Exercise walk-through

El Nino and La Nina ▪ 4.9

eXercise

You must be able to

- describe **El Niño** 厄尔尼诺 and **La Niña** 拉尼娜
- link them to changes in ocean temperature and weather
- explain effects on ecosystems and fisheries

Method — The normal pattern

Normally, trade winds push warm surface water **west** across the Pacific, and cold, nutrient-rich water **upwells** off South America (supporting fisheries).

Method — El Niño

In **El Niño**, the trade winds weaken, so warm water spreads **east**. Upwelling is suppressed, so nutrients (and fish) decline off South America; global weather shifts (droughts and floods in different regions).

Method — La Niña

La Niña is the opposite — trade winds strengthen, warm water piles up in the **west**, and upwelling off South America is **stronger** (more nutrients).

Method — A worked effect

During El Niño, reduced upwelling means fewer nutrients, so plankton and fish populations crash off Peru, hurting the fishing industry.

Practice 2.1 ▪ 1 mark

In El Niño, which way does warm water spread across the Pacific?

Solution 2.1

Method: The normal pattern

Worked steps

Eastward B1.

Practice 2.2 ▪ 1 mark

What happens to upwelling off South America during El Niño?

Solution 2.2

Worked steps

It is suppressed (reduced) B1.

Practice 2.3 ▪ 1 mark

How is La Niña different from El Niño?

Solution 2.3

Worked steps

In La Niña the trade winds strengthen and upwelling off South America is stronger (the opposite of El Niño) B1.

Exam-style 3.1 ▪ 1 mark

During El Niño, the fishing industry off South America suffers because

A upwelling and nutrients decrease

B upwelling increases

C the water freezes

D trade winds strengthen

Solution 3.1

Method: A worked effect

A upwelling and nutrients decrease ✓

B upwelling increases

C the water freezes

D trade winds strengthen

Worked steps

A — upwelling and nutrients decrease.

Exam-style 3.2 ▪ 2 marks

An El Niño year begins.
(a) Describe what happens to the trade winds and warm water.
(b) Explain the effect on plankton and fish off South America.

Solution 3.2

Method: El Niño

Worked steps

(a) The trade winds weaken, so warm surface water spreads eastward across the Pacific M1 A1. (b) Warm water suppresses the cold nutrient upwelling, so plankton decline and fish populations crash M1 A1.

Exam-style 3.3 ▪ 2 marks

Explain why upwelling of cold water supports rich fisheries.

Solution 3.3

Method: The normal pattern

Worked steps

Upwelling brings cold, nutrient-rich water to the surface, fueling plankton growth that supports fish and the whole food web M1 A1.