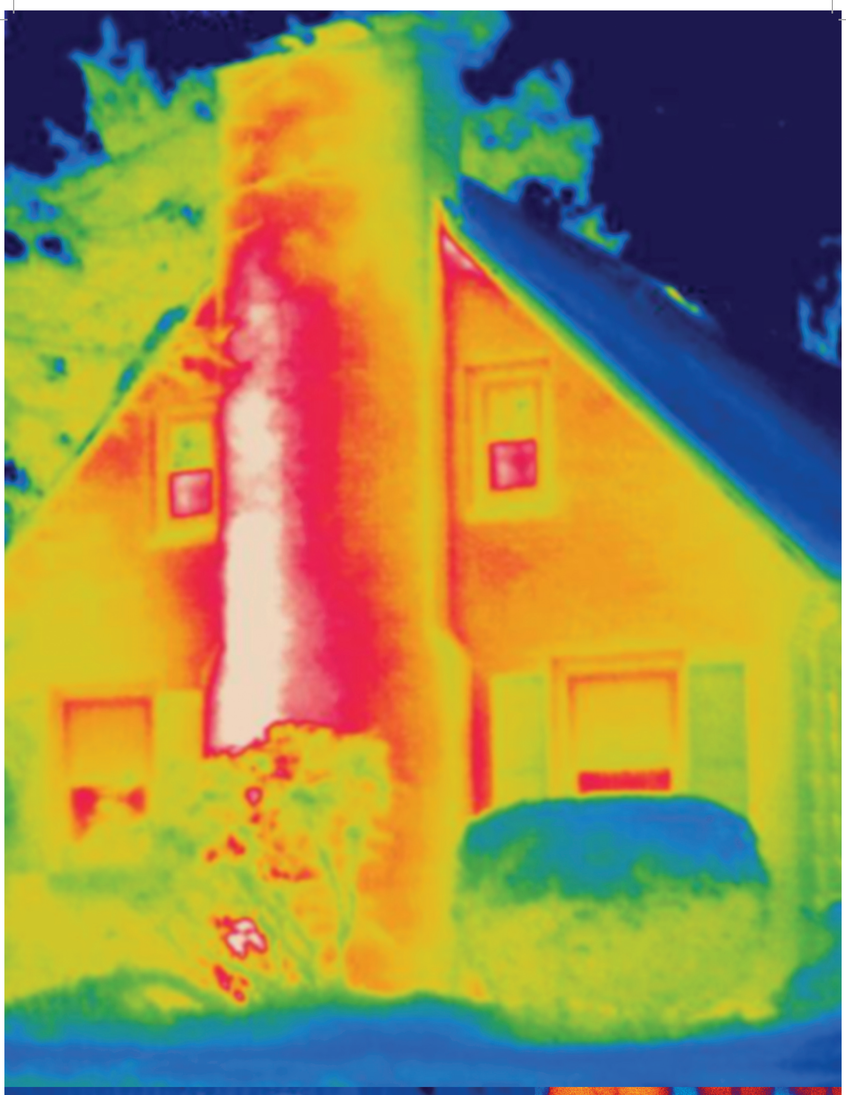

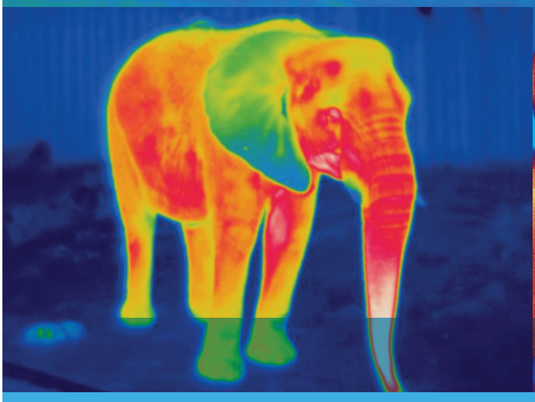

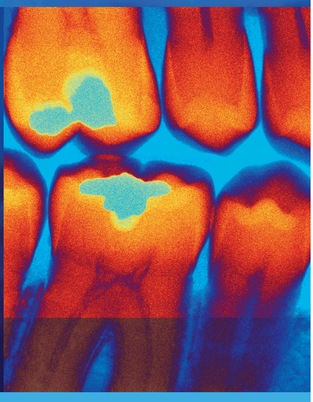

IR IMAGING

Color By Numbers

Hey kids, how does an elephant stay cool on a hot day? Take a look at the elephant's ears in this image for some clues. The picture above is what's known as a **Thermal Image or Infrared Image.** Red shows the warm areas and blue indicates cold. Elephants use their cooler ears to release body heat and cope on a hot sunny day. Pretty awesome, right?

To create the elephant image, special cameras were used to detect differences in temperature. Colors that the human eye can see are assigned to various levels of brightness or thermal activity. So, the elephant's ears really aren't green inside, it's just the color assigned to that temperature.

Catch the wave.

Scientists translate the colors in thermal images to numbers which are called **wavelengths.** Wavelengths can be as long as a football field or as short as a tiny end of a pin or even shorter than an atom. That's pretty darn tiny! These waves are all part of the **electromagnetic spectrum.** The light our eyes can see is just a very small portion which is called the **visible light** area of the electromagnetic spectrum. We can see the colors of a rainbow. Unless you are super human, all the other areas of the electromagnetic spectrum are invisible.

So hot that it glows!

Thermal imaging relates wavelength to temperature through what's known as the **Planck radiation formula.** You can see temperature when you look at a thermal image like the elephant, but humans are blind to this type of **infrared** heat in everyday life unless the object is super-duper hot. We're talking a thousand degrees Celsius-type glowing hot! Hot objects we can see include the sun, the flames of a campfire, a red-hot electric burner on the stove or the filament in an old-fashioned light bulb.

Thermal imaging cameras aren't just for examining elephants.

Firefighters use thermal imaging cameras to "look through" smoke and "see" the color of heat from flames. So if a fire is burning between two walls or behind a closed door in the next room, firefighters know exactly where the danger is located. Oh yeah, and thermal images can also detect where people are in a room so they can be rescued.

There are many other uses for this technology. Thermal imaging may be used in medicine to help people and all types of animals, manufacturing to improve design, and in astronomy to study stars and planets.

Explore more, ask your teacher or visit www.optics4kids.org today.