

Similar Triangles in Flight

Summary

Through Internet activities the students discover the use of similar triangles in remote sensing photography. They learn how similar triangles help guide small planes over areas that are hard to photograph. This gives valuable information to archaeologists, biologists, geologists and others. The students then learn to make a clinometer so that they can calculate the height of several items around the school. Students will also create problems on similar triangles and navigation.

Time Frame

5 class periods of 45 minutes each

Group Size

Small Groups

Life Skills

Thinking & Reasoning, Communication

Materials

Each group will need the following items:

- protractor
- drinking straw
- cardboard
- scissors
- tape
- string
- a weight (a small rock will do if you have nothing else).

NOTE: the site describing the making of the clinometer is from Australia. When it mentions cotton, this means string.

Background for Teachers

The students need to have learned similar triangles and angles of inclination. Visit the sites (listed below) beforehand. They are relatively short and easy to peruse. The site on making the clinometer should be visited so that you can answer questions on construction.

Intended Learning Outcomes

- Make observations and measurements.
- Solve problems by applying science principles and procedures.

Instructional Procedures

1. Schedule a time with the students to use the Internet in the computer lab. Note: If only one computer is available, give each group a list of questions that they must answer from the website. Then give the students a practice worksheet (on similar triangles) to work on as other groups are called up to work on the computer.

The students will create a report from the Remote Sensing Research site. The report needs to address the following questions:

- Archeology: a) How does low altitude flying apply to archeology? b) Why weren't the ruts noticed

before this photo? c) Describe in detail Dr. Butler's project.

Prairie Dog: a) How did they find the prairie dog population before RPV's? b) How do they find it now?

Landslides: a) What is the Grand ditch and where is it located? b) What happened at the Grand Ditch? c) Describe the landslide; include the damage done and the appearance.

Sighting: a) What is a thumb gauge and how is its length figured? b) Explain in detail the similar triangles used in flight; include what each segment and point represent. c) Explain and illustrate how a clinometer is used.

2. Give the students time to write the first draft of their report. If you are working with one computer, have the groups relate to the class the information they found before writing the reports.
3. Have the students exchange and correct each other's papers for errors. The final draft of the report is due the next day. The final will be re-written at home.
4. Have the students get on the Internet for instructions on making a clinometer. Each group will construct a clinometer.
5. Go outside and have the students measure pre-selected items around your school for their height. Have them keep a data table of all information. The data should include height to eye, angle, distance etc.
6. Have each student create problems (about five each) both on the use of the clinometer for height, and the use of the similar triangles to solve for the thumb gauge. They must then solve each problem. At the bottom of the page they are to give a written explanation of how to solve the triangles for altitude, and how to solve for height using a clinometer.

Assessment Plan

Use the problems the students create and their data tables from the outside measuring activity as assessment for the activity.

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