



# Principles of Flight



## Lesson Plan: Where are We? Understanding Aeronautical Charts and Topographic Maps

**Grade Level:** 7-8

**Subject Area:** Science and Math

**Time Required:** *Preparation:* 10 minutes  
*Activity:* 4 hours

### National Standards Correlation:

#### *Science (grades 5-8)*

- Unifying Concepts and Processes Standard: Evidence, models, and explanation.
- Science as Inquiry Standard: Understandings about scientific inquiry.
- Unifying Concepts and Processes Standard: Change, constancy, and measurement.
- Science and Technology Standard: Abilities of technological design.

#### *Math (grades 6-8)*

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.
- Data Analysis and Probability Standard: Develop and evaluate inferences that are based on data.

**Summary:** “Topographic Field Trip” provides students with the opportunity to examine spatial information and relate it to real-world features through the use of sounds, graphics, text, animation, and interactivity in a game-like adventure. Students tour the nation’s capital, examine historical maps, and refine their problem-solving skills. Upon completion of the field trip, students apply the knowledge they have gained by reading aeronautical charts from their local airport.

**Objectives:** Students will:

- Analyze and interpret topographic maps
- Examine historical maps
- Measure distance and direction
- Determine latitude and longitude
- Learn map features
- Reinforce knowledge of previously introduced terms
- Retrieve information with a computer
- Look at digital aerial photography

**Background:** Topography is the detailed mapping of the surface of the earth. Pilots use various sectional maps and aeronautical charts to fly their aircraft. Although these maps tend to change frequently because of land development, most of the symbols remain the same. Students can begin to understand and appreciate how pilots fly their aircraft by learning to recognize and understand some of the symbols on these maps. Sectional maps/aeronautical charts are available at most airports. These charts change approximately every 6 months. Ask for the older version of the maps-many airports will give these away for free.



**Materials:**

You will need:

- U.S. Geological Survey CD-ROM titled “A Topographic Field Trip of Washington, D.C.,” Available for Macintosh only — free of charge, or dual platform Macintosh/Windows, write to:  
U.S. Geological Survey  
Information Services  
Box 25286  
Denver, CO 80225-0286  
or visit: [www.usgs.gov/](http://www.usgs.gov/)
- Sample aeronautical charts/sectional maps (available at airports), laminated
- Dry erase markers (one per student)
- Math and science journal

**Procedure:****A. Warm-up**

1. Discuss ways in which people can locate places. Ask, “How do pilots know where to fly?” (Note: Pilots use numerous instruments to control and fly airplanes, but what happens when the instruments fail? Pilots use special maps to locate features on the earth’s surface.)
2. Review airplane controls and the three dimensions in which aircraft fly (pitch, yaw, and roll).
3. Review how to retrieve information from a computer.

**B. Activity I**

1. Students complete computer-simulated topographic field trip individually or in pairs. (This will take up to four 45-minute class periods. The game contains its own instructions on what steps to take to complete the field trip, and students will learn how to read maps as the game progresses. Encourage students to make a journal of terminology and symbols used in reading these topographic maps.
2. Give each student or team a sectional map upon completion of the field trip.
3. Locate three different natural formations, and the highest and lowest natural elevations on their charts. Use the marker to circle and label each.

**C. Wrap-up**

Students switch maps with other classmates, and determine if the answers are correct.

**Assessment/  
Evaluation:**

Students should be evaluated on their ability to efficiently locate formations on topographic maps, and accuracy of journal entries.

**Extensions:**

1. Create topographic maps of your own community.
2. Invite an aerial photographer or a cartographer to discuss his/her work with the class.

**Resources/  
References:**

*Aviation Fundamentals*. Englewood, Colorado: Jeppesen Sanderson, Inc., 1986.

U.S. Geological Survey CD-ROM, “A Topographic Field Trip of Washington, D.C.” 1997.

