

## I SAW THE LIGHT

## INTRODUCTION:

**Jeremiah 31:35** *Thus saith the Lord, which giveth the sun for a light by day, and the ordinances of the moon and of the stars for a light by night, which divideth the sea when the waves thereof roar; The Lord of hosts is his name:*

## How would you...

Make sense of the light in the night sky? How do you find your way in the dark? What simple tools would make the most difference?



Thankfully, our nights are not nearly as dark as the darkness of a cave. God gave us light in the darkness. Our Sun, Moon, and stars are not only lights, they're also timekeepers. As the earth rotates, they appear to move like hands on our clocks. Their light guides us through time and space just as God's Word can guide us through life. The Psalmist declares, "Your word is a lamp unto my feet and a light unto my path." (Psalm 119:105)

**GENESIS 1:14** *Then God said, "Let there be lights in the expanse of the heavens to separate the day from the night, and let them be for signs and for seasons and for days and years; NASB*

## DEVOTIONS: JOHN 8

**John 12:35-36** *Then Jesus said unto them, Yet a little while is the light with you. Walk while ye have the light, lest darkness come upon you: for he that walketh in darkness knoweth not whither he goeth.<sup>36</sup> While ye have light, believe in the light, that ye may be the children of light. These things spake Jesus, and departed, and did hide himself from them. KJV*



The Bible use "light" as a symbol of God's presence, goodness, truth, and divine guidance. In contrast, darkness is a symbol of evil, sin, and ignorance. There are few words that carry this much symbolism. Christ himself is the "light of the world." Light is unique in its power to transform.

**John 8:12** *Again Jesus spoke to them, saying, "I am the light of the world. Whoever follows me will not walk in darkness but will have light.*

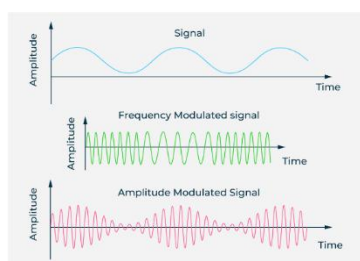
For a scientist, light is their most important tool in their toolbox. We need light to observe, diagnose, identify, and "fingerprint." Atoms and elements interact with light giving evidence

of their identity. Lab devices ID elements by the light they absorb or emit. A blood test run in a medical lab identifies problems by the way light interacts with the electrons of an atom.



Other light, such as x-rays (short-wave, high energy light), see through our skin and muscle. These images detect broken bones or other disorders. Like God, an x-ray sees what's on the inside not just what's on the outside. Many other forms of radiation and electromagnetism (EM) are used in the medical field.

Radio and microwaves (long-wave, low-energy light waves) go through us, through our houses, and through most buildings carrying signals to receivers (like satellite dishes). These light waves carry coded messages that interact with tiny circuits and chips.



Like God's Word, light is able to pierce joint and marrow. It can even carry the Gospel message around the world. Unlike God's Word, however, today's communication methods can be used to promote anti-Christian worldviews and philosophies as well as godly messages.

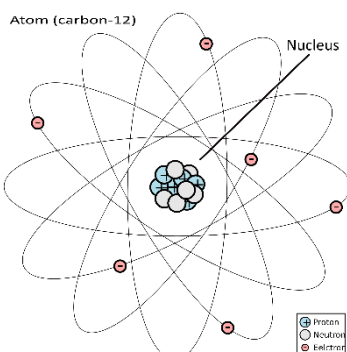
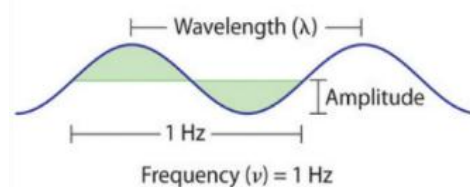
Light's interaction with matter is a natural phenomenon, created by God. How we choose to harness its power is a human dilemma. Just as light shines on both the Christian and the non-Christian, God's Word can fall on fertile or barren ground. God's light may harden hearts or melt hearts. Although parallels between light and God abound in scripture, it's essential to recognize that the way we interact with God's Word is always a personal choice.

## VOCABULARY:

**WAVELENGTH** – a distance measure from crest to crest.

**FREQUENCY** – the number wave cycles per second ( $\nu$ ) given in Hertz (Hz).

**AMPLITUDE** – one half the height of a wave (intensity)



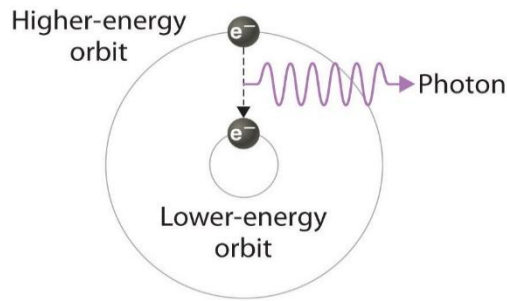
**ELECTROMAGNETISM** – a fundamental force in nature also known as “light.”

**ELECTRONS** – a negatively-charged particle found outside the nucleus of an atom

**ABSORPTION** – photons that add energy to electrons

**EMISSION** – photons emitted/released by electrons

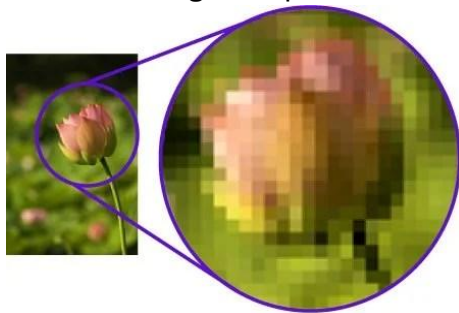
**PHOTON** – a particle of light with a distinct wavelength and frequency.



**ELECTRON JUMPS (aka transitions)** – whenever photons are absorbed or emitted, electron energy levels change. These changes result in electron orbits at greater or lesser distances from the nucleus. At highest energy levels, electrons escape the nucleus creating ions.

**RADIANT kinetic energy** is energy transferred by electromagnetic **photons or waves**. Photons are light particles whereas waves are continuous light. Both radiate heat and energy.

**CCD** – A charge-coupled device transfers photon energy to electrons. Each pixel on the CCD sensor converts the energy into an electrical charge.



**PIXEL** – the smallest unit of a raster image.

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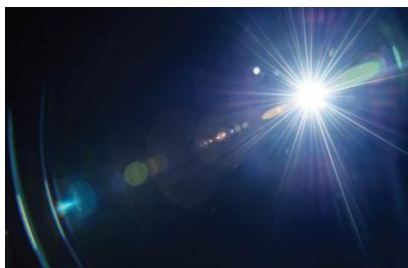
**SOLAR CELL** – a nonmechanical device that converts sunlight directly into electricity (aka photovoltaic – PV cell)

**SOLAR PANEL** – a large group of solar cells (PV cells) collecting light waves from the sun.

## THEME: I SAW THE LIGHT

**PROVERBS 29:18** *Where there is no vision, the people perish: but he that keepeth the law, happy is he.*

The saying, “I saw the light,” is used when a new belief replaces an old. Light brings clarity that darkness can’t. Understanding light’s interaction with matter changed the modern era more than any other knowledge.



“Light” is both visible and invisible. Of all the many wavelengths of light, only **VISIBLE** light is visible to our eyes. But knowing about the invisible light has opened our eyes to all its possibilities. This unseen light brings us television, radio, cell phones, the internet, and medical tests that save people’s lives. God’s gift of light keeps giving and giving.

**HOSEA 4:6** *...my people are destroyed from lack of knowledge.*

## **TIMELINE/Introduction (History): The Modern Era**

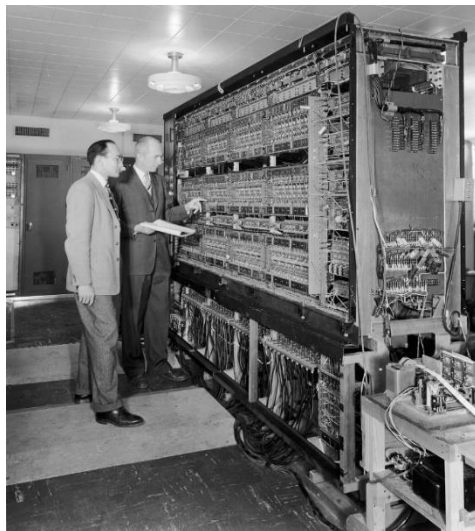
**Jeremiah 31:35** *This is what the Lord says, he who appoints the sun to shine by day, who decrees the moon and stars to shine by night...*

The Modern Era inventions far exceed any other 250 years of history. Moveable-type printing made books available to the public. The faster books spread, the faster knowledge grew.

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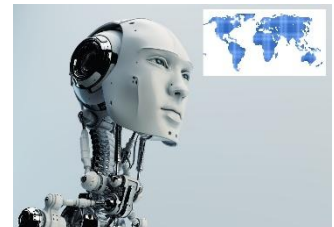
Other inventions such as steam and coal-powered engines, transportation, and the mass production were key to the Industrial Revolution. Telegraph, telephone, radio, the light bulb, electricity, and computers led to the Information Era of the 20<sup>th</sup> Century. Mankind learned about electromagnetism and its ability to carry information – radio, computers, internet, and more.



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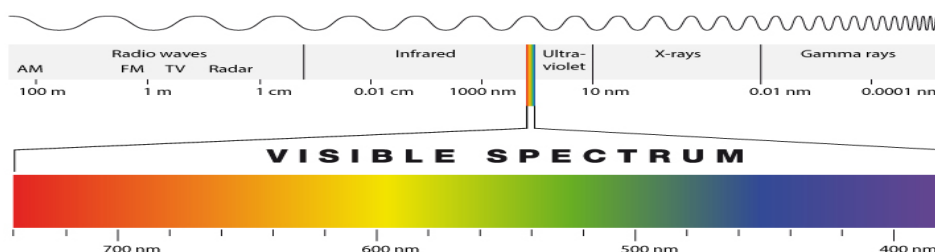
AI (Artificial Intelligence) was also created by humans, but AI's superhuman power comes from its ability to access all of mankind's printed words. If we're not mindful of how AI is used, our future may look more like the confusion of Babel than the clarity of wisdom from God's word.

Robots are being used to replace humans. Their roles may be almost limitless. Where should these robots be allowed and where should we call for, "No robots allowed?" These are questions only godly men and women can answer. It's important to be ready to give an answer, and to REMEMBER mankind's failures of the past.



## **EQUIPPED/Science Principles: ELECTROMAGNETIC SPECTRUM**

Electromagnetism (EM) is one of the four basic forces of the universe. This radiant, kinetic energy source we call light can grow plants, burn through steel plates (lasers), and even explode stars. It supplies all the energy needed by plants (and animals) to feed the world.



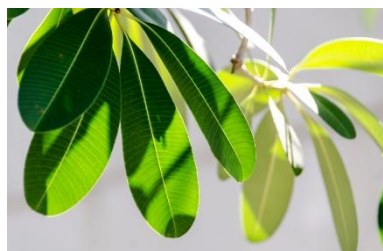
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Light waves are divided into 6 or 7 basic categories: radio/microwave, infrared, visible, ultraviolet (UV), x-rays, and gamma rays.



Electrons interact with light to push or pull things (seen with magnetism), jump or flow (like static electricity), and absorb or emit photons. Electricity is fueled by photons and electrons. These interactions are called light and matter interactions because photons are light and electrons are matter.

Visible light is composed of all colors of light. The Sun's peak range is in the visible range. A rainbow acts like a prism to reveal the colors of white or clear light. White light is a mixture of all the colors. White material reflects all these colors to our eyes.

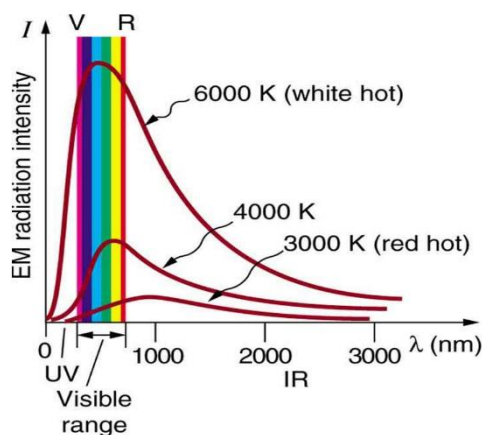
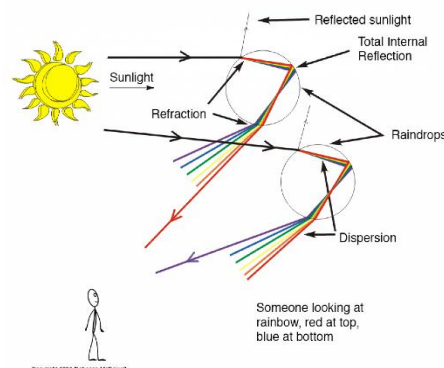


Green plants reflect mostly green light and they absorb the other colors which are used for photosynthesis. Black absorbs all colors therefore it doesn't reflect any colors to our eyes. Black material absorbs all the colors.

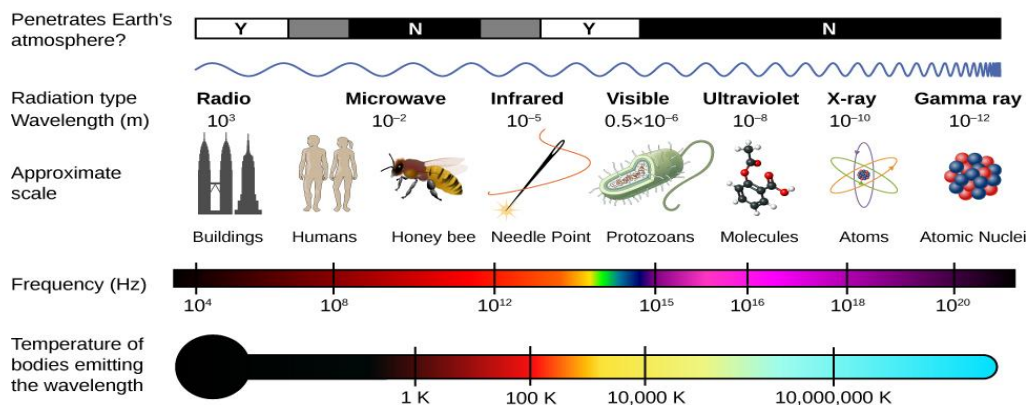
Wearing black will keep you warmer in sunlight, but wearing white will keep you cooler in the summer.

The surface of the Sun is nearly 6000 degrees Kelvin (the graph to the left shows the temperature and color composition of the Sun). Fortunately, the sunlight received here at Earth's surface is just right for our temperate climate. The earth absorbs light well except in the polar regions where ice and snow are on the ground. Can you guess why?

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### From Low Energy to → High Energy



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Solar panels collect light primarily in the visible range. Shorter-wave ultraviolet (UV) light is invisible to our eyes but it's responsible for most sunburns. People emit invisible,

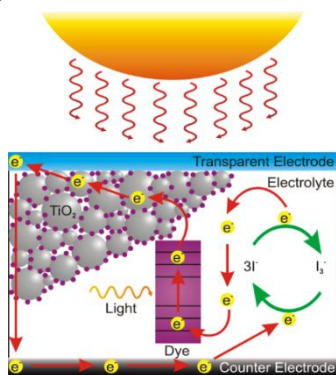
infrared (IR) light we can't see, but a thermometer (gun-like sensor) reads our IR emissions.

Radio waves are used by satellites, television, radio, and cell towers, and many other things. They too are invisible. Microwaves are higher frequency radio waves used for many forms of communication and cooking.

X-rays and gamma rays are very high energy/frequency waves. Both are released by powerful nuclear explosions, including star explosions. Gamma radiation is extremely harmful to humans and is the highest energy of all light waves.

### GEAR-UP/Practical Illustration: PHOTON INTERACTIONS

Solar panels and satellite dishes are receivers or light collectors. They collect photons for energy (solar panels) or for communication (satellite disks). Both transfer the energy of photons to electrons that create electrical pulses.

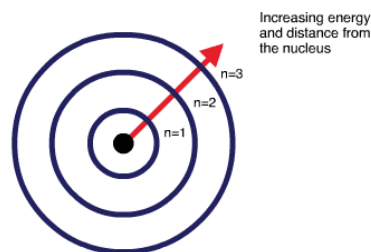


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These energized electrons can pass on an electrical pulse like what happens when static electricity shocks you. A doorknob is passing electron energy to you when it shocks you! Electrons move around on a “rubbed” balloon that sticks to your hair. Batteries can be used to store this energy for later use.

An electron may jump to higher energy levels or completely escape an atom’s nucleus if it collects enough photon energy. These jumps are called

transitions. They are the result of light (photons) interacting with matter (electrons).



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**Psalms 18:28** “You, Lord, keep my lamp burning; my God turns my darkness into light.”

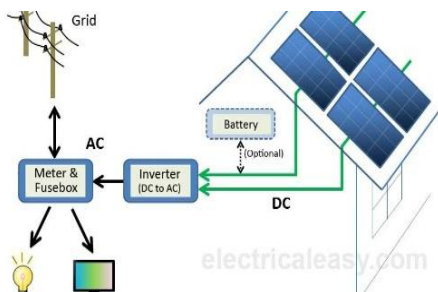
### EXPERIMENT/EXPLORE: SOLAR CELLS AND PANELS

Solar cells convert sunlight directly into electricity. Small solar panels are used for many gadgets – calculators, outdoor lights, robotics, battery chargers, and many more items. Solar panels can be used to heat your home through electricity.

EXPLORE: Do you have any items in your home that use solar collectors or solar panels?



Many households have solar calculators. The tiny slit above the display panel is a solar panel. Some homes have solar panels on their roofs. Try to find homes in your area that may be using these. Also, many street signs or street lights are being converted to solar energy. These will have small solar panels set up near the lights connected by wiring.

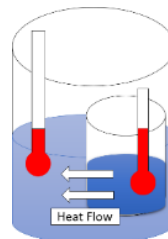


1. Solar/radiant energy is: KINETIC or POTENTIAL

2. Solar panels collect: AIR or SUNLIGHT

### ENERGY REVIEW

3. Energy flows from:  
high → low or low → high



Electricity naturally flows from high to low, like all energy naturally flows. Therefore, if you have extra electron energy, you will pass it on (shock) to something else.

### EXPERIMENT WITH A DIFFRACTION GRATING



1. Visible light is composed of:  
WHITE/CLEAR LIGHT ONLY or A RAINBOW OF COLORS

2. All colors of light mixed together create: BLACK LIGHT or WHITE LIGHT

Create a solar collector/fire starter by using a dish-shaped reflector. Your reflector concentrates light energy to a certain location above it, focusing sunlight. Since light has heat, it's able to ignite tinder and be used to start a campfire. This same principle works with curved glass (a magnifying glass).



Satellite dishes, with similar shapes, focus low energy light (radio waves) to collect signals. Although both collect light, your dish doesn't have smart circuits or filters attached to it. With a smart device, only certain frequencies are decoded or transmitted. It's a good thing radio waves aren't as "hot" or energetic as visible light. There would be a lot of burnt-out receivers if they were collecting sunlight rather than radio wave light.

### GOT-IT/Apologetics:

**Psalms 18:28** "You, Lord, keep my lamp burning; my God turns my darkness into light."



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Not only do we need light, but every element on earth is a product light. Harnessing light has transformed our entire way of life. From static electricity to nuclear power (that releases gamma radiation/light), light exposes the possibilities and wonders of our world.

In **Genesis 1:3**, God said, "Let there be light" and there was light. This statement is profound. These are the first recorded

words God spoke to create our physical world, “Let there be light,” and they are a powerful revelation. Light energy is a building block of all elements in our universe. These words are, indeed, the inspired Word of God.

We know more about God’s creation because light reveals it to us. Scriptures often tell us about the power of light to see truth and expose error. Light has given us the Information Age and will fuel the Age of Artificial Intelligence. Our challenge remains, however, to be the light on the hill and not light hidden under a bushel basket.

**MATTHEW 5:14-15** *You are the light of the world. A city situated on a hill cannot be hidden. No one lights a lamp and puts it under a basket, but rather on a lampstand, and it gives light for all who are in the house.*

#### **REFLECTION/Devotion:**

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**ISAIAH 9:2, 6-7** *The people walking in darkness have seen a great light; on those living in the land of deep darkness a light has dawned... 6-7a For unto us a child is born, unto us a son is given, and the government will be on his shoulders. And he will be called Wonderful Counselor, Mighty God, Everlasting Father, Prince of Peace. Of the greatness of his government and peace there will be no end.*

These verses were written long before Christ was born, before the wisemen sought Him, before the Church Age began. Jesus is known by all these names. He is the ruler of the Kingdom of God and Heaven that has no end. He is the light that expelled the darkness for all those who **choose** to “see” the light.



**I SAW THE LIGHT** is an expression we use to say we understand the truth. For many people, the distance from their head to their spiritual heart is too far for them to see through the darkness. Our spirits have a higher way of knowing than our heads. Someday, everyone will SEE THE LIGHT and discover this higher way of knowing; but, someday may be too late for those who refuse to listen and open their spiritual hearts.

**Acts 26:18** *...to open their eyes and turn them from darkness to light, and from the power of Satan to God, so that they may receive forgiveness of sins and a place among those who are sanctified by faith in me.'*



## REMEMBER THESE THINGS/Devotion:

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We often use a “light bulb” as a symbol for a new idea or understanding. A simple electric light bulb in a dark closet or room can make all the difference in finding something you need to find. Darkness is the absence of light. Darkness is NOT an entity itself. It cannot exist where Light rules. Light expels darkness in a way that fills and overcomes that which is empty or lacking.



**John 1:5** <sup>5</sup> *The light shines in the darkness, and the darkness has not overcome it.*



Robots may be made in our likeness, but they’re far from human. Humans are made in God’s image. We have the breath of life, unlike a robot that runs on batteries and electricity. Although Artificial Intelligence can process a greater amount of data faster, it will never have free will, self-awareness, or the ability to tap into a true consciousness of a God-given spirit.

**Psalms 18:28** “You, Lord, keep my lamp burning; my God turns my darkness into light.”