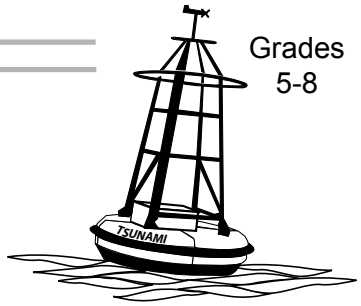
Ground Truthing



Grades 5-8

Overview:

Students collect the waypoints around the school and compare them to the coordinates used in *Google Earth*. (NOTE: It is expected that students can mark a waypoint with a GPS and enter coordinates in *Google Earth* before doing this lesson.)

Targeted Alaska Grade Level Expectations:

Geography

[A1] A student should be able to make and use maps, globes, and graphs to gather, analyze, and report spatial (geographic) information. A student who meets this content standard should use maps and globes to locate places and regions.

[B2] A student should be able to utilize, analyze, and explain information about the human and physical features of places and regions. A student who meets this content standard should analyze how places are formed, identified, named, and characterized.

Technology

[A1-3] A student should be able to operate technology-based tools. A student who meets this content standard should: use a computer to enter and retreive information, and use technological tools for learning, communications, and productivity. A student who meets this content standard should use local and worldwide networks.

[C1-3] A student should be able to use technology to explore ideas, solve problems, and derive meaning. A student who meets this content standard should use technology to observe, analyze, interpret, and draw conclusions. A student who meets this content standard should solve problems both individually and with others. A student how meets this content standard should create new knowledge by evaluating, combining, or extending information using multiple technologies.

[E1] A student should be able to use technology to responsibly and understand its impact on individuals and society. A student who meets this content standard should evaluate the potentials and limitations of existing technologies.

Objectives:

Students will:

- enter coordinates in *Google Earth*;
- take waypoints with a GPS;
- retrieve coordinates from a GPS; and
- determine the accuracy between positions taken with a GPS and the same location in *Google Earth*.

Materials:

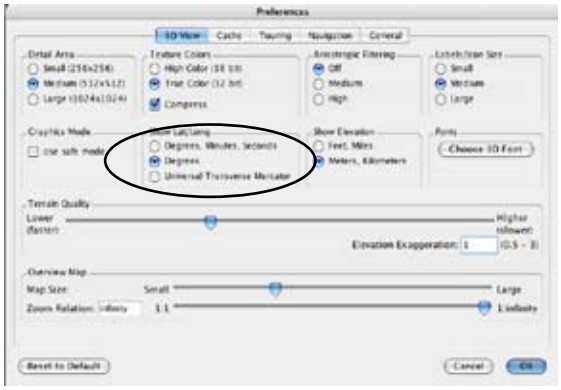
- GPS receiver
- Computer with Internet access and *Google Earth* installed
- STUDENT WORKSHEET: “Ground Truthing”

Science Basics:

"Ground truth" is a term used in mapping to compare data on the ground to data collected from remote sensing techniques. One common use of ground truthing is to compare vegetation types found in an area with image data of the same area, which can assist in classifying the types of land cover. Another use is to compare GPS coordinates with software program coordinates to determine if there are any errors.

Using an incorrect or mismatched datum is a common source of error in mapping. The default datum for GPS receivers is WGS84 (World Geodetic Survey 1984). WGS84 is the datum used in *Google Earth*. Coordinates taken with a GPS in the WGS84 datum would not target the correct location on a USGS topographic map in Alaska, because USGS topographic maps for Alaska use Alaska NAD27 datum. Consequently, the coordinates could be off by several hundred feet. Additionally, if the GPS is set to Alaska NAD27 datum, the coordinates will not plot correctly in *Google Earth*, which uses WGS84. The datum used can be changed on the Setup page of the GPS receiver.

Activity Preparation:



1. The GPS and *Google Earth* should be set to the same format. This lesson uses decimal degrees.
2. In *Google Earth*, set the preferences to degrees.
3. The GPS should be set to decimal degrees. In the Garmin Legend, go to **Main Menu** □ **Units** □ **Position Format hddd.dddd**. The teacher should check to make sure the datum is set to WGS84.

4. If possible, collect some waypoints that are away from the school. Ask students to enter the coordinates in *Google Earth* to find the location.

Activity Procedure:

1. Students enter coordinates in *Google Earth* and determine the location.
2. Students take waypoints with a GPS around the school and enter the coordinates in *Google Earth* to see if *Google Earth* places them in the same location.

Answers:

1.Yes, it looks like the same place.

2. It is Merrill Field in Anchorage.

3. It is a helicopter in flight.

4. They should be in the same place.

Name:_____

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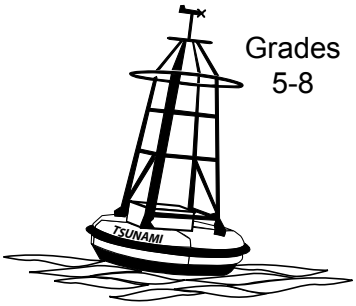
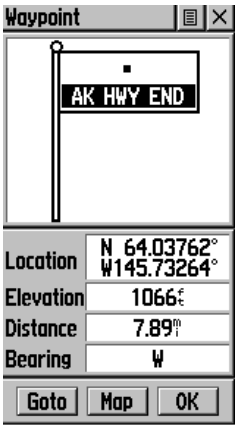


Student Worksheet

Ground Truthing (page 1 of 3)

"Ground truth" is a term used in mapping to compare data on the ground to data collected from remote sensing images. A GPS will be used to mark waypoints around the school. Once collected, enter the coordinates into *Google Earth* to see if they match the same location.

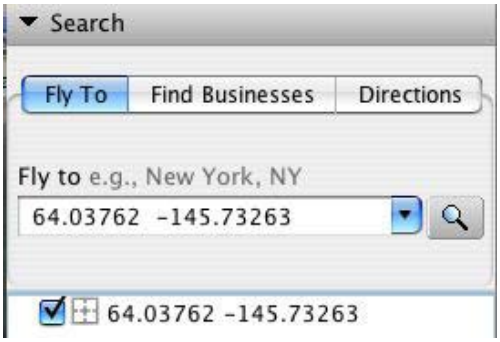
Part 1: Example of Ground Truthing



A family traveled up the Alaska Highway. When they got to the end of the highway at Milepost 1422, they marked a waypoint with their GPS. Later, they entered the coordinates into Google Earth. The coordinates were taken on the side of the road near the Visitor Center where the Alaska Highway joins the Richardson Highway in Delta Junction.

Enter the following coordinates in the search bar of Google Earth: 64.03762 -145.73263 (it can also be entered as N64.03762 W145.73263)

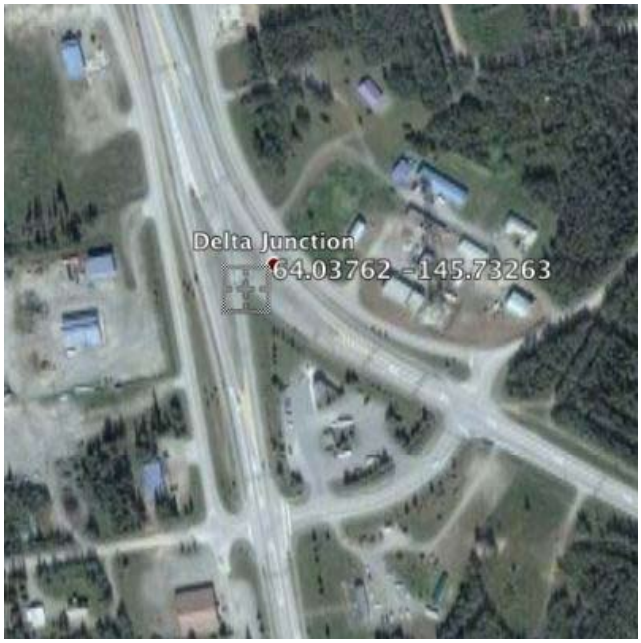
Press return or click the magnifying glass. Google Earth will zoom to the location.



1. Does the *Google Earth* image look like it is the location described at Milepost 1422?

   _____

Sometimes ground truthing involves interpreting what is seen in an image. Search for 61.212895, -149.844997.



2. Where is this location? _____

   _____

3. What is seen here?_____

   _____

Name:_____

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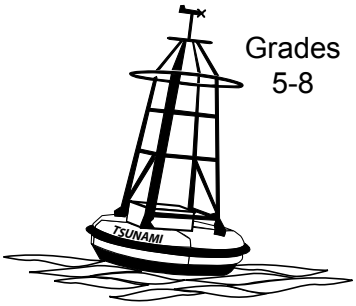

Student Worksheet

Ground Truthing (page 2 of 3)

Part 2: Collecting Waypoints

Before going outside, look in *Google Earth* at the area around the school to determine good possibilities for waypoints. The intersection of two roads near the school, the corner of a parking lot or playground are possibilities.

Use a GPS to mark 3 waypoints around the school. Write the waypoint names and coordinates as you take the waypoints.

Remember that a GPS needs a clear view of the sky. Do not take waypoints too close to the school building or near objects (under trees, tall buildings, etc.) that would interfere with satellite reception.

List the waypoint names and coordinates below:

Name	Latitude	Longitude

Help Finding the Waypoint List

If you need to find the list of waypoints, use the **find button** on the left side of the GPS.

Press the **find button**.

Press down on the **click stick** to select waypoints.

Press down on the **click stick** again to select nearest.

Highlight the waypoint to see the coordinates for that waypoint.

Name:_____

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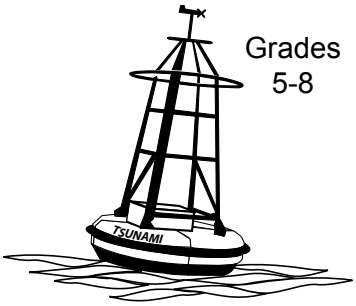

Student Worksheet

Ground Truthing (page 3 of 3)

Part 3: Launch Google Earth

Enter the latitude and longitude for each of the 3 waypoints in the search box. *Google Earth* will zoom to the location and show a box with the coordinates nearby.

4. Do each of the waypoints look like they are in the same location you marked with the GPS?

_____

If your teacher has additional waypoints, enter them in *Google Earth*. List the locations for each of the waypoints.