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National Content Standards • Grades 5–8

C. Heat

Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.

The 14 Big Ideas About Heat & Corresponding Labs

Idea 1. Heat is a form of energy and can be produced by friction between two objects, electricity flowing through an object, light being absorbed by an object, or combining one chemical substance with another.

Idea 2. The temperature of an object is defined as the average amount of heat and is measured using a tool called a thermometer. Temperature is independent of the mass of an object.

Idea 3. When the temperature of a material increases, the motion of the atoms in that material also increases. When the temperature decreases, the speed of the molecules also decreases.

Idea 4. Heat is measured in units called calories. The more mass an object has the more heat it can store. The amount of heat an object can absorb is measured as its specific heat.

Idea 5. Heat always moves from hot to cold. The greater the difference in temperature between two objects, the faster their temperatures change.

Idea 6. Insulation is the ability of a material to prevent the movement of heat.

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Idea 7. Heat waves can radiate through a vacuum or gas in all directions. Gases expand when they are heated and contract when they are cooled.

Idea 8. Heat can travel through gases and liquids as a convection current. Liquids and gases expand when they are heated and contract when they are cooled.

Idea 9. Heat can be conducted through solids. Solids expand when they are heated and contract when they are cooled. The amount that they change is measured as the coefficient of expansion.

Idea 10. Added heat can cause solids to change state and become liquids. This is called the melting point of a substance and it is used to identify the material. Added heat can also cause liquids to change state and become gases. This is called the boiling point of a substance and it is used to identify the material.

Idea 11. If enough heat is added to a material that it bursts into flames, it has reached a temperature called the kindling point.

Idea 12. Removing heat can cause gases to change state and become liquids. This is called the condensation point of a substance and it is used to identify the material. Removing heat can also cause liquids to change state and become solids. This is called the freezing point of a substance and it is used to identify the material.

Idea 13. Some materials change directly from solids to gases or from gases to solids. This characteristic is called sublimation.

Idea 14. Heat causes the molecules in some substances to rearrange. When this happens, a measurable change can be observed.