

Science Project Ideas:



Radio Waves, Microwaves, Infrared radiation, Visible Spectrum, Ultraviolet, X-rays, Gamma Rays. AND Inquiry questions that relate.

How does the average **human experience the electromagnetic spectrum** in their daily life? How is it helpful or harmful? A general overview of how humans interact with EM radiation.

How does **human sight** work and how is light and the EM spectrum involved? Why do some people wear glasses? What is laser eye surgery? What is colour blindness? What is 20/20 vision?

Viewing Space: How do Astronomers use the EM spectrum to view space in different ways? How does this work? What have they learned?

Global Warming: How are the greenhouse effect, global warming, and EM radiation connected?

How is EM radiation used in **crime scene investigations (CSI)**? How do investigators use electromagnetic radiation to help solve crimes, enforce the law (ie radar guns), or prevent crimes or safety issues?

What is **LIDAR** and how is it used? Where is it used? How does it work?

How is EM radiation used in **medicine**? Medical imaging? How do MRI's and X-Ray scans work? Are there any other uses? What does radiation in cancer treatment mean? Are there medicines or treatments that use EM radiation?

How do **cameras** work and how is EM radiation involved? How do camera lenses work? How does a video camera work? What is focussing? How does a camera zoom or take more detailed and vivid photos?

What is **Gamma Radiation** and why is it helpful/harmful? Is it natural? Is it artificial? Where can it be found or be produced?

How are gamma rays involved or connected to **nuclear technology**? Is gamma radiation different from other types of radiation? Why are nuclear meltdowns so harmful? How does it involve EM radiation? Why is it still unsafe to visit Chernobyl or Fukushima? What is radiation poisoning? Can nuclear tech be safe?

Sun/Tanning/Sunburns and Human skin: How does sunlight impact human skin? What is a sunburn/tanning? How does sunscreen work?

What are eclipses? How do they work? Why do they happen? How do they impact the Earth? Can they be predicted?

What is **aurora borealis**, how does it involve EM radiation, and how and why does it occur? Why don't we see it on the moon?

What is the **Earth's Magnetic Field**, how does it involve EM radiation, and why is it important? Is it changing? Does it help protect in any way? If so, how? What is aurora borealis? Why does it happen? How does it happen?

What is the **history of the science around light**? How do we know what light is? What do we not know? How was the light bulb invented? What is the timeline of the science of EM radiation and light?

How is EM radiation used in **communication technology**? How do we use it in common technology such as cell phones and wi-fi?

How do scientists use EM radiation to **observe the Earth** in different ways? Using **satellites** and different cameras and scanners. What information can be obtained about the Earth? Can weather patterns be predicted? How is EM radiation involved with monitoring the ever changing Earth?

What is **infrared radiation**? Where is it found? How is it produced? How can it be useful to humans? What is an infrared camera? How does it work?

What is the **James Webb OR Hubble** telescope and what is it capable of? How does it work? How is it related to EM radiant energy?

What are microwaves? How are they useful to humans? How does technology that uses microwaves work? Are microwaves natural? If so, what produces microwaves and where can they be found?

How does a **computer/phone** screen work? How does it produce such clear images? How is EM radiation involved? How does your **TV screen** emit light?

What is **bioluminescence** and how does it work? Where is it found? How is EM radiation involved?

What are radio waves? How do humans use them? How are they produced? Are they natural? How can they travel through walls? Are there different types of radio waves? What are the ways radio waves are used in the world?

What is Ultraviolet radiation/light? Why is it significant? Is it helpful/harmful to humans or the environment? Is it used in technology? How? Why?

What is the Sun? How does it work? How is it involved with EM radiation? How does it impact Earth? What is a solar storm? How is the Sun related to light and EM radiation?

Navigation: How is EM radiation used in ancient / modern **navigation**? What is radar? How is it used? How does it work? How is Em radiation involved? What is GPS and how is it related to EM radiation?

How do **solar panels** work? How are they used? How is EM radiation involved? How could they be used? What is the future potential of this technology? Can it be improved for greater efficiency?

What is chemiluminescence and how does it work? What are the ways it is useful? How is EM radiation involved?

Internet: How does Wi-fi work? Why does the signal vary depending where you are? What is a router and how does it use EM radiation? How can you get wi-fi on planes? Why is the BC ferry wi-fi connection so bad?

Sanitation: How Ultraviolet **Light** Reduces Bacteria and Viruses. How can UV light be used for sanitation? Is it safer than chemicals? Is it effective? How does it kill different germs? How could electromagnetic radiant energy help better sanitize our spaces and help reduce the transmission of germs/viruses/bacteria.

How does our **atmosphere** interact with EM radiation? Why is the sky blue? Do all types of EM radiation make it to Earth's surface? Why do sunsets and sunrises look the way they do? Why can't we see stars during the day?

What is **Photosynthesis** and how does it work? How do different coloured rays of **light** affect photosynthesis? Do all plants photosynthesize the same? How is photosynthesis related to climate change and EM radiation? Can photosynthesis happen without light? How does intensity/frequency of light affect photosynthesis?

Lighting our World: How do different types of light work in our cities, buildings, houses, and technology? What are LEDs and how do they work? Car headlights? What modern tech is used to light our spaces and how does it work?

What is Phosphorescence? How does it work? Where can it be found? How can we produce phosphorescence artificially?

What is the **Visible Spectrum** of EM radiation/light? Any other questions related to this topic?

What are all the ways a **modern airliner/ship uses EM radiation**? Navigation, communication, sensors, radar etc...

How does **air traffic control** use electromagnetic radiant energy? How does this allow them to better do their job?

How is electromagnetic radiant energy used in **geography and mapping** the world? How do geographers use it to view various landscapes, collect data, and create different types of maps?

How do **meteorologists (weather scientists)** use electromagnetic radiant energy to monitor and forecast the weather? Why is this helpful? How do they do this? How can they predict dangerous weather events such as hurricanes or tornadoes?

How are **climatologists** using electromagnetic radiant energy to monitor **climate change**? What technology do they use? How does it work?

How do **biologists and ecologists** use electromagnetic radiant energy? How do they use it to monitor various ecosystems, collect data, and learn more about the health of the environment?

Warming and cooling of the Earth: Why do seasons happen? Why and how does the weather/temperature vary over the Earth? What is Earth's albedo? Why does it matter and how is it related to melting sea ice and global warming/climate change?

Seeing beyond the visible spectrum: Certain organisms can detect (see) electromagnetic radiation outside of the visible spectrum. How do they do this? Why did they develop this ability? What frequencies can they detect or see? How and why do certain animals, insects, plants detect other forms of electromagnetic radiant energy?

Cutting edge Technology: What are scientists and engineers doing with EM radiation that will be used in the future? What will the coming years hold for the use of EM radiation? What will it be used for? How are we better understanding what we can do with it?

Cutting edge Science: What are scientists researching about light right now? What have been some significant advances in our understanding of light and its place in our lives and in the universe in more recent years? How are scientists researching light in 2025?

How is electromagnetic radiant energy used in **archaeology**? How do archaeologists use it to discover secrets of the past and analyze artifacts? Why do they use it? What are the ways they can use this type of energy? What instruments/technology allows them to do this? How does it work?

Additional Inquiry Questions Ideas

Below is a **well-organized, classroom-ready list** of inquiry questions and project topics, grouped into the **seven regions of the electromagnetic spectrum**. Each section includes **5–10 project ideas**, giving you far more than the 26 topics you need.

I've also woven in **3D-model inspiration** ideas to help students imagine what they might build.

Inquiry Project Ideas for a Grade 8 “Science World EM Spectrum Exhibit”

1. Gamma Rays

- How do gamma rays help scientists study supernovas?
- Why are gamma rays dangerous to living things?
- How do gamma-ray bursts form, and why are they so powerful?
- How do doctors use gamma rays to treat cancer?
- What tools do astronomers use to detect gamma rays in space?
- How does Earth's atmosphere protect us from gamma rays?
- What would happen if a gamma-ray burst hit Earth?

- **3D model ideas:** exploding star, gamma-ray telescope, atmosphere shield layers.

◆ 2. X-Rays

- How do X-ray machines create images of bones?
- Why can X-rays pass through some materials but not others?
- How do airport security scanners use X-rays safely?
- How do animals like mantis shrimp detect X-ray wavelengths?
- How do astronomers use X-rays to study black holes?
- What safety measures protect people from too much X-ray exposure?
- **3D model ideas:** X-ray tube, layered materials showing penetration, black hole X-ray jets.

● 3. Ultraviolet (UV) Light

- How does UV light cause sunburns and skin damage?
- How does sunscreen block or absorb UV radiation?
- How do insects like bees use UV light to find flowers?
- How does the ozone layer protect Earth from UV radiation?
- How do UV lights disinfect water or surfaces?
- Why do some materials glow under UV light (fluorescence)?
- **3D model ideas:** ozone layer model, UV-sensitive flower patterns, sunscreen molecule models.

● 4. Visible Light

- How do prisms split white light into a rainbow?
- How do human eyes detect different colours?
- How do optical illusions trick the brain using visible light?
- How do lasers work, and what makes them different from normal light?
- How do cameras work? How is this related to light and EM radiation?
- How do telescopes gather and focus visible light?
- How do animals see colours differently from humans?
- **3D model ideas:** giant prism, eye anatomy, laser beam path, telescope mirror system.

● 5. Infrared (IR)

- How do thermal cameras “see” heat?
- How does infrared radiation help astronomers see through dust clouds in space?
- How do remote controls use infrared signals?
- How do snakes use infrared sensing to hunt?
- How does Earth absorb and emit infrared radiation (greenhouse effect)?
- **3D model ideas:** heat-map sculpture, IR remote system, snake pit organ, greenhouse model, camera dissection.

● 6. Microwaves

- How do microwaves heat food?
- How does Wi-Fi use microwaves to send information?
- How do satellites use microwaves for communication?
- What is the cosmic microwave background, and why is it important?

How do radar systems use microwaves to detect objects?

- **3D model ideas:** microwave oven interior, Wi-Fi signal map, radar dish, early-universe CMB map.

● 7. Radio Waves

- How do radios convert radio waves into sound?
- How do astronomers use radio telescopes to study space?
- How do cell phones use radio waves to communicate?
- How do walkie-talkies send and receive signals?
- How do emergency services use different radio frequencies?
- How does SETI search for alien signals using radio waves?
- **3D model ideas:** radio tower, giant radio telescope dish, cell-tower network, signal spectrum.



Bonus: Exhibit-Design Challenge Prompts

- How can you design an interactive exhibit that helps visitors “feel” your wavelength?
- What everyday technology uses your part of the spectrum, and how can you show it visually?
- How can you compare your wavelength to the others in a way visitors will remember?