

GPS Devices & Place-based Learning

Virtual Adventures & Community Connections

The Workshop

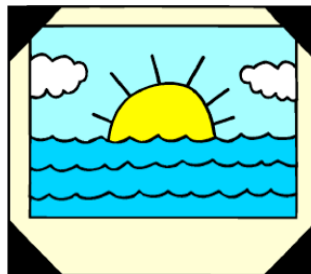
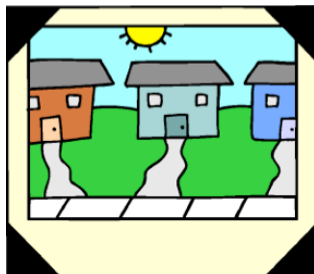
GPS Basics

Place-based Learning

Geocaching

GPS Classroom Applications

GPS & Community Connections



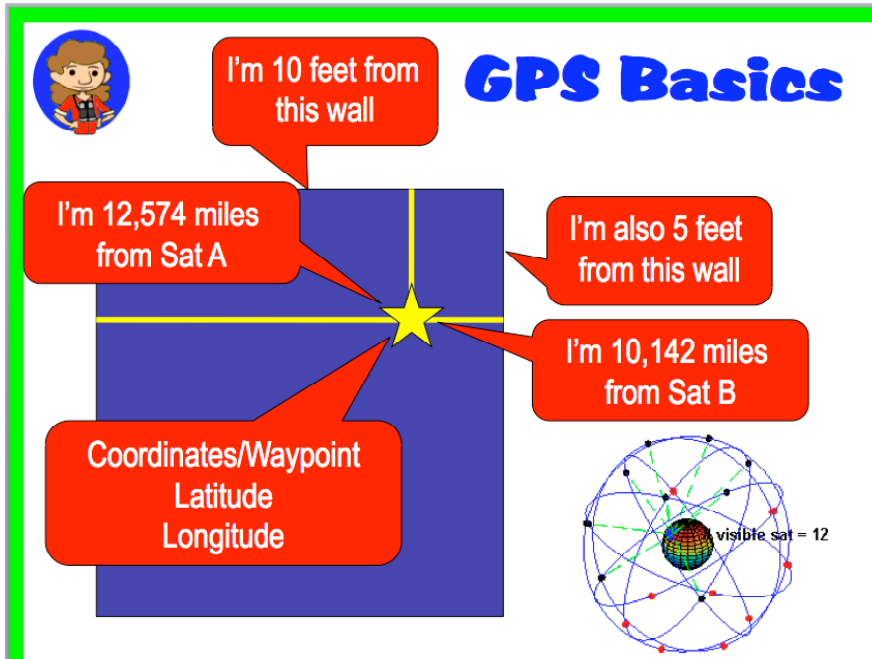
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GPS Basics

- ❖ Global Positioning System uses GNSS technology: 24-30 satellites working together
- ❖ GPS receiver acquires location, time, velocity information
- ❖ GPS involves: control on the ground, space-based satellites, user with GPS device



GPS Basics

I'm 10 feet from this wall

I'm 12,574 miles from Sat A

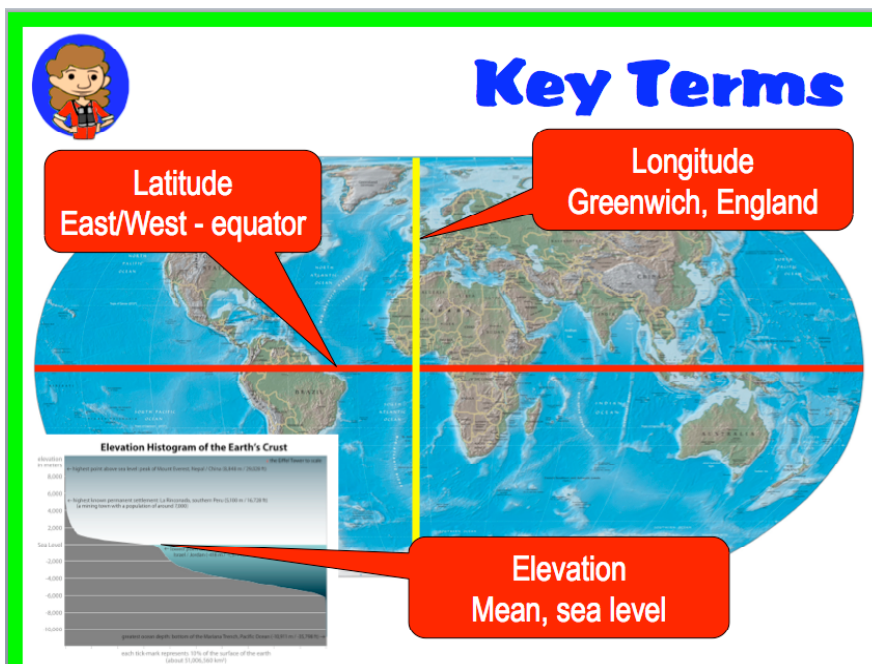
I'm also 5 feet from this wall

I'm 10,142 miles from Sat B

Coordinates/Waypoint
Latitude
Longitude

visible sat = 12

The diagram shows a yellow star representing a GPS receiver. It is positioned between two vertical blue bars representing walls. A red speech bubble above the star says "I'm 10 feet from this wall". A red speech bubble to the left says "I'm 12,574 miles from Sat A". A red speech bubble to the right says "I'm also 5 feet from this wall". A red speech bubble below the star says "I'm 10,142 miles from Sat B". A red box at the bottom left contains the text "Coordinates/Waypoint", "Latitude", and "Longitude". To the right is a globe with a network of lines and dots, with a label "visible sat = 12".



Key Terms

Latitude
East/West - equator

Longitude
Greenwich, England

Elevation
Mean, sea level

The diagram shows a world map with a red horizontal line representing the equator and a yellow vertical line representing the Prime Meridian. A red speech bubble on the left says "Latitude East/West - equator". A red speech bubble on the right says "Longitude Greenwich, England". A red speech bubble at the bottom says "Elevation Mean, sea level". In the bottom left corner, there is a graph titled "Elevation Histogram of the Earth's Crust" showing elevation in feet on the y-axis (from -10,000 to 10,000) and area on the x-axis. The graph shows a distribution of land and sea level elevations.

Overview

Place-based Education

- ❖ Connects school to community
- ❖ Grounds learning in local phenomena and lived experience
- ❖ Rooted in John Dewey's concerns about authentic learning

Reading – Firefox <http://www.foxfire.org/teachi.html>

Reading – *Umphey, Michael Tinkling Cymbals and Sounding Brass: Hearing the Different Drum*

Our Community

- ❖ What is “our community”?
- ❖ What makes us like others on the Mississippi River?
- ❖ What makes us unique?
- ❖ How can we share this idea?
- ❖ How is our community like and different from others?

Reading - *Smith, Gregory A. (April 2002). Place-based education: Learning to be where we are. Phi Delta Kappan, 584-594.*

Connections

- ❖ Know yourself, Know your community, Connect to the world

Your Unique Community

- ❖ History, Environment, Culture, Economy, Literature, Art and music

Place-based Approaches

- ❖ Cultural Studies, Nature Studies, Real-world Problem Solving, Internships & Entrepreneurial Opportunities

Key Elements

- ❖ Local phenomena, Students as creators, Students ownership, Teachers as guides, Sharing, Community involvement

Teachers as Facilitators

- ❖ Students use scaffolding - guidelines, worksheets, data; Teachers act as guides, partners



Real World Applications of GPS

National Geodetic Survey – formed in 1897 by Thomas Jefferson for conducting surveys <http://www.ngs.noaa.gov/>

Geodesy – a science that involves measuring changes in the location of points on the Earth's surface, Earth size and shape. Uses fixed locations (benchmarks), stable structures (monuments), multiple points (datum), along with triangulation, trigonometry, & GPS. References include latitude (equator), longitude (Greenwich, England), and elevation (sea level) Elements include control, space, and user. Benchmarks are markers placed by surveyor from the US government to identify specific locations.

Wildfires

Area burned	Burn intensity	Structure locations
Road and trail access	Water sources	Location/type of fuel in fire path
Fire progression & line construction	Planning treatments & prescribed fire	

Who Cares?

Earthquake predict	Building roads & bridges	Making maps	Landing aircraft
Navigating ships	Tracing health of land and sea		

Track a Person

Child Locator House Arrest Sex Offenders Alzheimer's Patients
Wrist/Ankle/Implants, Watch, Pagers, Cell phones, Onstar

Track Transportation

Truckers, Construction workers, Scientists, FEMA workers, Flights, Military, Cars - onstar

Take to Location

Fun, Work

Tourist's Path

Driving, Horseback riding, Walking & running, Golfing, Hiking, Scuba diving, Mountain climbing, Flying

Town & City Tours

What are the key sites?
What photos could be used? comparisons - old/new buildings
How GPS waypoints are needed? What maps & guides will help? Structures, Natural Places

Byways & Trails

National Scenic Highways
 Coastal Drives
 Pony Express Route

BLM Scenic Byways
 Route 66
 Civil War Sites

State Historic Projects
 Historic Trails

Walking Tours

Cemetery tours
 Historic homes
 Map, guide, audio, photos

Historic markers
 Small parks

Community tours
 Buildings and grounds

Historic Reenactments

Exact locations and times
 Lewis and Clark
 Underground Railroad

Build historical fiction
 Oregon Trail

Trail of Tears

Storytelling

Meet in location
 Historic tribal meeting

“You are there”
 Location of old fort

Cemetery sites (Shelbyville, IL)

Natural Places

Geologic formations
 Waterfalls

Hot springs
 Animal migration

Geysers
 Dinosaur tracks

Remote Location Tours

Places without signs
 Petroglyphs

Historic sites
 Ghost towns

Building Ruins
 Natural areas

Biological Surveys

Remote navigation
 Map species encountered
 Map boundaries
 Before & After

Locate specific points on ground
 Map geological features
 Trace change over time

Scientific Experiments

Bears, wolves, birds
 Mark old coal mines
 Watch sink hole development

Earthquake points/comparisons
 Mark underground wiring paths
 Mark for Revisits

Specific Topics

Intermittent streams
 Water habitat surveys

Unsafe areas - cliffs, mines

migration barriers, logjams, spawning/rearing areas, test management practices, population checks

Mining

Calculate boundaries of leach fields of mine recovery
 Locate property lines
 Check compliance - air, water

Trace flows & disturbances
 Check old shafts

Forestry & Agriculture

Map noxious weed infestations
 Check harvest areas
 Map wood harvesting roads

Plan agriculture plantings
 Document soil sampling sites

Mark irrigation wells
 Match to satellite imagery

Utilities

Identify, plan, manage
 Electric and gas lines, Wind farms, cell towers, Oil wells and storage tanks
 Water systems, Service roads & facilities

Real Estate

Listing and selling property
 Location exploration
 Location of fences, tanks, improvements

Appraisals
 Easements
 Planning sales of acreage/tracts

Government

Cities: Drainage, water, utilities; Project locations; Homeland Security

Historic Locations

Museums, Historical Societies: school, post office, courthouse, jail, homes, businesses

Sites for Thought

Mark a location
 Write a description

Document location
 Write a poem

Write a short story

Special Events

Olympics: torch movement, events planning
Iditarod Shipwreck Exploration Lewis & Clark Events

Recreation

Historic trail markers Bike route markers Horseback riding Finding good fishing

Ecosystems

Chesapeake Bay Salmon Movement Changes in sea level
Hillside Erosion Migration Patterns

Other Groups

US Army Corps of Engineers - dams, dikes, levees,
Bureau of Land Management - land surveys, public use areas, historical markers
Highway Departments
Utilities Companies

Geocaching

Geo - earth Caching - computer cache, cache of treasure
Virtual Cache - leave no trace Regular Cache - share a treasure

Virtual Cache

Leaves no trace
Photograph the site
Identify a trail without establishing trail
Great for fishing spots, Great on slick rocks

Classroom Applications

Now and Then

GPS location - Photographs, Trace history, Recollections of area

Nature Trail or Walk

GPS location – Photographs, Identify plants, rocks, features, Guide, Map with stops
Ideas: Wildflowers, Trees, Mushrooms, Lichens and moss, Rocks, Fossils, Rock formations

Historic Trail or Walk

GPS location – Photographs, Identify locations, people, history, Guide, Map with stops
Ideas: Petroglyphs, Tombstones, Historical markers, Simulate a time period: artifacts, music, situation

Virtual Walk through History

Mark location with GPS. Collect artifacts related to that location.
Read a short story or poem set in that location.
Ask students to write about a fictional person who might have lived there.
What would they see?

Standards Review

Use GPS locations to focus on identified “standards” need areas
Instructions - writing step-by-step instructions for getting to a location or doing something at a particular location
Observations - writing quality descriptions (i.e., terrain, historic building, landscape)

Photo Tour

Mark GPS location. Take a photo. Write a description.
Ask a member of your other community to locate a place with similar features based only on the written description and take a photograph. Examine the photographs and do a visual comparison.

Author Exploration

Author writes about a particular spot.
Read a novel, short story or poem.
Locate that area using GPS or GIS.
Write your own prose about a particular place of your choice.
Mark that spot with a GPS location and include this in the prose.
Ask others to reflect on this spot as it relates to the prose.

Author Variations

Pre-select locations for creative writing
Design specific types of writing activities such as poetry types, free prose, etc.
Use a GPS location as a starter for persuasive writing (i.e., concerns about old buildings, historic buildings, pollution, traffic problems)
Ideas: Mark Twain; Richard Peck's, *The River Between Us*

Building Projects

Archiving History, Remodeling Building

Interdisciplinary Approaches: Reading Writing Math Science Social Studies

Use Your Senses

Locate interesting sensory items. Create a multi-sensory exploration

Jeffrey pine smells like...Pumice stones are...Pine cones contain...

Incorporate

Testing equipment, Audio recordings, Maps, Notepads and Sketchpads

Worksheets, Cameras and video recorders

What can the GPS do that you can't do effectively another way?

Natural objects, Structures, Trace movement, Compare same place over time

GPS Tips and Ideas

10 Tips for Accuracy

1. Use outdoor locations
2. Consider impact of buildings
3. Consider time of year/tree density
4. Do multiple readings
5. Come from 3 directions/encircle
6. Don't make sudden turns
7. Take 2 readings before setting
8. Provide a visual clue
9. Keep batteries charged
10. Remember, it's not exact



Ideas Community Places, Roads, Bridges, City and County Structures
Historic Locations - Indian mounds, Underground railroad

Simple GPS Applications

Don't create a "GPS project"... Instead...

Add locations to "now & then"

Identify features of location

Newsletter Format

Create virtual tour of community

Track environmental information

Virtual Tour Format

Try It!

Rather than saying, how can I use the GPS and GIS? Ask what do I want to do?

Then, ask how the GPS, websites, digital camera, and other technology can help achieve this goal.

Place-Based E-scrapbooking

Explore the world where you live. A place-based approach focuses on exploring and sharing idea about your local area.

Agriculture. What crops are common in your area? How large are the farms and ranches? What's the growing season? How is the community impacted by agriculture? How has this changed over time?

Characteristics. What are some key ideas you could use for comparison (i.e., cost of food, number/types of retail, parking restrictions, climates, entertainment costs, sports options, public transportation)

Communication. How long have telephones been in the community? How many land and cell phones are in the community?

Economy. What businesses and industries are part of the local community? How has this changed over time? What do you predict for the future?

Entertainment. What types of entertainment was popular before radio and television?

Events, Festivals, and Traditions. What are the unique and interesting events, festivals, and traditions?

Geography. What are the boundaries of the town? How is the town connected to other areas? What geographic features characterize the area (i.e., river, stream, roads)?

Historical Events. How did a particular historical event influence the development of our area? We interrupt this program to bring you a news bulletin...

Land Use. How is the land in your own used? Where are the homes, schools, businesses, library, town hall, medical facilities, utilities, and roads? What controversies exist about land use such as Walmart coming to town or zoning for highways, utilities, etc.? What are issues related to land use? What are the perspectives? How can information be collected? What are the possible solutions?

Local Legends. What famous people were born or lived in the area?

Highs and Lows. What are the highs and lows in your community (i.e., temperatures, water levels, unemployment, student numbers, costs)? What is increasing and decreasing in your areas? Is this good, bad, or neutral?

Industry, Agriculture, Business. How has industry changed over time? How does it compare with the current industries? What caused the change?

Movement. How has the town population changed? What are the migration patterns? Why do people move into the town, away from the town, or within the town?

Natural Disasters. What are the most common natural disaster risks in the area (i.e., blizzards, hurricanes, tornadoes, volcanoes, drought, floods, fires, ice, wind storms,)? How frequent are disasters in the history of the area? Are people prepared for these problems? What local services plan for disasters? What is the school and town emergency plan?

Peoples and Cultures. What local groups of people can be identified through history? Did these people come from particular areas of North American or the world? How far back can they be traced? How did they use the land? What were their customs, traditions, and religions? What tools, instruments, or other things did they create? Are they still in the area or did they move?

Place Profile. What are the key buildings, geographic areas, etc. to explore? What is its history? Who built it and why? What was it used for? What is it used for now?

Schools. How has education changed? How have the schools changed? Why? When I look outside the school windows what do I see?

Transportation. How did people travel around the local area through history? How often did they take long trips? Where did people go? Why? How are products and people moved over distances? What modes of transportation have been used (i.e., carriage, stage coach, train, truck, car, airplane)? How does transportation impact business and industry? How could transportation be improved? What role do the geographic features (such as rivers or hills) play in transportation? How much do people travel each day to school, work, and play? What mode of transportation do they use? How does geography impact this? How has this changed through generations?

Travel. If you were planning a trip to your partner town, what would you want to know about the new place? What do you want to know about the history, local culture, geography, tourist attractions, weather, and transportation? Plan a trip for your partner school students to your town. How would they get there? How long would it take? What local animals and plants would they see? What local geographic and historical features would you explore?

Exploring the Possibilities

Activity #1: GPS Adventure

As a small group, take the GPS device outside. When you find the location, fill in the following spaces below:

Draw a map to the location.	Describe something you see.
Sketch something you see.	Create a problem to solve at this location.

Activity #2A: Our Place

Create a map for an imaginary place (i.e., rural, small city, suburban, or urban setting). Include schools, government buildings, businesses, industries, farms, libraries, museums, natural areas, historical areas, and other points of local interest. Brainstorm local attractions such as local natural, cultural, and historical features, festivals, and famous local residents.

Activity #2B: GPS Projects

Brainstorm projects that would make use of GPS devices for place-based projects in your imaginary place. Consider other technologies that might be incorporated. Talk about specific subject area connections. Consider authentic student audiences for projects and ways to incorporate community agencies.

Activity #2C: Connections

Discuss plans for your own GPS project in your community. Create a list of resources needed, people involved, timeline, standards addressed, activities, and assessment tools.

Find and Think

Write down the waypoint provided by your leader. Be sure to double-check the numbers. Enter these numbers into your GPS. Find the location.

What do you see? Describe the location in words and pictures.

Complete at least 2 of the following activities:

- ❖ Brainstorm questions you have about the location. What resources could you use to answer these questions?
- ❖ Write a poem about the location.
- ❖ Write a short story that includes factual information about this location.
- ❖ Create a 3-4 panel comic showing an encounter that might happen or happened at this location. Write the dialog in English or in another language.
- ❖ Observe the area carefully. Create detailed sketches of the location including labels, definitions, objects, facts, and observations. Brainstorm other data that could be collected such as temperature, object sizes. What tools would you need to record this information?
- ❖ Create a math problem that could be solved at this location.
- ❖ Create a timeline showing how this location has evolved over time (i.e., eras, years, months, days, minutes).
- ❖ Create a concept map organizing ideas, thoughts, or facts based on this location.
- ❖ Create a Venn Diagram comparing something at this location with another place or time.
- ❖ Compare this location to another location (i.e., history, science).
- ❖ Brainstorm specific grade level standards you could address from this location.
- ❖ From where you're standing, what other interesting locations could serve as interesting waypoints?

Create and Share

Create

It's fun to have a series of related locations to explore as part of a driving or walking tour.

Identify another waypoint that is CONNECTED in some way to the first waypoint. For instance, your waypoint may take explorers to another example (i.e., type of tree, historical monument, highway intersection).

Design an activity that others can complete.

Ideas:

- ❖ Write a scenario to kick off the activity such as "Imagine life at this spot 300 years ago..."
- ❖ Design a mystery that begins or ends at this location.
- ❖ Create a meaningful, authentic problem to solve with information gathered at this location.
- ❖ Connect this location to another person, place, thing, event. Ask participants to make a comparison.

Share

Write your waypoint here:

Write your activity below:

Share your activity with another team. They will complete your activity and give you feedback on your activity.