

Investigating GPS: Getting There and Back... How Accurate ?

Purpose: To use a GPS to mark the start and end positions of a straight line route, and to use the GPS to navigate back to the start.

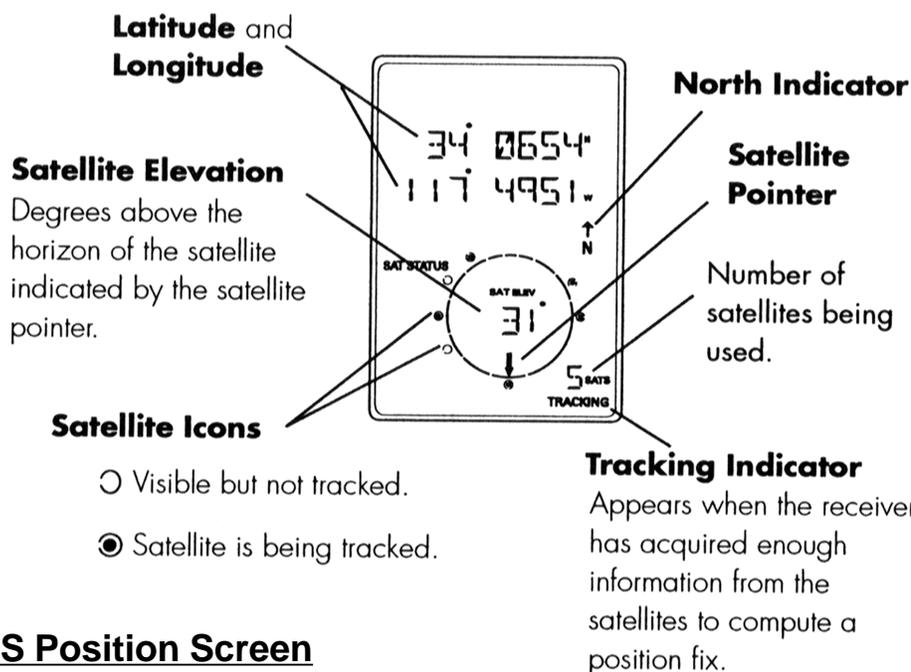
Materials: one GPS (per team)

Procedures:

1- Power up your GPS and move outdoors. For this activity you will need an open field or an area on your school campus where you can move at least a quarter mile in a straight line without passing under bridges, tunnels or overhangs of any kind.

2- Once your GPS has warmed up and has tracked enough satellites to get your position fix, use the MARK button to save your starting position. Using a GPS on land, saved positions are known as “landmarks” and are abbreviated “LM01” through “LM99” on the screen. On the water, navigators call landmarks “waypoints.”

3- Next, walk in a straight line away from your starting point. As you move keep observing the GPS Position screen (shown below). Continue walking until either the latitude or longitude numbers (or both) change their value. --How precise is the GPS? Approximately how far did you have to walk to see a change?



GPS Position Screen

4- Continue your walk and keep looking at the GPS screen until you have either reached the end of the open space, at least one quarter mile. MARK this point in your GPS.

5- Now you will use your GPS to navigate a route back to your starting position. The easiest way to do this is to press the GOTO button. Use the LEFT/RIGHT arrows on the GPS to select your starting position, which has a default name of "LM01," meaning the first landmark saved. Press ENTER or GOTO. This displays the navigation screen which tells you the bearing and distance to your starting point.

-- How far are you from your starting point?

6- Follow the Steering Indicator (in the circle at the bottom of the screen) to navigate. Turn left or right as instructed as you move.

-- Does the Steering Indicator give you the correct information about which way to move?

-- What is your walking speed?

7- After you have successfully navigated your way back to your starting point using the GPS, let's try to see how little a distance can be to use GPS navigation. Try walking the same route away from your starting position that you did the first time, only this time just go half way across your open space. MARK this point and use GOTO to navigate back to the start.

-- Was the Steering Indicator accurate?

-- Was it any more or less accurate than when a greater distance was travelled?

8- For the third and final test of GPS accuracy, walk away from the starting point again. This time keep a sharp eye on the display screen. As soon as you see a change in either latitude or longitude, MARK this point, and try navigating home.

-- Did the GOTO function work correctly?

-- Was the Steering indicator accurate this time?

-- Was it more or less accurate than before?

ANALYSIS:

1- With your group, discuss the benefits and limitations of using a GPS for short range navigation.

2- How would the accuracy and usefulness of using your GPS change if you were taking a 200 mile trip? Explain.

3- If the latitude and longitude coordinates for the location of "buried treasure" on your school campus were given to you, how easy would it be to find and recover it? Explain.