

Lab Framework

Text:CORD Classic

Unit number and title:Unit 15 Using Formulas to Solve Problems

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Lab Title

Using Formulas for Average MPG and MPH

Contact Information: (ncjohnson@seattleschools.org)

Short Description: (Automotive math using formulas to solve problems)

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

- To teach students how to use basic formulas to solve problems.
 - Rearrange the parts of a formula to fit the problem
 - Substitute values into formulas and find solution
 - To reinforce steps required in using a formula

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

- Formulas required on additional list see below

- **New Vocabulary**

- Raceway Miles Per Hour
 - Laptime Performance
 - Miles per hour
 - Miles per gallon

- **Materials List**

- Lab work sheet with MPH and MPG formulas

- **GLEs addressed**

- Math: (GLE 1.5.1, 1.5.5, 1.5.6, 2.1.1, 2.2.20)
 - Reading: (Reading)
 - Writing: (Writing)

- **Leadership Skills**

- **SCAN Skills**

- **Set-up information**

- zerox copies of worksheet and formulas
 - Current pricing for gasoline and mpg of various car models
 - Formula worksheet (see below)

Formula Worksheet for Average MPG and MPH

- Miles per gallon (MPG)
Miles per gallon means distance driven in miles divided by amount of fuel used in gallons

$$\text{MPG} = \frac{\text{miles}}{\text{Gallons}}$$

- Miles per hour (MPH)
Miles per hour means distance driven in miles divided by time of trip in hours

$$\text{MPH} = \frac{\text{miles}}{\text{Hours}}$$

- Miles = miles per gallons x gallons
- Gallons = $\frac{\text{miles}}{\text{MPG}}$
- Miles = miles/hour x hours
- Hours = $\frac{\text{miles}}{\text{Miles per hour}}$
- Raceway Miles per Hour = $\frac{\text{miles} \times 3600}{\text{Seconds}}$
- Seconds = $\frac{\text{miles} \times 3600}{\text{Miles per hour}}$

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required**)
Explain formulas and how to use them
Worksheet 2 class periods
- **Teacher Assessment of student learning** (scoring guide, rubric)

Worksheet/quiz

6. How long will the trip take? _____

7. Convert 3.65 hours to hours and minutes.

8. Convert 4 hours and 32 minutes to 4 hours and hundredths of minutes.

9. How many seconds in one hour?

10. You are a race car driver running Indianapolis. 45 seconds around a 2.5 mile track, what is your average speed?

- **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
- importance of fuel efficiency of different car models
- discussion of financial needs to own a car and use it
- trip planning and budgeting

- **Optional activities**

Have students plan a trip with their dream car and an economy car

- **Career Applications**

LAB TITLE: Using Formulas for Average MPG and MPH

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
Figure out mileage, miles per gallon, miles per hour
Raceway miles per hour
- **Grouping instructions and roles**
- **Procedures** – steps to follow/instructions
use formulas to solve problems
- **Outcome instructions**
- **Assessment instructions** (peer-teacher)
turn in worksheet at end of session, teacher will grade, review in class

Lab Data Collection

Student: _____ **Date:** _____

Unit: _____

Lab Title:

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected/given data

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

Summary Statement:

Other Assessment(s)