

4.5 Global Wind Patterns

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **global wind patterns**.

You must be able to:

- explain **convection cells** 对流环流 (Hadley cells) and uneven heating
- link rising/sinking air to wet and dry regions
- describe the **Coriolis effect** 科里奥利效应

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ Uneven heating drives circulation

The Sun heats the **equator** more than the poles. Warm air **rises** at the equator, cools, and **sinks** around 30° latitude, forming **convection (Hadley) cells**.

■ Rising = wet, sinking = dry

- **Rising** air cools and drops rain → **wet** regions (tropical rainforests near the equator).
- **Sinking** air warms and dries → **dry** regions (deserts near 30° latitude).

■ The Coriolis effect

Earth's rotation **deflects** moving air (and water): to the **right** in the Northern Hemisphere, to the **left** in the Southern. This curves winds into belts (trade winds, etc.).

■ A worked link

Most major deserts sit near 30°N/S because that is where dry, sinking air suppresses rainfall.

2 Practice

Now apply the methods above.

2.1 Where does warm air rise in the global circulation? [1]

2.2 Does rising air create wet or dry conditions? [1]

2.3 What causes the Coriolis effect? [1]

3 Exam-style questions

3.1 Deserts commonly form near 30° latitude because air there is [1]

- **A** rising and wet
- **B** sinking and dry
- **C** stationary
- **D** always cold

3.2 Air rises at the equator and sinks near 30° latitude.

(a) State the climate (wet/dry) at the equator and at 30°. [2]

(b) Name this circulation pattern. [1]

3.3 Explain how uneven heating of Earth drives global wind patterns. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **4.5 Global Wind Patterns** lesson on the **Learn** page;

- read the **Global Wind Patterns** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 At the equator.

2.2 Wet.

2.3 Earth's rotation.

3.1 B —sinking and dry.

3.2 (a) Equator: wet; 30°: dry. (b) A convection (Hadley) cell.

3.3 The Sun heats the equator most; warm air rises there and sinks at higher latitudes, and Earth's rotation deflects the moving air, creating the global wind belts.