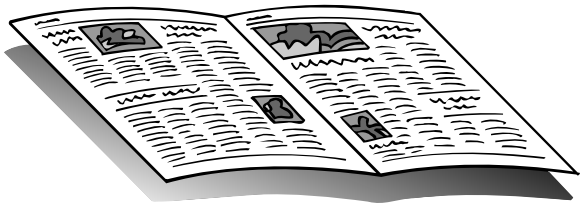
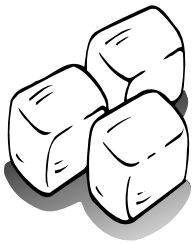
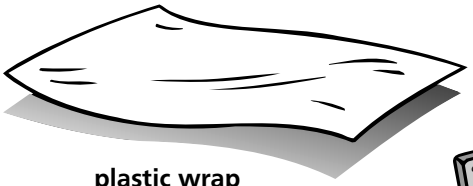
Chapter Science Investigation Name _____

Slowing Heat Transfer

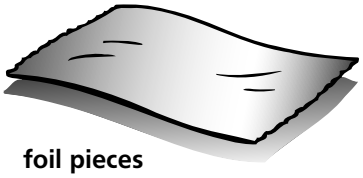
What You Need

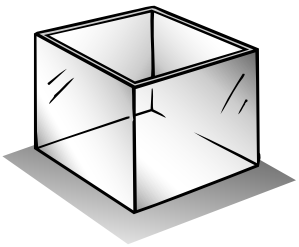

newspaper pieces
(30 cm × 30 cm)

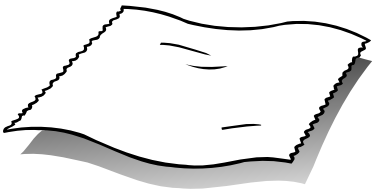

ice cubes

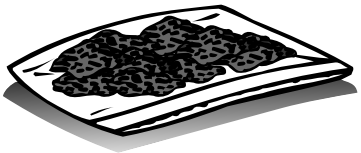

plastic wrap
(30 cm × 30 cm)

one
thermometer


foil pieces
(30 cm × 30 cm)


small, plastic container
(10 cm × 10 cm)


waxed paper pieces
(30 cm × 30 cm)


bag of vermiculite

Find Out

Do this activity to see what materials serve as heat insulators.

Process Skills

Predicting
Communicating
Observing
Controlling Variables
Interpreting Data
Classifying
Designing Investigations
Experimenting

Time

- 30 minutes at the beginning of the first day
- 5 minutes every two hours throughout the day and 10 minutes the following day if necessary
- The same amount of time on various days over the next two weeks

What to Do

1. **Record** the temperature in the room with a thermometer and compare its reading to the room thermostat, if available.

2. **Record** 0 °C for the temperature of the ice cube.

3. Wrap the ice cube in one piece of waxed paper and place it in the plastic container.

4. **Record** the time the experiment begins and **predict** how long it will take for the ice cube to melt completely. **Record** your prediction.

5. **Observe** the ice cube at two-hour intervals throughout the day and at the start of the next day, if necessary. Observations should take no longer than one minute before you rewrap the ice cube. **Observe** the ice cube until it has completely melted, and **record** the time it takes to melt. **Compare** your time with the time recorded by the other groups.

6. Repeat Steps 1–5, twice a week for two weeks. Each time, wrap a new ice cube in a different insulating material.

7. **Evaluate** the materials as heat insulators by listing them from the best to the worst heat insulator.

Testing Materials as Heat Insulators					
Insulation Used	Room Temperature	Ice Cube Temperature	Difference in Temperature Readings	Prediction: How Long Will It Take for the Ice Cube to Melt?	Results: How Long Did It Take for the Ice Cube to Melt?
Foil					
Newspaper					
Waxed Paper					
Plastic Wrap					
Vermiculite					

Conclusions

1. Compare your predictions with your observations.

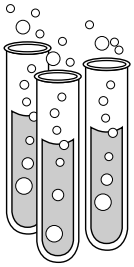
2. Which material provided the best heat insulation?

3. List the materials in order of effectiveness as heat insulators.

New Questions

1. What materials are used for insulation in our homes and schools? Why?

2. What other materials might insulate an ice cube for more than one day?



Name _____

ACTIVITY

Producing Heat

Record your observations in the chart below.

Lightbulb Strength	Temperature After 3 Minutes
Light Turned Off	
Light Turned On (25-watt bulb)	
Light Turned On (40-watt bulb)	
Light Turned On (60-watt bulb)	

What do you **predict** will happen when you replace the 40-watt bulb with the 60-watt bulb?

Name _____

Conclusions

1. Was heat produced by electric current? How do you know?

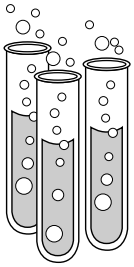
2. Did the brightness of the bulb affect how much heat was produced? How? What evidence do you have for your answer?

3. Why was it useful to record the temperature before you turned on the 25-watt bulb?

Asking New Questions

1. What do you think will happen if you repeat the activity using a 100-watt bulb? Why?

2. Will turning the lights off in a room help to keep the room cooler? Why?



Name _____

ACTIVITY

Observing Heat Transfer by Conduction

Which butter pat do you **predict** will melt faster when the sticks are placed in hot water?

What did you **observe?**

Which stick feels warmer?

Name _____

Conclusions

1. Compare your prediction with your observation.

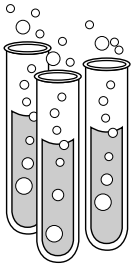
2. What form of heat transfer melted the butter?

3. Why did the sticks need to hold the butter outside of the pie pan?

Asking New Questions

1. **Predict** what will happen if you put the butter pat on the end of a plastic spoon.

2. How would the towels feel after you remove the pie pans holding hot water? Why?



Name _____

ACTIVITY

Using Heat to Do Work

What did you **observe** about the fork when the jar with the balloon was put in cold water?

What do you **predict** will happen to the fork when the jar with the balloon is put in hot water?

What did you **observe** when the jar was put in hot water?

Name _____

Conclusions

1. What happened to the air in the jar when you chilled it?

2. What happened to the air in the jar when it warmed?

3. Describe what happened to the handle of the fork.

Asking New Questions

1. How could you use your jar to lift objects?

2. Think about what you know about water heating on the stove. Would the jar and fork work as well if the jar were completely full of water instead of air?

3. What would happen if you actually boiled water inside the jar?