

Grade 7

Science Focus



Lab Workbook

Unit 3

Heat and Temperature

Using Energy

Problem: Can a survey, by students in the school, provide enough information to make conclusions about how energy is used for heating and cooking?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on page 189

Data Collection:

Respondent	Energy source to heat building	Energy source to cook	Method	Why it was chosen?

Analysis of Data:

1. _____

2. _____

Extend your Knowledge (Optional)

Lab Investigation 3-A submitted by _____

Date _____

Make Your Own Thermometer

Investigation 3-B
Pages 196 - 197

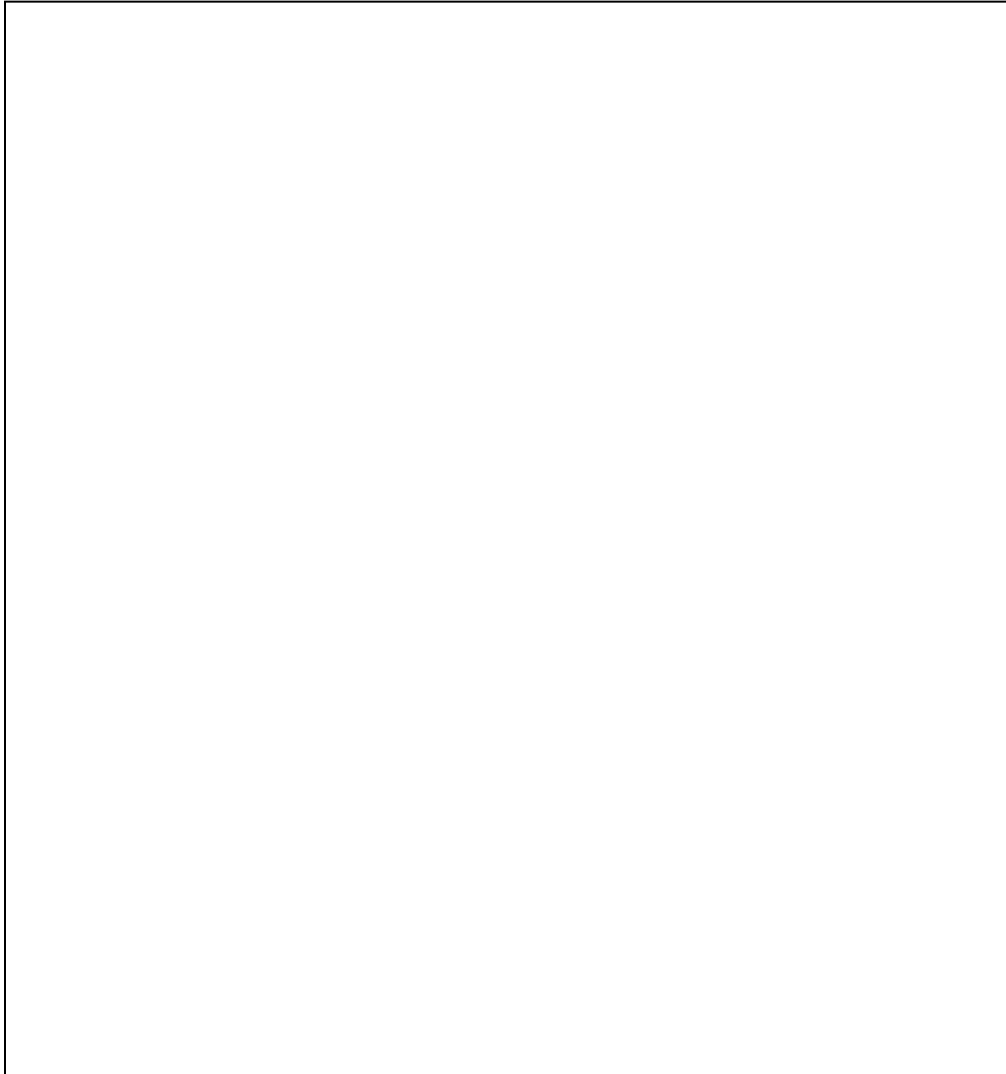
Problem: Is it possible to make an accurate thermometer from everyday materials?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on pages 196 - 197

Part 1

Scientific Illustration of Your Thermometer:



Evaluation of Model:

1. _____

Heats Up

Cools Down

2. _____

Part 2

1. _____

2. _____

3. _____

Lab Investigation 3-B submitted by _____

Date _____

Expanding Solids

Investigation 3-D
Pages 212 - 213

Problem: What evidence can you observe of solid materials expanding as they are warmed, and contracting as they are cooled?

Hypothesis: _____

Part 1

Investigative Procedure: Follow the directions outlined on page 212

Analysis of Data:

1. (a) _____

(b) _____

2. _____

3. _____

Part 2

Investigative Procedure: Follow the directions outlined on page 213

1. _____

2. _____

3. _____

4. _____

Conclude and Apply:

5. _____

Lab Investigation 3-D submitted by _____

Date _____

Hot Stuff !

Challenge: What is Specific Heat Capacity. **Procedure:** Directions outlined on page 219

PART 1: Rate of Temperature Change(Complete the Tables)

Material	Rate of Temperature Change	Specific Heat
Sand on the Beach	warms _____	_____
Water in the Lake	warms _____	_____

Material	Your Answer	Specific Heat Capacity
Bottom of a cooking pot	_____	High Low
Cold pack for treating injuries	_____	High Low
Water in the Lake	_____	High Low

PART 2: Size of Temperature Change

5. faster _____ slower _____
6. _____
7. (a) _____
(b) _____
(c) _____
8. _____

Lab 3-E submitted by _____

Date _____

The Plateau Problem

Investigation 3-F
Pages 222 - 223

Problem: What happens to the temperature of water while it changes state?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on pages 222 - 223

Data Collection: (Record your observations)

Time (min)	Temperature of melting ice ($^{\circ}\text{C}$)	Temperature of boiling water ($^{\circ}\text{C}$)

Analysis of Data:

1. (a) responding variable _____

(b) manipulated variable _____

2. **Line Graphs (next page)** 3. Marked on graph (a) and (b) 4. Marked on graph

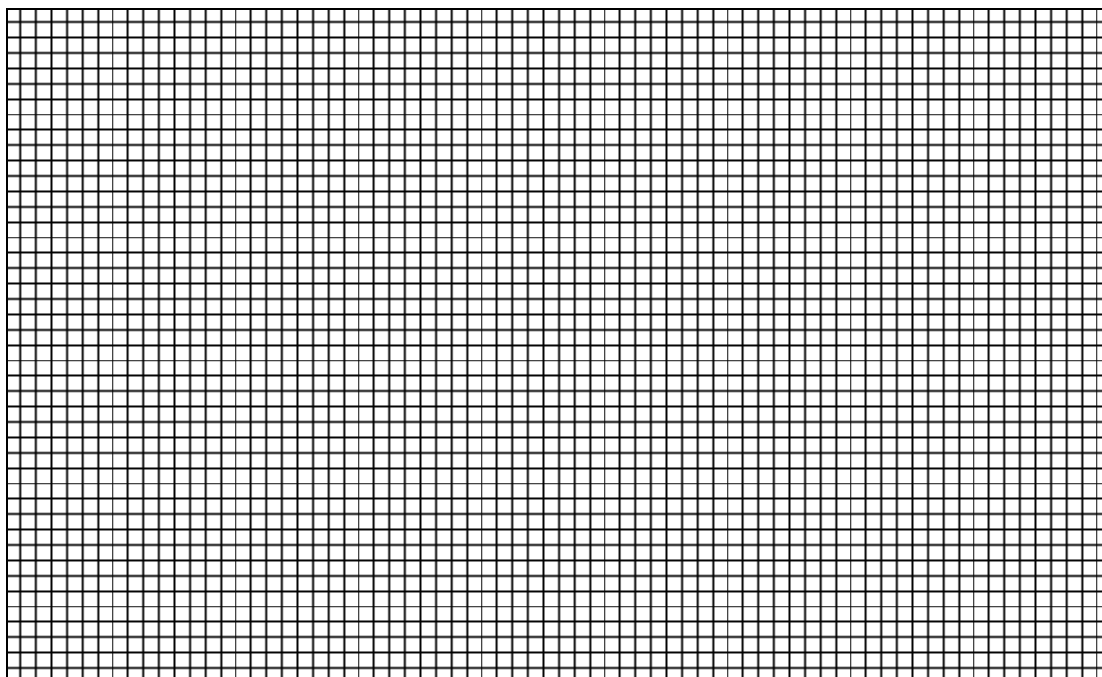
5. (a) _____

(b) _____

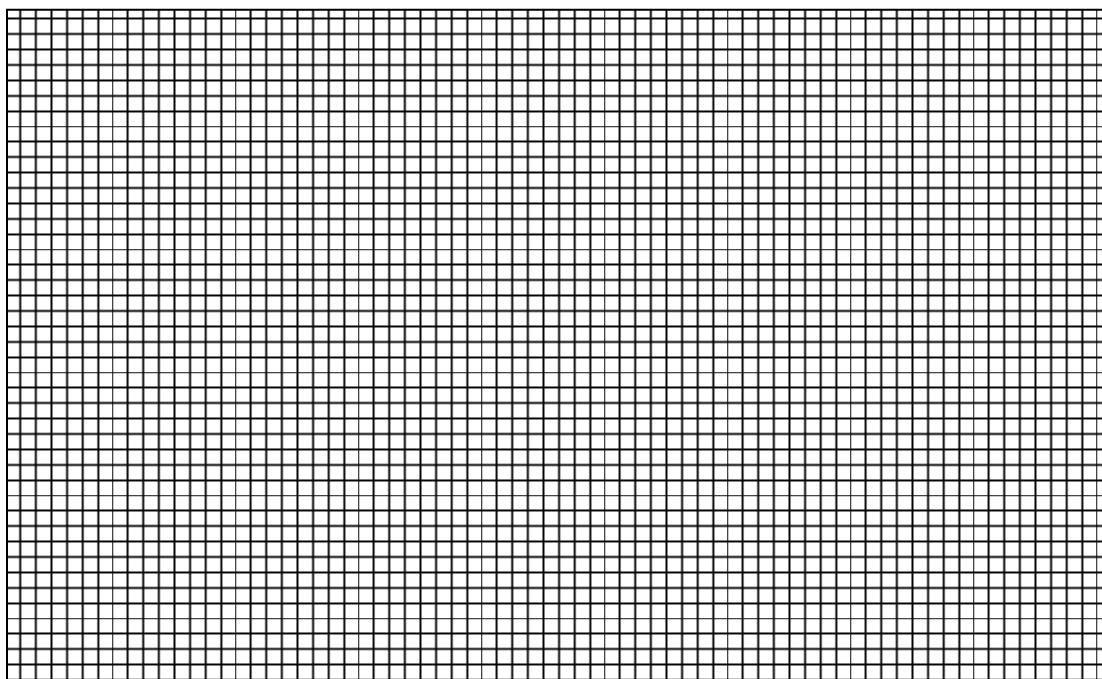
6. **Line Graph (next page)** 7. Marked on graph

8. (Class Averages) **Average melting point** _____ $^{\circ}\text{C}$ **Average boiling point** _____ $^{\circ}\text{C}$

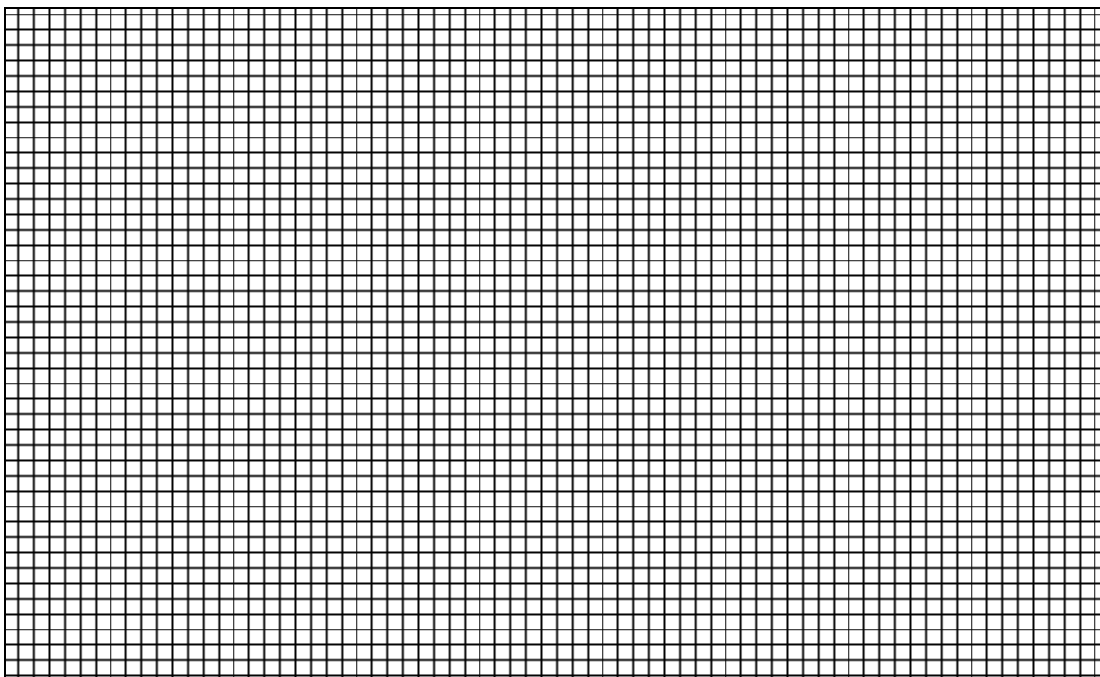
Title : _____



Title : _____



Title : _____



Conclude and Apply:

9. _____

10. _____

11. (a) _____

(b) _____

Lab Investigation 3-F submitted by _____

Date _____

Comparing Surfaces

Problem: How can information about materials help you to make wise choices about which material to use for a particular situation?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on page 228

Title : _____

Surface	Ability to absorb	Ability to radiate	Ability to reflect
light-coloured			
dark-coloured			
shiny texture			
dull texture			

color and texture that is :

- (a) the best reflector - _____
- (b) the worst reflector - _____
- (c) the best absorber - _____
- (d) the worst radiator - _____

Analysis of Data:

1. (a) _____

- (b) _____

- (c) _____

- (d) _____

2. (a) _____

(b) _____

3. _____

Lab Investigation 3-G submitted by _____

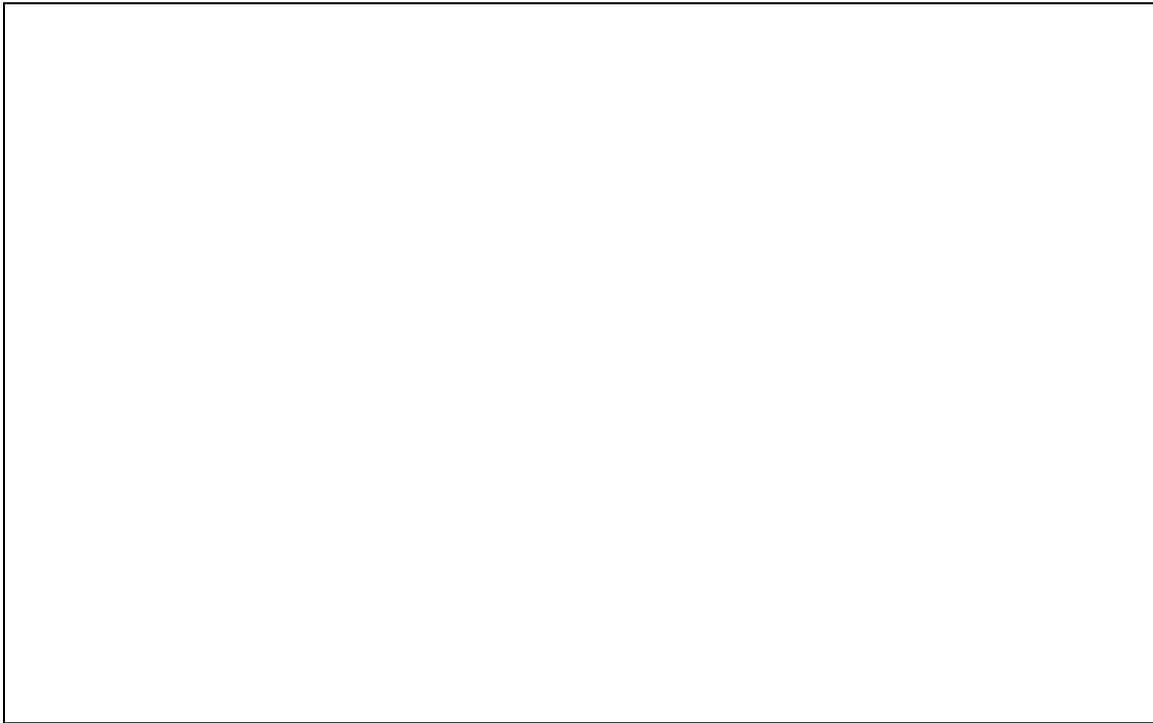
Date _____

Making A Transfer

Problem: How can you design and build a candle-powered water heater?

Specifications: Outlined on page 234

Scientific Illustration of Model



Evaluate:

1. _____
2. _____
3. _____
4. _____

Lab Investigation 3- H submitted by _____

Date _____

Passive Paint

Investigation 3-I
Page 242

Problem: Can painting walls in a room change the efficiency of a solar heated model?

This Lab has to be approved before you do it

Specifications: Outlined on page 242

Hypothesis: _____

Scientific Procedure

Step 1 _____

Step 2 _____

Step 3 _____

Step 4 _____

Step 5 _____

Step 6 _____

Step 7 _____

Step 8 _____

Step 9 _____

Variables:

(a) responding variable _____

(b) manipulated variable _____

(c) controlled variables _____

Scientific Illustration and Observations:

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Observations

Evaluate:

1. _____

2. _____

3. _____

Lab Investigation 3-I submitted by _____

Date _____

Simulating the Greenhouse Effect

Investigation 5-J
Page 246

Problem: How can you simulate the greenhouse effect?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on page 246

Analysis of Data:

1. _____

2. _____

3. _____

Conclude and Apply:

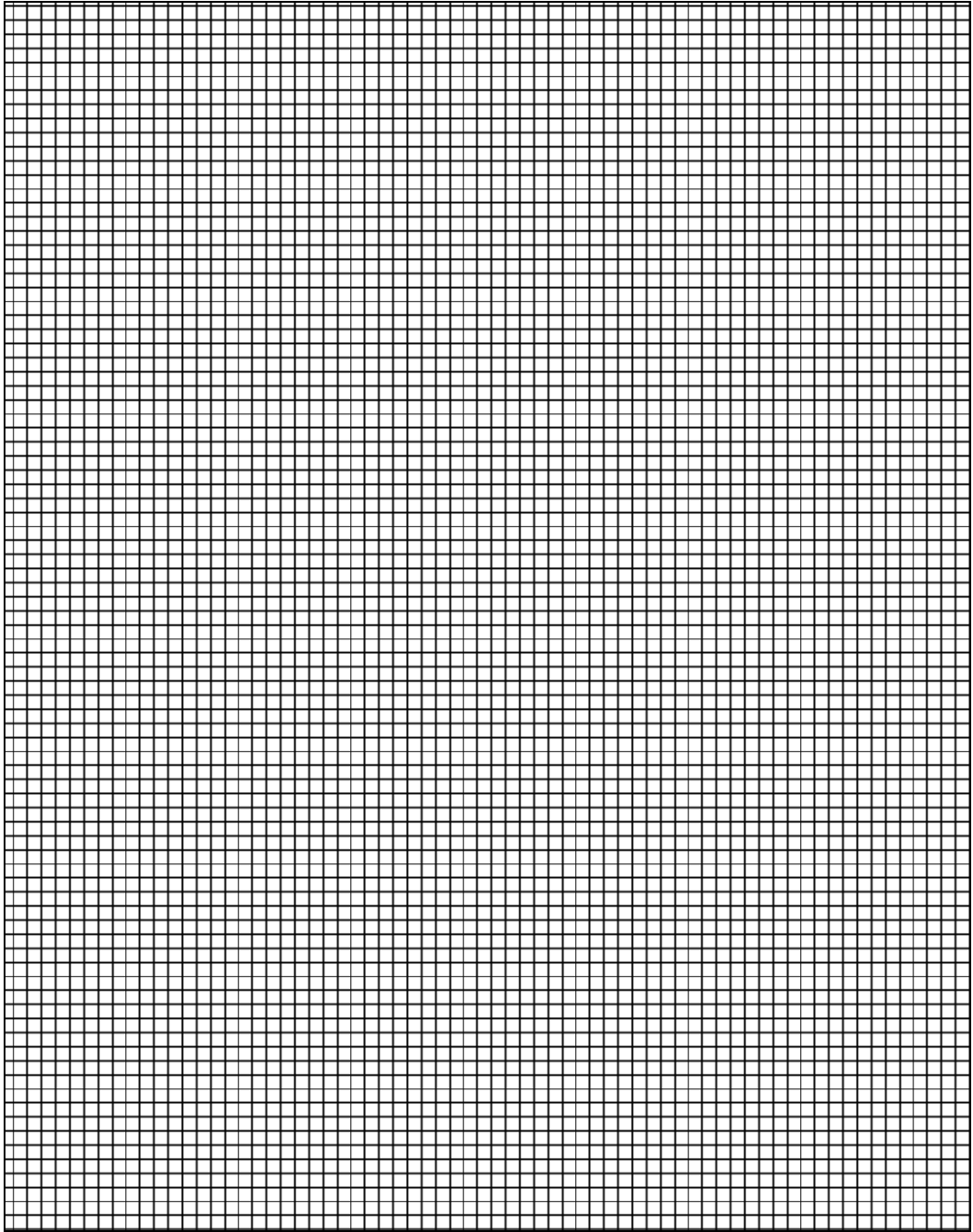
4. _____

5. **Line Graph** (Next page)

Lab Investigation 3-J submitted by _____

Date _____

Title : _____



You Choose !

Decision Making Situation: What are the best choices?

Investigative Procedure: Follow the directions outlined on page 249

Producing Hot Water (heater)	My Action (or Inaction) and why
- insulate	
- turn down thermostat	
Transporting hot water (pipes)	
- insulate	
Using hot water (shower)	
- take fewer showers	
- take shorter showers	
- install energy-saving shower head	
- other alternatives	
Estimate of time (minutes) spent in shower ...	
Amount of Water used (15L X # of minutes)	
Shower time compared to bath time	<p>220L / 15L = _____</p> <p>You would need to take _____ showers to use the same amount of water as one bath.</p>

Analysis of Data:

- _____
- _____

3. _____

4. _____

5. _____

Extension: (Optional)

1. _____

2. _____

3. _____

Lab Investigation 3-K submitted by _____

Date _____

Keep It Warm

Investigation 3-L
Pages 250 - 251

Problem: What is the effect of increasing the thickness of an insulating material on the amount of energy transferred through the insulation?

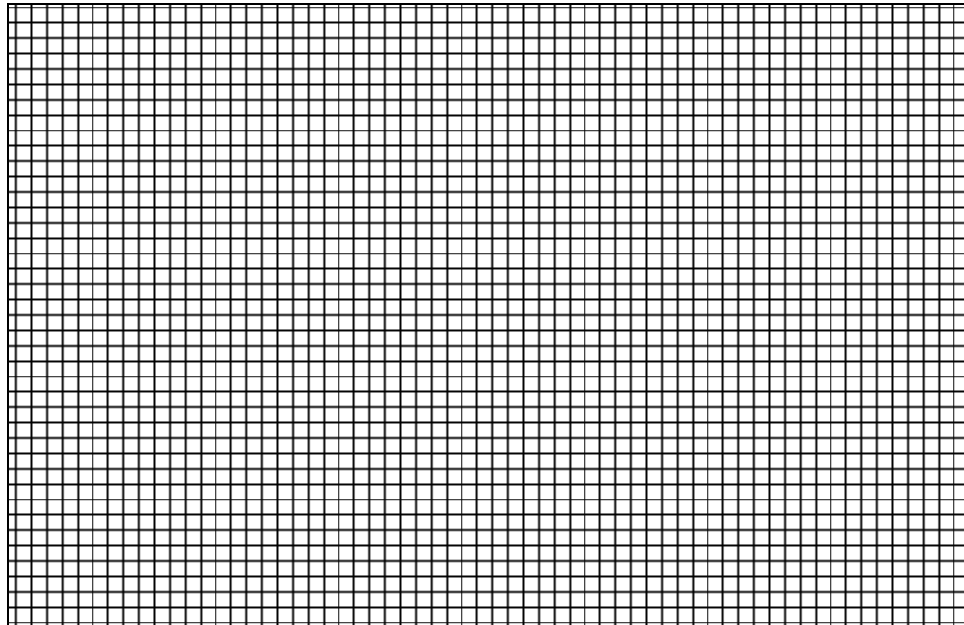
Hypothesis: _____

Investigative Procedure: Follow the directions outlined on page 250

Data Collection:

Group	Amount of Paper (sheets)	Temperature After							
		1 min	2 min	3 min	5 min	10 min	15 min	20min	...
1	0								
2	1								
3	2								
4	3								
5	4								
6	5								
7	6								
8	7								

Results: Graph Title : _____



Analysis of Data:

1. _____

2. Variables:

(a) responding variable _____

(b) manipulated variable _____

(c) controlled variables _____

3. _____

4. (a) conduction _____

(b) convection _____

(c) radiation _____

Conclude and Apply:

5. _____

6. _____

7. _____

8. _____

9. _____

Extension: (Optional)

10. _____

Web Pages found:

Lab Investigation 3-L submitted by _____

Date _____

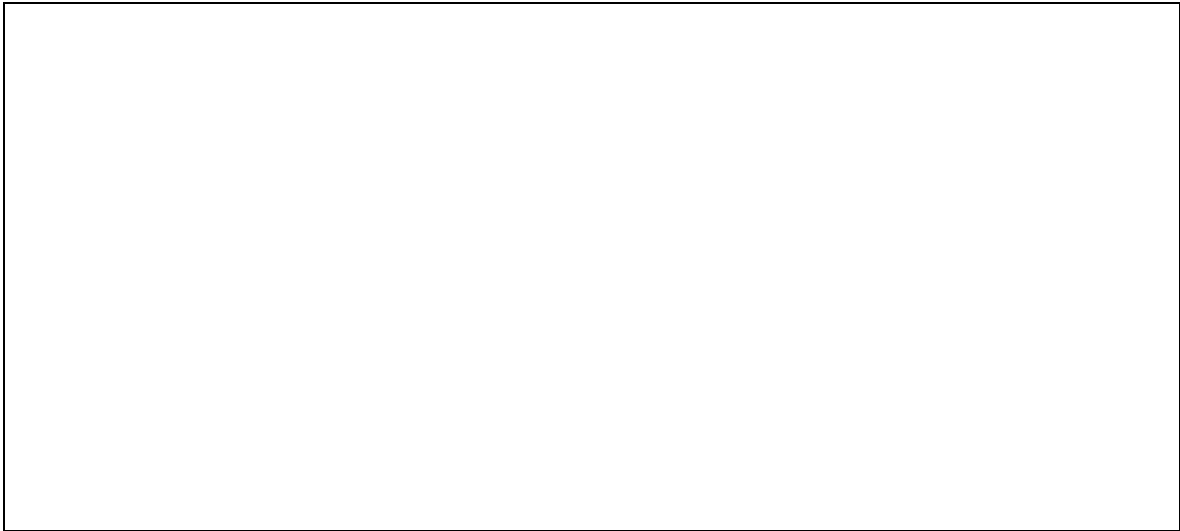
How Much Energy?

Problem: What is the effect of the choice of cooking method on energy use?

Hypothesis: _____

Investigative Procedure: Follow the directions outlined on page 253

(Can you design a solar cooker?)



Analysis of Data:

1. _____

2. _____

3. _____

Lab Investigation 3-M submitted by _____

Date _____

Student Project **Analyzing An Issue Using Thermal Energy Efficiently**
A Simulation - Unit 3 Pages 260 - 261

Heat and Temperature
Alternative End of Unit Project

Reference: Using Thermal Energy Efficiently (Textbook pgs. 260 – 261)

There are differences in heating principles that many people are unaware of. Your project is to convince them (by way of your Ads) that, there is value in various heating principles, because they can be used as alternatives to the burning of fossil fuels.

The essence of your project is to run an **Ad Campaign** that will get your points across. In other words, you must sell your ideas to your audience with authentic, realistic proof and meaningful proposals that will be attractive to your audience, in order to make them embrace your **Alternative Energy Ideas**.

Specifications:

- Your Ad Campaign must consist of **3** (different) – **30 sec** PowerPoint Slide Shows - which (theoretically) would air on T.V.
- Each slide show must focus on only one alternative energy idea you want to promote.
 - 3 different slide shows using one alternative energy, or
 - 3 different slide shows, each with a different energy alternative (approach it from a different perspective in co-operation with the use of other forms of thermal energy)
- Each **slide show must run automatically** and not exceed the time allowed.
- Sample ideas for content (principles) might include:
 - **Passive solar energy**
 - **Active solar energy**
 - **Wind power**
 - **Water power**
 - **Composter power**
 - **Geothermal energy**
- Each slide show should include:
 - The features of the thermal heating principle you are presenting
 - Statistical data used to support your principle
 - Benefits that would be gained by users
 - Cost difference/comparisons
 - **Catch phrase!**
 - **Enduring image!** (it leaves a lasting impression on the audience)
 - Identify how **Science and Technology** has helped to make the use of this type of alternative energy possible.
- Your Ad Campaign also needs **3 posters**, one for each of the shows you are presenting
 - Each poster should promote only the idea you want to come across from each of the shows and should include the **catch phrase** and **enduring image**
 - Each poster (**8½ X 11**) should be **colored** and suitable for posting on a bulletin board, or used as a billboard sign
- Your Ad Campaign will be evaluated by a panel of judges who will use the Rubric you have been provided with for the Power Point Shows and the Posters.

‘Alternative Energy’ Ad Campaign Scoring Guide

Criteria	Comments	Score (Circle only one)
Power Point 1		Not Done 1 2 3 4 5 Exemplary
Scientific Principle covered ...		
Advertising Principle used ...		
Power Point 2		Not Done 1 2 3 4 5 Exemplary
Scientific Principle covered ...		
Advertising Principle used ...		
Power Point 3		Not Done 1 2 3 4 5 Exemplary
Scientific Principle covered ...		
Advertising Principle used ...		
Poster 1		Not Done 1 2 3 4 5 Exemplary
Poster 1		Not Done 1 2 3 4 5 Exemplary
Poster 1		Not Done 1 2 3 4 5 Exemplary
Total	/ 30	

Evaluation Rubric for Project

- 5 - All elements covered, exceeds all expectations
- 4 – All elements covered, surpasses most expectations
- 3 – All elements covered – minimum expectations
- 2 – Most elements covered, within expectations
- 1 – Few elements covered, below expectations