HARVEST OF THE MONTH - DECEMBER / DAIRY

Grades 6 - 8

KANSAS STATE DEPARTMENT OF EDUCATION

Kansas leads the world in the success of each student.

JULY 10, 2025

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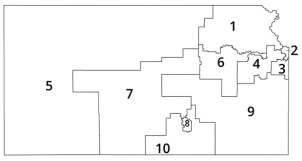

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SUCCESS DEFINED

A successful Kansas high school graduate has the

- Academic preparation,
- Cognitive preparation,
- Technical skills,
- Employability skills and
- Civic engagement

to be successful in postsecondary education, in the attainment of an industry recognized certification or in the workforce, without the need for remediation.

OUTCOMES

- Social-emotional growth
- Kindergarten readiness
- Individual Plan of Study
- Civic engagement
- Academically prepared for postsecondary
- High school graduation
- Postsecondary success

Kansans CAN

MISSION

To prepare Kansas students for lifelong success through rigorous, quality academic instruction, career training and character development according to each student's gifts and talents.

VISION

Kansas leads the world in the success of each student.

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Kansas leads the world in the success of each student.

July 1, 2025

HARVEST OF THE MONTH

December / Dairy

INTRODUCTION

Over the next few weeks, we will be learning about a kind of food that we harvest in Kansas. I'm going to give you some clues to see if you can guess what this food is.

- This type of food doesn't grow from the ground. These types of food are made from milk. Usually from cows and goats, but sometimes other animals as well.
- This type of food provides our bodies with calcium which helps to make our bones and teeth strong.
- This type of food can include things like milk, whipped cream, yogurt, cheese, butter, and even ice cream!

Can you guess what food I'm talking about? We will be learning about Dairy!

VOCABULARY

Solid: A state of matter that has a definite shape and volume. The particles are packed tightly and don't move much.

Liquid: A state of matter that has a definite volume but takes the shape of its container. The particles can move around more than in a solid.

Gas: A state of matter that doesn't have a definite shape or volume. The particles move freely and spread out to fill any space.

Energy Transfer: The movement of energy from one object or place to another, like when heat moves from the Sun to Earth or from a stove to a pot.

Atoms: The tiny building blocks of all matter. Everything around you is made of atoms.

Molecular Movement: How molecules (groups of atoms) move. In solids, they vibrate; in liquids, they move around each other; in gases, they move quickly in all directions.

GENERAL RESOURCES

ENGAGE

Project the following picture for students to see:

Picture taken from https://superstem.scholastic.com

Ask students to create a notice and wonder chart like the one below:

Notice	Wonder

Lead a class discussion about what students notice and wonder about the picture. Listen for ideas that are centered around:

- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.

Have students navigate to the following article at superstem.scholastic.com[1] for students to read with a partner.

1 https://superstem.scholastic.com/issues/2023-24/050124/ice-cream-creator.html?language=english#700L

EXPLORE

Explain to students they are going to become food scientists and are going to make ice cream using what they know about how phase change occurs.

Use the following procedure for students to work in groups of three to four to make ice cream in a bag.

Activity adapted from sciencebuddies.org.[2]

1. In each small sealable bag, place one tablespoon of sugar, ½ cup of half-and-half (or milk or heavy whipping cream), and ¼ teaspoon of vanilla extract. Seal both bags well.

   Image Credit: Teisha Rowland, Science Buddies / Science Buddies

2. Add four cups of ice cubes to one of the large, gallon-sized bags. Then add ½ cup of salt to the bag.

   Image Credit: Teisha Rowland, Science Buddies / Science Buddies

3. Put one of the small bags you prepared into the large bag with the ice cubes. Be sure both bags are sealed shut.

   Image Credit: Teisha Rowland, Science Buddies / Science Buddies

2 https://www.sciencebuddies.org/stem-activities/ice-cream-bag

4. Put on oven mitts or wrap the bag in a small towel and then shake the bag for five minutes. Feel the smaller bag every couple of minutes while you shake it, and take a peek at it.

   Image Credit: Teisha Rowland, Science Buddies / Science Buddies

5. Now add four cups of ice cubes to the other large, gallon-sized bag, but this time do not add any salt to it. What do you think will happen without using salt?
6. Put the other small bag you prepared into this large bag. Be sure both bags are sealed.
7. Put on oven mitts or wrap the bag in a small towel and then shake the bag for five minutes, as you did before. Again, feel the smaller bag every couple of minutes while you shake it, and take a peek at it.
8. If you successfully made some ice cream, you can enjoy it now as a tasty reward for your chemistry challenge!

Cleanup

If you would like, you can enjoy your tasty ice cream treat now or save it in the freezer for later.

EXPLAIN

You should have seen that the ice cubes in the large bag with salt melted much more, and felt much colder, than the ice cubes in the large bag without salt. Because it was cold enough (several degrees below freezing), the ice cube bag with salt should have been able to cool the ingredients enough to harden them and turn them into ice cream. In contrast the ice cube bag without salt was not cold enough to do this and the ingredients should have remained fluid.

Do not worry, the second bag is not wasted — you can go back and turn the still liquid ingredients into ice cream! Simply put the small bag in the large bag that had ice cubes and salt and shake them for another five minutes.

If you have ever made ice cream with an old-fashioned hand-crank machine, you probably packed a mixture of ice and rock salt around the container holding the cream. The salt allows the ice and salt mixture to get colder than pure water ice. This extra-cold mixture of salt and ice is able to freeze the ingredients in the ice cream machine (and in the bags you used in this activity) and turn them into ice cream. (This is the same process that goes on when icy roads have salt spread on them to melt the ice.) While pure water freezes at 0 degrees Celsius (32 degrees Fahrenheit), water mixed with salt will freeze below 0 degrees Celsius.

In creating your ice cream you also made an emulsion. Emulsions are the combination of two liquids that normally do not mix well like fats and water. In your ice cream the fat molecules in the cream are perfectly mixed with water, ice crystals, sugar, and small pockets of air to form a delicious cold treat.

Dairy is essential to our lives. Share with students the dairy infographic[3].

ELABORATE

Schedule a visit from the mobile dairy classroom for your students to experience[4].

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3 https://www.dairymax.org/sites/default/files/DMH_26931_13_Nutrients_Handout_PrintReady.pdf

4 https://www.southwestdairyfarmers.com/pages/mobile-dairy-classroom#

KANSAS SCIENCE STANDARDS ADDRESSED

MS-PS1-4 Matter and its Interactions

Students who demonstrate understanding can:

MS-PS1-4

Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Clarification Statement:
Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education.

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to predict and/or describe phenomena.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.

PS3.A: Definitions of Energy

- The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary)
- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary)+

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects. (5-PS3-1)

Connections to other DCIs in fifth grade: N/A

Articulation of DCIs across grade-levels: K.LS1.C (5-PS3-1); 2.LS2.A (5-PS3-1); 4.PS3.A (5-PS3-1); 4.PS3.B (5-PS3-1); 4.PS3.D (5-PS3-1); MS.PS3.D (5-PS3-1); MS.PS4.B (5-PS3-1); MS.LS1.C (5-PS3-1); MS.LS2.B (5-PS3-1)

Common Core State Standards Connections: ELA/Literacy

RI.5.7
Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1)

SL.5.5
Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-PS3-1)

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