

Satellites and Weather Teaching Box

Answer Key for Student Worksheet on

Electromagnetic Radiation & Layers of the Atmosphere

Electromagnetic Radiation

Read about electromagnetic (EM) radiation, visible light, radio waves, and wavelength on these web pages:

- Electromagnetic (EM) Spectrum [SciEd.ucar.edu/em-spectrum]
- Visible Light [SciEd.ucar.edu/visible-light]
- Radio Waves [SciEd.ucar.edu/radio-waves]
- Wavelength [SciEd.ucar.edu/wavelength]

Fill in the table below, comparing red and blue light with radio waves. How are wavelength and the amount of bending related? (*Desired student responses are shown in red, italicized text.*)

Electromagnetic (EM) Radiation	Wavelength	Amount of Bending
Blue Light	<i>450-495 nanometers</i>	<i>Most</i>
Red Light	<i>620-750 nanometers</i>	<i>A little less than blue</i>
Radio Waves	<i>millimeters to kilometers</i>	<i>Prediction: Least</i>

Make a prediction: do you think radio waves bend more or less than visible light?

Note to Teachers: *the values students record in the **Wavelength** column don't need to be precise. Any value in the 400-500 nm range is OK for blue light; anything in the range of 600-750 is fine for red light. With radio waves, the key concept is that they are **much, much longer** than light waves.*

Layers of the Atmosphere

Read about the layers of Earth's atmosphere on these web pages:

- Layers of Earth's Atmosphere [SciEd.ucar.edu/atmosphere-layers]
- Troposphere [SciEd.ucar.edu/shortcontent/troposphere-overview]
- Stratosphere [SciEd.ucar.edu/shortcontent/stratosphere-overview]
- Mesosphere [SciEd.ucar.edu/shortcontent/mesosphere-overview]

Fill in the table below comparing the lower layers of the atmosphere. (*Desired student responses are shown in red, italicized text.*)

Atmosphere Layer	Altitude of Bottom of Layer	Altitude of Top of Layer	How temperature changes as you go up	Humidity
Troposphere	<i>0 km (ground level)</i>	<i>About 10 km (6.2 miles or 33,000 feet)*</i>	<i>Gets colder</i>	<i>Up to 100%</i>
Stratosphere	<i>About 10 km* (6.2 miles)</i>	<i>50 km (31 miles)</i>	<i>Gets warmer</i>	<i>Very dry</i>
Mesosphere	<i>50 km (31 miles)</i>	<i>85 km (53 miles)</i>	<i>Gets colder</i>	<i>Very dry</i>

* Varies with latitude and season. Can be as high as 20 km near the equator, and as low as 7 km over the poles in winter. Student responses may vary because of this.

Notes to Teachers:

- *Students should notice that almost all moisture is found in the lowest layer (troposphere) and that the layers above (stratosphere and mesosphere) are very dry.*
- *In the troposphere and mesosphere temperatures **get colder the higher you go**; however, in the stratosphere the opposite is true - **temperatures get warmer** with increasing altitude.*
- *Although air pressure and density are not included in the table, you may want to ask students how those two quantities change with altitude. Air pressure and the density of air are both greatest at low altitudes, and gradually become less and less with increasing height.*