1-PS4-4  Waves and Their Applications in Technologies for Information Transfer

Students who demonstrate understanding can:
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]

The performance expectation above was developed using the following elements from the NRC document A Framework for K-12 Science Education:

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
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<tbody>
<tr>
<td><strong>Constructing Explanations and Designing Solutions</strong></td>
<td><strong>PS4.C: Information Technologies and Instrumentation</strong></td>
<td><strong>Connections to Engineering, Technology, and Applications of Science</strong></td>
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<td>Constructing explanations and designing solutions in K-2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</td>
<td>People also use a variety of devices to communicate (send and receive information) over long distances.</td>
<td>Influence of Engineering, Technology, and Science, on Society and the Natural World</td>
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<td>• Use tools and materials provided to design a device that solves a specific problem.</td>
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**Observable features of the student performance by the end of the grade:**

1 Using scientific knowledge to generate design solutions
   a Students describe* a given problem involving people communicating over long distances.
   b With guidance, students design and build a device that uses light or sound to solve the given problem.
   c With guidance, students describe* the scientific information they use to design the solution.

2 Describing* specific features of the design solution, including quantification when appropriate
   a Students describe* that specific expected or required features of the design solution should include:
      i. The device is able to send or receive information over a given distance.
      ii. The device must use light or sound to communicate.
   b Students use only the materials provided when building the device.

3 Evaluating potential solutions
   a Students describe* whether the device:
      i. Has the expected or required features of the design solution,
      ii. Provides a solution to the problem involving people communicating over a distance by using light or sound.
   b Students describe* how communicating over long distances helps people.