Snapshot Day Lesson Plan – Math with Ships

Summary: Students will use mathematical reasoning to determine elapsed times, distances covered, and the speeds of boats sailing the Hudson River on Snapshot Day 2004. The lesson can easily be adapted to use data from this year's Snapshot Day event.

Objective: Students will
- Correctly read data from a table
- Use addition and subtraction skills to determine distances traveled by vessels.
- Add and subtract using hours and minutes to determine elapsed time required by vessels to travel between river milepoints.
- Use multiplication and division skills to determine the speed of the vessels.

Subject Area: math, geography

Grade Level: intermediate

Standards: Mathematics, Science, & Technology Standards 1, 2, 3

Skills: interpret data; use numbers to identify locations and measure distances; add, subtract, multiply, and divide using decimals; apply mathematics in real world settings; reason mathematically

Vocabulary:
Barge, gypsum, Hudson River Mile, ship, tugboat, vessel

Duration:
Preparation time: 5 minutes; Activity time: 40 minutes

Materials:
student worksheet – Doing math with Hudson River shipping (1 per student)
Pencil

Background:
The Hudson River is an important shipping route for bulky cargoes like oil, grain, powdered cement, and road salt. A small unit of any of these cargoes has little value; shipping them in high volume by water is the best way to minimize the cost of transportation relative to the value of the cargo. Ships and tugboats pushing or pulling barges are common sights on the Hudson. Many of

these vessels are going to or coming from the Port of Albany. By volume and value, petroleum products are the most important commodities shipped on the Hudson.

The Hudson is measured in river miles, with 0 being at the Battery at the southern tip of Manhattan Island. The George Washington Bridge is located at Hudson River Mile [HRM] 12, the Mid-Hudson Bridge and Poughkeepsie at HRM 75, and Albany at HRM 145.

Activity:
Introduce the concept of Hudson River Miles to students. Discuss the kinds of ships and cargoes that they might see on the Hudson. The worksheet can be done as a group in class, assigned as in-class work, or sent home as homework.

Assessment:
- Share answers to questions from worksheets;
- make up similar elapsed time/distance/speed problems for quiz.

References:
Photos and dimensions of the barges described in this activity, as well as many tugboats commonly seen on the Hudson, can be viewed at the websites of the Bouchard Transportation Company http://www.bouchardtransport.com/HomePage.htm and the Reinauer Transportation Company http://www.reinauer.com/RTCWeb/DesktopDefault.aspx?tabindex=4&tabid=3 .

Answers:

1. *Gypsum Baron*	(a) HRM 18 to HRM 7	11 miles
	(b) 9:45 am to 10:45 am	1 hour
	(c)	11 miles per hour
2. *Bouchard B#35*	(a) 338 − 300	Yes, longer than a football field by 38 feet
	(b) HRM 124 to HRM 61	63 miles
	(c) 11:29 am to 4:45 pm	316 minutes
	(d) 63 ÷ 316	0.2 miles per minute
	(e) × 60	12 miles per hour
3. *RTC 120*	(a) HRM 115 to HRM 87	28 miles
	(b) 9:00 am to 11:17 am	137 minutes or 2 hours 17 minutes
	(c) 28 ÷ 137 × 60	12 miles per hour
4. *Alice Oldendorff*	(a) HRM 124 to HRM 115	9 miles
	(b) 1:02 pm to 1:35 pm	33 minutes
	(c) 9 ÷ 33 × 600	.27 miles per minute, 16.20 miles per hour
	(d) 108 ÷ 0.27	400 minutes (6 hours 40 minutes)
	(e) 1:35 pm + 6 hrs 40 min	8:15 pm

Doing Math with Hudson River Shipping
Student Worksheet

This table lists several vessels seen by students studying the Hudson River on October 6, 2004. It shows where these vessels were seen, when they were seen, and in what direction they were going. Use the information in the table to answer the questions below.

Hudson River Mile location	7 Manhattan	18 Yonkers	61 Beacon	87 Esopus	97 Ulster	115 Athens	124 Stuyvesant
ship *Gypsum Baron*	10:45am dropped anchor	9:45am South					
ship *Alice Oldendorff*						1:35pm South	1:02pm South
tanker barge *Bouchard B#35*			4:45pm South				11:29am South
tanker barge *RTC 120*				11:17am South	10:30am South	9:00am South	

1. The *Gypsum Baron*, 495 feet long, carries a mineral called gypsum to wallboard (sheetrock) factories on the Hudson at Haverstraw, Buchanan, and Rensselaer.

(a) How many miles did *Gypsum Baron* travel?

(b) How long did it take *Gypsum Baron* to go from Yonkers to Manhattan?

(c) How fast was the *Gypsum Baron* going in miles per hour?

Bouchard Towing Company tugboat & barge

2. The tanker barge *Bouchard B#35*, 338 feet long, carries oil to storage tanks along the Hudson. It has engines for pumping oil on and off the barge, but not to move it through the

water - a tugboat does that.

(a) A football field is 300 feet long from one goal line to the other goal line. Is the *Bouchard B#35* longer than a football field? How much longer?

(b) How many miles did the *Bouchard B#35* travel between Stuyvesant and Beacon?

(c) How long (in minutes) did the trip from Stuyvesant to Beacon take?

(d) What was *Bouchard B#35's* speed in miles per minute (round to the nearest tenth)?

(e) What was the speed of the barge in miles per hour?

3. The oil barge *RTC 120*, 405 feet long, belongs to the Reinauer Towing Company.

(a) How many miles did *RTC 120* travel between Athens and Esopus?

(b) How long did it take *RTC 120* to go from Athens to Esopus?

(c) How fast was the *RTC 120* going in miles per hour (round to the nearest whole number)?

Alice Oldendorff loading gypsum in Nova Scotia, Canada.

4. The *Alice Oldendorff*, 633 feet long, carries gypsum and rock salt to the Port of Albany

(a) How many miles did the *Alice Oldendorff* travel between Stuyvesant and Athens?

(b) How long did it take the *Alice Oldendorff* to get from Stuyvesant to Athens?

(c) What was the ship's speed in miles per minute and miles per hour (round to nearest hundredth)?

(d) At that speed, how long would the *Oldendorff* take to travel between HRM 115 and HRM 7?

(e) At what time would the ship arrive at HRM 7, assuming it kept the same rate of speed?