

JSD 3D Learning Activity Template

Grade:6

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Combined effort in planning

Title:

Heat transfer- The Making of Ice Cream

Utah Science with Engineering Education Standard (SEEd):

Standard 6.2.4 Design an object or tool that Maximizes heat energy transfer.

Key crosscutting concept(s) (CCC):

Energy and Matter

Stability and Change

Cause and Effect

Key science and engineering practice(s) (SEP):

Developing and using models

Planning and carrying out investigations

Asking questions and defining problems

Constructing Explanations and Designing Solutions

Materials:

Various size metal or plastic coffee cans with lids,
rock salt,
crushed ice,
1C milk,
1C half and half,
¼ C sugar,
1tsp vanilla

Time: 1 to 2 hours

Teacher background, key content information and hints:

Chemistry and heat transfer. Heat is the transfer of thermal energy between substances that are at different temperatures. Heat is always transferred from warm to cold so how does ice cream get frozen? The temperature from the ice and rock salt is colder than the cream mixture. When ice cream is being made the all of the heat from the cream mixture is transferring to the ice and salt thus making the ice to melt a bit and the ice cream's temperature to get colder and freeze.

Prior knowledge that students need:

Heat- the transfer of thermal energy between substances that are at different temperatures.

Freezing point is the temperature at which a substance changes from a liquid to a solid

States of matter are the different phases matter can take- solid, liquid and gas.

Students need to know that heat transfers from warm to cold and not have the misconception that the cold is transferring into the cream mixture. What is happening is that the temperature of the ice is lower than the cream mixture and during the ice cream making process, the heat from the cream mixture is transferring out of it and the temperature is stabilizing with the ice.

Learning Activity Plan

These three aspects of a lesson should be identified in your learning activity.

Gathering: (Obtain Information, Ask Questions/Define Problems, Plan & Carry Out Investigations, Use Models to Gather Data and Information, Use Mathematics/Computational Thinking.)

Reasoning: (Evaluate Information, Analyze Data, Use Mathematics/Computational Thinking, Construct Explanations/Solve Problems, Develop Arguments from Evidence, Use Models to Predict & Develop Evidence.)

Communicating: (Communicate Information, Argue from Evidence (written & oral), Use Models to Communicate).

Phenomenon: We know that heat transfer is from warm to cold, so how does ice cream freeze?

Learning Activity:

- Step 1. Research the chemistry behind ice cream making**
- Step 2. Brainstorm ideas about how you might design a low tech ice cream maker**
- Step 3. Draw a diagram of your design**
- Step 4 Construct your ice cream maker**
- Step 5 Test your ice cream maker**
- Step 6 evaluate the performance of your ice cream maker**
- Step 7 Identify how to improve the design of your ice cream maker**
- Step 8. Make the needed changes**
- Step 9. Retest and re evaluate your ice cream maker**
- Step 10. Share your results**

Assessment of student learning

Have the students write a few paragraphs describing in their own words what occurred that caused the ice cream to freeze instead of staying in a liquid state.

Have them make a drawing of a model of the ice cream maker design and label the design with an explanation of what is happening to the cream mixture.

Have them write a conclusion or a summary of the task and what actually happened to get the ice cream frozen.

Write a reflection of how they could have made the ice cream maker more effective.

Short description of the evidence the teacher is willing to accept that a student is proficient with the performance expectations.

This may be a rubric, narrative, or other set of descriptors that are useful for distinguishing proficient from non-proficient performances.

Student Page

Name _____

Title: The Ice Cream Maker

Draw and label a model of your ice cream maker that you are going to build. Explain your strategy on how you are going to use the cans, ice, and salt to make ice cream.

List any changes you made after you tested the ice cream maker.

Conclusion and Reflection: Making an Ice Cream Maker

Name:

What was happening when the ice cream was freezing?

Name one thing you didn't expect to happen when making your ice cream maker:

If you were to do this project again, what would you improve?

Now that you've finished making your ice cream maker, what would you now like to learn more about?

What do you now understand about heat transfer?

What was the easiest part of this assignment?

What was the hardest part of this assignment?