

## The Electromagnetic Spectrum

**Directions:** Use the descriptions below to help locate examples of electromagnetic waves in the wavestown picture.

**Radio waves** have the longest wavelength in the electromagnetic spectrum. These waves carry the news, ball games, and music you listen to on the radio. They also carry signals to television sets and cellular phones.

**Microwaves** have shorter wavelengths than radio waves, which heat the food we eat. They are also used for radar images, like the Doppler radar used in weather forecasts.

There are **infrared waves** with long wavelengths and short wavelengths. Infrared waves with long wavelengths are different from infrared waves with short wavelengths. Infrared waves with long wavelengths can be detected as heat. Your radiator or heater gives off these long infrared waves. We call these thermal infrared or far infrared waves. The sun gives off infrared waves with shorter wavelengths. Plants reflect these waves, also known as near infrared waves.

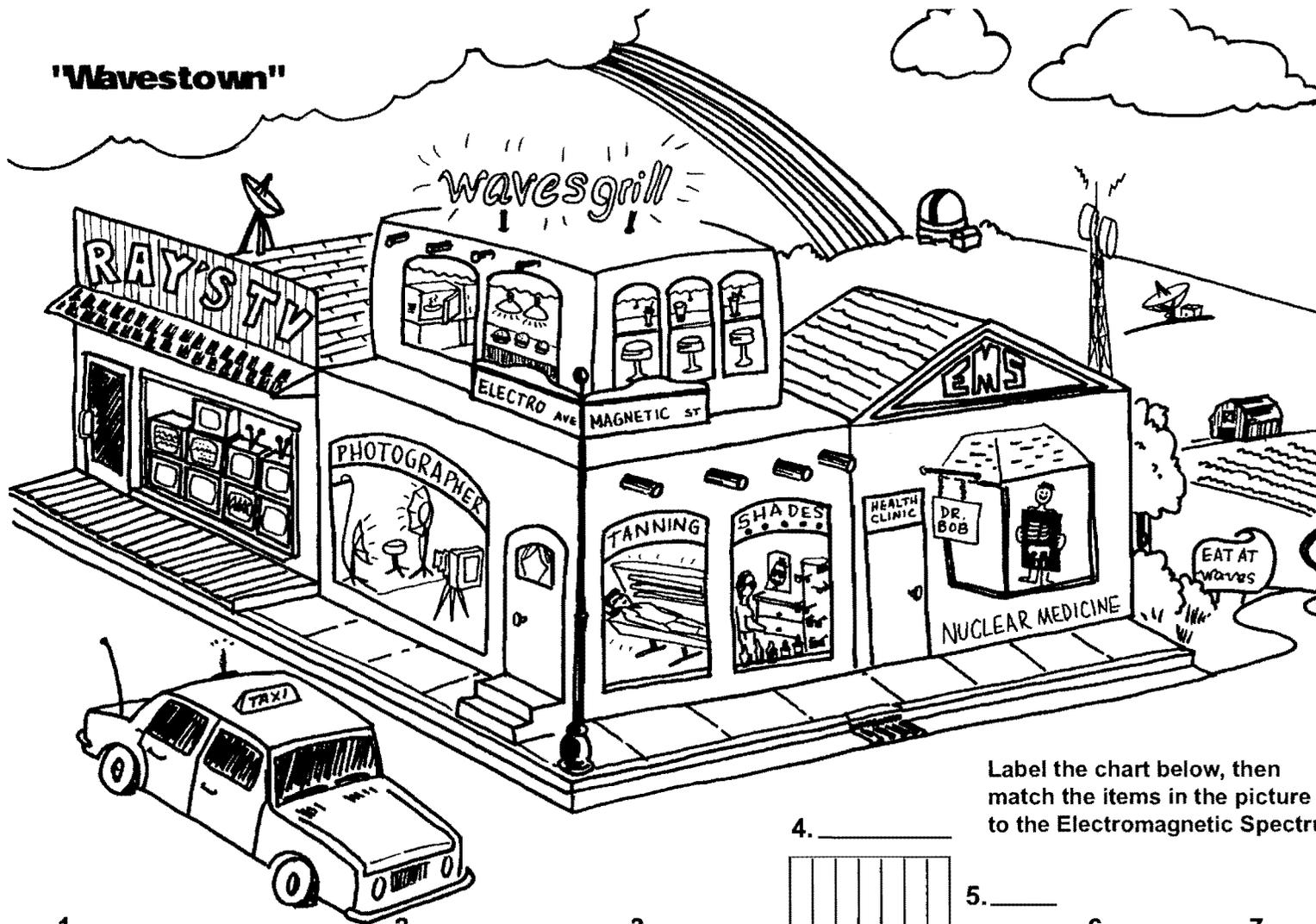
**Visible light waves** are the only electromagnetic waves we can see. We see these waves as the colors of the rainbow. Each color has a different wavelength. Red has the longest wavelength and violet has the shortest wavelength. These waves combine to make white light.

**Ultraviolet waves** have wavelengths shorter than visible light waves. These waves are invisible to the human eye, but some insects can see them. Of the sun's light, the ultraviolet waves are responsible for causing our sunburns.

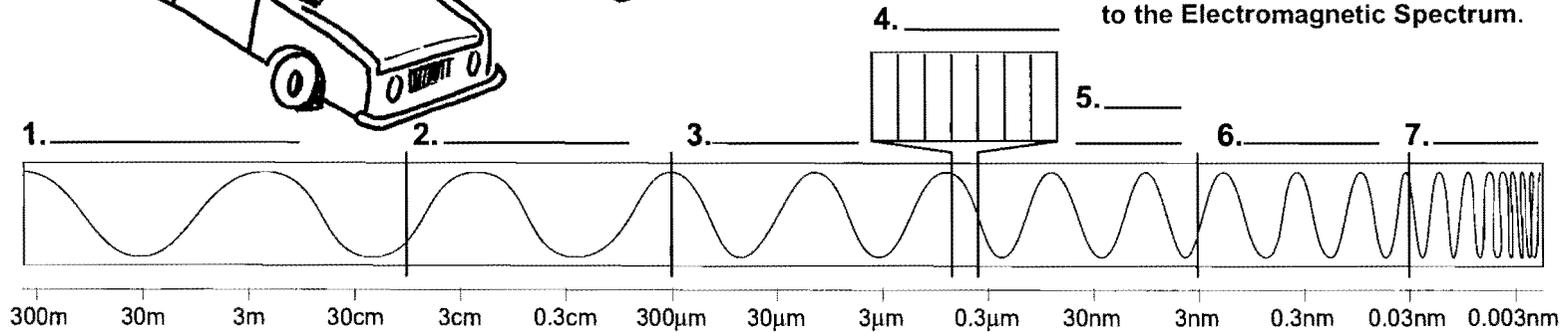
**X-Rays:** As wavelengths get smaller, the waves have more energy. X-Rays have smaller wavelengths and therefore more energy than the ultraviolet waves. X-Rays are so powerful that they pass easily through the skin allowing doctors to look at our bones.

**Gamma Rays** have the smallest wavelength and the most energy of the waves in the electromagnetic spectrum. These waves are generated by radioactive atoms and in nuclear explosions. Gamma rays can kill living cells, but doctors can use gamma rays to kill diseased cells.

# "Wavestown"



Label the chart below, then match the items in the picture to the Electromagnetic Spectrum.



Name \_\_\_\_\_

Wavestown

Date \_\_\_\_\_

## SCIENCE 8 – ELECTROMAGNETIC SPECTRUM WORKSHEET

NAME: \_\_\_\_\_

Vocabulary			
Electromagnetic radiation	Gamma rays	Radiant energy	Visible light
Electromagnetic spectrum	Infrared waves	Radio waves	Wavelength
Frequency	Microwaves	Ultraviolet rays	X rays

Use your notes from pages 9 – 10 and the terms in the vocabulary box to fill in the blanks for the following nine questions. You will not need to use every term.

- 1) The \_\_\_\_\_ represents the different forms of electromagnetic radiation.
- 2) Light is classified as \_\_\_\_\_ because electrical and magnetic fields vibrate in a light wave.
- 3) \_\_\_\_\_ is energy that travels by radiation. An example of this is light.
- 4) Heat radiation, also known as \_\_\_\_\_, cannot be seen by your eyes but can be felt by your skin.
- 5) Microwaves are one type of \_\_\_\_\_.
- 6) \_\_\_\_\_ can be used to communicate with satellites.
- 7) Because \_\_\_\_\_ have the highest energy of all electromagnetic radiation, they are the most damaging to human tissue.
- 8) Compared to all other types of electromagnetic radiation, radio waves have the lowest \_\_\_\_\_.
- 9) An overexposure to \_\_\_\_\_ can result in sunburns and skin cancer.
- 10) Why does an empty plate not heat up in the microwave?

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- 11) Why should you use sunscreen and a hat when you are out in the Sun?

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12) Match the kind of **Electromagnetic Radiation** (on the left) likely to be used in each of the following **technologies** (on the right). Each Technology may be used only once

Electromagnetic Radiation		Technology	
	X rays	A.	TV broadcast signals
	Microwaves	B.	In a hospital to keep surgical equipment sterile
	Gamma rays	C.	Examining the inside of a weld in a steel oil pipe
	Radio waves	D.	Lamp used to warm a baby chick
	Infrared waves	E.	Measuring the speed of a passing car
	Ultraviolet waves	F.	Used by an oncologist (a physician who studies and treats cancer)
	Radar	G.	Cell phone

Read the statements given below. If the statement is true, write "T" on the line in front of the statement. If it is false, write "F" and rewrite the statement to make it true.

13) \_\_\_ Radiant energy spreads out from its source in all directions.

\_\_\_\_\_

14) \_\_\_ Electromagnetic radiation includes only visible light waves.

\_\_\_\_\_

15) \_\_\_ Microwaves are a type of infrared wave.

\_\_\_\_\_

16) \_\_\_ X rays have more energy than gamma rays.

\_\_\_\_\_

17) \_\_\_ Radio waves, microwaves and ultraviolet waves all have longer wavelengths than visible light.

\_\_\_\_\_

\_\_\_\_\_

18) \_\_\_ Both X rays and gamma rays have higher frequencies than ultraviolet rays.

\_\_\_\_\_

19) \_\_\_ The Sun radiates both visible energy and invisible energy.

\_\_\_\_\_

20) \_\_\_ Communicating with satellites is an application of gamma rays.

\_\_\_\_\_