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Skymath Units

The Skymath unit on temperature is the first in a proposed series of middle school curricula that incorporate real-time weather data to teach mathematics.

This unit and future Skymath units are designed to teach significant mathematics through a flexible curriculum that can be adapted to the many different settings found in middle schools and junior high schools. Activities build on students' experience, interests, and understandings through both structured experiences and open-ended explorations. Students engage in authentic tasks, questions, problems, and projects that enable them to demonstrate and assess what they have learned and can do. As a general principle, Skymath applies a developmental approach to teaching and learning, and instruction flows:

- from off-line activities to on-line ones,
- from small data sets to large ones,
- from concrete images to abstract ideas,
- from the particular to the general.

The Skymath Temperature Unit has been developed in close cooperation with middle school teachers and students in Massachusetts and Colorado, and their experiences and ideas appear throughout this unit. Other teachers who have used Skymath in their classroom are encouraged to contribute to the curriculum by posting messages to the Skymath Mailing List. To join this list, send a message to Majordomo@unidata.ucar.edu. Leave the subject blank. In the body of the message, write

subscribe Skymath First_name Last_name

Substitute your own first and last names after the word "Skymath."

Outline of Handbook for Skymath Temperature Unit

Part 1: Introduction

Skymath is a mathematics curriculum that...

- supports NCTM Standards
- makes Internet a viable classroom resource
- uses real-time weather data
- involves classrooms in hands-on mathematics
- elicits higher-level thinking
- engages students in purposeful projects
- calls for reflection and communication

Part 2: The Skymath Approach to Teaching and Learning

Students

- are organized in groups
- collect and analyze real data
- exchange data and messages electronically with distant peers
- identify and solve problems that
 - emerge from classroom activities
 - may have many possible solutions
- present or publish information acquired during the unit

Teachers help students to

- learn new concepts
- acquire and develop skills
- articulate problems
- propose solutions
- experiment with their own ideas and methods
- express what they already know and what they do not yet know

Part 3: Mathematics Featured in the Skymath Temperature Unit

Students will:

- explore and learn about change through
 - measurement
 - representation
 - analysis
 - prediction
- regularly read and record temperatures

- represent their temperature data by constructing
 - tables
 - bar graphs
 - line graphs
 - maps
- use computers to
 - collect temperature data
 - create and analyze spreadsheet tables and graphs
 - collect and analyze regional and national temperature data
- develop the concept of central tendency
- estimate and calculate measures of central tendency
 - average (mean, median, mode)
 - max, min, range
- compare Celsius and Fahrenheit scales

Part 4: What Teachers Need to Do the Skymath Temperature Unit

- at least one Macintosh computer with Internet access
- an E-mail account
- for each computer, Blue Skies software (downloaded from UMich)
- spreadsheet software
- at least one StowAway™ temperature probe
- at least 12 indoor thermometers (some Celsius and some Fahrenheit)
- at least one mini-max thermometer
- overhead projector and ability to make transparencies

Part 5: Resources

- list of suppliers, books, etc.

Part 8: Suggested Schedule for Skymath Implementation

Because many Skymath activities involve the collection of data over time, they are designed to overlap rather than occur in a strictly sequential manner. The following schedule shows one possible example of how Skymath might be scheduled.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1: Getting Started						
Brainstorms						
E-Mail						
Where's the Math?						
Weather Watcher						
Blue Skies						
2: Matters of Scale						
Reading C and F						
Make Your Own Scale						
E-Mail						
Make a Rule						
3: Central Tendency						
Is Our Room...?						
How Can We Describe...?						
E-Mail						
Sampling and Comparing						
4: Data Representation...						
Line Graphs						
Exploring StowAway...						
What's Been Happening?						
E-Mail						
Were the Predictions...?						
StowAway™ #1						
5: Final Projects						
Answers and Questions						
Presentations/Reflections						
E-Mail						

Note: Weather Watcher and StowAway™ #1 are extended data collection activities.