

# Physics I: Grades 9, 10, 11, 12

Adopted 2022

## Forces and Interactions

**HS-PS2-1.** Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. [HS-PS2-1](#)

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**HS-PS2-2.** Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. [HS-PS2-2](#)

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**HS-PS2-3.** Apply scientific and engineering ideas to design, evaluate, and refine a device for example, one that minimizes the force on a macroscopic object during a collision. [HS-PS2-3](#)

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**HS-PS2-4.** Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. [HS-PS2-4](#)

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**HS-PS2-6.** Use mathematical representations to represent simple harmonic motion and pendulums. [HS-PS2-6](#)

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## Energy

**HS-PS3-1.** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. [HS-PS3-1](#)

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**HS-PS3-2.** Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). [HS-PS3-2](#)

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**HS-PS3-3.** Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. [HS-PS3-3](#)

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**HS-PS3-5.** Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. [HS-PS3-5](#)

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**HS-PS3-6.** Design, develop and analyze simple circuits and circuit elements. [HS-PS3-6](#)

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## Wave Properties

**HS-PS4-1.** Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. [HS-PS4-1](#)

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## Electromagnetic Radiation

**HS-PS4-3.** 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. [HS-PS4-3](#)

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**HS-PS4-4.** Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. [HS-PS4-4](#)