

How Fast? How Far?

Dennis Simi simid@oasd.k12.mi.us
Ontonagon Area Junior High School

Target Grade/Subject: 8th Grade Mathematics (LD, At Risk, Spec Ed)

Lesson Overview: To engage academically disadvantaged and/or challenged students in learning how to correctly make rates of change (speed) calculations and interpret their importance.:

Michigan Grade Level Content Expectations

M.UN.08.EG01 ... select and use standard tools for measurement of length, time, weight, volume and temperature:

M.UN.08.EG02 ... select appropriate units of measure for length, time, weight, volume and temperature

N.FL.08.11 ...solve problems involving ratio units such as miles per hour, dollars per pound or persons per square mile

Learning Objectives:

At the end of this lesson, student will be able to:

- 1) Make rates of change (speed) calculations (given a measured distance and speed one can calculate the amount of time travelled ... $\text{speed} = \text{distance}/\text{time}$; therefore, $\text{time} = \text{distance}/\text{speed}$)

Materials:

Math Textbook (McDougall-Littell Middle School Math Course 3- ISBN: 0-618-50817-1), large 8 ft by 6 ft Great Lakes Watershed and Ports Map, rulers, sketching pencils, SmartBoard, 1/4X1/4 inch grid paper, group maps with mileage keys made in previous lesson, TI-30sx calculators, compasses/dividers, writing utensils/erasers, individual student handouts and software (maps) listed below

Anticipatory Set (Lead-In): A loaded coal carrying laker can travel at about 10 to 13 knots. How long will it take to travel from Superior, with its load of clean burning low-sulfur Western coal, to here? What's a knot? What's not a knot?

Procedure:

1. Students groups will use their self-generated, scaled maps of the Great Lakes (especially Western Lake Superior), compasses/dividers, rulers and legends/mileage keys to determine the water travel distance between Superior, WI and Ontonagon, MI (or other similar ports) and compare this to other transportation routes (such as railroad and OTR/trucking).
2. Instructor will lead students to reflect on the advantages associated with freight hauling via ship v. other means (vehicular capacities, speed, environmental impact, cost-benefit ratios). Using the distance travelled and average speed of a loaded laker.
3. Students will calculate how long it takes to transport coal from Superior to Ontonagon.

Assessment

Informal assessment will be made by having each "crew" pick different ports to again measure and calculate travel times and present their calculations to the class.

New Terms

Knot	unit of measure of wind or a ship's speed (ie: travelling at 3 knots) = 6080.20 feet
Nautical	having to do with ships and navigation
Rate	a ratio of two quantities that have different units
Unit rate	a rate that has a denominator of one unit