TECHNOLOGY in Practice
Applications and Innovations

Chapter Overview, Concepts, and Goals
Chapter 1, What Causes Weather Patterns?

Chapter Overview

Chapter 1, "What Causes Weather Patterns?," introduces students to some of the important science concepts that influence the weather. The activities in this chapter provide students with information about how the Sun, water, and wind interact to cause various weather patterns.

In the **Engage** activity, *Water on the Move*, students will conduct a hands-on investigation to stimulate their thinking about water in the atmosphere. They then will view a demonstration to further stimulate their thinking about the phenomena of evaporation and condensation (although the terms will be formally introduced in the Explain activity).

The **Explore** activity, *Wind in a Box*, focuses on air movements. Students will use convection boxes to model air movements in the atmosphere.

The **Explain** activity, *Weather and the Movements of Water and Air in the Atmosphere*, provides the information that will help students connect their findings from the Engage and Explore activities to science concepts. Students will learn how the water cycle, air pressure, density, and temperature affect movements in the atmosphere and, in turn, how these factors interact to cause different weather patterns.

In the **Elaborate** activity, *Winds above a Rotating Earth*, students will build on their understanding of air movements in the atmosphere. They will begin the activity by using a hands-on model to investigate the effects of Earth's rotation on wind direction. They will also work through a simulation to learn about the Coriolis effect, the apparent change in direction of an object due to Earth's rotation. In an optional sidebar, students will learn more about the Coriolis effect through analysis of a Foucault pendulum, a technology that provided some of the first evidence for Earth's rotation.

Finally, in the **Evaluate** activity, *Patterns Help Us Understand Weather*, students will use what they have learned about air movements in the atmosphere to analyze weather fronts. They will also explain how patterns of water and air movements can be used to predict future weather events.

Chapter Organizer

Engage—Water on the Move

Key idea:
The change of water vapor in the air into liquid water is related to temperature.
Activity:
Students investigate the movements of water in the atmosphere through evaporation and condensation.
Linking question:
Are air movements in the atmosphere affected by temperature?

Explore—Wind in a Box

Key idea:
Differences in temperature cause air to move.
Activity:
Students use a convection box to investigate the effects of temperature on air movements.
Linking question:
How does temperature influence air and water movements in the atmosphere?

Explain—Weather and the Movements of Air and Water in the Atmosphere

Key idea:
Temperature, density, and pressure affect the movements of air and water.
Activity:
Through readings and a demonstration, students learn the factors that influence water and air movements in the environment and how these movements are linked to weather.
Linking question:
Are there factors that control the direction of the wind?

Elaborate—Winds above a Rotating Earth

Key idea:
Earth's rotation affects wind movements.
Activity:
Students learn how Earth's rotation affects the movements of wind. Then they work through a simulation to learn about the Coriolis effect.
Linking question:
How can people use an understanding of air and water movements to predict weather?

Evaluate—Patterns Help Us Understand Weather

Key idea:
Because air and water movements can be explained by science, people can recognize patterns that enable them to predict weather.
Activity:
Students use their understanding of the effects of temperature and pressure on air movements to predict air movements at a weather front.

Major Concepts

- Evaporation and condensation are important processes that control the movements of water in the atmosphere.
- Air movements are affected by temperature, pressure, and density.
- Wind movements are affected by the rotation of Earth.
- Because air and water movements are regulated by scientific processes, we can recognize patterns and use those patterns to make predictions about the weather.

Goals for the Chapter

By the end of this chapter, students will

- understand how condensation and evaporation affect how water moves in the atmosphere
- be able to explain how temperature, pressure, and density are related to the movement of air in the atmosphere
- be able to explain how the shape of Earth affects wind movements
- apply their understanding of water and air movements to their understanding of weather.