

DCI: Waves and Their Applications in Technologies for Information Transfer

1.PS4.A: Wave Properties

Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)

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1.PS4.B: Electromagnetic Radiation

Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)

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1.PS4.B: Electromagnetic Radiation

Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)

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1.PS4.C: Information Technologies and Instrumentation

People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)

Performance Expectation

1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.

Assessment Boundary: none

Performance Expectation

1-PS4-2: Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.

Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.

Assessment Boundary: none

Performance Expectation

1-PS4-3: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.

Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).

Assessment Boundary: Assessment does not include the speed of light.

Performance Expectation

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.

Science and Engineering Practice

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1), (1-PS4-3)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

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 phenomenon and designing solutions.

Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

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 phenomenon and designing solutions.

Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)

Crosscutting Concept

Cause and Effect

Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1), (1-PS4-2), (1-PS4-3)

Connection to Nature of Science

Scientific Investigations Use a Variety of Methods

Scientists use different ways to study the world. (1-PS4-1)

Connection to Nature of Science

Scientific Investigations Use a Variety of Methods

Science investigations begin with a question. (1-PS4-1)

Connection to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Common Core State Standards for ELA/Literacy

Speaking & Listening

SL.1.1 - Comprehension and Collaboration

Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1-PS4-3)

Common Core State Standards for ELA/Literacy

Card Type name

W.1.2 - Text Types and Purposes

Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)

Common Core State Standards for ELA/Literacy

Card Type name

W.1.7 - Research to Build and Present Knowledge

Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-PS4-1), (1-PS4-2), (1-PS4-3), (1-PS4-4)

Common Core State Standards for ELA/Literacy

Card Type name

W.1.8 - Research to Build and Present Knowledge

With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1), (1-PS4-2), (1-PS4-3)

Common Core State Standards for Mathematics

Measurement & Data

1.MD.A.1 - Measure lengths indirectly and by iterating length units.

Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)

Common Core State Standards for Mathematics

Measurement & Data

1.MD.A.2 - Measure lengths indirectly and by iterating length units.

Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)

Common Core State Standards for Mathematics

Mathematical Practices

MP.5 - Use appropriate tools strategically

CCSS text (1-PS4-4)