Lab Framework

Text: CORD
Unit number and title: *Unit 9 Using Ratios and Proportions*
Short Description: Figure out the proper gear ratio for a 4.3L Mercruiser engine and Alpha 1 outdrive
Developed by: Wayne Miller
Contact Information: wmiller@tacoma.k12.wa.us
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Lab Title
Gear Ratios for Marine engines

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  Students will be able to find the correct gear ratio for the 4.3L engine

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Basic use of gear ratio formula and problem solving techniques

- **Vocabulary**
  Alpha 1 outdrive, Mercruiser

- **Materials List**
  Pencil, paper, tape measure, three different gear ratio outdrives, one gas engine, and propeller, boat size, horsepower, gear ratio chart.

- **State Standards addressed**
  Math: A1.8.A Analyze a problem situation and represent it mathematically
  A1.8.B Select and apply strategies to solve problems

- **Leadership Skills**
  Team work in groups and group leaders

- **SCAN Skills/Workplace Skills**
  1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including **computers and other technologies**. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

- **Set-up information**
  Outdrive gear ratios, max rpm limits, boat size, and propeller size

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -Timeline required**)**
  There will be three groups 5 students (one team leader, one recorder, three problem solvers)
  The time line will be approx. 35-55 min.

- **Teacher Assessment of student learning** (scoring guide, rubric)
  Score the students as a group by checking the WOT rpm

- **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
  Students are able to figure out the volume of the fuel tanks and which on holds the most fuel.
  The real world application would be if you have a boat and the max WOT is 5500 rpm and you are getting 6500 rpm the engine will be damaged (valve train, pistons, etc.)

- **Optional activities**
  Propping of different size, weight boats

- **Career Applications**
  Boat Mechanic

LAB TITLE: ***Gear Ratios for Marine Engines***

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  We have a 4.3L Mercruiser engine with 205hp in a 18ft deep v-hull boat a 1.5:1, 1.81:1, and 2.0:1 gear ratio Alpha 1 outdrives with 21 pitch propellers. Which drive will be proper for us to reach a 5500 rpm WOT?

- **Grouping instructions and roles**
  There will be three groups 5 students (one team leader, one recorder, three problem solvers)

- **Procedures** – steps to follow/instructions
  Work in groups to figure out which is the proper ratio and then write them down. We will test your answers on the boat in the water.

- **Outcome instructions**
  Your figures should get the correct WOT rpm

- **Assessment instructions** (peer-teacher)
  Score the groups by the ones that correct answers

Lab Data Collection

Student: _____ **Date:** _____

Unit: Unit 9 *Using Ratios and Proportions*

Lab Title: Gear Ratios for Marine Engines

Criteria: Write the problem/objective in statement form

The proper gear ratio for a 4.3L 205hp Mercruiser engine is _____.

Data Collection: Record the collected/given data

Calculations: Complete the given calculations to solve for an answer(s)

Use boat size, horsepower, and gear ratio chart

Summary Statement:

The proper gear ratio is 1.81:1

Other Assessment(s)

What does 1.81:1, 1.50:1, 2.00:1 mean?