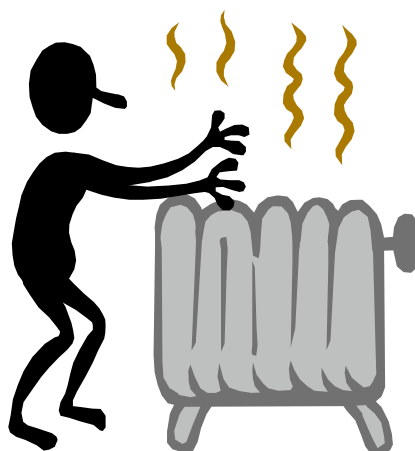




Chapter 15: **Heat** & **Electricity**

Lesson 1: How Is Thermal Energy Transferred?



Introduction

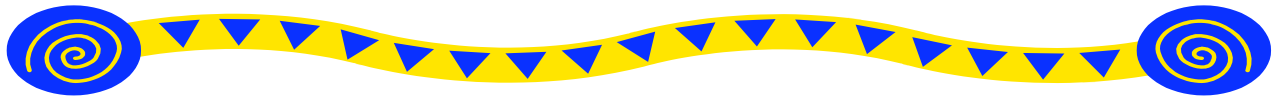
Did you ever wonder how objects become hot or how they cool off? How does heat move through matter, and where does the heat go when matter cools? What role does insulation play in the temperature of a building, room, or object? The transfer of thermal energy is what heats our homes in the winter. It warms the food we eat. It also helps some solid objects become pliable, so they can be shaped or bent. Insulation slows the transfer of thermal energy. But why would the flow of thermal energy need to be slowed? Read on to learn about thermal energy transfer.

Learning Objectives:

The learner will investigate the transfer of thermal energy through different materials.

The learner will define thermal energy and explain conduction, convection, and radiation.

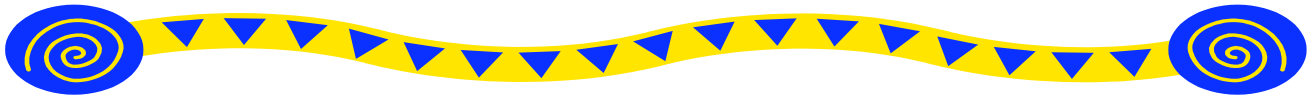
The learner will describe how insulation works.



Task

You will work collaboratively in groups of three to learn about conduction, convection, radiation, and insulation through websites. Each group member will choose a role to play: the conduction expert, the convection expert, or the radiation expert. Each expert will specialize in his or her method of thermal energy transfer, understanding how it works, in order to contribute to the final group project.

Each group will construct one poster or brochure to showcase the three types of thermal energy transfer and demonstrate how insulation can be used slow the transfer of energy in each case. Then each group will create a quiz with 10 questions that can be answered from the information presented on the poster or brochure. The quiz will be typed and attached to the bottom of the poster or brochure to be displayed.



Process

Remember, you are working as a group, and you have only one computer, so please remember to cooperate and be kind to each other. **You may want to take turns navigating as you search through the various websites.** Each expert will want to take some notes on his/her topic so the creation of the final project will flow smoothly.

Step 1: Choose a role.

All roles must be represented by your group.

- ★ Conduction Expert
- ★ Convection Expert
- ★ Radiation Expert



Step 2: Gather Information

As a group, read through the following websites, gathering the information you need, depending on your area of expertise.

Hold down CTRL and then click on the link:

Conduction, Convection, & Radiation Definitions

<http://www.srh.weather.gov/srh/jetstream/atmos/heat.htm>

After reading the Conduction paragraph, **click the words “Start Heating”** on the picture.

http://www.bbc.co.uk/scotland/education/bitesize/standard/physics/energy/heat_energy_rev2.shtml



Textbook Link Thermal Energy Transfer Audio/Video Clip

http://www.harcourtschool.com/activity/science_up_close/615/deploy/interface.html



Additional Explanations of Conduction, Convection, and Radiation

http://coolcosmos.ipac.caltech.edu/cosmic_classroom/light_lessons/thermal/transfer.html

Visuals of the Three Types of Thermal Energy Transfer

<http://zebu.uoregon.edu/~soper/Physics/thermaltransfer.html>



Step 3: Investigate Insulation

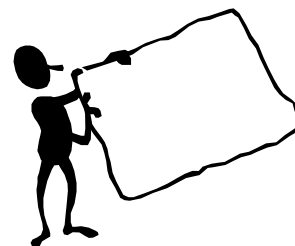
After gathering information from the above websites, complete the insulation activity below with your group.

All group members will need to take on the role of **Mathematician** to complete this activity. Make sure you gather enough data to explain your findings.



Adding insulation to the pyramid

<http://www.miamisci.org/af/sln/mummy/pyramid/index.html>



Step 4: Decision of Your Final Project

Decide what your final project will be: A POSTER or A BROCHURE.

Step 5: Construction of Your Project

Working as a group, create your poster or brochure. It must illustrate and describe the three types of thermal energy transfer, give examples of each, and explain how insulation can be used to slow the transfer of energy in each case.

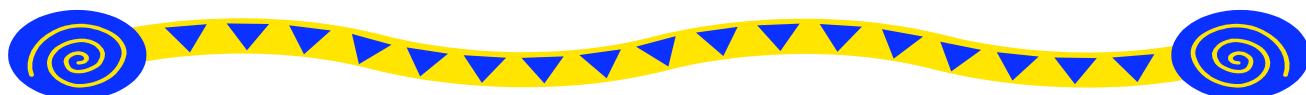
Your teacher will supply the necessary materials. Your project must be colorful and easy to understand. Make sure you label all parts so that anyone else who looks at your project can understand its contents.



Step 6: Quiz

Create 10 questions that can be answered by viewing your completed poster or brochure. Type and print the questions and attach the sheet to the bottom on your project.

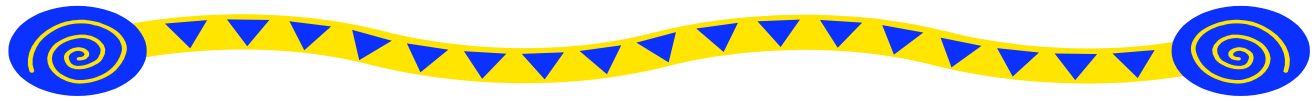
Then type and print the answers to be attached behind the questions.



Evaluation

Hold down CTRL and then click on the link below to view how you will be graded.

http://rubistar.4teachers.org/index.php?screen=ShowRubric&module=Rubistar&rubric_id=1625322&



Conclusion

Now that you have completed your WebQuest, you have learned about the different types of thermal energy transfer and how to maintain heat using insulation.

Reflect upon the following questions with your group members:

- Did you enjoy using computers for learning or do you prefer classroom instruction with your teacher?
- Was it easy or difficult to work with peers for your project? Did you like working with a group?
- Was it easy or difficult to read websites off of your computer?
- Would you have rather read your textbook?
- Do you think it would be beneficial to use both the Internet and your textbook, or was one better than the other?
- What did you learn about thermal energy?
- What did you learn about insulation and how it works?
- Did you teach your group members about your topic of expertise? Did they teach you about theirs?

Make sure you view the posters or brochures your peers created, and see if you can answer the quiz questions included in their projects.

