Wind Loop Lab

Complete a model of tropical atmospheric circulation.

MS-ESS2-6 "Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates..."

NAME _____ DATE _____

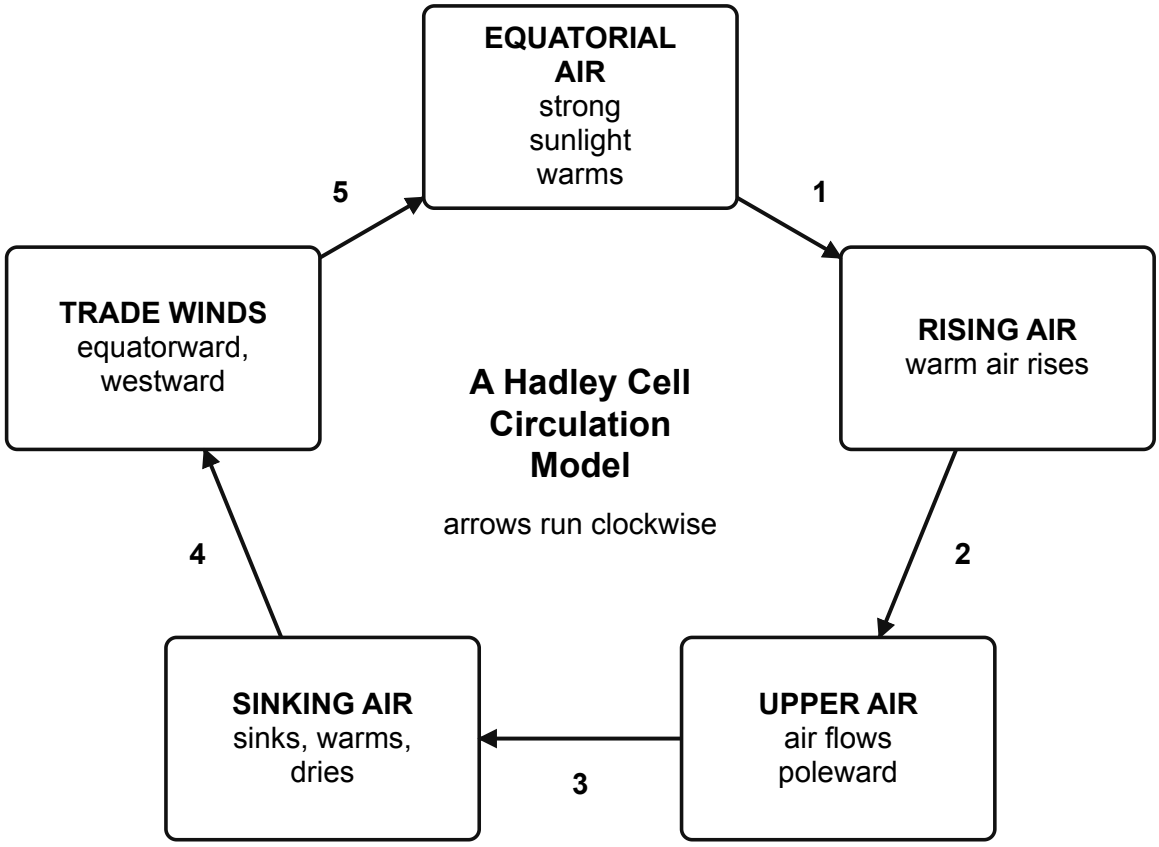
1 LABEL THE MODEL

Word bank below

Write one process from the word bank in each numbered box. Follow the arrows to trace the repeating movement of air.

WORD BANK

- air cools and moves poleward
- Air sinks and warms
- Flow curves westward
- strong heating makes air rise
- winds converge at equator



Arrow numbers match the response boxes on the next student section.

Label the arrows

Use the word bank to write the process for each numbered arrow.

Arrow 1 _____	**Arrow 2** _____	**Arrow 3** _____
Arrow 4 _____	**Arrow 5** _____	

2 RUN THE MODEL

Use your finished diagram

1. After air rises, what happens before it begins to sink?

2. Which stage is linked to drier regional climates, and why?

3. How does Earth's rotation affect the TRADE WINDS stage?

Revise the Model

Develop a model that connects the air circulation on page 1 to ocean circulation and regional climate. Show stronger solar heating near the equator, a warm surface ocean current moving heat toward higher latitudes, and cold, dense water sinking in a colder region. Add arrows for air and water movement and show how Earth's rotation curves their paths. Explain how a warm ocean current can affect the climate of nearby land.

3 CHECK IT

Before you turn it in

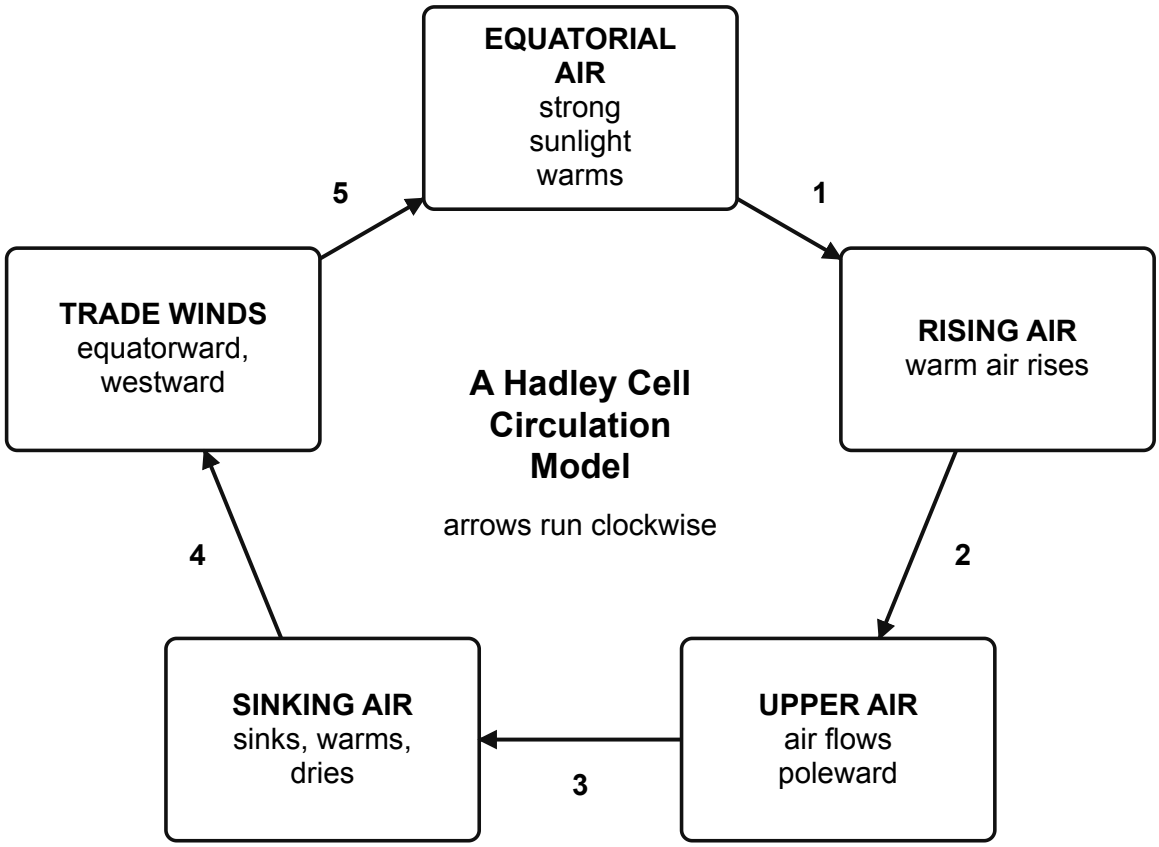
- [ ] I modeled air and ocean circulation.
- [ ] I included unequal heating and Earth's rotation.
- [ ] I linked transported heat to regional climate.

TEST THE MODEL

What is one part of Earth's climate system that this air-circulation model leaves out?

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PART 1 · COMPLETED MODEL



Arrow 1
strong heating makes air rise

Arrow 2
air cools and moves poleward

Arrow 3
Air sinks and warms

Arrow 4
Flow curves westward

Arrow 5
winds converge at equator

PART 2 · RUN THE MODEL

1. **It cools and moves poleward high in the atmosphere.** (After air rises, what happens before it begins to sink?)
2. **SINKING AIR, because descending air warms and its relative humidity decreases.** (Which stage is linked to drier regional climates, and why?)
3. **Earth's rotation deflects these equatorward surface winds westward, producing the trade winds.** (How does Earth's rotation affect the TRADE WINDS stage?)

REVISE THE MODEL · SAMPLE

Accept a model in which unequal solar heating warms tropical air and surface water; warm air rises and cooler air returns near the surface. Surface winds help drive ocean currents. Warm surface water transports thermal energy toward higher latitudes; cooling increases density and can cause sinking, with deeper return flow. Earth's rotation deflects large-scale motion to the right in the Northern Hemisphere and left in the Southern Hemisphere. A warm current can warm nearby air and moderate a coastal region's climate. Students must connect unequal heating and rotation to BOTH atmospheric and oceanic circulation; exact current names are not required.

TEST THE MODEL (SAMPLE ANSWERS)

- It leaves out ocean currents that move heat and affect climate.
- It does not show how continents and mountains change wind paths.

This simplified loop represents a Hadley cell. It shows equatorial heating, upper-air movement, sinking air, and curved surface trade winds, but not all global circulation cells. Trade winds move toward the equator and are deflected westward by Earth's rotation; the Coriolis effect does not draw air toward the equator.