**Click on the link:** [**http://somup.com/cbebcwRB7**](http://somup.com/cbebcwRB7) **.**

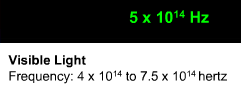
**Procedures:**



1. On the right side of the screen, click on a “wave tile” (one of the pictures). Notice the frequency range shown in the text box.



2. Click on the dial (*to the left of the moving wave*) until the number shown in the moving wave screen (green color) is in the frequency range of the EM radiation you are testing (white box below that number).



3. Once the frequency range matches, click “Match”.

If you were correct, a text box will open. Click “Find Wavelength”.

Record the type of EM Radiation, its frequency, and its wavelength in the data table below.

4. Repeat the procedures until you have finished all seven EM Wave types. [*Complete the data table below*]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wave Type |  |  |  |  |  |  |  |
| Frequency Range |  |  |  |  |  |  |  |
| Wavelength Range |  |  |  |  |  |  |  |

5. Once the data table is complete, drag each EM wave type DOWN (to the bottom) in the correct order from lowest energy (longest wavelength) to highest energy (shortest wavelength). Fill in the table below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EM Spectrum from lowest energy to highest energy** | | | | | | |
|  |  |  |  |  |  |  |



Low Energy

HIGH

Energy

Low frequency

Longer wavelength

High frequency

Shorter wavelength

**Electromagnetic spectrum**

Radio Microwave TV Infrared Visible Ultraviolet X-ray Gamma Ray

“ROYGBIV”

Long Wavelength, Low Frequency Short λ, High f

boom box & TV (*radio*) … Short Wave radio & Microwave & Satellite dish (*microwave*)

Stove (*IR*) … bulb and sun (*visible*) … Fluorescent lights, black lights, Dark rooms (*UV*)

Geiger counter, X-rays, Radiation Therapy (*X-ray*) … Atomic energy; medical treatments (*gamma*)

### Notice that there is OVERLAP of the spectrum radiation for each category

1. Write a statement about the relationship between frequency and wavelength of electromagnetic radiation?

2. Which of the types of radiation above has the greatest energy? Which has the least energy?

3. List the VISIBLE color spectrum in order from longest wavelength to shortest.

4. What is the relationship between the frequency and energy of electromagnetic waves?

a) directly proportional c) if one increases the other decreases

b) inversely proportional d) there is no relationship.

5. What kind of electromagnetic wave is potentially most dangerous to people?

a) radio b) infrared c) ultraviolet d) gamma.

6. Electromagnetic waves can behave like what type of light particle?

a) photons b) electrons c) neutrons d) “phosphorescent gambules”

7. How would you describe X-rays in terms of frequency and wavelength?

a) high frequency, low wavelength c) high frequency, high wavelength

b) low frequency, low wavelength d) low frequency, high wavelength.

ANSWER KEY

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wave Type | **Radio** | **Microwave** | **Infrared** | **Visible** | **UV** | **X-ray** | **Gamma** |
| Frequency Range | 103 – 109 | 109 – 1011 | 109 – 1014 | 1014 | 1014 – 1017 | 1017 – 1019 | 1017 – 1019 |
| Wavelength Range | 105 – 10-1 | 10-1 – 10-3 | 10-3 – 10-7 | 10-7 | 10-7 – 10-9 | 10-9 – 10-11 | 10-11 – 10-15 |

5. Once the data table is complete, drag each EM wave type DOWN (to the bottom) in the correct order from lowest energy (longest wavelength) to highest energy (shortest wavelength). Fill in the table below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EM Spectrum from lowest energy to highest energy** | | | | | | |
| **Radio** | **Microwave** | **Infrared** | **Visible** | **UV** | **X-ray** | **Gamma** |



Low Energy

HIGH

Energy

Low frequency

Longer wavelength

High frequency

Shorter wavelength

**Electromagnetic spectrum**

Radio Microwave TV Infrared Visible Ultraviolet X-ray Gamma Ray

“ROYGBIV”

Long Wavelength, Low Frequency Short λ, High f

boom box & TV (*radio*) … Short Wave radio & Microwave & Satellite dish (*microwave*)

Stove (*IR*) … bulb and sun (*visible*) … Fluorescent lights, black lights, Dark rooms (*UV*)

Geiger counter, X-rays, Radiation Therapy (*X-ray*) … Atomic energy; medical treatments (*gamma*)

### Notice that there is OVERLAP of the spectrum radiation for each category

1. Write a statement about the relationship between frequency and wavelength of electromagnetic radiation?

***Inverse (indirect) relationship; one increases while the other decreases.***

2. Which of the types of radiation above has the greatest energy? Which has the least energy?

***Gamma rays have the highest energy; radio waves have the lowest energy****.*

3. List the VISIBLE color spectrum in order from longest wavelength to shortest.

**Red, orange, yellow, green, blue, indigo, violet (ROYGBIV)**

4. What is the relationship between the frequency and energy of electromagnetic waves?

**a) directly proportional**

5. What kind of electromagnetic wave is potentially most dangerous to people?

**d) gamma**.

6. Electromagnetic waves can behave like what type of light particle? **a) photons**

7. How would you describe X-rays in terms of frequency and wavelength? **a) high frequency, low wavelength**