DATE: NAME: CLASS:

CHAPTER 10	Investigation 10.B: Build a Heating Device	BLM 10.2.1
HANDOUT		

In this investigation, you and the members of your group will design, build, and calculate the efficiency of a heating device. You will have the opportunity to test your design and make modifications to it in order to improve its efficiency.

Problem

How can you build an efficient heating device?

Safety Precautions

• Tie back long hair and secure any loose clothing. Before you light any fuel source, check that there are no flammable solvents nearby.

Materials

- balance
- thermometer (alcohol or digital)
- stirring rod
- water
- other available materials as dictated by your plan

Design Specifications

1. As a class, develop a list of specifications that each group's heater must meet.

Plan and Construct

2. In your group, put together an initial design for your water heater that meets the class specifications.

Investigation 10.B: Build a Heating Device (continued)

3. Design a data table to record the data necessary to determine efficiency.

4. Think about the calculations that you will have to perform to calculate the efficiency of your heater. Will you be collecting enough data?

5. Check your initial design with your teacher.

6. Build your heater. Carry out your efficiency investigation and record all observations and data.

7. Determine the efficiency of your water heater.
(a) Calculate the energy output (the thermal energy absorbed by the water).

(b) Calculate the theoretical energy input from your energy source.

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(c) Calculate efficiency by using this formula:

$$\text{Efficiency} = \frac{\text{Energy output}}{\text{Energy input}} \times 100\%$$

8. With the members of your group, list sources of energy loss from your system.

9. Revisit your design and make improvements that will decrease energy loss.

10. Repeat the investigation with your improved design.

Investigation 10.B: Build a Heating Device (continued)

Evaluate and Communicate

1. Evaluate your original and improved designs. What other design modifications would you like to make? Explain your answer.

2. Perform an Internet search to investigate ways in which the efficiency of water heaters can be improved. How would you apply this knowledge to your classroom water heater? ICT

3. Compare your design with the designs of other groups. Write a one-page advertisement on the following page for your water heater that highlights its selling points.

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