

JSD 3D Learning Activity Template

Grade: 6th

Title: Heat it up with popcorn!

Utah Science with Engineering Education Standard (SEEd): Develop a model to predict the effect of heat energy on solids (states of matter).

Key crosscutting concept(s) (CCC): Energy and matter: flows

Key science and engineering practice(s) (SEP): Developing and using models. Constructing explanations.

Materials: Students - Heat it up with popcorn worksheet, pencil and colored pencils.

Teacher: Popcorn, hot air popcorn popper, microwave, lunch sack, pan, and oil.

Time: 1 hour

Teacher background, key content information and hints: An understanding of convection, conduction, and radiation. Make sure you can pop the popcorn with each method of heat transfer. I would try the microwave and stove top method if you have not done it before. See the attached you tube video for how to pop popcorn in the microwave, without using prepackaged popcorn, <https://youtu.be/bEAQGEQrZs4>. I am also attaching a video on how to pop stovetop popcorn, without using jiffy pop, <https://youtu.be/k5ZwWoQMbH0> Here is a link on hot air popper popcorn in case you can't teach in the faculty room to demonstrate yourself <https://youtu.be/LgNhBWmD-rc>.

Prior knowledge that students need: An understanding of convection, conduction, and radiation. This should be after several investigations on heat transfer.

Learning Activity Plan

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

Gathering: Students will use their previous knowledge of heat transfer to develop models of how popcorn is cooked using a stovetop, microwave, and hot air popcorn popper.

Reasoning: Students will construct explanations of the three types of heat transfer and provide an example of each. They will also model the three types of heat transfer used in popping popcorn.

Communicating: After each pair has completed their models, they will explain what they drew and how heat is transferred through that method of cooking popcorn.

Phenomenon: Heat is transferred in three ways.

Learning Activity: Students will explain heat transfer and give an example of each. They will also construct a model of the three types of heat transfer used to cook popcorn. They must label each picture and show the movement of heat. After the students draw their models and explain each type of heat transfer, the teacher will demonstrate each method to cook popcorn. The students can then eat the popcorn. :)

Materials for Each Group: heat it up with popcorn worksheet, pencil and colored pencils.

Procedure: Each pair will explain and provide an example of each type of heat transfer. They will then draw a model of the three types of heat transfer that can be used to cook popcorn (do not tell them the ways this is done, they should be able to figure this out on their own). After all the students are done, they will explain why they choose what they did. After the student activity, demonstrate the ways to cook popcorn using the three different methods.

Assessment of student learning: Teacher will assess the students on their explanations and worksheet.

Names: _____

Heat it up with Popcorn!

Heat Transfer

Name each of the three types of heat transfer, explain them, and give an example.

Type of heat transfer	Explanation	Example

Popcorn

Draw and label a picture of each method of popcorn preparation, showing the movement of heat. Below each picture, write the form of heat transfer that is occurring and explain the reason for your answer.

Answers

Stovetop: Conduction - The heat is transferred by direct contact from the pan, to the oil, to the kernels of popcorn.

Microwave: Radiation - The kernels are heated by the radiation in the microwave, and the kernels heat up, giving off more heat to the kernels surrounding it and making it "doubly warm".

Hot air popper: Convection - The hot air transfers the heat to the cooler kernels, and when enough hot air heats the kernels they pop.