

# Physical Science: Grades 9-12

## Structure and Properties of Matter

- 1 Use the periodic table to identify patterns among familiar elements (such as, their location in the Periodic Table, the number of electrons, their relative size, and/or how they are classified). Familiar Elements include: Hydrogen, Helium, Oxygen, Copper, Tin, Nickel, Carbon, Sodium, Potassium, Calcium, Lead, Iron, Gold, Silver, Aluminum, Neon.** [EE.HS-PS1-1](#)
  - H** Use the periodic table to identify patterns among familiar elements (such as their location in the Periodic Table, the number of electrons, their relative size, and/or how they are classified). Familiar Elements include: Hydrogen, Helium, Oxygen, Copper, Tin, Nickel, Carbon, Sodium, Potassium, Calcium, Lead, Iron, Gold, Silver, Aluminum, Neon. [EE.HS-PS1-H.1](#)
  - M** Use illustrations or models to identify how familiar elements are used in real-world situations. Familiar elements include: Helium, Oxygen, Copper, Tin, Nickel, Carbon, Sodium, Potassium, Calcium, Lead, Iron, Gold, Silver, Aluminum, Neon. [EE.HS-PS1-M.1](#)
  - L** Given the name and description of a familiar element, identify a real-world use. Familiar elements include: Helium, Oxygen, Copper, Nickel, Sodium, Calcium, Iron, Gold, Silver, Aluminum, Neon. [EE.HS-PS1-L.1](#)

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- 2 Use an investigation to describe the relationship between the melting and/or boiling points of a common substance and/or that as the temperature increases, so does the spacing and motion of the particles of the substance.** [EE.HS-PS1-3](#)
  - H** Use an investigation to describe the relationship between the melting and/or boiling points of a common substance and/or that as the temperature increases, so does the spacing and motion of the particles of the substance. [EE.HS-PS1-H.3](#)
  - M** Use an investigation to identify the melting point and/or boiling point of a familiar substance. [EE.HS-PS1-M.3](#)
  - L** Identify a familiar substance as boiling or melting. [EE.HS-PS1-L.3](#)

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**3 Use evidence to describe the relationship between the structure (properties) and function of natural materials or those made by humans.** EE.HS-PS2-6

- H Use evidence to describe the relationship between the structure (properties) and function of natural materials or those made by humans. EE.HS-PS2-H.6
  - M Use evidence to identify one or more structure properties (such as strength, weight, heat conductivity, durability, flexibility, magnetism, or buoyancy, etc.) of a given natural material or one made by humans. EE.HS-PS2-M.6
  - L Observe and identify a material (such as metal, plastic, or plant material) used to make a familiar product. EE.HS-PS2-L.6
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**Chemical Reactions**

**1 Use models, simulations, or illustrations to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar).** EE.HS-PS1-2

- H Use models, simulations, or illustrations to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar). EE.HS-PS1-H.2
  - M Use illustrations, models, or simulations to identify the changes that occur during a chemical reaction. EE.HS-PS1-M.2
  - L After observing a familiar chemical reaction, identify a result of the chemical reaction. EE.HS-PS1-L.2
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**2 Use evidence to explain how changes in temperature and/or concentration of the reacting particles can affect the rate of reactions.** EE.HS-PS1-5

- H Use evidence to explain how changes in temperature and/or concentration of the reacting particles can affect the rate of reactions. EE.HS-PS1-H.5
  - M While observing a chemical reaction identify that increasing the temperature makes the reaction happen faster. EE.HS-PS1-M.5
  - L While observing a chemical reaction involving the increase of temperature, identify the source of change (i.e., heat). EE.HS-PS1-L.5
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**Forces and Interactions**

**1 Use data to describe how the net force acting on an object, or the mass of the object impacts its acceleration (as increasing, decreasing, or staying the same) or the direction of the object.** EE.HS-PS2-1

- 1 Use data to describe how the net force acting on an object, or the mass of the object impacts its acceleration (as increasing, decreasing, or staying the same) or the direction of the object. EE.HS-PS2-H.1
- 2 Use data or simulations to determine how a force (e.g., push, pull, gravity, or friction) acting on an object changes the speed of an object. (e.g., faster, slower, stays same, or stops). EE.HS-PS2-M.1
- 3 Given an object that has a push/pull force applied and an object without a force applied, identify which of the two objects goes faster as it moves down a ramp or along a flat surface. EE.HS-PS2-L.1

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**2 Use models, illustrations, or simulations to show the change in momentum of each object after two objects collide or show that the total momentum remains the same as before the collision.** EE.HS-PS2-2

- H Use models, illustrations, or simulations to show the change in momentum of each object after two objects collide or show that the total momentum remains the same as before the collision. EE.HS-PS2-H.2
- M Using models, illustrations, or simulations, to describe that, after a collision between two objects, the force of movement (momentum) for each object is in the opposite direction of the original movement. EE.HS-PS2-M.2
- L Given objects with and without momentum, identify the object that is moving. EE.HS-PS2-L.2

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**3 Use models, illustrations, or simulations to show how factors, such as relative size, charge of particles, relative quantity of charges, and/or relative distance between objects affect the gravitational or electrostatic force between objects.** EE.HS-PS2-4

- H Use models, illustrations, or simulations to show how factors, such as relative size, charge of particles, relative quantity of charges, and/or relative distance between objects affect the gravitational or electrostatic force between objects. EE.HS-PS2-H.4
- M Use models, illustrations, or simulations to show how factors, such as charge of particles, and/or relative distance between objects affect the electrostatic force between the objects. EE.HS-PS2-M.4
- L Identify the objects that attract (stick together) or repel (push apart) due to electrostatic forces. EE.HS-PS2-L.4

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**4 Use an investigation to identify evidence that an electric current produces a magnetic field and/or a changing magnetic field produces an electric current.** EE.HS-PS2-5

- H Use an investigation to identify evidence that an electric current produces a magnetic field and/or a changing magnetic field produces an electric current. EE.HS-PS2-H.5
  - M Use evidence to identify when a magnetic field and/or an electric current is flowing. EE.HS-PS2-M.5
  - L Given a simple electric circuit, identify when an electric current is flowing (such as when an appliance or device is on). EE.HS-PS2-L.5
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## Energy

### 1 Use evidence to describe devices that convert one form of energy into another form of energy. EE.HS-PS3-2-3

H Use evidence to describe devices that convert one form of energy into another form of energy. EE.HS-PS3-H.2-3

M Given evidence, identify one or more form(s) of energy used by a device. EE.HS-PS3-M.2-3

L Given demonstrations or models of energy, identify the form of energy. EE.HS-PS3-L.2-3

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### 2 Use an investigation to provide evidence that heat transfers between substances until energy is uniformly distributed. EE.HS-PS3-4

H Use an investigation to provide evidence that heat transfers between substances until energy is uniformly distributed. EE.HS-PS3-H.4

M Use evidence to compare the temperatures of two substances of different temperatures before and after combining. EE.HS-PS3-M.4

L Given two materials with different temperatures, identify which material is hotter or cooler, before or after a transfer of thermal energy. EE.HS-PS3-L.4

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### 3 Use a model to describe the magnetic or electric forces and fields of two interacting objects and/or the resulting change in the motion of the objects. EE.HS-PS3-5

H Use a model to describe the magnetic or electric forces and fields of two interacting objects and/or the resulting change in the motion of the objects. EE.HS-PS3-H.5

M Use a magnet to demonstrate that objects with opposite charges attract and objects with like charges repel. EE.HS-PS3-M.5

L Use the results of an experiment to identify materials that are attracted to a magnet. EE.HS-PS3-L.5

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## Waves and Electromagnetic Radiation

### 1 Use a wave model to provide evidence to describe/identify a relationship between two wave properties (vibration, speed, wavelength, frequency) or how a device uses waves to transmit information. EE.HS-PS4-1-5

H Use a wave model to provide evidence to describe/identify a relationship between two wave properties (vibration, speed, wavelength, frequency) or how a device uses waves to transmit information. EE.HS-PS4-H.1-5

M Use evidence to compare effects of sound or light traveling through media or recognize that a device uses waves to transmit information. EE.HS-PS4-M.1-5

L Use models or a demonstration to identify the type of wave (sound, light, etc.) used in devices. EE.HS-PS4-L.1-5

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**2 Use evidence to describe advantages of digital devices and digital information storage.** EE.HS-PS4-2

**H** Use evidence to describe advantages of digital devices and digital information storage. EE.HS-PS4-H.2

**M** Use evidence to identify how digital devices are beneficial. EE.HS-PS4-M.2

**L** Given a digital device and an analog device, identify the digital device. EE.HS-PS4-L.2