Lesson #1  Great Lakes Shipping Across The Country & Around The World
Lesson #2  Great Lakes Floor Map: Shipping and Receiving Cargo on the Great Lakes

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Grade/Subject: 6-8 grade, Earth Science

Lesson Overview:
This is a two-part, 2-day lesson. On Day 1, students utilize the Great Lakes Maritime Webquest lesson independently on the computers. On Day 2, students work with the teacher and use the Great Lakes floor map to examine maritime shipping—how/why it relates to them and the types of ships and goods that travel upbound and downbound on the Great Lakes. Students will demonstrate with hands-on authentic assessment their ability to interpret diagrams and data tables on shipping and receiving of goods on the Great Lakes.

Sources Consulted:

Michigan Tech – Great Lakes Maritime Institute
Western Upper Peninsula Center for Science, Mathematics and Environmental Education
Ms. Joan Chadde, Principal Investigator by the Great Lakes Maritime Research Institute.
Dr. Richard D. Stewart, University of Wisconsin - Superior and
Dr. James P. Riehl, University of Minnesota – Duluth, Co-Directors
http://techalive.mtu.edu/glmri/index.htm

Michigan Tech – Great Lakes Floor Map Kit

Lake Carriers’ Association – map of the U.S. and Canadian Great Lakes Ports
    Suite. 915
    614 West Superior Avenue
    Cleveland, Ohio  44113-1383
    www.lcaships.com

Learning Objectives:
The expected learning outcomes of these two lessons are as follows:

1.) Students will label the five Great Lakes, their connecting waterways and familiar cities.
2.) Students will have beginning interactive knowledge of what maritime shipping is, how/why it relates to them and the types of ships and goods that travel upbound and downbound on the Great Lakes.
3.) Students will demonstrate with hands-on authentic assessment their ability to interpret diagrams and data tables on shipping and receiving of goods on the Great Lakes.

State or National Benchmarks Addressed:
S.IA.06.11 Analyze information from data tables and graphs to answer scientific questions.

S.IP.06.16 Identify patterns in data.

S.RS.07.19 Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.

E.ES.07.82 Analyze the flow of water between the components of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.

**List Materials Needed:**
1-2 Great Lakes Floor Maps (or other large chart of the Great Lakes)
Comprehensive Map of the Great Lakes states
Lake Carriers Association Map of U.S. and Canadian Ports
Cut and laminated labels of the following:

A. ALL FIVE Great Lakes
B. Soo Locks and St. Mary’s River
C. St. Clair River, Lake St. Clair and the Detroit River
D. Niagara Falls and the Welland Canal
E. St. Lawrence Seaway
F. direction to the Atlantic Ocean
G. Grosse Pointe Park
H. Chicago, IL
I. Detroit, MI
J. Sandusky, OH
K. Milwaukee, WI
L. Duluth, MN
M. Erie, PA
N. Buffalo, NY
O. Toronto, Ontario
P. Windsor, Ontario

Computer Lab for 15 students x 2 days
10 – 2 meter lengths of brightly colored yarn

**New Vocabulary:** Upbound, Downbound, Taconite, Commodity, Maritime, Saltie, Bentonite, Intermodal

**Focus Question:** *See Attachment* Created on Power Point - students will be greeted with a series of 4 changing large Great Lakes ships on the smart board – underneath the captions will read: Where Have You Seen Me? Why Am I Important? What’s Inside My Cargo Hold? Where Am I Going?

**Lesson #1** Great Lakes Shipping Across The Country & Around The World
Freighters........you see them on Lake St. Clair every time you are at one of our waterfront parks, or the War Memorial, at the G.P. Yacht club, Little Club, Crescent Sail, Bayview, driving down Lakeshore or on the Nautical Mile in St. Clair Shores. You will see them in the Detroit River if you are walking along the waterfront down near Hart Plaza. You might even see them if you are boating, fishing or swimming in our lake. They are a regular sight along our little stretch of the Great Lakes Watershed. Did you ever wonder what was in them? Where are they going? Sometimes you can even see them passing each other in the shipping channel. This Webquest is the answer to all those questions. Follow the directions EXACTLY and you will keep yourself on track. 1 Point Per Question = 30 Total Points

Go to:  http://techalive.mtu.edu/glmri/index.htm  (YES – type this in EXACTLY – read carefully)

Once you are on the website – click on the icons – do you hear the sounds? Cool!  Now – Click “Start” in the upper right hand corner.

Commodities of the Heartland:

1. Another name for “commodities” is ________________________.

2. A healthy economy needs for commodities to be  

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________


3. The Great Lakes region is also known as the  

____________________________________________________________________________________

4. What are the top four commodities shipped through the Minnesota ports:  

____________________________________________________________________________________
____________________________________________________________________________________

Click on each of those four commodities to see where they are found & processed and what they look like.

**Now click on the Right Arrow to keep going and READING!**

5. What is the grain used for? ____________________________

What is the Bentonite used for? ____________________________

What is the coal used for? ____________________________

Iron Ore is used to make ____________________________ for cars.

*Click on the arrow to go to the next page:*

Play the game “Commodities to Products” Keep going until you get them all right!
6. What does “Maritime Shipping” do?
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

7. Using a system of connecting channels & waterways freighters can navigate through all five Great Lakes: Name the Five Great Lakes
   _______________ _______________ _______________
   _______________ _______________

8. What is the total length of the farthest port to the Atlantic Ocean? _______________ How long does this journey take? _______________

9. What does it mean to be “Upbound” and “Downbound?” Click the words to find out!
   Upbound –
   Downbound –

10. How many of those freighters you see are “Salties?” _______________
    What does the term “Saltie” mean? _______________

    View all the pathways for the salties around the world by clicking each box.

11. Spend the next 3-4 minutes spinning the wheel to see the different ships and their routes. Pick out THREE of those ships you think are interesting. Give me its name & ONE FACT about each of them. Do any of them go through Lake St. Clair? If so, you may have seen it and you didn’t even know it!
    A. ______________________________________________________________________________
       ______________________________________________________________________________.
    B. ______________________________________________________________________________
       ______________________________________________________________________________.
    C. ______________________________________________________________________________
       ______________________________________________________________________________.

    Click the arrow to go to the next page: (Marine Transport – A Team Sport)
12. Maritime shipping is “intermodal.” What does this mean?

_______________________________________________________________________________________

Click the arrow to go to the next page: (Why Maritime Shipping?)

13. True or False – Compared with trucks, railways and airplanes – ships are MORE expensive to use when transporting goods (commodities.)

14. Click on the bar graph – which mode of transportation is the MOST expensive? ____________

Click “back” and then go on to the next page: (Other Benefits)

15. Look at those three bar graphs and answer the following questions:
   a. Which mode of transportation is the noisiest? ____________________________
   b. Which mode of transportation has the most accidents? ______________________
   c. Which mode of transportation has the most emissions? ______________________
   d. Which mode has the BEST record in accidents, noise & emissions? ____________

Click the arrow to go to the next page: (What about Niagara Falls?)

Read this paragraph:

16. Where are the three places that ships get challenged on their journeys?
   i. ____________________________ lii. ____________________________ liii. ____________________________

17. What did the engineers create that solved the problem of the ships getting from one waterway to another? ____________________________

Click the arrow to go to the next page: (Lake Elevations)

18. Explore these lake elevation using the diagram:
   a. What Great Lake has the highest elevation?
   b. What Great Lake has the 2nd highest elevation?
   c. What is the elevation change between Lake Superior and the St. Mary’s River?
   d. What engineering creation solved that elevation change?
   e. What is the elevation of Lake Erie?
   f. What is the elevation of Lake Ontario?
   g. What engineering creation allowed ships to travel between Lake Erie and Lake Ontario?
   h. Are there locks at the St. Lawrence River?
19. How many LOCK SYSTEMS currently operate on the Great Lakes? ____________________

Click on the diagram of the lock and wait for it to load—watch the animation and see if it makes sense to you. What does the boat do from beginning to end? (one or two sentences)

20. Play the game and answer all 10 questions—WRITE YOUR SCORE HERE! __________________

Lesson #2  Great Lakes Floor Map

Working in groups of 4 use the maps of the Great Lakes, the map of the U.S. and Canadian Ports and the following rubric to complete the Great Lakes floor map. You will have to work collaboratively (together) on this. You will need a recorder, map navigators, & labelers. Trade jobs as you move through the lesson. No Arguing! This is worth 42 Points—2 Points per task.

Using the labels, strings and other object given to you in the plastic bags—Label the following:

A. ALL FIVE Great Lakes
B. Soo Locks and St. Mary’s River
C. St. Clair River, Lake St. Clair and the Detroit River
D. Niagara Falls and the Welland Canal
E. St. Lawrence Seaway
F. direction to the Atlantic Ocean
G. approximate location of one of the Grosse Pointe parks
H. Chicago, IL
I. Detroit, MI
J. Sandusky, OH
K. Milwaukee, WI
L. Duluth, MN
M. Erie, PA
N. Buffalo, NY
O. Toronto, Ontario
P. Windsor, Ontario
Now using the map of the Great Lakes and St. Lawrence Seaway Ports and the long pieces of yarn trace the shipping routes as shown below: (**Make SURE you pay attention to the “key” that shows what ports ship and what ports receive!!) Fill in the blanks as you go to complete your grade:

Charlevoix SHIPS __________________________. Where in Michigan could this be RECEIVED? __________________________. Use your yarn to SHOW this on the map.

Chicago ships General Cargo. Where in Michigan could this be RECEIVED? ______________. Use your yarn to SHOW this on the map.

Port Inland, Drummond Island, Calcite and Presque Isle all SHIP __________________________.

Choose one of those shipping ports and use your yarn to show where it can be received in Michigan. Where port did your ship to decide to unload at? __________________________.

What does Escanaba ship? __________________________ What TWO places in Michigan RECEIVE this shipment? __________________________ ______________. Use your yarn to show one of those two receiving ports. What is Iron Ore used for? __________________________ (Look it up or recall from your computer lesson.)

Name in the space below ALL the items that the City of Detroit Ships or Receives. Good thing Detroit has a waterway that runs through it!

When your group is ALL DONE – call me over to check it! This is worth 42 points.