Science
Teacher
Education
Program

DESIGN A CLINOMETER

Lesson Summary:

In the 1920s, Carl Stromer from Norway used a mathematical formula called triangulation to determine the height of the aurora. Students build a simple measuring device with which they can determine the height of classroom objects.

Objectives:

The student will:
- build a working clinometer;
- use a clinometer to determine the height of an unknown object;
- use triangulation to determine the height of an object;
- measure in degrees, calculate averages, and interpret data; and
- determine that Carl Stromer used similar triangulation techniques to figure out the height of the aurora.

GLEs Addressed:

Science

[5] SA1.2 The student demonstrates an understanding of the processes of science by using quantitative and qualitative observations to create inferences and predictions.

[6] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct simple repeatable investigations.

[7] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings.

[8] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct repeatable investigations, in order to record, analyze (i.e., range, mean, media, mode), interpret data and present findings.

[5] SE2.1 The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by investigating a problem or project over a specified period of time and identifying the tools and processes used in that project.

Math

[5] S&P-2 The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; drawing or justifying conclusions) by using information from a variety of displays (tables, bar graphs, line graphs, or Venn diagrams) (M6.2.2).

[6] S&P-3 The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; drawing or justifying conclusions) by using mean, median, mode, or range (M6.2.3).

[7] S&P-3 The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions; drawing or justifying conclusions) by determining mean, median, mode, or range (M6.3.3).

[7] PS-5 The student demonstrates the ability to apply mathematical skills and processes across the content strands by using real-world contexts such as science, humanities, peers, and community (M10.3.1 & M10.3.2).

[8] PS-5 The student demonstrates the ability to apply mathematical skills and processes across the content strands by using real-world contexts such as science, humanities, peers, community, and careers (M10.3.1 & M10.4.2).

[10] MEA-2 The student demonstrates understanding of measurement techniques by applying right triangle trigonometry (sine, cosine, and tangent) to find missing dimensions in real-world applications (M2.4.4).

Search Terms: Carl Stromer, clinometer, triangulation, mathematics, tangent, angle, aurora, Northern Lights