Ask an Astronomer

Question: "Why is the sky blue?"
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Well, the quick explanation of why the sky is blue is because of how light from the Sun interacts with the Earth's atmosphere. But to really explain this, we need to know a bit about light itself.

The white light from our Sun is actually made up of a whole range of different colours, which we see for ourselves when we see a rainbow in the sky. Scientists call this rainbow a "spectrum." Each of these colours has a slightly different wavelength -- red light has the longest wavelength that we can see, while the wavelength of blue light is much shorter.

So how does this all tie into the colour of our sky? The secret is in how the light reacts to the gases that make up our atmosphere -- mainly nitrogen and oxygen. The molecules of these gases interfere with the incoming sunlight. The short-wavelength blue light is more strongly affected, and is scattered in all directions, while the longer-wavelength green and red light is able to pass straight through. As you look at the sky, you're seeing this scattered light, and so the sky looks blue.

So, if the atmosphere scatters blue light more effectively than red light, then you may wonder why sunsets look red. The answer is twofold.

Firstly, when you look at the sunset, you're looking toward the Sun, not away from it, so while the blue light has been scattered away, you're looking at the redder light that passes straight through the atmosphere to your eyes.

Secondly, the Sun is low in the sky, and so the light is forced to travel through much more of the atmosphere than it does at midday. In the process, it passes through far more water vapour and dust. Water vapor and dust both absorb the short-wavelength blue light, while letting the longer-wavelength red light pass through to your eyes.

Astronomers are using the principle of absorption to study the atmospheres of planets around stars many light-years away. Different molecules absorb different wavelengths of light, making a unique pattern in the spectrum, like a fingerprint that we can use to identify the molecules. By identifying these fingerprints in the light from distant worlds, we can tell what the atmospheres are made of, even from billions of miles away.

Using the Spitzer and Hubble Space Telescopes, astronomers have been able to use this technique to find clouds of sandy dust in the atmosphere of one Jupiter-like planet, called HD 209458b, along with sodium, oxygen, hydrogen and carbon.

The hope is that someday soon we may even be able to tell whether a distant planet has life or not, just by looking at its spectrum.

For "Ask an Astronomer," I'm Dr. Carolyn Brinkworth of the Spitzer Science Center.