



**Grade 4**

**3.2.4.G Physical Science:** Waves and Their Applications in Technologies for Information Transfer

**Students who demonstrate understanding can generate and compare multiple solutions that use patterns to transfer information.**

**Clarifying Statement:** Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.

**Assessment Boundary:** N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
<p><b>Constructing Explanations and Designing Solutions</b></p> <p>Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</p> <ul style="list-style-type: none"> <li>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.</li> </ul>	<p><b>PS4.C: Information Technologies and Instrumentation</b></p> <ul style="list-style-type: none"> <li>Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.</li> </ul> <p><b>ETS1.C: Optimizing The Design Solution</b></p> <ul style="list-style-type: none"> <li>Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.</li> </ul>	<p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Similarities and differences in patterns can be used to sort and classify designed products.</li> </ul> <hr/> <p style="text-align: center;"><b><i>Connections to Engineering, Technology, and Applications of Science</i></b></p> <p><b>Interdependence of Science, Engineering, and Technology</b></p> <ul style="list-style-type: none"> <li>Knowledge of relevant scientific concepts and research findings is important in engineering.</li> </ul>

**Pennsylvania Context:** N/A

**PA Career Ready Skills:** Identify multiple ways to solve conflicts and practice solving problems.

**Connections to Other Standards Content and Practices**

Standard Source	Possible Connections to Other Standard(s) or Practice(s)
Agriculture (AFNR)	CS.01.02.01.c: Solve problems in AFNR work-places or scenarios using technology.
Science, Environmental Literacy and Sustainability (NAAEE)	K-4 Strand 3.1.C. Identifying and critiquing alternative solutions and courses of action: Learners develop plans, including possible design solutions, for addressing selected local environmental issues.
PA Core Standards: ELA	CC.1.5.4.A: Engage effectively in a range of collaborative discussions on grade-level topics and texts, building on others' ideas and expressing their own clearly.



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
PA Core Standards and Practices: Math	MP.4: Model with mathematics. CC.2.4.4.A.4: Represent and interpret data involving fractions using information provided in a line plot.
PA Standards: Social Studies	N/A
Educational Technology (ISTE)	1.4. Innovative Designer: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
Technology and Engineering (ITEEA)	STEL-7M: Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.