**The Amazing Cell Phone!**

**Purpose:**

The purpose of this activity is determine the frequency, wavelength, and spectral range for every mode of EM radiation used by a modern “smart” phone.

**Materials:**

* “Smart” phone (the “smarter” the phone, the better)
* Computer with Internet access (or use your smart phone!)
* Calculator (or use your smart phone!)

**Introduction:**

Although we still call them “cell phones”, modern “smart” phones are truly much, much more than a telephone! Even if we think about what else our “phone” will do other than just make phone calls, most of us do not think about how the phone actually does all that it does for us. In this activity, we will look at a modern “smart” phone, and determine the frequency, wavelength, and spectral range the “smart” phone used to accomplish all that it does for us.

**Activity:**

Compare your cell phone with the phone of your partner. Pick the “smartest” phone to use for this activity. You will use the table on the back of this page to complete the activity.

Examine the phone and consider all of the things it can do that require some form of EM radiation to accomplish each task. For each task, write the mode of communication used for the task in the first column of the table.

The second column is where you indicate if the phone must send, receive, or both send and receive using each mode of communication.

To complete the entries for the third column, use the computer to look up the frequency range that cellular devices are allowed to use for each mode of communication.

Calculate the wavelength range that corresponds to each frequency range to complete column 4.

In column 5, determine the range of the EM spectrum each mode of communication is using (i.e. infrared, microwave, etc.)

**Post-activity:**

Below the table on the backside, answer the post-activity questions.

**Data Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mode of Communication | Send, Receive, or Both? | Frequency Range | Wavelength Range | Range of the EM Spectrum |
| Example:  Bluetooth | Both | 2.400 – 2.4835 GHz | 0.1249 – 0.1209 meters | UHF Radio waves |
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**Post-activity:**

1. Examine your list of modes of communication you entered in your table. List the modes of commination that *interact directly* with humans. For each mode, explain how the interaction works. For example: Visible light: we *see* the screen.
2. Examine your list of modes of communication you entered in your table. List the modes of commination that *do not interact directly* with humans. For each mode, explain why not. For example: WiFi: the phone sends and receives radio waves.
3. For those ranges of the EM Spectrum that humans cannot interact with directly, what do you think is happening when those EM waves come at us?