

Unit Design- Waves, Sound, & Light

Middle School – Grade 7

Texts to be used: Waves, Sound & Light (W)
McDougal Littell & *Unit Resource Book (URB) where noted

RI Statements of Enduring Knowledge - (Established Goals):

PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

<p>PS2 (5-6)- 6 Students demonstrate an understanding of energy by...</p> <p>6a <u>differentiating among the properties</u> of various forms of energy.</p> <p>6b <u>explaining how energy may be stored in various ways</u> (e.g. batteries, springs, height in terms of potential energy).</p> <p>6c <u>describing sound as the transfer of energy through various materials</u> (e.g. solids, liquids, gases).</p> <p>PS2 (7-8)- 6 Students demonstrate an understanding of energy by...</p> <p>6a using a real world example to explain the <u>transfer of potential energy to kinetic energy</u>.</p> <p>6c explaining that while energy may be stored, transferred, or transformed, the <u>total amount of</u></p>	<p>PS1 (5-8) – SAE + MAS–4 *** <i>Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter.</i></p> <ul style="list-style-type: none">Text reference: Chapter 2.0-2.2 pp.34-48 (W) <p>PS2 (5-8)-SAE+ POC- 6 Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).</p> <ul style="list-style-type: none">Investigations: (Set up stations for “Explore Activities” on page 35 (W)) <p>Investigation: What is sound p/37 (W)</p> <p>PS2 (5-8) INQ+SAE+POC – 7 <i>Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation).</i></p> <p>PS3 (7-8) - LA Students demonstrate an understanding of the visible spectrum of light by...</p> <p>LAa experiment how light from the sun is made up of a mixture of many different colors of light (e.g. using prisms, spectrometers, crystals).</p> <ul style="list-style-type: none">Investigation: Wavelength & Color p.p. 100-101, (W)Demonstrate: Prisms and light-colors/spectrum <p>Lab representing in words, diagrams, or other models <u>the visible spectrum as a part of the electromagnetic spectrum (consisting of visible light, infrared, and ultraviolet radiation) and composed</u></p>
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energy is conserved.

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of all colors of light

- Text reference: 3.0 -3.3 **(W) pp.72 -92**
- Investigation: How does the signal from a remote control travel? P. 73 **(W)**
- Investigation: How can you make radio waves? P. 79 **(W)**
- Discuss: Are cell phones harmful? P.87 **(W)**

LAc differentiating between electromagnetic and mechanical waves.

- Text Reference: Chapter 1.0-1.1 pp. 8-15 **(W)**
- Investigation: How will the rope move? P.9 **(W)**
- Inquiry: How do waves compare? P. 13 **(W)**
- Longitudinal vs transverse wave on a spring/slinky pp.13 & 14 **(W)**
- Text Reference: Chapter 1.2 pp.16-21
- Go over "graphing of a wave-reinforcing graphing skills p.19
- Investigation :How can you change frequency? P. 20 **(W)**
- Investigation: Wavelength p.22 **(W)**
- Text reference: Chapter 1.3 pp. 24-30
- Investigation: How do ripples reflect? P.24
- Demonstrate: Reflection of waves & Refraction p.25 **(W)**
- Investigation: How can you make a wave diffract? P.26 **(W)**
- Discuss p. 27 & 28 (W) "Waves Interact with other waves"
- Text reference: Chapter 2.1-2.2 pp.34-48 **(W)**
- Investigations: (Set up stations for "Explore Activities" on page 35 **(W)**
- Investigation: What is sound p/37 **(W)**

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Waves, Sound & Light (W)

	Focus Questions (Essential Questions)	Instructional Activities & Investigations (INQ)	Big Ideas (Understandings)
1	What is a wave?	<ul style="list-style-type: none"> Text Reference: Chapter 1.0-1.1 pp. 8-15 (W) Investigation: How will the rope move? P.9 (W) 	<ul style="list-style-type: none"> A wave is a disturbance in a medium (Electromagnetic require no medium) that is a result of energy being transferred from place to place.
2	How do waves transfer energy?	<ul style="list-style-type: none"> Inquiry: How do waves compare? P. 13 (W) Longitudinal vs transverse wave on a spring/slinky pp.13 & 14 (W) 	<ul style="list-style-type: none"> Transverse waves are where the medium moves perpendicular to the direction of the wave Longitudinal waves are where the medium moves parallel to the direction of the wave. Earthquakes are examples of waves as are waves in water and sounds.
3	What are the measurable properties of all waves?	<ul style="list-style-type: none"> Text Reference: Chapter 1.2 pp.16-21 Go over “graphing of a wave-reinforcing graphing skills p.19 Investigation :How can you change frequency? P. 20 (W) Investigation: Wavelength p.22 (W) 	<ul style="list-style-type: none"> Frequency is the number of waves made by a source through a medium every second. Period is the time for one complete wave (oscillation) Wavelength is the linear distance or length of one complete wave. Velocity is the speed of the wave. Amplitude is the maximum displacement of the medium.
4	Waves behave in predictable ways	<ul style="list-style-type: none"> Text reference: Chapter 1.3 pp. 24-30 Investigation: How do ripples reflect? P.24 Demonstrate: Reflection of waves & Refraction p.25 (W) Investigation: How can you make a wave diffract? P.26 (W) Discuss p. 27 & 28 (W) “Waves Interact with other waves” 	<ul style="list-style-type: none"> Waves can reflect, refract, diffract, and interfere with each other. Constructive interference is where wave energies add up and destructive is where energies subtract from each other.

5	Sound is a wave	<ul style="list-style-type: none"> • Text reference: Chapter 2.1-2.2 pp.34-48 (W) • Investigations: (Set up stations for “Explore Activities” on page 35 (W)) • Investigation: What is sound p/37 (W) 	<ul style="list-style-type: none"> • Sound is a longitudinal wave
7	How do we hear sound waves?	<ul style="list-style-type: none"> • Text reference: pp. 38-39 (W) • Discuss diagrams, pp.38-39 (vocal chords & ears”)(W) 	<ul style="list-style-type: none"> • Structure of the ear and vocal chords are important to their function as receiver and transmitter of sound waves. • Sound waves travel through solids, liquids, and gases.
8	How does sound transfer energy? (How does sound waves vibrate particles?)	<ul style="list-style-type: none"> • Investigation: p.41 How does sound transfer energy? p. 41 (W) 	<ul style="list-style-type: none"> • Sounds travel fastest in solids, then slower in liquids, and slowest in gases due to the arrangement/closeness of particles that transfer energy.
9	What are the unique traits of electromagnetic waves?	<ul style="list-style-type: none"> • Text reference: 3.0 -3.3 (W) pp.72 -92 • Investigation: How does the signal from a remote control travel? P. 73 (W) <u>or</u> demonstration with SMART Board Remote • Investigation: How can you make radio waves? P. 79 (W) • Discuss: Are cell phones harmful? P.87 (W) • Investigation: Wavelength & Color p.p. 100-101, (W) • Demonstrate: Prisms and light-colors/spectrum 	<ul style="list-style-type: none"> • Electromagnetic waves travel through various media and space (vacuum) • Color of an object depends on the wavelengths of light reflected by the object. • White light is composed of all the colors of the spectrum.