

Unit 4:

Temperature Graphing & Extrapolation Lab

Submitted by:

Short Description: Given a thermometer, students will measure and record data (temperature) from different locations on a school campus over the period of two days. The data will be used by students to calculate differences (whole number and percentage) in temperature, and extrapolate their findings for a hypothetical third day.

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
Students will...
 - Research data about temperature in different locations on school grounds.
 - Create a graph showing temperatures and locations.
 - Correctly answer questions about the graph.
 - Make future predictions using graph data to support their findings.
- **Statement of pre-requisite skills needed (i.e., vocabulary, measurement techniques, formulas, etc.)**
 - thermometer reading in degrees Fahrenheit
 - scientific notation for degrees Fahrenheit
 - knowledge of bar graph and pie chart terminology and application
 - extrapolation using graph data
 - computing mathematic ratios
- **New Vocabulary**
 - extrapolation
 - confounding variable
- **Materials List**
 - 10 thermometers capable of measuring room temperature
 - paper / pencil (each student)
 - student worksheet
 - teacher graph template
 - document camera
 - 2 different colored markers
 - calculator (each student)
- **GLE's addressed**
 - M 2.2.1 - Apply strategies, concepts, and procedures to devise a plan to solve the problem
 - M 2.2.2 - Apply mathematical tools to solve problems
 - M 4.1.1 - Understand how to develop or apply an efficient system for collecting mathematical information for a given purpose.

- **Set-up information**
 - make student worksheet copies (1 for each student)
 - select a 2-day period where the weather forecast indicates a definite change in temperature
 - gather all needed supplies

- **Lab organization**
 - students split into 10 teams (modify for class size needs)
 - leadership positions: thermometer captain (safeguards equipment); record keeper (records data accurately); policy keeper (group follows guidelines of lab)
 - cooperative learning in small groups
 - Timeline:
 - Day 1 (50 min):
 - As a whole class, brief overview of lab / instructions (5 min.)
 - As a whole class, overview of student worksheet (5 min.)
 - Formation of groups and role assignments. Each group is assigned to two adjacent locations (5 min.)
 - As a whole class in small groups, thermometer calibration / homeroom temperature measures (5 min.)
 - In small groups, temperatures taken at locations (10 min.)
 - As a whole class, temperatures reported, averaged, and recorded on teacher bar graph template. (15 min.)
 - Individually, students record data on their student worksheet. (5 min.)
 - Day 2 (80 min):
 - As a whole class, brief overview of lab / instructions (5 min.)
 - As a whole class, thermometer calibration / homeroom temperature measures (5 min.)
 - In small groups, temperatures taken at locations (10 min.)
 - As a whole class in small groups, temperatures reported, averaged, and recorded on teacher bar graph template. (10 min.)
 - Individually, students record data on their student worksheet. (5 min.)
 - Individually, students complete worksheet using data to extrapolate future temperature (25 min.)
 - In small groups, students compare their results and make modifications where appropriate (5 min.)
 - As a whole class, small groups share their results / projections. Teacher facilitates discussion of key concepts and provides clarification (30 min.)

- **Teacher Assessment of student learning(scoring guide, rubric)**
 - Guide will vary depending on temperatures recorded
 - Discussion of key concepts (confounding variables, etc.)
 - key concepts covered on Unit quiz

- **Summary of learning(to be finished after student completes lab)**
 - discuss real world application of learning from lab
 - opportunity for student to share/present learning

- **Career Applications**
 - contractor / air & heating: installation of units in different building types and locations
 - tourism / recreation: vacation planning, activity planning
 - household management: planning outing

LAB TITLE: Temperature Graphing & Extrapolation Lab

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
 - How does outdoor temperature affect the temperature at different locations on our school's campus?
 - What are the implications for future temperature fluctuations on our campus?
- **Grouping instructions - roles**
 - Students are grouped into 10 teams
 - Within teams, students decide who will take which leadership position
 - thermometer captain (safeguards equipment)
 - record keeper (records data accurately)
 - policy keeper (group follows guidelines and expectations of lab)
- **Procedures - steps to follow/instructions**
 - Hold thermometer stationary at each location for 3 minutes.
 - After 3 minutes, record the temperature indicated on the thermometer in degrees Fahrenheit.
 - Return to class within 10 minutes.
 - Report data to class. Complete student worksheet using class data (data is averaged for each location to create one temperature).
- **Outcome instructions**
 - Data collecting
 - Extrapolation using percent increases / decreases
- **Assessment instructions (peer-teacher)**
 - Students: work in small groups to share results and provide peer:peer tutoring. This is conducted after completing the student worksheets individually,
 - Teacher: assesses student knowledge and understanding during whole class discussion, and by small group observations.

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Name: _____

Period: _____

Criteria: (Write the problem/objective in statement form)

Date: ____/____/____

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Data Collection: (Record data in degrees Fahrenheit)

Location	Temp. Day 1	Temp. Day 2	Difference Day 1 v. 2	% Change Work Area <i>Show All Work</i>	% Change	Temp. Day 3	Difference Day 2 v. 3	% Change Work Area <i>Show All Work</i>	% Change
Outside Main Office (in shade)							+10° F		
Inside Main Office									
Homeroom									
Cafeteria (in middle)									
Parking Lot (in middle)									
Gym (middle of a wall)									

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Extrapolations Day 3: Use data from Collection table to extrapolate location temperatures for Day 3. Use the percent increase of the different locations as a basis for your projections (you can consider other factors as well). Support your projections with data and logical reasoning. Show all work.

Location	Projected % Change	Temp. Day 2	% Change Work Area <i>Show All Work</i>	Projected Temp. Day 3	Reasoning for Projections
Outside Main Office (in shade)					Assumed Day 3 temperature is +10°F
Inside Main Office					
Homeroom					
Cafeteria (in middle)					
Parking Lot (in middle)					
Gym (middle of a wall)					

What are three confounding variables that may affect your projections? Explain your reasoning.

- 1.
- 2.
- 3.

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