Electromagnetic Spectrum Range Name _____

Part B: Wavelengths of the Full Electromagnetic Spectrum:

However, the colors we can see are only a tiny portion of all the electromagnetic waves that exist. You can repeat the same exercise above for all 7 types of electromagnetic waves. However, the math becomes more complicated, because the different wavelengths have different orders of magnitude.
For example, instead of studying the difference between 400 nm and 700 nm, we are now studying the difference between 0.1 m, 0.0003 m, and 0.0000000055 m wavelengths.

With these units, we can represent them in two different ways: SI or metric.
The SI unit for wavelength is meters. If we want to use meters to represent these structures, we will have to use scientific notation. To avoid awkward scientific notation numbers, we can also use the metric system to represent these numbers.
You need to become proficient in both systems. These numbers are typically quoted as metric, but you must use SI units whenever plugging into a formula!

Type of Wave	**Range in SI (meters)**	**Range in Metric**
Radio	> 1	Greater than 1 meter
Microwave	1 to 1×10^{-3}	1 m to 1 mm
Infrared	1×10^{-3} to 8×10^{-7}	1 mm to 800 nm
Visible Light	8×10^{-7} x 4×10^{-7}	800 nm to 400 nm
Ultraviolet	4×10^{-7} to 1×10^{-8}	400 nm to 10 nm
X-Ray	1×10^{-8} to 1×10^{-12}	10 nm to 1 pm
Gamma Ray	$< 1 \times 10^{-12}$	Less than on pm

Credit: http://hubblesite.org

Note that this table gives estimates only! In fact, different sources will give different values for the ranges of these numbers. This is understandable: the 7 types of electromagnetic waves are human constructs to help us understand them. All that really matters in the physical world is the wavelength, frequency, and energy of a particular wave and how it interacts with its environment.

Electromagnetic Spectrum Range Name _____

For an electromagnetic wave of the wavelength given, determine what type of electromagnetic wave it is:
The left side values

$\lambda = 1 \times 10^{-2}$ m	
$\lambda = 6 \times 10^{-7}$ m	
$\lambda = 2 \times 10^{-7}$ m	
$\lambda = 4 \times 10^{-8}$ m	
$\lambda = 2$ m	
$\lambda = 3 \times 10^{-13}$ m	
$\lambda = 8 \times 10^{-10}$ m	
$\lambda = 5 \times 10^{-5}$ m	
$\lambda = 0.2$ m	

The next topics to learn:
- Learn the formulas that relate wavelength, frequency, and energy
- Learn applications and occurrences of each of the seven types of electromagnetic wave

Electromagnetic Spectrum Range Name _____

Good resources on this topic. There are lots!

https://courses.lumenlearning.com/boundless-physics/chapter/the-electromagnetic-spectrum/

https://www.siyavula.com/read/science/grade-10/electromagnetic-radiation/11-electromagnetic-radiation-03

http://hubblesite.org/reference_desk/faq/answer.php.id=70&cat=light

YouTube Videos Relevant to This topic:

kangaroos fighting on an infrared camera
https://www.youtube.com/watch?v=TRiS4DWlga4

infrared camera police chase
https://www.youtube.com/watch?v=xsMMvLL0B_k