

Exercise walk-through

4.8

Earth's Geography and Climate

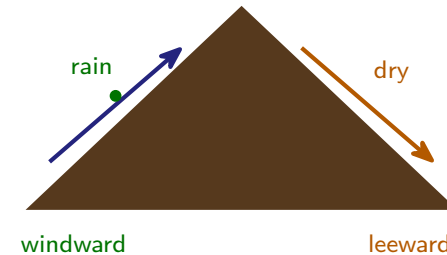
AP Environmental Science

Climate and El Niño

Climate is set by latitude, elevation, and nearness to water.

- a mountain **rain shadow** :
wet windward, dry **leeward**
- **ocean currents** move heat
poleward

In **El Niño** , weak **trade winds** stop **upwelling**
– fisheries collapse.



El Niño and La Niña

El Niño and **La Niña** are periodic shifts in Pacific Ocean temperatures and winds.

El Niño (warm eastern Pacific) and La Niña (cool eastern Pacific) alter rainfall, storms, and fisheries **worldwide** – for example, floods in some regions and droughts in others.

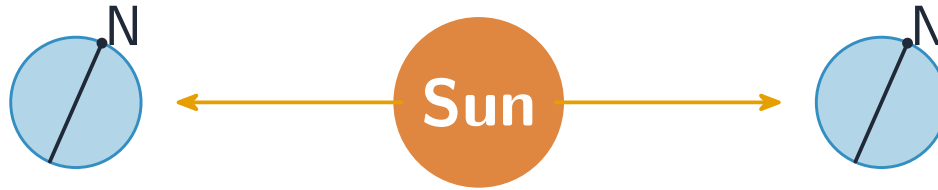
Worked example – a tectonic plate over geological time

A plate moves 5 cm per year. How far does it travel in 1 million years?

- $5 \text{ cm/yr} \times 10^6 \text{ yr} = 5 \times 10^6 \text{ cm}$
- $= 5 \times 10^4 \text{ m} = 50 \text{ km}$

A rate too small to notice becomes continent-scale over geological time.
Convert the units before you interpret the number.

Solar Radiation and Earth's Seasons



summer in the north
(N leans towards the Sun)

winter in the north
(N leans away from the Sun)

The tilt of the Earth's axis causes the seasons

Exam tips

- **Seasons come from the Earth's tilt**, not its distance from the Sun.
- Soil forms very slowly, so **erosion faster than formation** permanently depletes it; know soil texture (sand/silt/clay) and horizons.
- Explain global wind patterns from uneven heating + the **Coriolis effect**, and a **rain shadow** (wet windward, dry leeward).
- Name the atmospheric layers (troposphere = weather, stratosphere = ozone) and air composition (~78% N₂, 21% O₂).
- **El Niño / La Niña** are Pacific temperature shifts that change rainfall worldwide.

Exercises 2.1-2.3

2.1 On which side of a mountain does rain fall (rain shadow effect)? [1]

2.2 How do large water bodies affect nearby temperatures? [1]

2.3 What happens to temperature as elevation increases? [1]

Exercises 2.1-2.3

2.1 On which side of a mountain does rain fall (rain shadow effect)? [1]

2.1

- The windward side
-

2.2 How do large water bodies affect nearby temperatures? [1]

2.2

- They moderate them – milder, more stable temperatures nearby
-

2.3 What happens to temperature as elevation increases? [1]

2.3

- It falls (decreases)

Exercise 3.1

3.1 A rain shadow desert forms on the mountain's

[1]

☐

A windward (wet) side

B leeward (dry) side

C summit only

D base only

Exercise 3.1

3.1 A rain shadow desert forms on the mountain's

[1]

☐

A windward (wet) side

B leeward (dry) side

C summit only

D base only

3.1 B

- the leeward (dry) side

Exercise 3.2 (a)

3.2 Moist air blows over a mountain range.

(a) Describe what happens to the air on the windward and leeward sides.

[3]

Exercise 3.2 (a)

3.2 Moist air blows over a mountain range.

(a) Describe what happens to the air on the windward and leeward sides. [3]

(a)

- On the windward side the air rises, cools, and drops rain; the dry air then descends the leeward side, warming and staying dry

Exercise 3.2 (b)

3.2 Moist air blows over a mountain range.

(b) State the type of ecosystem likely on the leeward side.

[1]

Exercise 3.2 (b)

3.2 Moist air blows over a mountain range.

(b) State the type of ecosystem likely on the leeward side.

[1]

(b)

- A desert (dry ecosystem)

Exercise 3.3

3.3 Explain why a coastal city has smaller temperature swings than an inland city at the same latitude. [2]

Exercise 3.3

3.3 Explain why a coastal city has smaller temperature swings than an inland city at the same latitude. [2]

3.3

- Water heats and cools slowly, so the nearby coast stays milder; inland areas lack this buffer and have larger day-night and seasonal swings