

Learning Objective: Weather and Climate Factors

NGSS Standard: MS-ESS2.D-1 - Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.

Objective:

Students will be able to:

1. Explain the difference between climate and weather.
2. Explain the factors that determine climate.
3. Explain how some of these factors work together to determine regional climates.

Time Required: 90 minutes

Materials Needed:

- Teacher computer with internet access and projector
- Student computers/laptop/tablet with internet access (preferably one per student but at least enough for small groups of 3 -4 students)
- Colored pencils/crayons/markers
- How Air Moves Handout (attached)

Teacher Preparation:

- Create Playlist 1, a 10-minute [playlist](#) in [Legends of Learning](#) with the following game found in the Weather and Climate Factors learning objective:
 - *Bottles: Weather and Climate*
- Create Playlist 2, a 20-minute [playlist](#) in Legends of Learning with the following game found in Weather and Climate Factors learning objective:
 - *Battle of Wits - Climate*
- Make copies of How Air Moves handout

Engage: 15 minutes

- 1) The teacher will play the video “Climate Factor Rap” on YouTube <https://www.youtube.com/watch?v=nxNtfNKvVOE>
- 2) The teacher then leads a discussion about the video, namely the difference between weather and climate and the factors that affect climate.

Explore: 10 minutes

- 1) Students will [sign in to Legends of Learning and enter your teacher code](#).
- 2) [Launch](#) Playlist 1 to your students.
- 3) Students will complete *Bottles: Weather and Climate Factors* as the teacher assists students as needed. Stopping game play to address the questions asked in the game may be needed.

Explain: 25 minutes

- 1) The teacher will play the video “Bill Nye the Science Guy on Wind (Full Clip)” <https://www.youtube.com/watch?v=uBqohRu2RRk>

- 2) Students will be given the How Air Moves handout with an illustration showing the different movements of air over land and water in a coastal area at both night and day.
- 3) Students will describe in words, the step by step process of convection currents to create a land breeze and a sea breeze.

Elaborate: 25 minutes

- 1) Students will log on to the NASA DATA-GLOBE Digital Earth System site:
<http://mydasdata.larc.nasa.gov/globe/>
- 2) Jigsaw: Teacher will group students into groups of 2-3. Each group will examine Surface Temperature and Insolation animations and develop a one slide PowerPoint (or similar program) which will describe ONE of the following:
 - a. Describe the rotation of the Earth and the role this rotation plays in the unequal distribution of heat on Earth.
 - i. The Earth's rotation causes the Coriolis Effect. This causes a deflection of direction in both the wind and ocean currents. The deflection is to the 'right' in the Northern Hemisphere, and the 'left' in the Southern Hemisphere. Due to these deflections, currents in the ocean, and air, are formed. This causes an unequal distribution of heat across the Earth.***
 - b. Describe what role the oceans and their currents play and how they affect regional climates.
 - i. The oceans play a pivotal role in climate regulation. Currents, both warm and cold, determine the relative harshness, or temperance of a region's climate.***
 - c. Describe how, if at all, these patterns change over several years. Have there been shifts in global temperatures or have they remained fairly consistent?
 - i. Wind patterns/currents, such as the Jet Stream, and Gulf Stream, have remained mostly constant for many, many years. There have been shifts in global temperature; they have NOT remained constant.***
- 3) Once completed, the teacher will lead a discussion in which the groups share out their slides.

Evaluate: 15 minutes

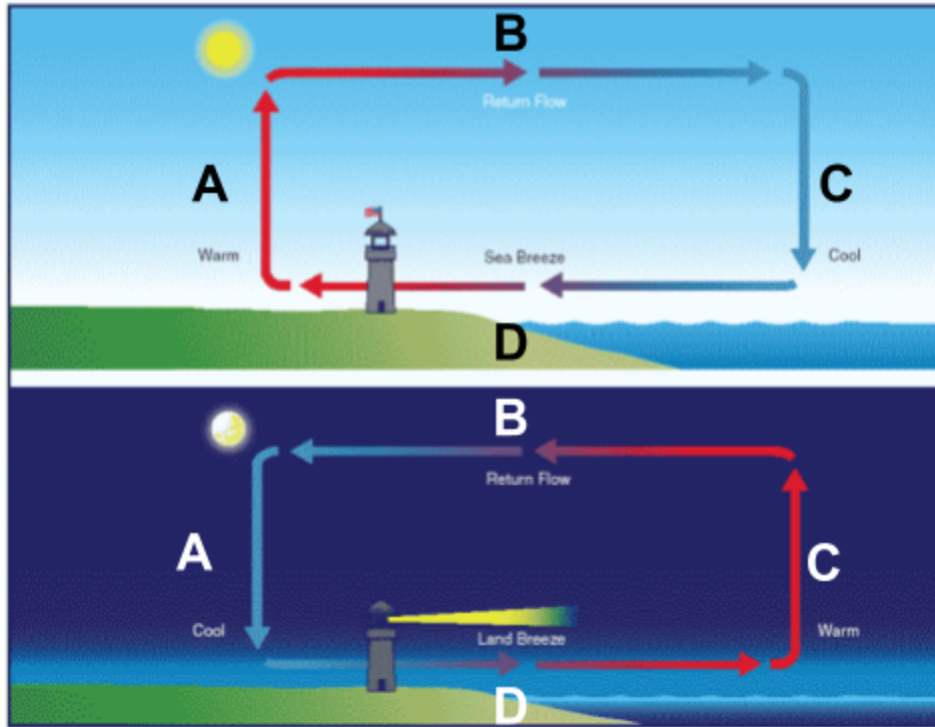
- 1) [Launch](#) Playlist 2 for students.
- 2) Students will play *Battle of Wits - Climate War* and be assessed on their ability to answer the questions provided in the game correctly.
- 3) Teacher will analyze student results to determine what concepts need to be a focus for reteaching.

Name: _____

Date: _____

How Air Moves

Directions: Using the diagram below, explain in your own words what is happening to the air at each point to create sea breezes and land breezes.



Sea Breeze:

- A - _____
- _____
- B - _____
- _____
- C - _____
- _____
- D - _____
- _____

Land Breeze:

- A - _____
- _____
- B - _____
- _____
- C - _____
- _____
- D - _____
- _____