

Big IDEA

Pressure changes global winds?

There is energy in winds. We try to move a sailboat and turn it. A cool breeze from the wind is a pleasure. On a cold, windy day, you don't think it is a pleasure when the wind's force on your bodies. Cold air is denser than warm air, so it exerts more pressure, or force, on a sail. This is why a pocket of cold air is called a low-pressure area. A pocket of warmer air is called an area of high pressure.

Winds blow from regions of high pressure to regions of low pressure. Warm air at the equator forms a region of low pressure. The cold air at the poles forms regions of high pressure. Differences in air pressure create global winds. Global wind systems that circle the equator, warm air rises and moves toward the poles. At the poles, cool air moves toward the equator.

Earth rotates, or spins like a top, so the winds moving from high to low pressure curve to the west in the Northern Hemisphere. The winds moving from high to low pressure curve to the east in the Southern Hemisphere. The directions in which the winds curve are reversed. This is the Coriolis effect.

Use the illustration and information on the next pages. Then, follow the steps in the Science Log to learn more about the idea." ♦

Trade Winds

Some of the sinking cool air from the horse latitudes moves back toward the equator. It replaces the warm air rising in the doldrums. Earth's rotation causes this pocket of cool air to blow from east to west. These so-called trade winds are very reliable in terms of both speed and direction. Their name, *trade winds*, actually means "winds of commerce." European sailors and merchants in the sixteenth century realized that this was the quickest and safest route from Europe to America.

Doldrums

Warm air near the equator rises to form an area of low pressure. Because the region has little wind, sailors who traveled on tall ships named these winds the doldrums, which means "dull."

Prevailing Westerlies

Some of the sinking cool air from the horse latitudes moves toward Earth's poles. Because they are moving in a direction opposite to the trade winds, the prevailing westerlies are also called the anti-trade winds.

Polar Easterlies

Air surrounding Earth's poles is very cold and dense. These high pressure areas slowly move toward the equator. If they meet a mass of warm air moving upward from the equator, a weather condition known as a polar front forms.

Horse Latitudes

Air moving away from the equator cools off. The dense, cool air sinks back to Earth, forming high-pressure areas called the horse latitudes. These latitudes may have been named by the crews of sailing ships. The sailors would sometimes throw horses overboard to save water when their ships were stranded in the high-pressure areas.

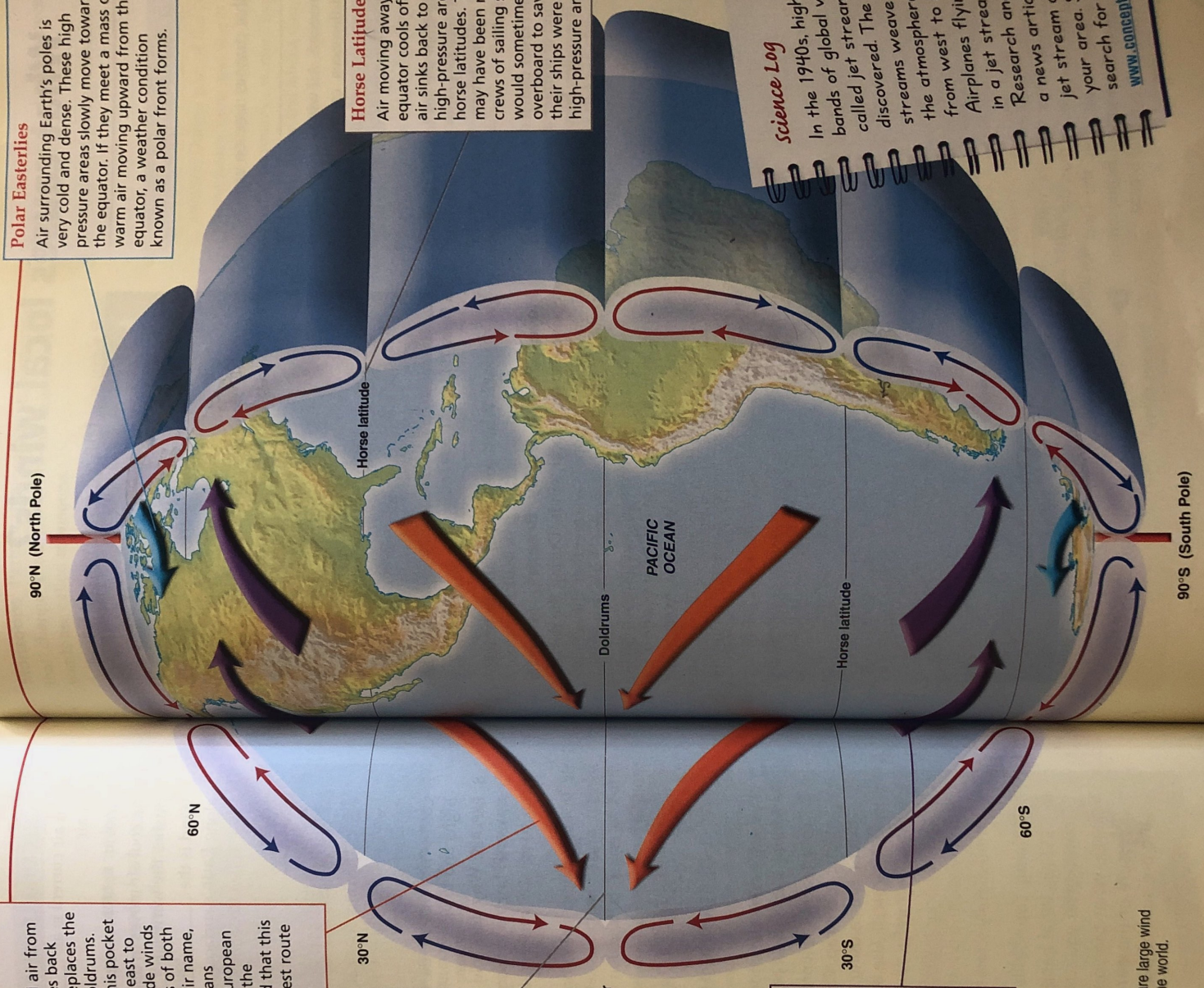


Figure 11-22 Global winds are large wind systems that travel around the world.

WRITING ACTIVITY

Science Log

In the 1940s, high-speed bands of global winds were discovered. The jet streams weave through the atmosphere, moving from west to east. Airplanes flying eastward in a jet stream gain speed. Research and then write a news article on current jet stream conditions in your area. Start your search for information at www.conceptsanichallenges.com.