

# 08: Heat & Phase Changes

Content Area: **Special Education**  
Course(s):  
Time Period: **Full Year**  
Length: **4 weeks**  
Status: **Published**

## General Overview, Course Description or Course Philosophy

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Physical Science establishes a basic approach to the fundamentals of chemistry and physics. The following concepts will be explored: atomic structure, chemical bonding, chemical reactions, the periodic table, kinetic theory, and kinematics. The use of technology to gather and analyze data will be incorporated. This course is concept-oriented with a focus on Chemistry and Physics in the real world. Laboratory work and special projects will facilitate active learning and accommodate different learning styles.

## CONTENT AREA STANDARDS

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SCI.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.
SCI.HS-PS3-4	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

## RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

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MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are

	appropriate to task, purpose, and audience.
LA.WHST.11-12.6	Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.
TECH.9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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- the kinetic molecular theory can be used to explain the properties of solids, liquids, and gases, and that changing between them involves the flow of energy.
- Temperature is a measure of the average kinetic energy for the molecules/atoms in a substance.
- Heat flow is the energy transfer between objects due to a temperature difference between them.
- The energy that a substance has due to its temperature is its internal energy.

## **INTERDISCIPLINARY CONNECTIONS**

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Algebra, ELA/Literacy, Geometry

## **EVIDENCE OF LEARNING**

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Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

## **Formative Assessments**

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- Checks for understanding during lesson
- Online feedback (CK-12)
- Do Now activities.
- Student-centered questioning and discussion that is facilitated by instructor.

- Exit Tickets.

## **Summative Assessments**

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- Benchmarks – departmental benchmark given at the end of MP1, MP2, and MP3
- Alternative Assessments
  - Lab inquiries and investigations
  - Lab Practicals
  - Exploratory activities based on phenomenon
  - Gallery walks of student work
  - Creative Extension Projects
  - Build a model of a proposed solution
  - Let students design their own flashcards to test each other
  - Keynote presentations made by students on a topic
  - Portfolio

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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Vernier.com/experiments

Khan Academy, Crash Course Physics, and Bozeman Science

American Chemical Society ([acs.org/content/acs/en/education/resources/highschool.html](https://acs.org/content/acs/en/education/resources/highschool.html))

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.