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McMinnville

Lesson Title: "Mapmaking"
Grade Level: 7th-8th Grade
Era- 3- Revolution and the New Nation (1754-1820)

Objectives:
TLW explore the mapmaking craft.
TLW examine the Lewis and Clark maps.
TLW identify and apply mapmaking techniques and tools.

Standards:
8.3.5 Interpret a geographic map of the early United States
8.3.6 Recognize how topographical features such as mountain and river systems influenced the settlement and expansion of the US
8.3.7 Interpret a chart or map of population characteristics of the early US (i.e. density, distribution, regional growth)

Materials:

- Graph paper
- Compasses
- Computers with Internet access
- Small index cards
- Lesson 3 Student Activity Sheet (below)
- www.volunteervoices.org http://idserver.utk.edu/?id=200700000002685 (Map of Tennessee-pre-1838)
- PBS Classroom Resources (www.pbs.org)

Procedure:
Introduction:

1. Divide students into small groups, assigning each a William Clark map to examine. Tell them to note their observations about the map—unique or unusual features, how they differ from other maps, what they indicate, etc. (Students may complete Section 1 of the activity sheet.) Have students discuss their findings and how they believe the maps were created.

2. Explain to students that the Lewis and Clark expedition used several instruments to map out the places they visited. William Clark observed and recorded the landmarks they passed, relying largely on his keen sense of observation, as well as the information that he gained from navigational tools.

   Have students read "For the Lewis and Clark Journey of Discovery: Mapmaking" to better understand Clark's skills as a cartographer and the tools and methods he

used to create maps. Tell students that they will have an opportunity to explore mapmaking techniques and tools to understand how maps unfold.

3. Ask students if they know what a compass is. If yes, ask whether they have ever used one. Show students a compass (or several different models), explaining and demonstrating how it functions and for what it is typically used. Explain that the compass was perhaps the primary navigational tool Clark used to map locations it visited..

4. Allow students to experiment with the compass to locate a direction and then discuss the experience. Was the compass helpful? What did they need to know in order to use the compass? Is a compass always accurate?

5. Pass out one piece of graph paper to each student, explaining that they will have a chance to create a map. Have them label the top of the page North and then label the seven other directions (NE, E, SE, S, SW, W, NW) along the perimeter of the page. Explain that the map's scale will be one square = 10 feet. In other words, if a line is 10 feet long on the ground, it will be one square long on the graph paper. Ask them to draw an "X" in the middle of the page.

6. Tell students to mark on their maps directions you will give them, starting at the X. For example, ask them to move 20 feet to the north of the X or thirty feet to the southeast, reminding them of the map's scale. Provide sufficient directions for students to create a detailed map. (Students may work in pairs.)

7. Have students discuss this mapmaking activity. What did they learn? How do navigational tools, such as a compass, aid in the actual creation of maps? What would they do if they wanted to create a map of a place where they had never been, giving thought to Clark's challenge to do just that and the activities they just completed (using a compass, creating a directional map). What would they need to learn about the area? What would they record on the map to make it easy for someone else to follow the same route and find the same places later? Have them brainstorm responses to these questions. (They may jot down their thoughts in Section 2 of the activity sheet.)

Body:

1. Tell students that they will embark on a mini expedition in their immediate surroundings (community, park, school field) during which they will map out a route based on landmarks and pre-determined travel directions.

   Here are the steps to organize and conduct the expedition:

a. Plan a general route that your students will follow, ideally one with a single starting point, but which leads students to different destinations.

b. Once you have determined the starting point, determine the directions in which students can travel from that point. For example, if your route begins on the southwestern section of the school field, and you want them to remain on the field, they can begin by traveling any direction except southwest, and will need to generally veer toward the north, northeast, or east.

c. Use index cards to create direction cards that include every direction the class can follow. When the class has been divided into teams, each team will take three or four of these cards to find out which directions it should travel. (The purpose of assigning directions in this manner is to avoid having all groups heading the same direction at the same time.)

d. Divide the class into teams of four or five students. Have each team randomly choose three or four Direction Cards. These will be the directions in which each team will travel. Give each group a compass.

e. Begin the expedition by making sure that everyone understands the directions relative to the starting point. Using their compasses, have each team locate North to demonstrate their comprehension of locating and following a direction.

f. Distribute a sheet of graph paper to each group. Have each group record the starting point on the graph paper, which will serve as a map. It is important that the point be in a position on the map that leaves room for mapping the rest of the route. Thus, if the teams begin in the southwest portion of the field, they should record the starting point on the southwest (lower left) corner of the map. They should also draw the maps to scale, making ten steps be equal to one grid on the paper.

g. Teams will now travel a short distance in the direction of their first Direction Card. They will stop when they reach a landmark, which they will record on their map by placing a marker in a location that corresponds to the direction they have traveled from the starting point. (A landmark can be anything on the ground that is relatively permanent. On a typical school field, for example, this could be a trashcan, a pylon, a base, or even a bare patch of grass.) If students traveled northeast of the starting point, the first landmark should be placed to the northeast of the map's starting point.

h. Once they have recorded the first landmark, groups should refer to their second Direction Card for their next destination. They should travel in the specified direction until they encounter a landmark, marking it in on their map, along with any landmarks they find interesting along the way.

i. Teams will continue until they have used all their Direction Cards. Their final destination will be a landmark to which their last Destination Card leads them.

Conclusion:

1. Back in the classroom, have students compare group maps. Which appear to be the most accurate? Which would be the most useful if they wanted to tell someone how to return to the places they have been? What techniques were the most helpful in figuring out how to make the maps? How easy or difficult is it to make a map? Do they think it would be easier or harder if the territory were unfamiliar? Why? Do they think they would have the patience and precision that was required of William Clark to map the Corps of Discovery's route? (Students can answer these questions in writing in Section 3 of the Student Activity Sheet.)

Assessment:

- worked cooperatively and efficiently in a group and on group projects
- followed directions
- created an accurate to scale map of the landmarks his or her group passed during the outdoor expedition.
- participated in the classroom discussion.

Lesson 3: Mapmaking Name:

Student Activity Sheet Date:

Section 1
William Clark created several maps along the expedition's journey. Look at these maps and list what you notice about them in the space below.

Section 2
Imagine that you have been asked to create a map of a place that you have never visited before.

a. What would you need to learn about the area in order to create the map?

b. What things would you record on the map to make it easy for someone else to follow the same route and find the same places later?

Section 3
Now that you have made a map of the "expedition" you went on with your classmates, answer these questions:

a. How easy or difficult is it to make a map?

b. Do you think it would be easier or harder if the territory were unfamiliar? Why?

c. Do you think you would have the patience and precision that was required of William Clark to map the Corps of Discovery's route?

Have the students look at the following maps:

Courtesy of Florentine Films

Original by Clark. 1810, Copied by Samuel Lewis 1814
Courtesy of Library of Congress

"For the Lewis and Clark Journey of Discovery: Mapmaking"

How did Lewis and Clark measure distances on their historic "Voyage of Discovery" from 1804 to 1806? William Clark was the primary cartographer of the expedition, according to Journal editor Dr. Gary Moulton "working with crude and unreliable instruments and with no apparent training," yet doing "a masterful job." Clark was primarily concerned with the "direction of travel from point to point, the number of miles covered between the points, and the daily mileage accumulation."

Volume One of *The Journals of the Lewis and Clark Expedition*, Lincoln: University of Nebraska Press, 1983, edited by Gary E. Moulton, is an oversize atlas which reproduces all the maps drawn during the expedition. This book is a fine source of geographical information as it was known to the explorers.

Equipment

Capt. Lewis indicated in his lists of expedition equipment that they carried quite a few surveying instruments, but all of them were far more useful for short rather than long-distance measuring. These included a "two pole chain" (33 feet long), a "log line reel" which measured the rate of boat travel (these measurements were affected by river currents), compasses, quadrants, sextants, and a chronometer. Early in the second year, the chronometer ran down, which further complicated things by making it impossible to determine longitude. Gary Moulton notes that: some of these scientific instruments may have been used in establishing distances between widely separated points, but for routine measuring it seems likely that the explorers used estimates or the time-honored method of 'dead reckoning.' The fact that various journals give differing mileage figures for the same area traversed supports such a conclusion. John J. Peebles, who has examined the route of the explorers in Idaho, found that for river travel the journalist's mileages are generally short of true figures, while for land travel the reverse holds. Exaggerations of land mileage figures occur more often when the party traveled over difficult terrain. In fact, the mileage estimates are of little help in determining specific geographic points or expeditionary campsites. Journal entries and geographic landmarks on the maps are more reliable guides. Clark, then, probably based his mileage figures on the time of travel or his skill and experience as an outdoorsman (see page 4 of Volume One).

Moulton theorizes that Clark relied on compass readings for his "courses." His compass traverse notes are at the beginning of nearly every journal entry. According to Moulton, Clark "probably employed the route traverse method, taking bearings at each turn of the trail or bend in the river and plotting those shifts on his maps.... For his mapping Clark was probably taking 'back sightings' or 'back azimuths,' giving his bearing from north or south in degrees. After traveling forward some miles, Clark would turn and take an azimuth reading from his previous point of sighting. This procedure was necessary because he could not always determine his next point of observation. In converting back azimuths to forward readings, Clark may have become confused occasionally, and some of his readings may seem turned around because they reflect the direction he was looking rather than the direction that he had traveled."