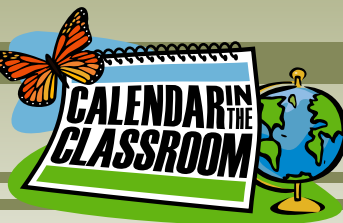




Temperature Graphing

 Daily Temperatures

Overview

This quick and easy integrated math and science lesson links students to their environment on a daily basis and gives them individual responsibilities for data collection as they learn to read thermometers, record temperatures and graph their data.

Background

The 'normal' high and low temperatures given for each date in the *calendar* are averages computed over a 30-year period.

Students will use their counting skills and make predictions as they compare their measured daily temperatures with the normal high and low temperature data contained in the *Minnesota Weatherguide Environment™ Calendar*.

For the purpose of making comparisons it is important to discuss standardization of the way you collect data. Students will understand the concept of a "fair test." The temperature should always be measured at the *same time of day* and from *the same spot*. (It wouldn't be fair to measure temperature in the early morning one day and the late afternoon on the next day -- or to measure in the shade one day and in the sun on the next day -- unless you and the students want to compare how these conditions will affect the temperature.)

The Activity

Day 1

In the first lesson students learn to read an outdoor thermometer and record the measurement on a data sheet or in their journals. A paper thermometer template is included at the end of the lesson. It contains instructions and can be printed and distributed to students for practice in reading temperatures before they handle a real thermometer.

This activity can be ongoing throughout the school year. The first few times students measure and record temperatures it should be done as a whole class activity in order to develop a standardization of procedures. Once students understand the procedures it can quickly be done by a single student on a rotating basis as part of a morning meeting or math routine. Collecting daily data gives students confidence in their scientific ability and develops a sense of responsibility when it is their day to measure the temperature.

Learning to read a thermometer

1. Reproduce the thermometer template and have students follow directions to thread the red/white strip of paper (or ribbon) that has been taped together, through the slits on the paper thermometer. Thread from the back of the paper, through the bottom slit. Then thread across the thermometer and out toward the back of the paper through the top slit. Ask students to adjust their thermometers by pulling the tape to indicate a temperature of 32°F or 0° C. This is the temperature of freezing water.

Time:

30 min on 1st day
5-10 min daily

Skills:

Predicting
Measuring
Recording
Calculating
Graphing

Vocabulary:

normal temperature
daily temperature
maximum temperature
minimum temperature
difference (math)

Materials Needed:

- thermometer
- thermometer template (optional)
- weekly data page
- number line
- graph paper
- *Minnesota Weatherguide Environment™ Calendar*

Now have them adjust the thermometer to several more practice readings.

2. Once students are familiar with the paper thermometer and confident in their ability to read temperatures, have them read room temperature on the real thermometer. Here are simple rules for handling the glass thermometers.

- Handle with care because they contain a delicate glass tube filled with a red alcohol liquid. The red liquid in thermometers is alcohol with a red dye, so it is not a dangerous fluid like the silver colored mercury in more technical thermometers.

- When holding a thermometer be sure to keep fingers away from the red bulb. Body heat will affect the temperature. Allow a minute or more for the thermometer to adjust to any new temperature conditions.

Day 2

Warm Up

Ask students to describe how the temperature may change during the day. During what part of the day is the temperature usually coolest? Warmest? Explain that the class is going to begin long-term data collection to see how the daily temperature changes over time.

The Activity

This activity can be done as part of a morning meeting or math routine. It should be done at about the same time every day.

1. On the *Minnesota Weatherguide Environment™ Calendar* locate the normal (or average) maximum and minimum temperatures for the day. Record them on the board so all of the students can see the numbers.
2. Have students make predictions about what they think the temperature is currently.
3. Take students outside to read the actual temperature using a thermometer that is permanently mounted or was placed outside before the lesson. Record the temperature on the data page. Notice other aspects of the weather: Is it sunny or cloudy? Windy or calm? Is there precipitation? Record these observations.
4. Once back inside, refer to the calendar to see the daily *normal temperature*. Using the *current temperature*, count the *difference* between the normal high and the normal low.
5. At the end of the week or end of the month, make a graph of the daily temperatures. Discuss the data displayed on the graph. A year-long graph displayed in the school hallway is impressive to students.

Wrap Up & Assessment

Are students able to accurately read a thermometer? Can they record observations correctly?

Questions for Discussion and Comprehension

- What was the highest, lowest, and most frequent recording for the recording period?
- Why might the temperature be higher or lower than the normal for a recording period?
- Who might be interested in knowing the daily temperature? People hosting outdoors events, farmers, construction workers, etc.
- Why is it important to measure at the same time and place each day?

Extensions

- Students record daily temperatures at home and make their own graph.
- Pick a city from the southern hemisphere and use a daily newspaper/online resource to record the previous day's temperature. Compare these data points with those of the classroom thermometer.
- Place the thermometer in different places outside and investigate if they make a difference in the temperature. Compare temperatures on the north and south side of the building.
- Report data to the main office for inclusion in morning or afternoon announcements.

Resources

Minnesota Weatherguide Environment TMCalendar

online: <https://jeffersfoundation.org/programs/calendar-in-the-classroom/>

Minnesota Academic Standards

3-D Science Standards

Science Practices:

1. Developing and Using Models
3. Plan and Carry out Investigations (investigating through observation)
4. Analyzing and Interpreting Data
6. Using Mathematics and Computational Thinking
8. Obtaining, Evaluating and Communicating Information

Crosscutting Concepts:

1. Patterns
3. Scale, Proportion, and Quantity

Disciplinary Core Ideas:

ESS2: Earth's Systems

2nd Grade: Represent data to describe typical weather conditions expected during a particular season (e.g., temperature)

Math Standards

Grade	Strand	Anchor Standard	Code	Benchmark
1	Data Analysis	Data Sciences: Identify, formulate and investigate statistical questions by collecting data considering cultural perspectives, analyzing and interpreting data and communicating the results.	1.1.1.1	Notice and describe patterns in data-rich situations and create statistical investigative questions with teacher guidance. (MP6, MP7)
2	Data Analysis	Data Sciences: Identify, formulate and investigate statistical questions by collecting data considering cultural perspectives, analyzing and interpreting data and communicating the results.	2.1.1.1	Notice and describe patterns in data-rich situations and create statistical investigative questions. (MP6, MP7)
2	Data Analysis	Data Sciences: Identify, formulate and investigate statistical questions by collecting data considering cultural perspectives, analyzing and interpreting data and communicating the results.	2.1.1.3	Collection and use data to consider and decide what data will answer a question. Represent data as drawings, picture graphs, dot plots (a.k.a. line graphs or line plots). Communicate observations. (MP3, MP5)
2	Patterns and Relationships	Number Relationships: Describe/interpret and use quantities, relationships between and representations of quantities and number systems. Describe and relate operations. Use strategies and procedures accurately, efficiently and flexibly. Assess the reasonableness of the results.	2.3.5.2	Read, write, compare, order and represent whole numbers up to 1,000. Representations may include numerals, expanded notation, addition, subtraction... (MP4)



Daily Data – Temperature Chart

Date	Normal Temperature	Actual Temperature

Observations about the weather this week:

