



## You Are OUR Sunshine, Our ONLY Sunshine!

You may hear the earth referred to as the Goldilocks planet. You may also hear the sun called a Goldilocks star. Neither the earth, nor the sun have blonde curls and barge into people's homes without an invitation, but they are called this because they are "just right." God made the sun perfect for the earth to give us just the right amount of heat, just the right amount of gravity, and just the right amount of light. Any more or any less and life could not exist. Let's learn more about this custom-made star to understand what makes it special just for us!

### **Perfect for Us**

When you compare our sun to other stars in the universe it is really just a very average star. It is one out of billions of main sequence stars in the universe and is classified as a yellow dwarf (G2V). It does not seem average to us because it is the closest star to us and the ONLY star in our solar system. It is at the center of our solar system and is so big that a million earths could fit inside of it as well as everything else in our solar system! That doesn't sound very dwarf-like so it is hard to imagine that there are stars a hundred times larger than our sun. Our sun being a dwarf star is a good thing though because its mass is just the right amount to have a gravitational pull that keeps our solar system together and in a consistent elliptical orbit around it. If it was any bigger we would be pulled closer which would be too hot and if it was any smaller its gravity would not be strong enough to keep us in orbit and we would randomly float away into deep space.

In our last lesson you learned that a star's energy comes from thermonuclear fusion where hydrogen atoms collide to make helium atoms. It is the same for the sun which burns off more than twenty-four billion tons of hydrogen gas a minute. This makes our sun a huge ball of electrically-charged gas with a powerful magnetic field that loops and twists all around it. All of this activity gives off a great deal of energy which comes to the earth in the forms of heat and light. The core of the sun reaches temperatures of 27,000,000 °F and the sun's surface is approximately 10,000 °F. That's a LOT of heat so God put our earth at the perfect distance of 93 million miles away so we get just the right amount of heat. Since earth is 93 million miles away it takes eight minutes for the light to reach us which gives us just the right amount of light. The heat and light from this solar energy warms our bodies, warms our oceans, powers our water cycle, creates our weather, gives us colors, provides food, and creates oxygen to breathe! We are also learning to harness solar energy to power our homes and other technology.

### **Other Features of the Sun:**

- **What's a Solar Cycle?** The surface of the sun is a very busy place and all of that activity causes its magnetic field to flip approximately every eleven years. The sun's north and south poles literally switch places. This is called the solar cycle and the sun's activity increases and decreases within this time.
- **Solar Wind** is a result of the active energy on the sun's surface creating a continuous wind of charged particles coming out in all directions from the sun's surface. The earth is protected from damaging solar winds by its atmosphere and magnetic field. Particles that do sneak through cause beautiful auroras.
- **The Sun Has Spots!** Sunspots are visible dark areas of cooler temperatures on the sun's surface that are caused by a particularly strong magnetic field pulling some of the heat within the sun away from the surface. Sunspots move and change size. They range in size from 10,000 miles across to 100,000 miles.
- **Solar Flares** are a sudden explosion of the sun's energy that occur near sunspots. These explosions are comparable to nuclear bombs and can disturb radio signals, knock out a power grid, and damage satellites.

## **Plants NEED Sunshine to Make Their Own Food**

You probably know that plants need water, soil, and sunshine to live and grow, but you may not be aware that plants need food too AND they have a sweet tooth!. All plants make their own food, a type of sugar called glucose, with a process called **photosynthesis**. The "recipe" for glucose calls for carbon dioxide, water, and a good measure of sunlight. In photosynthesis, the energy from the sun's light causes a chemical reaction that breaks down the molecules in the carbon dioxide and water and rearranges them into glucose and oxygen. This chemical reaction cannot take place without the sun. The plant uses the glucose food for energy to grow and it gives off the oxygen which is lucky for us because we need it to breathe! Plants are also a major part of our food chain that we can't live without, so...Thank You Sun!

## **"You Make Me Happy When Skies Are Grey"—How the Sun Helps Our Bodies**

Does the sun really make you happy? Yes! Sunshine increases your body's serotonin level, which is a hormone that is linked to boosting your mood and happiness. If you've ever heard of the winter blues this comes from the fact that there are less daylight hours in the winter months so many people will feel more down or depressed due to lack of sunlight.

Sunlight also helps you get a better night's sleep! Your body starts making another hormone called melatonin after it gets dark which helps you sleep. The more daylight you are exposed to the better your body will be able to stay in a routine of making melatonin and keep you on a good sleep schedule. If you rarely see daylight because you are spending your day inside playing video games then your body doesn't know when to make the melatonin that helps you sleep more restfully.

Sunshine also helps us build strong bones and teeth! When your bare skin is exposed to the ultraviolet-B radiation in sunlight, it reacts with a chemical in your skin that creates Vitamin-D. You have probably heard that calcium builds strong bones, but without Vitamin-D, your body can't absorb the calcium. Vitamin-D also helps with your body's immunity health, muscles, brain cells, and is even linked to cancer prevention. It is actually recommended that you get 5-15 minutes of direct sunlight without sunscreen at least 2-3 times a week. If you will be outside for longer than 15-30 minutes be sure to put on your sunscreen so you won't get burned. So if you want to be healthy and happy with strong bones and muscles, get off your electronic devices and go outside to make some Vitamin-D.

## **Words of Warning!**

While 5-15 minutes of direct sunlight on our bare skin is a good thing, longer than that can cause sunburns, skin damage, and possibly skin cancer. If you will be outside for longer than 30 minutes, even in the winter or on a cloudy day, protect your skin with sunscreen, protective clothing, and wear a hat.

Now, let's talk about your eyes. Never, never, ever, ever look directly at the sun! NEVER, EVER! I mean NEVER.... Do you understand what I am saying? Here is why. Have you ever tried the experiment of using a magnifying glass and sunlight to burn a dry leaf or melt chocolate? If you have not, DO NOT go running to grab a magnifying glass to try it without your parent's permission. In the experiment, if you hold the magnifying glass in a certain way you can focus the energy of the sun's light onto the dry leaf or a chocolate bar which will cause the leaf to smoke and catch fire and the chocolate to melt. Your eyes are designed with a lens similar to a magnifying glass with the purpose of focusing light onto your retina in the back of your eye. Looking directly at the sun will have the same effect as the magnifying glass experiment. Your eyes won't catch fire or melt, but they will definitely become severely damaged from the sun's intense focused light in your eye. In addition, you cannot feel pain in your retina so you won't even know the damage is occurring until it's too late. So, never look directly at the sun, especially through a telescope or binoculars! Wearing sunglasses if you will be in bright sun is a must! Have I made myself clear?? Good! Enjoy the sunshine God gave us but be safe while doing so!

In our next lesson we will learn how the earth is like a giant Tilt-a-Whirl giving us seasons and time!