

## 18th Century Heating and Cooling System of the Brunner Family at Schifferstadt Lesson Plan

Name of activity: Heating and Cooling at Schifferstadt

Materials needed: Copy of reading article “18<sup>th</sup> Century Heating and Cooling at Schifferstadt” for each student  
Copy of architectural drawing of Schifferstadt for each student or each group for use during and after reading  
Pencil  
Worksheets  
Crayons  
Drawing paper  
Chart paper (2 pieces for each group of 4)  
Overhead projector, chart paper, blackboard or other method for recording class discussion

Duration: 2 forty minute time periods

Indicators: **Language Arts:** 400.60.08 Demonstrate and independently apply the uses of “before and during reading” strategies to create an oral and/or written response to reading

**Social Studies:** 400.30D.01.01a Describe ways and reasons people modify the natural environment and the consequences of modification  
400.40A.03.03b Describe how technological ideas, such as the building of roads, impact the way people live and work

Teacher Background: Information about Schifferstadt can be found on the Frederick County Landmarks Foundation web site. Go to [www.frederickcountylandmarksfoundation.org](http://www.frederickcountylandmarksfoundation.org), click on the button for Schifferstadt, and go to Education.

Lesson Development:

1. Divide the class into groups of 4. Ask each group to create a web on chart paper that shows ways that people today keep their homes warm in the winter.
2. Bring the class together to record their ideas on a class web on overhead projector, chart paper, blackboard or other method. Ideas may include gas, oil, electricity, fireplace, or woodstoves.
3. Then do the same for cooling a house in summer. Ideas may include fans, air conditioners, shade trees, etc.
4. Ask students to think back in time 300 years. Could the people living here at that time use the same methods for heating and cooling their homes? Explain answers. Emphasize the idea that there was no electricity at that time.

5. Introduce the Brunners and their move to Frederick County in the 1700's. Inform students that the home they lived in still stands in Frederick. Display the picture of Schifferstadt. Ask students if anyone has seen or visited the building. If so, elicit what they remember of the building.

Activities:

1. Distribute the reading, "18<sup>th</sup> Century Heating and Cooling at Schifferstadt". Set the purpose for reading: Read to learn about features in the house that allowed the Brunner family to stay warmer in winter and cooler in summer. Inform them that later they will use this information to design a simple house.
2. Before reading, review the questions that students will be answering.
3. Allow time for students to read and answer questions on worksheet. They may read independently, with partners, in small groups, or as a whole class at the discretion of the teacher.
4. As a class, students share their answers to the questions.

5. **For teacher information, here are the questions to be answered. A key can be found after the worksheets.**

- a. Using the information from the reading and the drawing of the house, color in the following items on the drawing:

Cellar    jamb stove    draft door    wishbone chimney center hall    summer kitchen
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- b. Create a chart with two columns. Label one column "heating in winter". Label the other column "cooling in summer". Place each of the following features in the correct column.

Cellar    summer kitchen    jamb stove    draft door Wishbone chimney    center hall    fireplace
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Conclusions:

Students should discuss these questions in small groups. Then bring to whole class discussion. The teacher should record answers.

1. You keep some foods, such as milk and butter, in your refrigerator to keep them cool. Think about these foods. List at least four that the Brunners would have difficulty keeping because they did not have a refrigerator.
2. What fuel did the Brunners use to heat their home? What fuel is used to heat your home? Which is better? List at least 3 advantages of your choice.
3. How did the Brunners use the resources of their environment to make their home comfortable? How did this impact chores and work they had to do?

Thoughtful Application:

Today, many people are worried about the dangers of global warming. (This concept may need to be defined for the students.) Many think that the fuels used to heat and cool houses may be adding to the problem. Some are building houses now that take this into consideration.

Your parents have decided to build a new house. They want to design the house to take advantage of the environment as much as possible to keep the house cool in the warmer months.

They found out that you have learned about Schifferstadt, and they have asked for your help. Make a list of at least 3 features from Schifferstadt that could be used today to help cool a house.

Using these features, draw a design for a house that will stay cooler in the warm weather. Label the features you used in your house.

Assessment/Evaluation:

Students should have designs that incorporate cross-ventilation by having outside doors and/or windows that are directly across from one another. They should also have interior doors that can be opened to allow for cross-ventilation from room to room. There should be an area underground that can be used for cooking in summer (summer kitchen).

Extension:

Learn more about how fire warms an area. Conduct this experiment:

Question: How does fire affect the temperature of an area?

Hypothesis: Fire will cause the air to grow warmer?

Materials:

Candle  
3 matches  
Paper  
Pencil

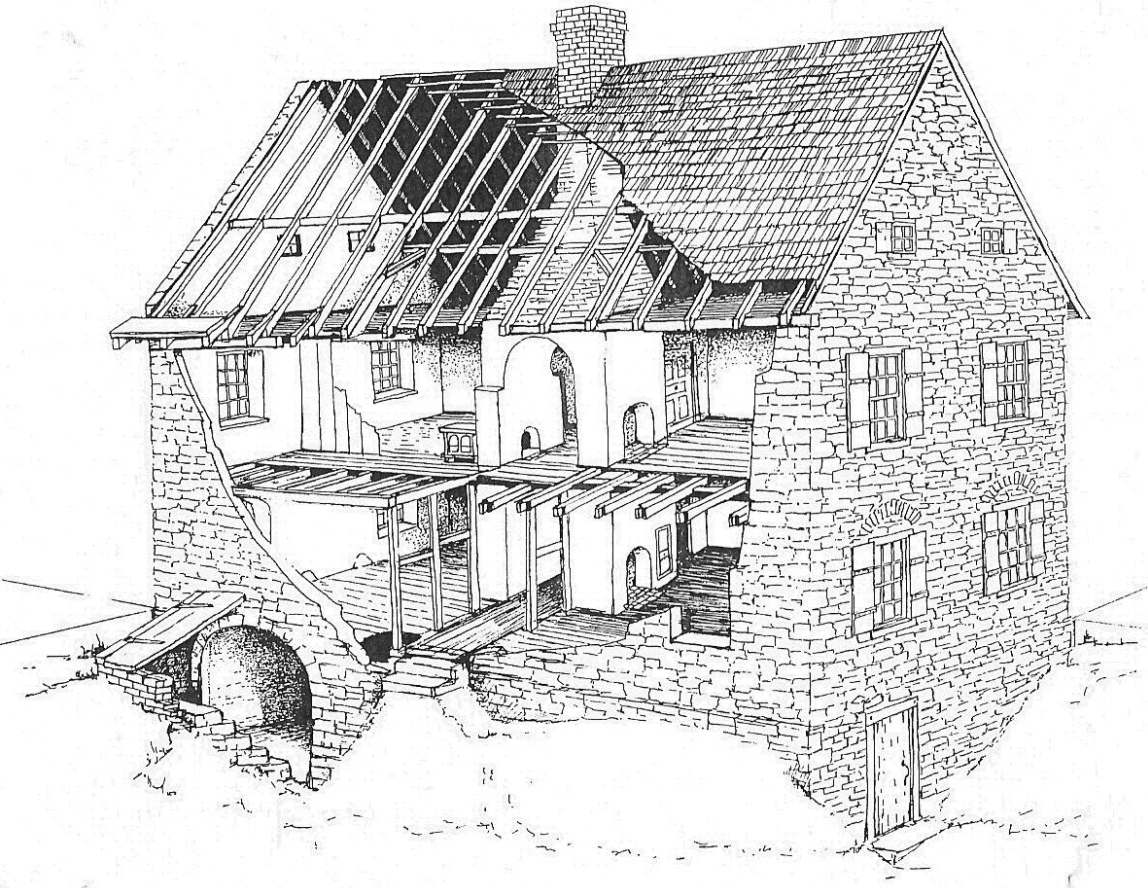
Procedure:

1. With adult supervision, place a candle in a candleholder.
2. Use a thermometer to measure the temperature one inch from the side of the wick of the candle.
3. Then light the candle.
4. After five minutes, measure the temperature one inch from the side of the wick.
5. Record the results on a chart.
6. Repeat steps 2 through 5, but measure two inches from the side of the candle.
7. Repeat these steps, but measure four inches from the side of the candle.

Observations and conclusions:

Look at the data you recorded. What do you observe?  
Go back to the question and the hypothesis. What can you conclude?

ARCHITECTURAL DRAWING OF SCHIFFERSTADT



## 18<sup>TH</sup> CENTURY HEATING AND COOLING AT SCHIFFERSTADT

Imagine moving to a new country, where there are no houses, few neighbors, no electricity, and no stores. This is what the Brunner family did in the 1820's. They had moved to Pennsylvania from Germany and then came to Frederick. They had to build a house using the materials around them, mostly stone and wood. They had no stores, so they had to provide for all of their needs using the materials around them. And they had no electricity, so they had to use materials around them to cook and to heat their home.

It is difficult today to imagine living without electricity. We use electricity every day, and we often take it for granted. We use it to watch TV, light our rooms, cook and store our foods, and to warm our houses. The Brunner family had to do all of this without electricity.

In this lesson, you will learn how they used materials around them to make a house that would stay warm in winter, cooler in summer, and allow them to cook their food.

**COOKING:** One of the most important jobs in colonial times was to provide food for the family every day. This difficult job was accomplished without the help of modern tools we use today such as microwaves, refrigerators or gas stoves.

During most of the year, the family used the large **fireplace** in the **main kitchen** to prepare their food. In front of the fireplace was a **hearth**, or brick floor. Food could be placed in pots and hung from hooks over the hearth to make the food warm. Food could also be placed directly over the fire to cook.

Above the fireplace was a tunnel that went up through the wall to the top of the house called a **flue**. Smoke and heat from the fire went up the flue and out of the house through the **chimney**. As the heat went up the flue, it made the walls around it warm. This warmth helped to heat the kitchen and other rooms in the house. During the cold weather, the fireplace was very important for both heating and cooking.



However, what about in the warm months? Having a fire in the main kitchen every day would make the house warmer, and in the summer that was uncomfortable. The family had a solution called the **summer kitchen**.



The summer kitchen was located underground. There was a passage from it to a cellar where food was stored. Since it was underground, it did not get as hot because the sun never heated it. This area would stay cool all year. A small fireplace and hearth were located there. It was used for cooking in the warm months, and the fireplace in the main kitchen remained empty. This helped to keep the rest of the house cooler.

HEATING: In addition to the kitchen fireplace, the Brunner family used other ways of warming their house during the cold months.

On the first floor of the house were the **main parlor** and the parents' bedroom. The parlor had a **jamb stove** to warm it. The stove was built into the wall, and the Brunners used a small tunnel through the wall to put wood into it. This allowed the dirty wood and ashes to remain outside of the room. That heated the parlor, but what about the bedroom?



The parents had a **draft door**. This was a small opening that looked like a door. It was in the wall between the bedroom and the parlor. When it was open, some of the heat from the parlor moved into the bedroom and kept it warm.

On the second floor of the house were two bedrooms for the children. There were jamb stoves in the walls between these bedrooms to allow heat to go into both bedrooms.

COOLING: While staying warm in the winter could be a problem, staying cool in the summer was a bigger problem. With no electricity, there were no fans or air-conditioning. What are some of the ways the family stayed cool?

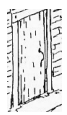
The most important was the use of the **summer kitchen**. By moving this important source of heat away from the living quarters, it helped to keep the house cooler. The family used more strategies to keep the house cooler.



Notice that there is a **center hall** that goes from the front door to the back door of the house. On warm days, the doors could be opened. This allowed a breeze to pass through the house. This is one example of **cross ventilation** that the family used to keep the house cooler.



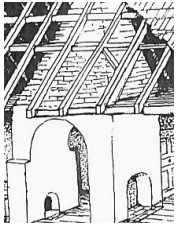
In the bedrooms upstairs, the **draft door** between the bedrooms could be opened, allowing a cooling breeze to move between the rooms. This is another example of cross ventilation.



A bigger challenge was to keep some foods cool enough to store for a few days. Foods such as milk and cheese needed to stay cool, but there was no refrigerator. The Brunners used a **cellar**, a room located in the ground similar to a basement. The temperature in this room stayed between 50 and 60 degrees Fahrenheit all year round. The Brunners put the cellar close to the garden where food was grown, and close to the kitchen where food was cooked. There was a passage between the cellar and the summer kitchen as well. There was a door from the kitchen to the cellar. When the door was closed, the cellar would stay cool and the heat from the kitchen fireplace stayed in

the kitchen. There were vents that went from the cellar to the ground just outside of the house. These vents were covered with iron bars to keep animals from getting into the cellar.

**CHIMNEYS:** All colonial houses had chimneys for the fireplaces. Most houses had one chimney for every flue from a fireplace, so it was possible to see how many fireplaces were in a house by counting the chimneys from the outside of the house. Schifferstadt was different.



The Brunners built a **wishbone chimney**. From the outside, there is only one chimney, so it looks as if there is only one fireplace. But you already know that this house had several fireplaces and stoves. The secret is that this chimney had four flues from four different rooms that came together in the attic. If you look at the shape of the chimney on the second floor where the flues join, you can see that the chimney is curved like the wishbone of a chicken! That's how this chimney got its name.

Look for these items when you visit Schifferstadt and remember a time long ago when people used many ideas to stay comfortable all year round. Some of these ideas are still in use today. Look for them in your home and in other buildings you visit.

# 18<sup>TH</sup> CENTURY HEATING AND COOLING AT SCHIFFERSTADT

Name \_\_\_\_\_ Date \_\_\_\_\_

1. Using the information from the reading and the architectural drawing of the house, color in the following items on the drawing:

cellar    draft door    wishbone chimney
center hall    summer kitchen

2. Create a chart with two columns. Label one column "heating in winter". Label the other column "cooling in summer". Place each of the following features in the correct column.

cellar    summer kitchen    draft door
wishbone chimney    center hall    fireplace

## Conclusions:

1. You keep some foods in your refrigerator to keep them cool. Think about these foods. List at least four that the Brunners would have difficulty keeping because they did not have a refrigerator.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

2. What fuel did the Brunners use to heat their home? What fuel is used to heat your home? \_\_\_\_\_

Which fuel is better? List at least 3 advantages of your choice.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

3. How did the Brunners use the resources of their environment to make their home comfortable? How did this impact chores and work they had to do?

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Application Activity:

Today, many people are worried about the dangers of global warming. (This concept may need to be defined for the students.) Many think that the fuels used to heat and cool houses may be adding to the problem. Some are building houses now that take this into consideration.

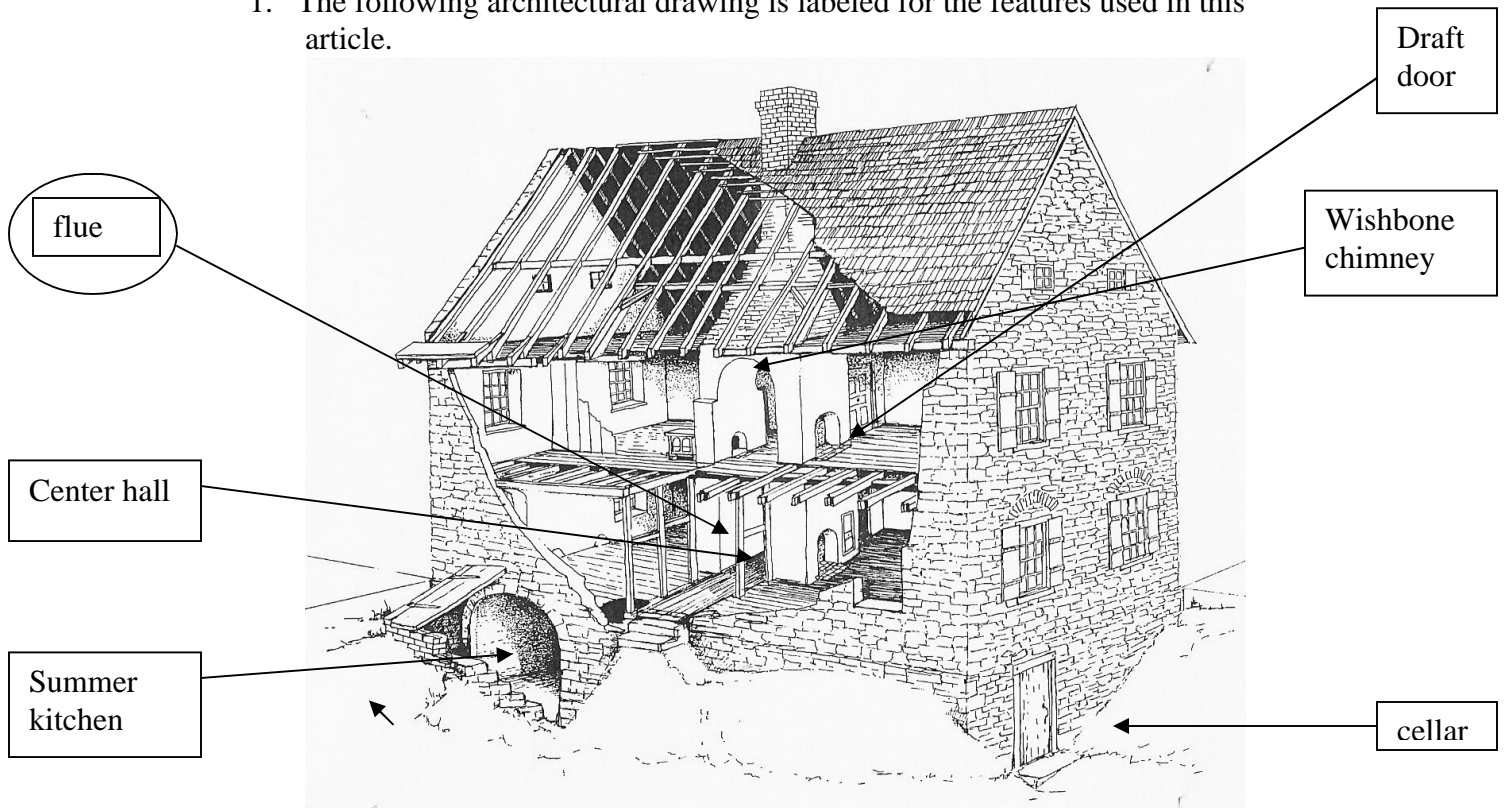
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## KEY FOR 18<sup>TH</sup> CENTURY COOLING AND HEATING AT SCHIFFERSTADT

1. The following architectural drawing is labeled for the features used in this article.



“heating in winter”	“cooling in summer”
Jamb stove	cellar
Draft door	summer kitchen
Wishbone chimney	draft door
Fireplace	center hall

2. The Brunners used the bountiful woods around them to get wood for the fireplace, jamb stoves, and summer kitchen. Our homes are heated by electricity, which is produced by a coal-fired plant. Some use oil, and some use natural gas. Others may use kerosene heaters, woodstoves or fireplaces as well to supplement the heat. There are advantages and disadvantages to all; accept all reasonable responses.
3. Fathers were responsible for chopping down trees and chopping them into firewood. The boys usually were responsible for bringing in firewood. Mothers were responsible for keeping the fire going all the time as there were no matches to relight the fire. Older girls helped with this responsibility.