

8 Seasons of Change

BIG IDEAS

- Earth's seasonal changes are caused by the tilt of the Earth on its axis and the planet's revolution around the Sun.
- Each season is characterized by the amount of solar radiation received in Earth's hemispheres.

Engage

Activate Prior Knowledge

In this Lesson you will learn about seasonal changes and their causes. Use the chart below to record what you already know about these topics. After you complete the Lesson, use the chart to record new information you learned.

Before reading and trying the activities in your textbook, think about the Questions below. Record what you know about each topic in the What I Know column of the chart.

Question	What I Know	What I Learned
Why are some places regularly warmer or cooler than others in a given month?		
What causes the different seasons?		
How is energy transferred from the Sun to Earth?		
How do marine mammals respond to seasonal changes?		

Explore

Vocabulary Review

Before trying the activities on Pages 143–151 of your textbook, review key vocabulary with the activity below. For Questions 1–9, match each term to the correct definition.

- | | |
|-------------------------|---|
| 1. ____ Revolution | a. When the Sun is directly over the Equator, creating 12 hours of daylight and 12 hours of night |
| 2. ____ Hemisphere | b. A measurement of incoming solar radiation |
| 3. ____ Equinox | c. An imaginary line around Earth that helps us locate places |
| 4. ____ Solar radiation | d. The Sun's energy, some of which enters Earth's atmosphere |
| 5. ____ Insolation | e. The bending of an object |
| 6. ____ Latitude | f. Gathered together; focused or intense |
| 7. ____ Curvature | g. One complete trip around the Sun (Earth takes ~365.25 days to move around the Sun) |
| 8. ____ Concentrated | h. One half of Earth |
| 9. ____ Axis | i. A real or imaginary line around which an object spins |

After completing the demonstration on Pages 143–150 of your textbook use the word bank to complete the following sentences.

Northern Hemisphere

rotation

Autumnal Equinox

diurnal cycle

Southern Hemisphere

Vernal Equinox

Winter Solstice

longest

1. Two times a year the strongest solar radiation lines up directly over the Equator, and everyone on Earth experiences 12 hours of day and 12 hours of night. One of these days is the _____, which occurs on September 22 or September 23. The _____ occurs on March 20 or March 21.

2. The Northern Hemisphere receives its strongest amount of solar radiation and _____ hours of sunlight on June 20 or June 21. This is known as the _____. The _____ occurs on December 20 or December 21 when the Southern Hemisphere is receiving the strongest amount of solar radiation and the longest hours of sunlight. When the _____ is experiencing summer, the _____ is experiencing winter.
3. Most parts of Earth experience a period of daylight and darkness over a 24-hour period. This is a result of Earth's _____, or the spinning of Earth on its axis. This cycle is called a _____.

Organize Information

The Lab on Pages 148–150 of your textbook helps you explore how the curvature of Earth affects the amount of solar radiation received on Earth's surface. Using a chart to organize new information such as this can help you visualize and compare concepts that are related.

After completing the It's All About the Rays activity in your textbook, use the chart below to record your observations about direct and indirect solar radiation.

	Sketch a diagram that shows how the curvature of Earth influences solar radiation	Explain your diagram in words
Direct Solar Radiation		
Indirect Solar Radiation		

Explain**Vocabulary Review**

Complete the chart below as you read Pages 152–157 of your textbook. Write the definition of each vocabulary term in your own words. Then, write a note or draw a picture that will help you remember the meaning of each term.

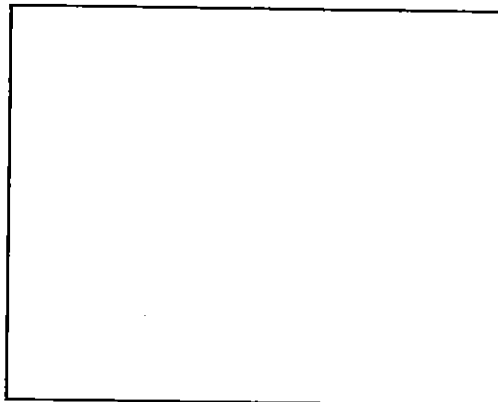
Term	Definition	How I Will Remember
Insolation		
Angle of insolation		
Differential heating		
Electromagnetic spectrum		
Albedo		
Evaporation		

Review What You Learned

After reading the *Explain* section of your textbook, answer the Questions below to review what you learned.

1. What does the term *differential heating* mean? _____

2. Describe in words how Earth experiences differential heating. Then, make a sketch to illustrate your explanation.



3. In what form does the Sun's radiation travel? _____

4. How does the Earth's atmosphere protect us from the Sun's radiation? _____

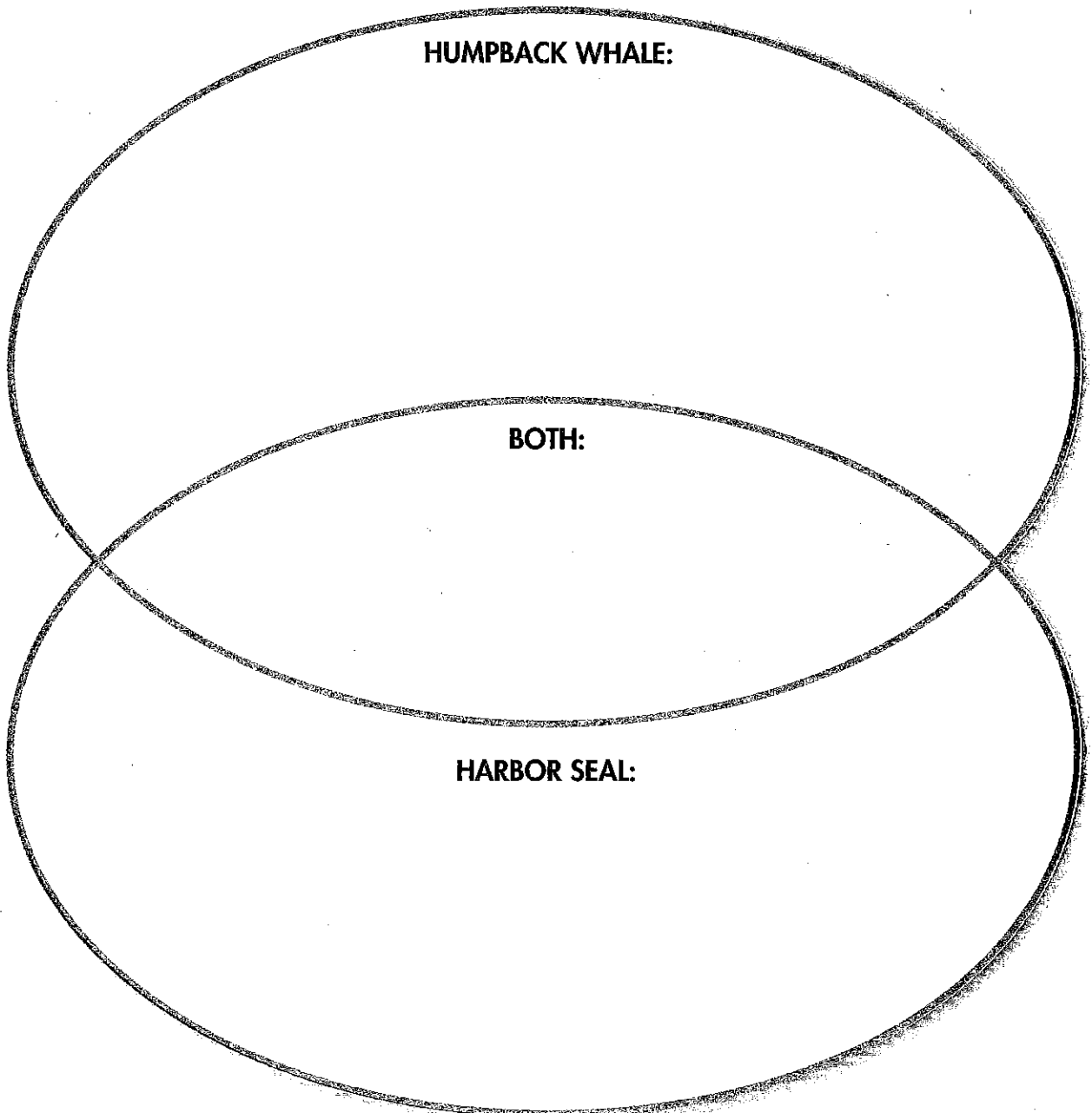
5. What is albedo? _____

6. What is one way in which heat is transferred back into the atmosphere. _____

Elaborate**Reading Strategy: COMPARE and CONTRAST**

The Elaborate section of your textbook describes behaviors of Humpback Whales and Harbor Seals. Comparing and contrasting the habits of one animal to another can help you better understand the characteristics of each. Remember, when we compare we tell how things are alike. When we contrast we tell how things differ.

After reading Pages 158–160 of your textbook, use the Venn diagram below to compare the behaviors of Humpback Whales and Harbor Seals. Record traits that seals and Humpback Whales have in common where the circles overlap. Record traits that are unique to each animal in the outer sections of the circles.



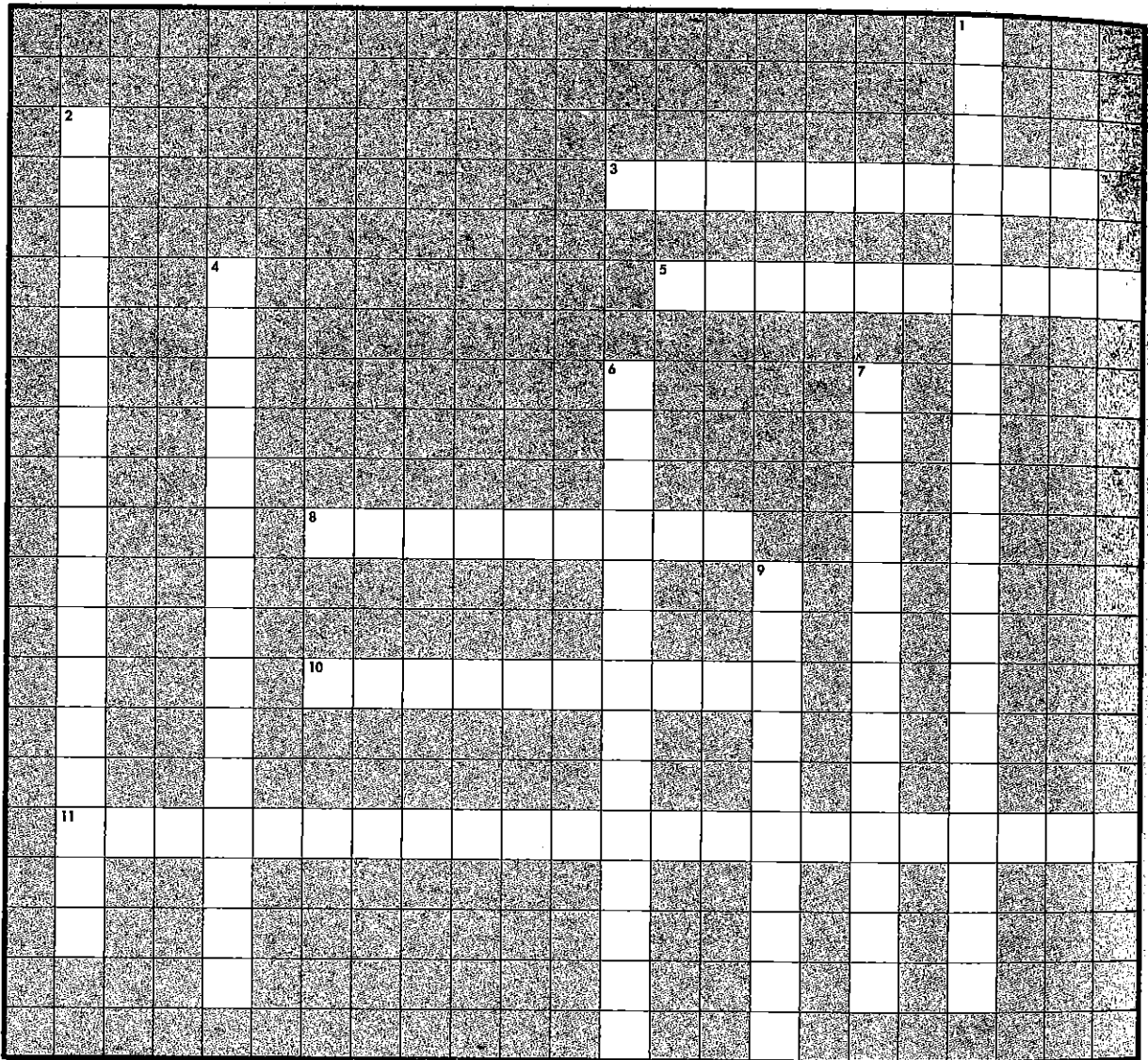
Evaluate

Lesson Summary

- Earth's seasons are a result of result of Earth's tilt on its axis and its revolution around the Sun.
- Seasons are characterized by the amount and intensity of solar radiation received in Earth's hemispheres.
- Due to the curvature of the Earth, different latitudes receive different amounts of radiation on a given day.
- The Sun's energy entering Earth's atmosphere is known as insolation (incoming solar radiation).
- The Sun's radiation travels through space to Earth in the form of electromagnetic waves.
- Earth's atmosphere protects Earth from much of the Sun's radiation.
- Marine mammals respond to changes in the seasons.

Lesson Review

When you have completed the Lesson, try the crossword puzzle on the next page to review key concepts of the Lesson. Then, turn back to Page 65 of this workbook and record information you gained from the Lesson in the What I Learned column of the chart.

**ACROSS**

3. One half of Earth
5. It takes Earth 365.25 days to make this
8. Waves used to kill bacteria
10. Waves with the longest wavelengths
11. In the Northern Hemisphere, the Sun's rays are spread out over a greater area

DOWN

1. At the Equator, the Sun's rays are concentrated over a small area
2. The angle at which the Sun's rays reach Earth's surface
4. 12 hours of day and 12 hours of night on September 22 or September 23
6. Sun's energy that enters the atmosphere
7. 12 hours of day and 12 hours of night on March 20 or 21
9. A measurement of incoming solar radiation