Review energy transfer

• How does energy transfer through a system by convection, radiation, and conduction?

Draw a group diagram to answer the question. Consider the way matter and particles in the system are affected by each process, what makes each process different, and what makes them similar.
**Introduce insulation**

1. Where are some places where people might want to reduce energy transfer?

2. Where have you heard of insulation before?
Introduce insulation

Discuss these questions with a partner.

1. How is the insulation used for a home related to weather and climate?
2. What happens if a home is poorly insulated?
Discuss home construction

Teacher master X, *Between the Walls*
Introduce model home

1. If the vial of hot water is placed in a cold environment, what will happen to it?
2. What energy transfers will cause that to happen?
Explain the challenge

Teacher master Y, *Home-Insulation Problem*
Focus question

• How can you reduce energy transfer to or from a model home?
Brainstorm testable materials

For the first test, everyone will use just one layer of a material between the cups.
Develop a plan

Teacher master Z, Class Materials Data
Plan for insulation

Teacher master AA, *Materials Test*
Discuss data collection

Notebook sheet 27, *Insulating Materials*

- Set up the insulated home and ice bath before putting hot water in the vial.
- Record the start temperature.
- Start with fresh hot water for the second set of trials.
Summarize materials data

Teacher master Z, *Class Materials Data*

Record your results.
As we rank the materials, remember that the goal is to minimize energy transfer between the inside of the home and the cold outside environment.
Think of your mental model of what happens with particles during heating and cooling. At the particle level, why do you think some materials act as better insulators than others?
View online activity

“Particles in Solids, Liquids, and Gases”

Weather and Water Course, 5.2: Insulation
Step 16
Homework

You will use what you learned to design insulation for a different model home. If you want to bring in more materials, or change materials based on the results, you can do that, but the materials must be recycled or reused.
Complete response sheet

Notebook sheet 28, **Response Sheet—Investigation 5**
Review vocabulary

Spend a few minutes reviewing the vocabulary for this part. Update the vocabulary index and table of contents in your notebook.

• engineering problem
• insulation
Answer the focus question

- How can you reduce energy transfer to or from a model home?
Wrap-Up/Warm-Up

Pair up with someone from a different group and discuss the strengths and limitations of the materials you used. Use the concept of a system in your explanations.
Wrap-Up/Warm-Up

1. What parts and subsystems make up this system?
2. How do they work together?
3. What are the advantages to thinking about the model home as a system?