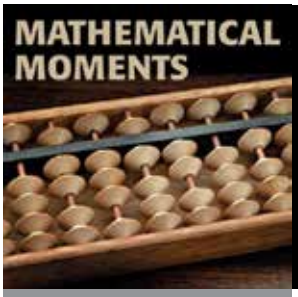

Explaining Rainbows

Even without a pot of gold at the end, rainbows are still pretty fascinating. The details of how they form are fascinating, too. Light is refracted upon entering and exiting raindrops, and reflected within raindrops, sometimes more than once. The angle of refraction and thus the position of the rainbow—not a fixed place but at an angle of elevation of about 42 degrees from the line connecting your eye to your head's shadow—can be figured out using trigonometry. Because different colors of light have different wavelengths, they are refracted at different angles, which produces a rainbow (or two).

If you look closely, you'll see lighter colors inside the inner violet band (inset), which appear because of the interference of light waves, with some waves reinforcing each other. The explanation for these bands isn't obvious and they weren't accounted for in early theories about rainbows. Proving that these lighter bands should appear required the wave theory of light and their precise description involved an integral, (the Airy integral) that was numerically evaluated using infinite series. Curiosity about rainbows has led to many other discoveries in mathematics and physics, including "rainbows" formed by scattered atoms and nuclei.

For More Information: *The Rainbow Bridge: Rainbows in Art, Myth, and Science*, Raymond L. Lee, Jr. and Alistair B. Frasier, 2001.

Image: Eric Rolph at English Wikipedia

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