Built for where it lives

60 minutes • B4.1.1 to B4.1.4 • Chapters 1, 2 • The dry lab

Habitats, the adaptations of marram grass and a mangrove, abiotic variables and the range of tolerance, and a transect across a dune

BY THE END, STUDENTS CAN

- [ ] Describe the habitat of a species by its place, its physical conditions and its type of ecosystem B4.1.1
- [ ] Explain the adaptations of marram grass to sand dunes and of a mangrove tree to salt swamps B4.1.2
- [ ] Give abiotic variables that affect the distribution of plants and of animals B4.1.3
- [ ] Explain a range of tolerance, and use transect data to link a species' distribution to an abiotic variable B4.1.4

TIMING

0–6	6 min	**Do now: the beach**	
6–20	14 min	**Two specialists**	
20–30	10 min	**Only so far**	
30–54	24 min	**A transect across a dune**	
54–60	6 min	**Exit**	
	60 min	**One lesson**	

STARTER

6 min

Do now: the beach

A photo of a beach with dunes behind it. Pairs list three ways the conditions change from the waterline to the back of the dunes.

ON THE BOARD, FROM THE GUIDE

Open the guide on the projector at each chapter (the links work in this PDF). Every figure plays from its own buttons, and the lesson's slides have the same figures, step by step, in the order of this plan.

01 A place to live

CHAPTER 01 IN THE SLIDES

Switch the figure through Marram grass and Red mangrove, and have the class say what will change before each.

> **Predict box:** On a dry, windy day, a marram leaf rolls up tightly. Why does this cut its water loss? Hands up or mini whiteboards first.
>
> **Answer B: The stomata face inwards into still, humid air, so the water vapour gradient from inside the leaf is much smaller**

02 Only so far, and no further

CHAPTER 02 IN THE SLIDES

Step through the figure (3 steps, the arrow keys on a projector). Stop on each caption and ask what changed before you go on.

1. A species does best at its **optimum** for a factor such as temperature.
2. Either side are **zones of stress**: individuals survive but grow and breed less.
3. Beyond the **lower and upper limits** it cannot survive: **zones of intolerance**.

> **Predict box:** On the dune transect (the Dry lab), which plant would you expect to grow nearest the sea? Hands up or mini whiteboards first.
>
> **Answer C: Sand couch, because it tolerates more salt in the sand than either of the other two plants can**

THE LESSON

14 min

Two specialists

Chapter 1 and its two states. Students draw a table: marram and mangrove, the problem each faces, and the adaptation that solves it.

10 min

Only so far

Chapter 2 and its step-through. Students sketch the tolerance curve and label the optimum, the zones of stress, the limits and the zones of intolerance.

24 min

A transect across a dune

The Dry lab. Pairs sample every 10 m, draw the kite diagram, then match each plant to the factor that best explains its limits, and answer the three predictions.

ACTIVITIES

FIELDWORK

A real transect

The IB expects students to collect transect data themselves. Run a tape across a gradient near school: from a path into a wood, from the edge of a pond, or up a slope. Every 2 m, a quadrat for percentage cover of two or three plants, and a sensor reading for light, soil moisture or soil pH. Back in class, draw the kite diagram and compare with the dune.

Needs: a tape measure, a quadrat, a light meter or soil probe.

PRACTICAL

Marram under the microscope

Hand sections of a marram or other rolled grass leaf (or a prepared slide), viewed under low power. Students draw it and label the cuticle, the grooves, the hairs and the stomata, then compare with a leaf of a lawn grass.

Needs: marram leaves or prepared slides, razor blades, microscopes.

PLENARY

6 min

Exit

Why can a transect show a correlation between a plant and pH but not prove that pH limits it?

WHAT STUDENTS GET WRONG

"Habitat means the area." A full description gives the location, the physical conditions and the type of ecosystem.

"Plants adapt to the dune." Individuals do not change to fit; populations evolve adaptations by natural selection over generations.

"A transect proves cause." Factors change together along it; it shows correlation.

STRETCH AND SUPPORT

Support: give the captions of each figure and film as a cut-up storyboard to put in order, and use the key terms (tap the dotted words) as a glossary.

Support: a sentence frame for the transect: "___ grows from ___ m to ___ m, where ___ is between ___ and ___."

Stretch: design an experiment to test whether salt limits marram grass, with its controlled variables.

IN THE GUIDE

1 A place to live

2 Only so far, and no further

Lab Dry lab: A transect across a dune

All The whole guide, with the figures that play

PPTX This lesson's slides, in the order of this plan

EXAM PRACTICE

Check yourself

Set it for homework: a fresh paper of exam-bank questions on B4.1 each time, marked as students go and saved to their Exam practice when they are signed in.

biologybybradford.com/exam-maker/sit?topics=B4.1&level=SL&paper=quiz&marks=15&src=ep

PRACTISE AND REVISE

BUILD FOR YOUR CLASS

- Tarsia puzzle, dominoes and picture reveal on B4.1, built from its key terms and ready to print
- A pub quiz with rounds on B4.1, to present or run with no projector
- An escape room built from the question bank on B4.1

ALREADY ON THE SITE FOR B4.1

- Lab: The Transect Pack
- Quiz: Adaptation to Environment
- Revision map: B4.1 Adaptation to environment, to fill in
- Exam questions: B4.1 in the exam maker, a paper with its markscheme

CARD SETS ON SPLYCR

Open a set to host it as a class game, or make a copy to edit.

- B4.1 Adaptation to Environment
- B3.2–C2.2 Plant Transport, Respiration & Neural Signalling

How this was made. The course structure, the activities and the teaching choices come from my own classroom, my presentations and my years of teaching IB and AP Biology. I use Claude, an AI, to help write and build the interactive guides, lesson plans, slides and practice questions, and to draw the diagrams and code the interactives. I direct the work and review it against the IB and AP specifications before it goes live.