Adopt-a-Ship: Great Lakes freighters.

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Target Grade: Gr.4

Lesson Overview:
Students research and write an informational essay of a Great Lakes freighter. Using online resources, they also will track their vessel’s location in terms of latitude and longitude over a five day period and calculate the distance traveled in nautical miles. Collected data will be represented in table form. All reports will be used to compile a class book.

Lesson Objectives:
After this lesson, students will be able to
1. Research important information of a Great Lakes freighter (length, width, depth, cargoes, history, etc...).
2. Plan, draft, and publish an informative essay of the freighter using the writing process.
3. Identify and record vessels’ location in terms of latitude and longitude on a map of the Great Lakes region and in a table.
4. Convert the distance between two points in terms of nautical miles.
5. Analyze the data (average daily movement, direction, etc...).

STANDARDS:

Grade 4 Social Studies
A.4.1 Use reference points, latitude and longitude, direction, size, shape, and scale to locate positions on various representations of the earth’s surface
A.4.2 Locate on a map or globe physical features such as continents, oceans, mountain ranges, and land forms, natural features such as resources, flora, and fauna; and human features such as cities, states, and national borders

Grade 4 English Language Arts
A.4.1 Use effective reading strategies to achieve their purposes in reading.
- Identify a purpose for reading, such as gaining information, learning about a viewpoint, and appreciating literature
A.4.4 Read to acquire information
- Summarize key details of informational texts, connecting new information to prior knowledge
- Identify a topic of interest then seek information by investigating available text resources

B.4.1 Create or produce writing to communicate with different audiences for a variety of purposes.
- Write nonfiction and technical pieces (summaries, messages, informational essays, basic directions, instructions, simple reports) that convey essential details and facts and provide accurate representations of events and sequences
B.4.2 Plan, revise, edit, and publish clear and effective writing.

- Produce multiple drafts, including finished pieces, that demonstrate the capacity to generate, focus, and organize ideas and to revise the language, organization, and content of successive drafts in order to fulfill a specific purpose for communicating with a specific audience
- Explain the extent and reasons for revision in conference with a teacher
- Given a writing assignment to be completed in a limited amount of time, produce a well developed, well organized, and effective response in correct English and an appropriate voice

Grade 4 Math

A.4.2 Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models*

E.4.1 Work with data in the context of real-world situations by

- formulating questions that lead to data collection and analysis
- determining what data to collect and when and how to collect them
- collecting, organizing, and displaying data
- drawing reasonable conclusions based on data

E.4.3 In problem-solving situations, read, extract, and use information presented in graphs, tables, or charts

Materials:
1. Copy of a four-square for each student.
3. Websites for researching specific vessels: www.americansteamship.com
   www.boatnerd.com
   www.duluthshippingnews.com
   www.lcaships.com
4. List of key maritime terms using Great Lakes-St. Lawrence Seaway website.
5. Map of the Great Lakes region for each student.
7. Computer lab or a set of laptop computers for students’ research.

Room Arrangement/Special Needs:
Room arrangement(s) is flexible. Students need space to work privately and collaboratively. Access to school computer lab or a set of laptops will be needed.

Vocabulary:
- **Aft**: Behind or back
- **Beam**: Width of a ship.
- **Berth**: A place where a ship anchors or ties up to a dock
- **Bow**: Front of the ship
- **Cargo**: Goods carried by a ship.
- **Commodity**: Anything that’s bought and sold.
- **Deck**: Flat surface on the upper part of the ship.
- **Depth/Draft**: Depth of water needed for a ship to float.
Distance from the keel to the water line.
- **Downbound**: Toward the Atlantic Ocean.
- **Harbor**: A place where ships may anchor.
- **Hatch**: Openings on a vessel leading to cargo holds.
- **Hold**: Space below the deck of a vessel where cargo is stored.
- **Hull**: Lowermost portion of a ship.
- **Keel**: A ship’s “backbone.” It runs along the lowest part of the hull.
- **Latitude**: Measure of distance on Earth north or south of equator.
- **Longitude**: Measure of distance on Earth east or west of prime meridian.
- **Maritime**: Having to do with sailing or shipping.
- **Maritime shipping**: Transportation of cargo via waterways.
- **Nautical Mile**: A customary unit of length used in air and sea navigation. A measure of distance equal to one minute of arc on the Earth’s surface.
- **Pilothouse**: Enclosed structure on the deck of a ship from which it can be navigated.
- **Port**: City or town with a harbor; left-hand side of a ship.
- **Starboard**: Right-hand side of a ship.
- **Statute Mile**: Normal mile (5,280 ft.)
- **Stern**: Back of a ship.
- **Taconite**: A low grade form of iron ore, usually in pellet form.
- **Upbound**: Away from the Atlantic Ocean.
- **Vessel**: A general term for any watercraft.

**Background information:**
A vast majority of goods and products we use each day are shipped on the Great Lakes. All cargoes must be moved in a timely manner without compromising the safety of the vessel or crew. Location of all vessels is documented in terms of latitude and longitude. The distance between any two points of latitude and longitude can be converted to nautical miles. A nautical mile is a unit of length equal to one degree of arc on the Earth’s surface. It is equal to about 1.15 statute (normal) miles.

**Preparation:**
1. Preview websites to be used in this lesson.
2. Preview handouts (sample four-square and essay, map of Great Lakes region)
3. Familiarize concept of nautical mile.

**PROCEDURE:**

**Focus question and attention-getter:**
- Ask about adopted items (highways for example)
- List students’ favorite items and that these are moved on the Great Lakes.

1. Overview of Great Lakes shipping. Discuss raw materials moved, trade routes for each, and port cities on the seaway. Use map and table from Lake Carriers’ Association website.
2. Introduce the activity by showing pictures of various Great Lakes vessels from selected websites. Identify key terms and parts of these vessels. Students select or are assigned a vessel for their project. (1-2 days)
3. Brainstorm ideas to include in reports. Model the writing process for the students’ ship reports. Include topic selection, research, prewriting (see four-square), drafting, revise/edit, and publishing. (2-3 days)
4. Students read/research their own vessels and plan their essays with a four-square. (1-2 days)
5. Write rough drafts. (two days)
6. Revise and edit pieces. (1-2 days)
7. Publish/Share essays with another class/student (my class will read/share their essays with first grade students).

Vessel Location Tracking:
1. Identify vessels’ daily location using Vessel Passage link on boatnerd.com.
2. Define and discuss latitude, longitude, and nautical miles.
3. Model/Practice activity using data from Sam Laud.
4. Plot daily locations on a map of the Great Lakes. Label each location by date and latitude and longitude. Connect each point.
5. Organize data in table form.
6. Analyze data
   • upbound
   • downbound
   • cargo and destination
   • total distance traveled
7. Check/verify vessels’ activity using websites.
8. Share data with another class/student.

Assessment
• Rubric for informative essay on traits of idea, organization, and conventions.
• Accuracy of vessel location on maps.
• Conclusions of data.

Resources
Sample informative essay and tracking table.
Blank tracking table.

Use the following website to convert latitude and longitude to nautical miles: www.ask.com/
Type in “converting latitude longitude to distance” in the website’s search engine. After clicking the search link, click on the second link on the page (Latitude/Longitude Distance Calculation). This should access a latitude/longitude distance calculator (http://jan.ucc.nau.edu/~cvm/latlongdist.html)

Hard copy of Latitude/Longitude Distance Calculator.

Hard copy of nautical mile website.
Websites for researching specific vessels:
www.americansteamship.com
www.boatnerd.com
Extensions:

Further analyze the data by doing the following:
1. Prepare a line graph of the data.
2. Find the average distance traveled each day.

Other math-related ideas:
3. Design and build a model of the ship. Be sure the scale is accurate and that the key parts of the vessel are labeled.
4. Convert nautical miles to statute miles and check work with the calculator.
5. Round mileage readings to various place values.
Check the boxes to show what is missing in the writing piece.

<table>
<thead>
<tr>
<th>Idea</th>
<th>Organization</th>
<th>Conventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong> Advanced</td>
<td>4 Advanced</td>
<td>4 Advanced</td>
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</tbody>
</table>
| • Focuses on main theme at all times  
• Details are clearly explained  
• Topic is supported by 3 or more interesting ideas  
• Many original ideas  
• Addresses the prompt | • Transitions appropriately used  
• Strong beginning, middle and end  
• Order of ideas makes sense  
• Paragraphs are organized by topic  
• All paragraphs clearly state a topic sentence | • High-frequency words are all spelled correctly  
• Punctuation marks are used correctly at all times  
• All necessary words are capitalized  
• Standard grammar is evident throughout  
• Paragraphs are indented |
| **3** Proficient | 3 Proficient | 3 Proficient |
| • Focuses on topic most of the time  
• Many details are clearly explained  
• Topic is supported by 2-3 ideas  
• Some original ideas  
• Addresses the prompt | • Transitions appropriately used  
• Good beginning, middle and end  
• Order of ideas usually makes sense  
• Some paragraphs are organized by topic  
• Many topic sentences clearly stated | • 1-2 high frequency words are incorrectly spelled  
• 1-2 punctuation errors  
• 1-2 capitalization errors  
• 1-2 standard grammar errors  
• Paragraphs are indented |
| **2** Minimal | 2 Minimal | 2 Minimal |
| • Focus is not always clear  
• Some details are clearly explained  
• Topic is supported by 1-2 ideas  
• Few original ideas  
• Vaguely addresses the prompt | • Few necessary transitions  
• Attempts beginning, middle, and end  
• Order of ideas sometimes makes sense  
• Few paragraphs are organized by topic  
• Few topic sentences clearly stated | • 2-5 high frequency words are incorrectly spelled  
• 2-5 punctuation errors  
• 2-5 capitalization errors  
• 2-5 standard grammar errors  
• Paragraphs are indented incorrectly |
| **1** Emerging/Basic | 1 Emerging/Basic | 1 Emerging/Basic |
| • Unfocused and hard to identify main theme  
• Details are not explained  
• Topic is not supported by details  
• Lacks any original idea  
• Did not address the prompt | • No transitions are used  
• Lacks beginning, middle and end  
• Order of ideas is confusing and hard to follow  
• Ideas are not organized in paragraphs  
• No clearly stated topic sentences | • More than 5 high frequency words are spelled incorrectly  
• More than 5 punctuation errors  
• More than 5 capitalization errors  
• More than 5 standard grammar errors  
• No attempt to indent paragraphs |
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Latitude &amp; Longitude</th>
<th>Change (Lat &amp; Long)</th>
<th>Distance Traveled (nautical miles)</th>
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</table>

**Data Analysis:**
(Note: the questions below are possible ideas for data analysis. Individual teacher discretion is suggested depending on the class.
1. Describe your vessel’s path. Is it upbound or downbound?

2. How far did your ship travel each day?

3. What was the average distance traveled each day?

4. Based on your vessel’s location, what might its cargo be and what are the shipping and receiving ports?

5. Assess your ship’s efficiency in terms of its delivery time.)
### Sample Vessel Tracking Table for Sam Laud

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Latitude &amp; Longitude</th>
<th>Change (Lat &amp; Long)</th>
<th>Distance Traveled (nautical miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/02/07</td>
<td>0700&quot;</td>
<td>46 00&quot;N, 83 48&quot;W</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>12/02/07</td>
<td>1900&quot;</td>
<td>46 00&quot;N, 83 48&quot;W</td>
<td>0 00&quot; Lat 00 00&quot; Long</td>
<td>0nm</td>
</tr>
<tr>
<td>01/08/08</td>
<td>0700&quot;</td>
<td>45 42&quot;N, 83 42&quot;W</td>
<td>South 0018&quot; East 00 06&quot;</td>
<td>18.5119nm</td>
</tr>
<tr>
<td>01/09/08</td>
<td>0800&quot;</td>
<td>46 24&quot;N, 84 12&quot;W</td>
<td>North 00 42&quot; West 00 30&quot;</td>
<td>46.9613nm</td>
</tr>
<tr>
<td>01/11/08</td>
<td>0600&quot;</td>
<td>46 42&quot;N, 92 00&quot;W</td>
<td>North 00 18&quot; West 07 48&quot;</td>
<td>322.8008nm</td>
</tr>
</tbody>
</table>

### Possible conclusions/inferences:

1. Why was the *Sam Laud* in one spot for so long on 12/02/07?

2. What days was the *Sam Laud* downbound/upbound?

3. Give a possible explanation for the *Sam Laud* traveling such a long distance between the tracking dates of 01/09/08 and 01/11/08.

4. What ports was the *Sam Laud* near on these tracking dates.

5. Provide a possible description of the *Sam Laud*’s activities during these five dates (destinations, loading/unloading ports, possible cargoes, etc...)
The **Sam Laud** was built for Buffalo's **American Steamship Company (AMC)** with a specific purpose in mind. The need for smaller, versatile vessels in order to access and serve smaller ports was the reasoning for building the **Sam Laud**. In her years of service the **Sam Laud** has met this objective.

Construction on the **Sam Laud** began in early 1974 at the Bay Shipbuilding Corp. of Sturgeon Bay, WI. She was launched on November 19, 1974. Construction was completed in 1975. This self unloading vessel was christened **Sam Laud** in honor the former chairman of AMC’s parent corporation, GATX, and made her maiden voyage on April 29, 1975.

The **Sam Laud**'s dimensions and power enhance its effectiveness. The **Sam Laud** is 634' 10" in length with a 68' 00" beam and a 40' 00" depth. Her single propeller is powered by two 3,500 horse power diesel engines. These features have enabled the **Sam Laud** to more than fulfill her intended purpose.

The **Sam Laud** cargo carrying capability is also effective in terms of her carrying capacity and versatility. This vessel is equipped with 20 cargo hatches leading to five cargo holds enabling it to carry loads close 24,000 tons. She also has moved a variety of cargoes including taconite, coal, and limestone. The number of ports called on by the **Sam Laud** including Green Bay, WI; Duluth, MN; and Chicago, IL further underscores her importance.

Today, retaining her original launch name and remaining in the same fleet serve as a final testimony to the **Sam Laud**. This durable and consistent vessel should remain a key mover of commodities on the Great Lakes for many years.
The Nautical Mile

What's a Nautical Mile and Why Do Sailors Use Them?

When we drive our cars on land, we use miles (mi.) to measure distance. These miles are actually "statute miles", 5280 feet. A nautical mile (nm.) is about 15% longer than a statute mile. But why have a different kind of mile?

Everything to do with sailing measurements and navigation has to do with traveling long distances across the large portions of the earth. All of the measurements were standardized by the English long ago when they were the greatest naval power both militarily and in trade. Here is how the English determined that a nautical mile was the unit to use when at sea.

Each day the earth rotates one full revolution. This is equal to 360 degrees of rotation, the same number of degrees of longitude or latitude around the earth, as you can easily see on a globe. Each degree can be divided into 60 equal parts called minutes, just like an hour is divided into 60 equal parts. Each minute of longitude, at the equator, or each minute of latitude, anywhere on earth, is equal to exactly one nautical mile. So a sailor knows when he or she crosses 10 degrees of latitude, he or she has traveled 600 miles north or south (1 nm/minute \times 60 \text{ minutes}/\text{degree} \times 10 \text{ degrees} = 600 \text{ nm}).

One British Admiralty nautical mile, established around 1600, is 6,080 feet. Today we know that a nautical mile, one minute of the earth's rotation at the equator, is actually equal to 6,076.115 feet, now called an international nautical mile.

Latitude/Longitude Distance Calculation

This query will determine the distance between two points on the earth given their latitudes and longitudes.

Valid input formats are at the bottom of this page.

Source
Latitude :     Longitude:

Destination
Latitude :     Longitude:

Units for results statue miles $\downarrow$ Send Query Clear Query

Questions or comments should be directed to Chris.Michels@nau.edu. My home page is here.

I got the formula for this calculation from the math forum at Drexel University. If you are interested in the math behind this calculation then you can read their explanation here.
Here is a page showing the important sections of the code that performs this calculation.

If you are looking for a way to determine your latitude and longitude go to the find location page.

Valid formats for Latitudes and Longitudes are:

option 1: **dddmmssD** or **ddd mm'ss" D**

where ddd = 1-3 digits for degrees, mm = 2 digits for minutes, ss = 2 digits for seconds and D = N,S,E, or W. The seconds and special characters (spaces, apostrophes, quotes) are all optional in this format. This leads to quite a large number of possible valid formats.

option 2: **ddd.ffffD**

where ddd = 0-3 digits, ffff = 0-10 digits and D = N,S,E, or W. This format represents a decimal number of degrees. If the number of degrees is a whole number, the decimal point is optional.

option3: **ddd mm.ffff'D**

where ddd = 0-3 digits for degrees, mm = 2 digits for minutes, ffff = 0-10 digits for decimal portion of minutes and D = N,S,E, or W. This format represents degrees and a decimal number of minutes.

Four-Square Format
<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Main Idea</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Conclusion</th>
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**Sam Laud** Informative Essay Four-Square
<table>
<thead>
<tr>
<th>Construction Dates</th>
<th>Features</th>
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</thead>
</table>
| 1. began 1974 at Bay Shipbuilding, Sturgeon Bay, WI | 1. **dimensions**:  
| 2. launch date (11/19/1974) | • length (634’ 10”)  
| 3. completion 1975 | • beam (68’ 00”)  
| 4. maiden voyage (04/29/1975) | • depth (40’ 00”)  |

**Sam Laud (for AMC, need for small vessels)**

<table>
<thead>
<tr>
<th>Cargoes Carried</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. taconite</td>
<td>1. original name</td>
</tr>
<tr>
<td>2. coal</td>
<td>2. original fleet</td>
</tr>
<tr>
<td>3. limestone</td>
<td></td>
</tr>
</tbody>
</table>
Sam Laud

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