Review: Exploring Physical Phenomena

Theme: What Happens When Light from the Sun Shines on the Earth?

Unit Structure: Identifying Resources

Developing Powerful Ideas Based on Evidence

Using Powerful Ideas to Develop Explanations for Intriguing Phenomena

Developing Mathematical Representations

Using Mathematical Representations to Estimate a Quantity of Interest

Exploring the Nature of Light Phenomena

Light and shadow phenomena

Ray model for light

Pinhole phenomena (geometry of similar triangles)

Reflection

Refraction

Dispersion

Explanation of rainbows

Exploring the Nature of Thermal Phenomena

Heat and temperature, equilibrium temperature, thermal conductivity, specific heat

Conservation of energy (algebraic equations)(simple graphs)

Considering the Influence of Light and Thermal Phenomena on Local Weather

Water cycle (diagram)

Sea breezes at the beach (diagram), energy transfer by radiation, conduction,

convection, evaporation, condensation, change of state

Considering the Influence of Light and Thermal Phenomena on Global Climate Change

Wave model for light: wave length, frequency, amplitude, speed

Greenhouse effect (diagram)

Energy transfer by radiation, reflection, absorption, emission

Energy budget

Albedo effect (difference in reflectivity of ice and liquid water when ice melts)

Rising sea levels: melting and thermal expansion phenomena

Representing changing quantities graphically (Analogy to motion graphs)

Exploring the Nature of Astronomical Phenomena in the Sun/Earth/Moon system

Two explanatory models for day and night

Explanatory model for the phases of the Moon (geometry of angles and circles)

Explanatory model for the Earth’s seasons

History of Science: Aristotle, Copernicus, Galileo, Newton

Sense-Making

Integrating science and literacy learning: speaking clearly, listening closely, writing coherently, reading with comprehension, creating and critiquing media resources

Educational Approaches and Policy:

Inquiry: 5E lesson plan (engage, explore, explain, elaborate, evaluate)

*Next Generation Science Standards*

Scientific and engineering practices

Cross cutting concepts

Disciplinary core ideas/Learning progressions