

RESOURCE LIBRARY
ACTIVITY : 30 MINS

Introduction to GIS

Students discuss GIS and its impacts on our everyday lives. They use ropes or string to simulate GIS technology, and then discuss how GIS helps users with data visualization and analysis.

GRADES

3 - 12+

SUBJECTS

Geography, Geographic Information Systems (GIS)

CONTENTS

7 Images

OVERVIEW

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For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/introduction-gis/>

DIRECTIONS

1. Activate students' prior knowledge.

Ask: *When have you used GPS?* Encourage students to share descriptions of using car-mounted GPS devices or GPS on a mobile phone for driving directions, or hand-held GPS devices for activities such as geocaching. Explain that GPS technology uses satellites to pinpoint position on Earth with the aid of a GPS device or unit. It's become a part of many

people's daily lives. Then ask: *Have you ever used a mobile phone app that allowed you to use maps to explore information?* Invite volunteers to share the name and details of relevant apps. Explain to students that many apps today include GPS technology, as well as elements of a GIS, which they'll learn about in this activity.

2. Introduce the vocabulary term geographic information system (GIS).

Explain that GIS is an acronym that stands for geographic information systems. GIS is a system or tool for displaying and analyzing data related to positions on Earth's surface. Give students a couple of current examples that they are likely to be familiar with, such as using GIS to understand crime patterns in a city or to track wildlife as animals migrate from one area to another. Then ask: *What is the difference between GPS and GIS?* (GPS provides users with geographic data. GIS allows users to display and analyze that data.)

3. Identify ways GIS impacts our everyday lives.

Explain to students that many different industries use GIS. Invite students to identify some examples of how a company, agency, or group might use GIS in their work. Offer the following examples:

- GIS technology supports the design, implementation, and management of communication networks for the phones we use, as well as the infrastructure necessary for Internet connectivity.
- GIS is used in managing and designing road networks and transportation infrastructure.
- GIS is used to help plan efficient routes for medical emergency vehicles to travel between emergency sites and medical care facilities like hospitals.
- Businesses use GIS to decide where to build new stores and restaurants. Marketing companies use GIS to decide to whom to market those stores and restaurants, and where that marketing should be.

Tell students that they are going to do a hands-on activity that will help them understand how GIS works. You can project the provided Pictures of Practice photo gallery to give students a preview of the hands-on activity or to allow them to refer to as they complete steps 4-7.

4. Have students create a shape, or polygon.

First, invite a small group of 4-5 students to use the floor and rope to create a map of the continental United States. Allow students to use reference material if they are not familiar enough with the shape of the country. Make sure students understand they do not have to use all of the rope, but it should take up a large part of the floor. Ask: *To create the United States, you created a shape, or a polygon. What are some other shapes you could have created?* (Possible responses: counties, cities)

5. Have students create lines.

Next, choose 3-4 different volunteers and ask them to create a major river with blue rope. Ask: *When you created the river, you created a line. What are some other lines you could have created?* (Possible responses: roads, trails, pathways)

6. Have students create points.

Once the floor map is in place, ask each student to stand on a location they either have visited or would like to visit. Ask: *When standing on the place you'd like to visit, you created a point. What are some other points you could have created?* (Possible responses: home, school, grocery store)

7. Query students.

Explain to students that you are going to touch their shoulder and ask them where they are standing and why they chose to stand there. Take enough time that you can interact with as many students as possible. Then explain to students that when you touched their shoulders, or "clicked" on them, they told you information about why they chose to visit that place. You queried students, and they provided you with information. Common vocabulary terms used in GIS are *shapes, polygons, lines, points, and query*. Working together, the class simulated a simple, low-tech GIS.

8. Conduct a wrap-up discussion.

Prompt students to think about the simulation as they have a whole-class discussion. Ask:

- *How does a GIS help users with data visualization? (They can use it to identify patterns.)*
- *How does a GIS help users with data analysis? (They can use it to identify relationships.)*

Then, revisit the real-world examples of ways GIS impacts our everyday lives from step 3. Ask:

- *Which example do you think best illustrates the potential impacts of GIS technology on our daily lives? Explain.*
- *What additional, similar examples can you think of?*

Modification

For younger students, use the board to illustrate how GPS and GIS are acronyms, or abbreviations using the first letter of each word to make a shorter word.

Modification

If time allows, encourage students to enhance the map in the following ways:

- add symbols for cows or corn to represent agriculture activity
- add books from around the room to represent elevation
- gather together more closely in areas of high population

Informal Assessment

Ask students to explain, verbally or in writing, the simulation and how it mimics a GIS.

Encourage students to include the definition of GIS, what GIS is used for, and the four parts of GIS: shapes/polygons, lines, points, and queries.

OBJECTIVES

Subjects & Disciplines

Geography

- [Geographic Information Systems \(GIS\)](#)

Learning Objectives

Students will:

- identify the parts of the acronym GIS
- define GIS
- compare and contrast GPS and GIS
- describe the different types of data used in a GIS
- identify industries and areas of work that use GIS as an essential tool
- summarize the simulation

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Hands-on learning
- Simulations and games

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information, Communications, and Technology Literacy
 - Learning and Innovation Skills
 - Communication and Collaboration
- Geographic Skills
 - Acquiring Geographic Information
 - Organizing Geographic Information

National Standards, Principles, and Practices

NATIONAL GEOGRAPHY STANDARDS

- **Standard 1:**

How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

ISTE STANDARDS FOR STUDENTS (ISTE STANDARDS*S)

- **Standard 6:**

Technology Operations and Concepts

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Rope (several different colors, including blue)

REQUIRED TECHNOLOGY

- Internet Access: Optional
- Tech Setup: 1 computer per classroom, Projector

PHYSICAL SPACE

- Auditorium
- Classroom
- Community center

SETUP

- Large, open area

GROUPING

- Large-group instruction

OTHER NOTES

This activity can also be used for professional development learning environments when introducing educators to GIS.

BACKGROUND & VOCABULARY

Background Information

Geographic information systems, or GIS, are computer systems for managing, analyzing, and displaying geographic information and data. GIS can show many different kinds of data on one map. This enables users to more easily see, analyze, and understand geographic patterns and relationships. Special vocabulary terms are used to describe the type of information and data used in a GIS, including points, lines, and polygons.

Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
acronym	<i>noun</i>	word formed from the first letters of each of the words in a phrase.
geographic information system (GIS)	<i>noun</i>	any system for capturing, storing, checking, and displaying data related to positions on the Earth's surface.
Global Positioning System (GPS)	<i>noun</i>	system of satellites and receiving devices used to determine the location of something on Earth.
line	<i>noun</i>	mark connecting two points. In GIS, a shape on a map defined by x, y coordinate pairs. A line can be straight or curved.
point	<i>noun</i>	mark that indicates a place or location. In GIS, an element defined by a pair of x, y coordinates.

Term	Part of Speech	Definition
polygon	<i>noun</i>	geometric figure having three or more straight sides. In GIS, a closed shape on a map defined by a connected sequence of x, y coordinate pairs.
query	<i>noun</i>	in GIS, a request to select features or records from a database. A query is often written as a statement or logical expression.
shape	<i>noun</i>	in GIS, the visible form of a geographic object as represented on a map. A GIS uses points, lines, and polygons to represent the shapes of geographic objects.

For Further Exploration

Instructional Content

- [National Geographic Education: Investigating Your World with My World GIS](#)

Interactives

- [Maps: Tools for Adventure–GIS in Action](#)

Websites

- [Esri GIS Education Community](#)
- [National Geographic Education: FieldScope](#)

