



# GPS

## Global Positioning System

Leidigh - Vrablic

*Title:* Day One: GPS Unit

*Audience:* First-grade regular education classroom

*Standards(s):*

**S.K-2.A.1.1.2:** Identify examples of technology.

**S.K-2.A.1.1.3:** Describe how technology can help people (e.g., home appliances, phones, computers, transportation).

*Vocabulary:* GPS (Global Positioning System)

*Essential Question(s):*

How does a GPS help people around the world?

*Behavioral Objectives:*

Students will be able to complete a group activity following directions around the classroom to understand how GPS works. Students will be able to draw one way we use GPS on a poster with a partner to be used on Day 2 and 3 of the Unit.

*Duration:* 30-40 minutes

*Materials:*

- Three sets of clues placed around the classroom; each set is printed on a different color paper. One set makes the directions easy to follow. The next set should make the directions harder to follow. The last set should have directions that don't make sense.
- Online satellite link (<http://science.nasa.gov/iSat/?group=SMD&satellite=28773>)
- Online shark link (<http://www.ocearch.org/tracker/>)
- Sample GPS devices
- Blank White Paper
- Markers/crayons

*Instructional Practices*

*Introduction*

Before the lesson begins, write the Essential Questions on the board for students to see. Have the students sit on the carpet in front of the board.

### *Anticipatory Set*

“Good morning, boys and girls. Today, we are going to start our unit on GPS. Raise your hand silently if you have heard someone, maybe mom or dad, talk about using a GPS before.” (Allow students to raise hands). “Excellent. Hands down. GPS is a type of technology that stands for Global Positioning System. Next week, you will remember that we are going to the Hershey Auto Museum to look at their cars and the history of transportation. We are learning about GPS because it helps people get from one place to the next place with directions. Many cars today have GPS devices in them or you can purchase them from stores. By the end of the day, you will understand how people use GPS technology around the world and why it is important.”

### *Sequence of Lesson*

“To begin, we are going to divide into three teams. As a team, I am going to give you a clue. You have to use your brains together in your group to come up with the correct answer and go to that place. For example, if my clue says, “*Go to the area where you sharpen pencils,*” where would I go? Everyone?” (Students respond that they would go to the pencil sharpener.) “Right, so I would go to the pencil sharpener and look for the clue that is the same color as mine. Then, I pick up that clue, read what it says, and go to the next place. I keep going until I find the last clue. The first team to get back to the carpet with their clues wins. All the clues are in the classroom, so you will not be going anywhere outside of the room. Any questions? I am setting the time for three minutes.”

(Have students repeat directions back to the teacher to make sure they understand. The point of this activity is simple: group one’s directions will make perfect sense and they will get back to the carpet first. Group two’s directions will take longer to complete, but they will still get back to the carpet. Group three’s directions will not make sense and may leave them confused or frustrated. This activity will help students understand that GPS provides them with directions. If the directions are not clear and detailed, they will not get from the starting place to the ending place correctly.)

When you are sure students understand, the teacher will divide the class into three teams of students. Begin the timer and give them their first clue. At the end of three minutes, groups one and two should be back on the carpet. Invite group three to come back to the carpet. Discuss with the students their results. Did all the groups get the correct clues? Were the directions easy or hard to follow? Did they feel frustrated?

“There was a purpose to this activity, boys and girls. GPS devices give us directions to follow when we are driving to different places. If the directions aren’t clear, it will take longer to get there. The people driving will probably be upset, frustrated, angry, or stressed. However, if the directions make sense, people will get to their location and feel happy.”

“We are going to talk now about how people use GPS. GPS is very important because it helps people all over the world. One example I already gave you is driving. GPS tells somewhere exactly where they are so they know where to go. There are other ways people use GPS. NASA, the group in charge of the space programs, use satellites to pinpoint an exact location. We can see in real-time where the satellites are located over Earth using GPS.” (Open real-time web link and show the satellite positions to students).

“The police use GPS to track criminals who are trying to get away. Police cars today can stick objects onto cars and GPS allows them to see on the computers in their car where the criminals are going. Airplanes have GPS built in to them so pilots know where other planes are in the sky and people on the ground can see where the plane is going. Zoologists put GPS on animals, like sharks, so they can see where they are in the ocean. Let’s use GPS to take a look at where the sharks are right now” (Open real-time web link and show the sharks).

“During emergencies, for example if someone falls into water, rescuers use GPS to pinpoint where they are and save them. One really neat GPS device being developed is for people who are blind, which means they can’t see. A special GPS is in their backpack and can tell them where they are out loud, so they don’t have to ask other people. It’s really neat how GPS can be used for so many different purposes.”

“Here is your task: I am going to split you into partners. Together, you and your partner are going to draw one way people use GPS around the world. I just listed several different ways. For example, I could draw a car on my piece of paper since people use GPS in cars to get where they are going. If you cannot remember, I can list some of the examples on the board. On the back of

the paper, you need to write your names. The pictures need to be your best work! We will use these pictures for our lessons during the next two days. When you are done, hand them in to me.” (Have students repeat the directions. Then, assign them partners).

### *Closure*

“Excellent work, today, boys and girls. Over the next few days, we are going to talk about how GPS works and try a few more activities with GPS using the pictures we drew today. Tonight, I want you to keep your eyes open when you are in a car or the bus and see if you can figure out if it has GPS or not.”

### *Assessment/Evaluation*

I will know that the students have mastered the idea of how people use a GPS by their responses in the paired poster. I will take informal data on their ability to draw one way we use GPS around the world and their ability to follow directions. I will also take informal data from their responses during the follow-up conversation to their opening group activity.

### *Assignments*

None

### *Special Considerations*

### *Early Finishers*

If students finish in their groups or pairs early, I will have students look at the sample GPS devices I will have placed on a separate table. I will need to remind students that these devices are expensive. Students may also read books about GPS, cars, and maps, which will be predetermined and available in the classroom. Possible titles include: *How Does GPS Work* by Leon Gray, *Charting the World: Geography and Maps from Cave Paintings to GPS* by Richard Panchyk, *STEM Jobs with Cars* by Jane Katirgis, *Ben and the Geocaching Treasure* by Heather Gregory, *Let's Go Geocaching* by John McKinney.

### *Remediation*

If students are having trouble with the idea of GPS, I will provide 1:1 remediation and pull them aside. I would tell the student to follow my directions. I could explain to the student that GPS allows us to follow directions that make sense. Then, I would tell the student to follow my

directions and close their ears at the same time. I would explain that without clear instruction, it is difficult to follow directions. When GPS works the right way, it can tell us where someone or something is.

*Enrichment*

If students understand this lesson very quickly, the teacher can provide students with the option to create directions for a place around the school that they could attach to a poster (i.e. cafeteria, library, gymnasium, etc.).

*Special Accommodations*

If students have trouble remembering all the ways GPS is used, the teacher can write a list on the board for students to reference.

*References*

[https://www.cfa.harvard.edu/space\\_geodesy/ATLAS/classroom.html](https://www.cfa.harvard.edu/space_geodesy/ATLAS/classroom.html)

### Example Clues for Group Activity

#### Group One (Printed on Blue paper):

- 1.) Throw your trash away here. (Trash Can)
- 2.) This is where you put your backpack each day. (Storage Area)
- 3.) Go to where you mark your lunch count (Lunch Count Section)
- 4.) This is where you can read a book. (Library Area)
- 5.) Head back to the place where we meet as a group. (Group Carpet Area)

#### Group Two (Printed on Green paper):

- 1.) This is where we enter and exit the classroom (Door)
- 2.) This is where you sharpen your pencil (Pencil Sharpener)
- 3.) Turn in your work here (Bin for Homework)
- 4.) The teacher writes here (Smart Board/Whiteboard)
- 5.) This is where you put your backpack each day (Storage Area)
- 6.) This is where you throw away your trash (Trash Can)
- 7.) Head back to the place where we meet as a group (Group Carpet Area)

#### Group Three (Printed on Pink paper):

- 1.) This is where you meet with the teacher (Could be teacher desk or group table)
- 2.) This is where you write (Could be a student's desk or group table)
- 3.) This is where you throw away trash (Could be multiple trash cans or the clue could not even be there.)
- 4.) This is where we do science (Could really be anywhere in the classroom)
- 5.) Go to a place where words are written (Could again be anywhere in the classroom)
- 6.) Head back to the place where we meet (Could be carpet, group table, or not there)





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## GPS – Day Two

By Marisa Vrablic

### Essential Question

What are coordinate grids and how to use them? How to write directions to get from one place to another?

### Standard(s)

Subject Area - 3: Science and Technology and Engineering Education Standard  
Area - 3.3: Earth and Space Sciences Organizing Category - 3.3.B: Origin and Evolution of the Universe Grade Level - 3.3.1.B: GRADE 1  
Standard – 3.3.1.B3: Distinguish between scientific fact and opinion. Ask questions about objects, organisms, and events. Understand that all scientific investigations involve asking and answering questions and comparing the answer to what is already known. Plan and conduct a simple investigation and understand that different questions require different kinds of investigations. Use simple equipment (tools and other technologies) to gather data and understand that this

allows scientists to collect more information than relying only on their senses to gather information. Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge. Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.

Assessment Anchor – S.K-2.A.1: Reasoning and Analysis

Anchor Descriptor – S.K-2.A.1.1: Identify the applications of scientific, environmental, or technological knowledge.

Eligible Content – S.K-2.A.1.1.2: Identify examples of technology; S.K-2.A.1.1.3: Describe how technology can help people (e.g., home appliances, phones, computers, transportation).

Subject Area – 1: Reading, Writing, Speaking, and Listening

Standard Area – 1.4: Types of Writing

Grade Level – 1.4.1: GRADE 1

Standard – 1.4.1.B: Write informational pieces using illustrations when relevant (e.g., descriptions, letters, instructions).

## **Objectives**

Students will be able to state what coordinate grids are and how to use them.

Students will be able to write clear directions from one place to another.

## **Materials and Equipment**

- Loose leaf paper
- Blank coordinate grid
- Coordinate grid with map of classroom
- Pencils
- All objects needed for this activity (This varies on students' "ticket out the door" from day 1 and what the teacher would like to use as examples.)
- Books about maps (See bibliography)

## **Procedures**

### **Introduction**

- "Today we are going to talk more about GPS. GPS's use coordinate grids to give people directions. We are going to be learning about what coordinate grids are and how to use them. We will also learn how to write directions for the "ticket out the door" you did yesterday."

## Anticipatory Set/Activating Learning Strategies

- I will start off the lesson by reviewing what they learned the day before. “Who can remember what GPS is? \*Take a few answers.\* GPS is a Global Positioning System. It is a map that is in a computer-like object that helps to tell us where to go. They use satellites in space to figure out a person’s location and where they want to go or their destination.”
- I will then connect what they learned to what they are going to learn about in the lesson. “Do you know how maps are made? Maps are made through surveyors. These surveyors are people who go around the world and find different points of the world. They connect these points together. They then make a coordinate grid. Does anyone know what a coordinate grid is? \*Take some answers.\*”

## Sequence of lesson

- The teacher will discuss what a coordinate grid is and how it is used. In doing so, the teacher will show an example of what a coordinate grid looks like. This provides students with a visual representation of what they are learning. After explaining what a coordinate grid is and what it looks like, the teacher will talk about how to use coordinate grids and maps to create directions for when a person wants to get from one place to another. The teacher will also show a map of their classroom and talk about why it is an aerial view. After discussing this, the teacher will model how to write directions from one place to another, choosing an object or location that they will not use for the guided practice. “A coordinate grid is what a map uses to know where it is going. A coordinate grid has numbers across the top and letters down the side. \*Show example of coordinate grid.\* This coordinate grid can be turned into a map of anything. It can be of our classroom, our school, our town, our state, our country, or even the whole world. For today, I’m going to show you a map of our classroom on a coordinate grid like this. \*Show map of classroom on coordinate grid.\* When looking at this map, it looks like you are on the ceiling looking down on the classroom. Does anyone know why that is? \*Take some answers.\* It is like that so that you can see everything on the map at the same time. This is called an aerial view. Can you say aerial view. \*Have students repeat it back.\* Now, I’m going to show you how you can make directions with this map. First, I am going to think about where I want to start my directions. I think I am going to start at my desk. So on the first line of my paper, I am going to write ‘Start at teacher’s desk.’ Next I am going to write the directions. I have already picked out what object and location that I want to write my directions to. \*State what your object is and where it is located so that the students can understand how to get from point A to point B.\* So I want to think about what is the best way to get from my desk to my object.” The teacher will show the students how to write

directions using key terms such as right, left, straight, or back. The teacher should provide students with arrows that go in the desired direction to help them with remembering and understanding the different directions. The teacher should also tell the students that there does not need to be a set number of directions. However, the directions should not take them all over the place. They should also be clear so that the person who is reading them knows where to go.

- After the teacher demonstrates writing the directions, the teacher will have students follow their set of directions to an object in the room. The teacher will separate the students into four groups, picked by them. The students will each have different directions to different objects in the room (i.e. the garbage can or the pencil sharpener). With these directions, there will be a starting point, a set of directions for the students to follow, and they will not know what they are trying to find until they get there. When students find their object, they are going to write what that object was and draw a picture on the back of their directions. “O.K. gals and guys, we are now going to get into four groups. When I put you in those groups, you will be given a set of directions. These directions will tell you where to start, but not where you finish. Each group has a different set of directions that will lead them to a certain place. Do not tell the other groups if you found your given location. We will see at the end what everyone’s location was. When you have found the end of the directions, I want you to write on the back of the directions where they led you and draw a picture. When you are done, come sit on the carpet and talk quietly with your group.” After giving the directions to the students, the teacher will monitor their ability to follow the directions and work in groups. This activity is used to help students understand why making clear directions is important to finding a specific object or location. The students will then share what their object is and where it was. The teacher will discuss the importance of clear directions, using the directions that were given to the group.
- For the last activity, the teacher will give students loose leaf paper to write their directions on. The teacher will also give each student back their “ticket out the door” from day 1 so they can look off of it to write their directions. Key points to remind the students of: they can pick any starting point that they would like to, they do not have to have a set number of directions, they should not write directions that make the reader go all over the room, and directions should be clear and easy to follow. The students will then give their “ticket out the door” back to the teacher and hand in their directions for their “ticket out the door.”

### **Closure/Summarizing Strategy**

- Once all the students finish, the teacher will then ask them what coordinate grids are, how we use them, and what the good ways to

write directions are. The teacher will talk about how tomorrow the students will be given each other's directions and have to find them.

### **Assessment/Evaluation**

- The summarizing strategy discussion will be the informal assessment of the students' knowledge of the lesson. The directions that each student wrote will be formally assessed for clear directions and whether or not it will be efficient for another student to follow.

### **Assignments (if any)**

No assignments

### **Special Considerations**

#### **Early Finishers**

Students will read books about maps until all the students are finished. (Books are listed in the bibliography.)

#### **Remediation**

Students will work one-on-one with the teacher to help write their directions. Teacher may simplify and break down the activities as needed.

#### **Enrichment**

Students will be asked to write multiple directions for different objects within the room from different starting points.

#### **Special Accommodations**

Students will work in pairs or groups of three to write directions for their collectively chosen object.

## **Bibliography**

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- Hennessy, B., & Joyce, P. (2004). *The once upon a time map book* (2nd ed.). Cambridge, MA: Candlewick Press.
- Rabe, T., & Ruiz, A. (2002). *There's a map in my lap!: All about maps*. New York, NY: Random House.
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- Scullard, S. (1991). *The great round-the-world balloon race*. New York, NY: Dutton Children's Books.

<http://www.pdesas.org/Standard/Views#188667|155222>

<http://www.pdesas.org/Standard/Views#28342>

<http://www.pdesas.org/Standard/Views#188667|155222>



# Example Classroom Map

	1	2	3	4	5	6
A				TEACHER'S DESK		
B		STUDENT DESKS				
C	SINK AND COUNTER SPACE			STUDENT DESKS		
D		STUDENT DESKS				
E						
F	LIBRARY					

Note: This is for example purposes only. For in class use, I would recommend putting in the actual number of desks and be more specific about areas within the classroom.