

Hi-Lo: Places Are Much More Than Just Elevations on a Map

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Grade Level	6 -7
Duration	1-3 class periods

National Standards

GEOGRAPHY

Element 1: The World in Spatial Terms

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

Element 5: Environment and Society

16. The changes that occur in the meaning, use, distribution, and importance of resources

AZ Standards

MATHEMATICS

The Number System

6.NS.C.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent quantities in real-world context, explaining the meaning of 0 in each situation.

6.NS.C.6. Understand a rational number can be represented as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself and that 0 is its own opposite.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

7.NS.A.1. Add and subtract integers and other rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

a. Describe situations in which opposite quantities combine to make 0.

b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are

Arizona Social Science Standards

The use of geographic representations and tools helps individuals understand their world.

6.G1.1 Use and construct maps, graphs, and other representations to explain relationships between locations of places and regions.

Key concepts include major landforms and water bodies, countries, cities, ecosystems, climate, languages, religion, economic systems, governmental systems, population patterns, disease, trade routes, and settlement patterns

7.G1.1 Use and construct maps and other geographic representations to explain the spatial patterns of cultural and environmental characteristics. Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology

7.G1.2 Analyze various geographic representations and use geographic tools to explain relationships between the location of places and their environments.

Human-environment interactions are essential aspects of human life in all societies.

6.G2.1 Compare diverse ways people or groups of people have impacted, modified, or adapted to the environment of the Eastern Hemisphere. Key concepts include but are not limited to hunter-gatherer communities, human settlement, Neolithic Revolution, irrigation and farming,

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additive inverses). Interpret sums of rational numbers by describing real-world context.

c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world context.

d. Apply properties of operations as strategies to add and subtract rational numbers.

Standards for Mathematical Practice

6. MP. 4. and 7. MP. 4. Model with mathematics.

ELA

Reading

Key Ideas and Details

6.RI.1 and 7.RI.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Research to Build and Present Knowledge

6.W.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

7.W.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.

Presentation of Knowledge and Ideas

6.SL.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

7.SL.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, appropriate vocabulary, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

domestication of animals, and influence of climate and seasons

7.G2.1 Explain how cultural demographic patterns, economic decisions, and human adaptations shape the identity of nearby and distant places.

Global interconnections and spatial patterns are a necessary part of geographic reasoning.

6.G4.1 Explain why environmental characteristics vary among different world regions. Key concepts include but are not limited to latitude, elevation, landforms, location, and human factors

6.G4.2 Describe how natural and human-made catastrophic events and economic activities in one place affect people living in nearby and distant places. Key concepts include but are not limited to disease, war, items exchanged, ideas spread along trade routes, and natural disasters

7.G4.1 Analyze cultural and environmental characteristics among various places and regions of the world.

Overview

Far too much of geography education focuses on place names on maps, often peppered with elevations of mountains and lowlands. Rather than fight a natural desire to know the extreme highs and lows on Earth, this lesson has students research disagreements on the best use of natural resources

in these extreme places. In addition, this lesson employs classroom kinesthetic manipulation of elevations through the use of an illustrated model or wall chart, while students practice skills in the subtraction of integers.

Purpose

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In this lesson, students will use cooperative learning strategies to explore and update conflicting information on the best use of natural resources in several parts of the world. The cooperative groups will then presents both sides of the controversy to their classmates and share the group's decision on how to best use the natural resources of this area. The students will then work with positive and negative integers through the use of a wall chart to explore elevation.

Materials

- HiLo map
<https://geoalliance.asu.edu/sites/default/files/LessonFiles/Dorn/HILO/HILO.PDF>
- Sticky notes
- Large World map
- 8 Cards for Locations
- Hand-held devices and internet
- Notes for Group Oral Presentation
- Scoring Guide for Oral Presentations
- Teacher Check Sheet—Class Wall Chart
- Labels for Elevations (copy landforms on yellow or brown paper) (copy water bodies on blue paper) (laminare if possible)
- Summary Chart of Elevations
- Hi-Lo Worksheet and Answer Key

Objectives

The student will be able to:

1. Describe changing ideas and disagreements on the best use of natural resources at different places.
2. Subtract integers.
3. Order integers using a concrete model.
4. Present research on a controversial issue in an oral format.
5. Work cooperatively with a group.

Procedures

Prior to Class: Post a large World map on the classroom wall. If needed, you can print a large World map and assemble it using <http://geoalliance.asu.edu/sites/default/files/maps/world-map-color-tabletop.pdf>

SESSION ONE and TWO

1. Introduce the lesson by asking what is a controversy? Discuss student responses. Share the definition: A controversy is an argument where people may disagree strongly about how the issue should be solved or

handled. Then share that they will be looking at some controversies on how to use our natural resources.

2. Divide the class into 8 groups. Provide each group a card for one of the 8 locations, a sticky note, and a HiLo map.
3. Have students locate the place described on their card on their HiLo map. Then have the one student from the group put a sticky note on the posted World map with the name of their assigned location.
4. Tell students that the information dealing with the controversy on their location card may or may not be up to date. Their task is to read the information on their card. Then they should verify the information using the internet. Once they have read and verified/changed some of the information on the card, they should ask for the Notes for Group Oral Presentation worksheet.
5. Working with their groups, students should complete (1 per group or 1 per individual) the notes sheet.
6. When all groups have completed the Notes for Group Oral Presentation worksheet, explain the Scoring Guide for the Oral Presentations. Allow time for students to prepare their oral presentations.
7. Have each group will make a brief oral presentation (5 minute maximum) to the entire class on the location, explanation of the controversy over this location (both pros and cons), and their group's decision on the best use of resources in this area.

SESSION THREE

Prerequisite Skills: Students should have had experience with positive and negative numbers. Prior to Class: Create a Wall Chart by hanging butcher paper or adding machine tape on a wall that is 7 feet high. The paper will need to be scaled in feet and inches from -4 feet through 0 feet and up to +3 feet. Create Labels for Elevation by color coding the land and water features. Laminare if possible.

1. Distribute the Labels for Elevation, one per student. Have students post their label on the Wall Chart at the appropriate elevation. Check for correctness using the Teacher Check Sheet.
2. Discuss the vertical wall chart. What did the students know already? What was surprising?
3. Discuss the difference between positive (above sea level) and negative (below sea level) elevations. Point out that sea level is 0 and that there is no -0.

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4. Model how to find the difference or distance between different elevations. Model one problem above sea level.
Example: K2 and Aconcagua,
 $28,251 - 23,034 = 5227$
5. Model one problem below sea level.
Example: Challenger Deep and Japan Trench. Hint: Since both elevations are negative, ignore the negative signs, just subtract. The answer negative because the difference is below sea level.
 $35810 - 28000 = -7810$
6. Model one problem comparing elevations above and below sea level. Example: Sun Devil Stadium and Death Valley. Hint: To find the distance between these two locations show students that they must add the numbers because they have to cover the distance from Death Valley to sea level and the distance from sea level to Sun Devil Stadium. Explain that if they drove to Death Valley from ASU's Sun Devil Stadium, they would first have to drop 1150 feet in elevation to reach sea level. Then, they would have to drop another 282 feet. So they would have to drop a total of 1432 feet.
7. In many math classes, students are taught a method to solve this type of problem (shown below). However it is helpful in the

understanding of integers if students can visualize why they add. Ask students (or their math teacher) how they were told to solve this problem.

$$1150 - (-282)$$

$$1150 + 282 = 1432$$

8. Distribute the Summary of Chart Elevations and Hi-Lo worksheet. Have students complete the Hi-Lo worksheet.

Assessment

Geography and ELA

The oral presentation can be graded using the Scoring Guide for Oral Presentations. Mastery will be considered a score of 80 points or higher.

Mathematics

The Hi-Lo Worksheet can be graded for correctness. Mastery will be considered a score of 80% or higher.

Extensions

Have students prepare a PowerPoint of photographs of the various places discussed in this lesson.