

# Keeping warm with Fur Feathers and Fat: Investigating Insulation

In this exercise you will have the opportunity to use a water bottle to construct a model of an exothermic (warm- blooded) animal and compare it with other teams models in order to compare how layers of insulation such as fur, feathers and fat help animals and people to stay warm. One model animal (water bottle) will be covered with insulation the other will be left uncovered to serve as a control.

## Materials:

At each lab station you will find:

2 water bottles

2 temperature probes in stoppers

Computer with software to measure temperature

Graduated cylinder.

Masking tape for labels

A bowl of ice.

## Available for the class:

A variety of insulation materials to test:

vegetable shortening, grass, sawdust, feathers, fur, fake fur, shredded paper, foam, wool clothing, cotton clothing and other materials such as primaloft and thinsulate

Warm and Cold tap water

Ziplock baggies

Ice supply

Procedure:

1. Choose the insulation materials that you would like to test.  
Prepare baggie of materials as demonstrated by your teacher.
2. Return to your lab station with your insulation and baggie.
3. Write down your hypothesis. Why do you think that this insulation will keep the water bottle warm?

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4. How many degrees will each of the bottles cool?  
\_\_\_\_\_ °C or °F covered  
\_\_\_\_\_ °C or °F uncovered
5. Measure equal amounts of warm water into each of the water bottles. Record the volume of the water on your lab sheet.  
\_\_\_\_\_ milliliters.
6. Insert the temperature probe / stopper into the bottles.
7. Put one bottle in your insulation baggie; leave the other bottle uncovered.
8. Start the computer collecting data, by clicking the collect button.  
Once the computer has started recording, you do not need to click it again. It will automatically stop recording when 20 minutes is over.

9. Record the initial temperature on your paper

\_\_\_\_\_ °C or °F covered

\_\_\_\_\_ °C or °F uncovered

10. Put both of the bottles into the bowl of ice.

Allow the program to run for 15 -20 minutes collecting data.

During this time you may visit the other learning stations in the classroom, read the background materials, color your maps and charts or work on your animal research project. At the end of 20 minutes return to you table.

11. Record the final temperature.

\_\_\_\_\_ °C or °F covered

\_\_\_\_\_ °C or °F uncovered

12. Subtract the initial (starting) temperature form the final temperature. Record the difference, this is your change in T.

\_\_\_\_\_ °C or °F covered

\_\_\_\_\_ °C or °F uncovered

13. You may print the graph of your results, do not save your data.

14. Return the insulation materials to the lab cart. Pour the water down the drain. Leave your computer running.

15. Return to the classroom to compare results with other lab teams.

16. Which insulation material worked the best? Explain your thinking?

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	Change in temperature
Fur	
Feathers	
Wool	
Cotton	
Newspaper	
Grass or leaves	
Real dog fur	
Foam peanuts	
Uncovered bottle	
Thinsulate	
Primaloft	

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