

Curriculum Unit
Title

Now you see it, now you don't: A unit to support eighth grade conceptualizations of size and scale through scientific notation applied to the electromagnetic spectrum

Allison Gantt

Author

KEY LEARNING, ENDURING UNDERSTANDING, ETC.

This unit aims to support students to build notions of size and scale beyond physical perception using the combination of a notational method (scientific notation) and knowledge of a new and critical context (the electromagnetic spectrum). The study of light involves microscopic wavelengths, incredibly fast speeds, and travel across long distances. The unit aims to supplement Illustrative Mathematics curricular materials about scientific notation with connections to this context and an emphasis on building new benchmarks for quantity, size, and scale.

ESSENTIAL QUESTION(S) for the UNIT

How can we visualize and compare the size and scale of large and small values through scientific notation, points of reference along the electromagnetic spectrum, and other landmarks in our world?

How does scientific notation simplify our calculations involving large and small values?

CONCEPT A

The Size of Light Waves

CONCEPT B

Frequency and the Speed of Light

CONCEPT C

Viewing Distances with Light and Time

ESSENTIAL QUESTIONS A

How can number lines expressing powers of ten help us to visually compare the very small wavelengths that differentiate colors of light?

ESSENTIAL QUESTIONS B

How can we show through examples that the speed of light is constant using calculations involving wavelength and frequency? How does scientific notation aid this process?

ESSENTIAL QUESTIONS C

How can we use the speed of light to make sense of the time it would take to travel very large distances? How does scientific notation aid in this process?

VOCABULARY A

Wavelength; Electromagnetic Spectrum; Powers of Ten

VOCABULARY B

Frequency; Scientific Notation; Hertz

VOCABULARY C

Light Year; Product

ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES

Illustrative Mathematics; NASA's "Tour of the EMS"; BBC's "What is a light year?"; Arcand, K., and M. Watzke, *Light: The Visible Spectrum and Beyond*.