

Seasons
Lesson Five
Spreading the Light

Standard II: Students will understand how Earth's Tilt on its axis changes the length of daylight and creates the seasons.

Objective 2: Explain how the relationship between the tilt of Earth's axis and its yearly orbit around the sun produces the seasons.

Indicator c: Use collected data to compare patterns relating to seasonal daylight changes.

Indicator d: Use a drawing and/or model to explain that changes in the angle at which light from the sun strikes Earth, and the length of daylight, determine seasonal differences in the amount of energy received.

Supplies:

- Flashlight
- Graph paper
- Protractor
- Ruler
- Calculator
- Three different colored crayons
- Worksheet
- Clipboards

Directions:

1. Pass out a flashlight, graph paper, ruler, and protractor to each group of four students.
2. Turn out the lights.
3. Have a student in the group hold the flashlight 12 inches away from the graph paper at a 90-degree angle.
4. Have another student circumscribe the bright part of the light that is on the graph paper with a crayon.
5. Count up the number of squares the light was within. Write the number in the area.
6. Have another student in the group hold the flashlight 12 inches away from the graph paper at a 75-degree angle.
7. Have another student circumscribe the bright part of the light that is on the graph paper with a different color crayon.
8. Count up the number of squares the light was within. Write the number in the area.
9. Have another student in the group hold the flashlight 12 inches away from the graph paper at a 60-degree angle.
10. Have another student circumscribe the bright part of the light that is on the graph paper with a different color crayon.
11. Count up the number of squares the light was within. Write the number in the area.
12. Ask the students why the number is different.
 - a. They will say that the when the flashlight was put on an angle the light spread out more.

13. Ask what they think happens to the heat of the light as it is spread out.
 - a. They will say that the more the light is spread out the less heat there will be for each square.
14. Tell them we are going to figure this out with our calculators.
15. Pass out the worksheet.
16. Tell the students that like the sun, the flashlight always gives out 100% of heat. However, this heat is going to be spread out and sharing the heat among the squares it is sharing with.
17. Take the first number and divide it into 100. Write it on the line. This is how much heat square is getting.
18. Take the second number and divide it into 100. (This answer should be smaller since the light is spread out more.)
 - a. What does this mean? (This means that the heat has reduced since the light has to spread out in a larger space. The heat is being spread out more and there is less heat for each square.)
19. Take the third number and divide it into 100. (This answer should be smaller than the other two since the light is spread out even more.)
 - a. What does this mean? (This means that the heat has reduced since the light has to spread out into even a larger space. The heat is being spread out and there is less even heat for each square.)
20. Take the fourth number and divide it into 100. (This answer should be smaller than the other three since the light is spread out even more.)
 - a. What does this mean? (This means that the heat has reduced more since the light has to spread out into even a larger space. The heat is being spread out and there is even less heat for each square.)
21. As the number gets greater and great, heat (light) is being spread out farther so there is less heat in each area since it has to spread out farther.
22. Ask the students what would happen if the angle got larger.
23. Ask the students how is this like the earth's angle changing when the earth is going around the sun.
24. Why is it hotter in the summer, and colder in the winter?
25. Why is the temperature moderate in the spring and fall—warmer than winter and cooler than summer?