on your ecosystem. You can find others who have chosen the same ecosystem and work in pairs or small groups.**
- **Use the information you have collected and include some pictures or videos.**
- **Think about the structure of your presentation. How many sections will it have? What are you going to say? What is your partner going to say?**

29

Support pupils' use of a computer-based presentation tool. Encourage the use of pictures and videos from the internet. Check and assist with pupils' presentation structure. Allow one or two lessons for presentation time.

UNIT 2
PAGE 29

Content Review answers

1 ecosystem, savannahs, adapt, population, habitat, desert

a Savannahs

b habitat

c ecosystem

d adapt

2 **a** Rainforest ecosystem. Example answers: warm or tropical, found near the equator, lots of rain, many different plants and animals

b Shoreline ecosystem. Example answers: aquatic, marine, where the sea meets the land, organisms are adapted to strong tides and waves, most organisms stick to the rocks

UNIT 2 ASSESSMENT PAGE 80

Think about it answers

1 A community of living things and the physical environment that surrounds them. Living (flora and fauna) and non-living (abiotic factors) components.

2 Soil, rocks, water, temperature, air, sunlight, climate

3 Pupils' own answers

4 Pupils' own answers

5 2,500,000,000 or 2.5 billion. If they are the same species of bacteria, then population. If they are various species, then community.

6 Nocturnal, store nutrients, reduce water loss through sweating and urination, store water, reduce water loss through spines

7 Pupils' own answers

8 Aquatic / marine. Clownfish, sponges, sea anemones. Also, coral reefs are actually animals!

9 Peregrine falcons, other birds, mice, rats, ants, bears, coyotes, foxes

10 Pupils' own answers. Focus on the difference between natural and artificial elements.

Think harder answers

1 Pupils' own answers. If one organism is affected, all the other organisms are as well.

2 Pupils' own answers

3 Being eaten (especially by crocodiles), drowning in a river, starvation, dehydration

4 Pupils' own answers

5 It produces large amounts of oxygen, which most organisms need to breathe. It absorbs large amounts of poisonous carbon dioxide and provides many organisms with shelter. There would be less oxygen produced on Earth and less biodiversity.

6 Their ears can grow to half the size of their body. These large, thin ears allow more body heat to be released.

7 Pupils' own answers. Focus on items that would keep someone warm, dry and camouflaged, as well as food and drink. Encourage pupils to use a proper introduction, conclusion and a variety of connectors between sentences.

8 Oceans – 96.5%; other saline water – 0.9%; freshwater – 2.5% (surface – 1.2%, ground water – 30.1%, glaciers and ice caps – 68.7%)

9 Freshwater or aquatic. Natural. It provides all the necessary biotic and abiotic factors.

10 Any major disaster that caused a major decrease in biodiversity or environmental quality. Examples might include: Chernobyl nuclear disaster, Exxon Valdez oil spill, volcanic eruption of Mount St. Helens.

UNIT 2 TRACKLIST