Lab Framework

Text:CORD Classic
Unit number and title:CORD Unit 2 Estimating Answers
Developed by:Susan Sears & Scott Feil
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Lab Title

Estimating Mileage

Contact Information: sears.susan@mail.wsd.wednet.edu, (509) 663-8117
Short Description: Given a ruler and map, the student will estimate mileage distances between two specified towns. Upon completion of estimation, students will use the map and calculators to calculate exact distance between the towns. Students will calculate time of travel in hours.

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  Students will make rough estimates.
  Students will round and truncate whole numbers to a given number of digits.
  Students will estimate answers to problems that involve several steps.
  Students will check the answers to problems to make sure they are reasonable.
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Students must be familiar with how to read a map and calculate mileage between towns through estimation and exact calculation.
  Students must be familiar with how to calculate time traveled for distances between towns.
  Students need to know how to estimate and truncate numbers.
  Students need to know the formula for calculating distance and time traveled.
- **New Vocabulary**
  Miles per hour (mph)
- **Materials List**
  1 ruler per student
  1 map per student
  Copy of lab data sheet and instructions, 1 per student.
- **GLEs addressed**
  Math: 1.1.6 Complete multi-step computations with combinations of rational numbers using order of operations and addition, subtraction, multiplication, division, powers, and square roots. W
  1.1.8 Apply estimation strategies in situations involving multi-step computations of rational numbers using addition, subtraction, multiplication, division, powers, and square roots to predict or determine reasonableness of answers. W
  1.2.6 Understand and apply estimation strategies to obtain reasonable measurements at an appropriate level of precision. W
  2.1.1 Formulate questions to be answered to solve a problem. W
  2.1.3 Identify what is known and unknown in complex situations. W

2.2.4 Determine whether a solution is viable, is mathematically correct, and answers the question(s). W

3.3.2 Evaluate reasonableness of results. W

Reading: 3.2.2 Apply understanding of complex information, including functional documents, to perform a task.

3.3.1 Apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.

Writing: 2.2.1 Demonstrates understanding of different purposes for writing.

- **Leadership Skills**

  1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical thinking skills while understanding outcomes of related decisions.

- **SCAN Skills**

  Basic Skills

  A. Locates, understands, and interprets written information prose and documents – including manuals, graphs and schedules – to perform tasks

  Writing

  B. Records information completely and accurately

  Arithmetic

  A. Performs basic computations

  C. Makes reasonable estimates of arithmetic results without a calculator

  Mathematics

  A. Approaches practical problems by choosing appropriately from a variety of mathematical techniques.

- **Set-up information**

  After handing out and going over the worksheet and student instructions, give each student a ruler and a map. Have student estimate the distance traveled between two specified towns using the map and ruler. Students need to truncate their estimates. After arriving at estimates, students will find exact mileage between the two towns using map and calculator. Student will then calculate time it takes to travel between the two towns.

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**

  1 class period

  Students will do this activity individually.

  Upon completion of activity, students will compare estimates and exact calculations in groups of 3-4 students.

- **Teacher Assessment of student learning** (scoring guide, rubric)

  Successful completion of the given task and accompanying data worksheet.

- **Summary of learning** (to be finished after student completes lab)

  -discuss real world application of learning from lab

  -opportunity for students to share/present learning

- **Optional activities**

  Have students compare two different routes between towns to analyze which route is the most efficient, taking into account road conditions (example: winter mountain passes).

Have students calculate amount of gasoline used and the cost of trip based on current gasoline prices.

- **Career Applications**

  Travel is required in every job, whether it is traveling to and from a person's job, construction manager traveling between construction sites, or a sales representative traveling from town to town. Students will gain skills in map reading, estimating distances, calculating exact mileage and time of travel.

LAB TITLE: Estimating Mileage
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

  Given a ruler and a map, estimate the mileage between the two specified towns truncating your estimate. When complete, calculate the exact mileage between the specified towns using map and calculator. Calculate the time it takes to travel between the two towns.

- **Grouping instructions and roles**

  Supply Clerk - Once group has formed, pick up one data sheet, one map, and one ruler for each student in your group.Hand out sheets, maps, and rulers. Collect all maps and rulers at end of class period.

  Group recorder - As each member completes his/her data, gather the information and record on the group data sheet.

- **Procedures** – steps to follow/instructions

  Divide students into groups of 3.

  Individually complete the first part of lab sheet on estimation using map and ruler. Show all work and truncate your answer to the hundred and record estimation.

  Using map and calculator, calculate exact mileage between the two specified towns. Show all work and record answer.

  Calculate the time it takes to travel between the specified towns.

  After all students in your group have finished, fill out the group chart.

- **Outcome instructions**

  Once you have completed your individual data recording, share your information with the group recorder.

  Turn in your completed worksheets, maps, and rulers.

- **Assessment instructions** (peer-teacher)

  Teacher observation and questioning strategies.

  Completed data recording sheet.

Name: _____ Period: _____ Date: _____

Unit 2 - Estimating Mileage

Directions: You have been given a map. The map has a legend that tells you the scale, for example 1" may equal 50 miles. The cities on the map are connected by roads of a certain length. Pick two cities that are at least 4 sections of road away from each other, and estimate the distance between the two cities. For the second part use a ruler to measure the distance along the roads between the two cities to make an exact measurement. Then, use the internet to find the travel distance.

Info: What two cities did you pick? _____ & _____

Estimate: Just looking at it, how far apart are the cities? _____

List an estimate for each section of road.

Section 1 _____ Section 4 _____ _____

Section 2 _____ Section 5 _____ Section 8 _____

Section 3 _____ Section 6 _____ Section 9 _____

Total of your estimates: _____

Did your initial estimate match your total? _____

Calculate: Now, use your ruler to figure the indiviual distances.

Section 1 _____ Section 4 _____ Section 7 _____

Section 2 _____ Section 5 _____ Section 8 _____

Section 3 _____ Section 6 _____ Section 9 _____

Total of your measurements: _____

Research: Now use the internet to find an answer (for example, MapQuest)

Distance between the two cities: _____

Analysis: Compare and contrast your three distances, your estimate, your measurements, and by research. Explain the similarities and differences in the space below.