

Angle of Sunlight – Reading

Name: _____ Date: _____ Period: _____

LT: I can study the effect of the angle of sunlight on climate and temperature.

The Effect of Angle of Sunlight on climate:

The REAL Reason for the

MISCONCEPTION! Many people think that during the winter, the earth is farther from the sun-so it's colder. This is incorrect. It is easy to understand why people think this... it uses what might be called "campfire logic." That is, the closer you are to a fire, the hotter it feels.

Distance of the Earth is NOT what causes the seasons! The difference between the earth's closest and farthest approach to the sun is very small. So-if you were sitting 1 meter from a fire, would you feel warmer because you scooted 1 cm (about ½ inch) closer? **NO!** So, the distance from the sun is not the cause of our seasons...

More evidence proving this theory WRONG:

- In countries below the equator the seasons are reversed. (So our summer is winter in Australia!)
- The Earth is **CLOSEST** to the sun in January!

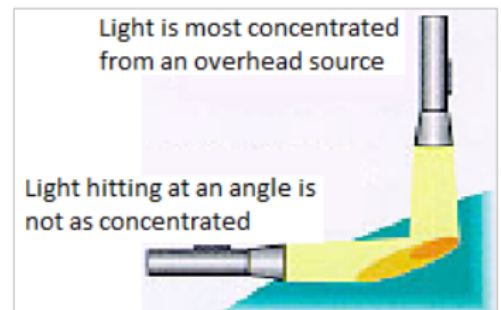
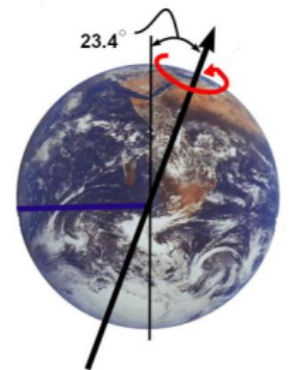


Campfire Logic: The farther you are from a fire, the colder it feels.

SO...WHAT IS THE REAL CAUSE OF OUR SEASONS?

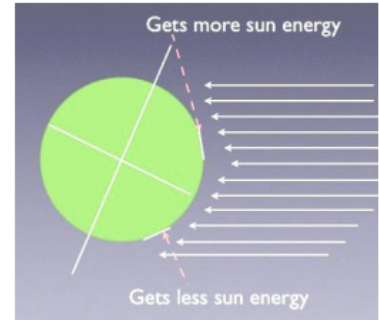
Let's look at some other important evidence:

- **The earth's axis is tilted**—If you could stick a huge straight pin down through the North Pole and have it poke out through the South Pole, the pin would represent the earth's axis, but it would not be straight up and down. It would actually be slanted at an angle.
- Let's consider a single day on earth. People living near the pole, at a mid-latitude (like you) and near the equator are **all pretty much at the same distance** from the sun, yet they all experience **VERY** different temperatures.
- When the sun shines directly overhead, the sunlight is concentrated in a small area and is **MORE** intense (**HOT**). When the sun is lower in the sky, the sunlight is not as intense because it gets spread out over a larger area (**COOLER**).

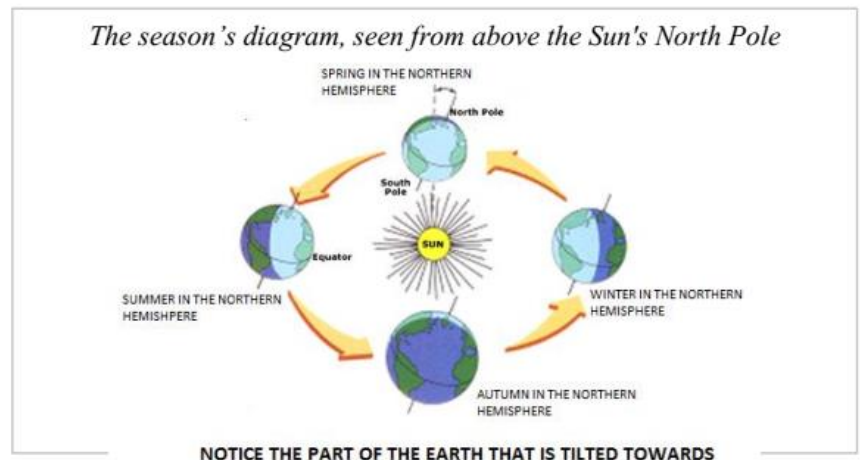


- **The angle of the earth's axis is what causes different seasons.** In summer, the earth is tipped toward the sun with more direct light; in winter, it's tipped away with less direct light. When it is summer in the northern hemisphere, it is winter in the southern.

- In the winter, the Northern Hemisphere is tilted away from the sun, making the sun at a low angle all day long. This means the earth isn't heated as much; the days are shorter so there isn't as much time to heat up and the nights are longer so the ground gets colder without the sun to keep heating it. In the summer, the Northern Hemisphere is tilted towards the sun, so the sun is higher all day long; the days are longer so the ground spends more time being heated; the nights are shorter so there isn't so much time to cool. And in spring and fall, the sun is at an intermediate angle so the temperatures are moderate compared to the other extremes.



- ⚙ Check out the diagram to see the angle the sun's rays are hitting the Earth throughout the year.



SO: The seasons, rather than being caused by our distance to the sun, are caused by the angle at which the sunlight hits the earth.

The Effect of Angle of Sunlight on Temperature:

The angle of incoming solar radiation influences seasonal temperatures of locations at different latitudes. When the sun's rays strike Earth's surface near the equator, the incoming solar radiation is more direct (nearly perpendicular or closer to a 90° angle). Therefore, the solar radiation is concentrated over a smaller surface area, causing warmer temperatures. At higher latitudes, the angle of solar radiation is smaller, causing energy to be spread over a larger area of the surface and cooler temperatures. Because the angle of radiation varies depending on the latitude, surface temperatures on average are warmer at lower latitudes and cooler at higher latitudes (even though higher latitudes have more hours of daylight during the summer months).