

HS-PS4-3 Waves and Their Applications in Technologies for Information Transfer

California Alternate Assessment for Science—Item Content Specifications

# HS-PS4-3 Waves and Their Applications in Technologies for Information Transfer

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
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| Recognize that electromagnetic radiation (e.g., a radio, microwave, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. | 1. Ability to recognize that electromagnetic radiation (e.g., a radio, microwave, light) can be modeled as particles called photons. | Electromagnetic radiation (e.g., radio, microwave, light) can be modeled as a wave. |

## **CA NGSS Performance Expectation**

Students who demonstrate understanding can:

**Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.** [Clarification Statement: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, and photoelectric effect.] *[Assessment Boundary: Assessment does not include using quantum theory.]*

## Mastery Statements

Students will be able to:

* Identify that electromagnetic radiation travels in waves
* Compare the movement of electromagnetic radiation waves to the movement of other objects or materials
* Identify that electromagnetic radiation is a form of energy
* Identify that electromagnetic radiation is in photons, which are like tiny particles

## Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Light from the Sun
* Microwave ovens
* Cell phone transmittal
* Television or radio tower transmission

## Additional Assessment Boundaries

* None listed at this time

## Additional References

California Science Test Item Specification for HS-PS4-3

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-hs-ps4-3.docx>

Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

The *2016 Science Framework for California Public Schools Kindergarten through Grade Twelve* <https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade Twelve

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

Appendix 2: Connections to Environmental Principles and Concepts

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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