Lab Framework

Text: AMME 3

Unit number and title: Unit 3 Label Explosions

   Short Description: Students learn to 'blow up' labels they don't need (one on top and bottom of an equation), and how to solve complex equations by simplifying.

Developed by: Jennifer Riepl

  Contact Information: jenniferr@leschischools.org

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Lab Title
Faster Than A Cheetah?

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  - Students will run two distances (20 yards and 100 feet) to obtain time in seconds. They will use this number to convert how many feet per second, yards per second, miles per yard, and miles per second they could run. They will compare their ground speed to animals of their choice and use the same equation to figure out the speed of each animal.

- **Statement of pre-requisite skills needed**

  * Students need to know the previous 3 steps of the Label Method 'Left, Right, Line 'em Up'

- **Vocabulary**
     * Numerator
     * Denominator

- **Materials List**
     * Stopwatch
     * 20 yard area marked off
     * 100 foot area marked off
     * Worksheet, pencil and calculator

- **State Standards addressed**
  Math:
   6.1.D Fluently and accurately multiply and divide non-negative fractions and explain the inverse relationship between multiplication and division with fractions.
  7.1.C Fluently and accurately add, subtract, multiply, and divide rational numbers.
  7.1.F Write an equation that corresponds to a given problem situation, and describe a problem situation that corresponds to a given equation.
  7.1.G Solve single- and multi-step word problems involving rational numbers and verify the solutions.
  7.2.B Solve single- and multi-step problems involving proportional relationships and verify the solutions
  7.2.I Solve single- and multi-step problems involving conversions within or between measurement systems and verify the solutions

Reading:

2.1.4 Apply comprehension monitoring strategies for informational and technical materials, complex narratives, and expositions: use prior knowledge

2.1.5 Apply comprehension monitoring strategies for informational and technical materials, complex narratives, and expositions: synthesize ideas from selections to make predictions and inferences

Writing:

3.2.2 Analyzes skills and strategies to contribute responsibly in a group setting

3.3 Knows and applies writing conventions appropriate for the grade level

- **Leadership Skills**
Students work in groups of 2 and must communicate in order to collect data in the amount of time allowed. A stronger student may be paired with a struggling student to assist them in this lab but both students are to participate. Students will write answers on a single lab sheet but will also fill out an individual evaluation of their group.

- **SCAN Skills/Workplace Skills**
    * Writing- Record information completely and accurately
    * Math- Perform basic computations on calculator; fill in a table

- **Set-up information**
    * Mark off a 20 yard area outside, either on grass, pavement, or on a track or in a gym.
    * Students work in pairs to time how long it takes them to run the two distances.
    * A stopwatch for each pair will be needed.
    * Clipboards or tablets of paper will be needed to record running times
    * The rest of the lab can be completed in the classroom

- **Lab organization** (-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**
    * Hour 1-explain the directions and review expectations of being outside the classroom. Group the students into pairs. Go to the marked off areas and record the times.
    * Hour 2-students move back to the classroom to begin answering questions.

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

- **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**
    * Students make up their own questions to ask other groups. The groups then switch questions and begin working the new problems.

- **Career Applications**

- The ability to set up equations and use conversions is a skill that is useful in many areas of the workforce.
  - **LAB TITLE: Faster Than A Cheetah?**

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  - Students will run two distances (20 yards and 100 feet) to obtain time in seconds. They will use this number to convert how many feet per second, yards per second, yards per minute, miles per hour, miles per yard, and miles per second they could run if they were to run at a consistent speed. They will then compare their ground speed to animals, cars, bicycles, etc. and use conversions to figure out yards per second, miles per yard, and miles per second.

- **Grouping instructions and roles**
  You will be in groups of 2, each of you are responsible for completing a worksheet with data you collect. At the end of the lab, you will each fill out a confidential evaluation on your group, to be seen only by me so honesty is important! If one partner is not pulling their own weight, their score will reflect that! (I will be monitoring the group and will factor in what I see as well)

- **Procedures** – steps to follow/instructions
  * Gather materials (pencil, calculator, worksheet and evaluation form)
  * Put your name on the paper
  * Read the directions
  * Discuss strategies for solving the problem with your partner
  * Using the data you collected, begin writing your equation(s) on the worksheet
  * Simplify and solve your equations, answering the questions on the worksheet

- **Outcome instructions**
  * On the reflection sheet, discuss what you learned from this lab. Why do you think conversions are an important part of math? Where could you use these conversions in the 'real world'? How fast are you?

- **Assessment instructions** (peer-teacher)
  * See attached rubric/evaluation

https://wa-appliedmath.org/

Names:_____

Faster Than A Cheetah? Lab

Directions:
You are going to run the distances marked off (20 yards and 100 feet) while your partner times you with a stopwatch. You must record your times on the worksheet provided, in the correct space (make sure the 20 yard time goes on the 20 yard line!). You will take your times and figure out how fast you really are in different forms of measurement! To do this, you will have to do some conversions (OH NO! The dreaded conversions!!!) but never fear… if you do them right (and I have faith you will!), your reward is You will use the following worksheet for your conversions and you may use your calculator. Don't forget to follow the Label Method: 'Left, Right, Line 'em Up'

Reflection: Why is it important to learn how to covert from yards to feet, feet to miles, and seconds to minutes, etc.? Where would you use this in the 'real world'?

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Rubric:
Name:

Respect (15 pts)	Cooperation (15 pts)	Conversions (50 pts)	Reflection (20 pts)	Total (100 pts)

Name:

Respect (15 pts)	Cooperation (15 pts)	Conversions (50 pts)	Reflection (20 pts)	Total (100 pts)

Name:_____

<u>Be Accurate!!!!!</u>

20 yard time:_____

100 feet time:_____

Using your times above, set up your first equation of **<u>yards per seconds</u>**.
   <u>Remember:</u>

<u>3 feet</u>	<u>5280 feet</u>	<u>60 seconds</u>	<u>60 minutes</u>	<u>24 hours</u>
1 yard	1 mile	1 minute	1 hour	1 day

<u>Equation:</u>_____

Once you have your equation set up, figure out what your speed is in minutes, hours and days. Figure out what your distance is in feet and miles. You should have one looooong equation, BLOW UP the labels you don't need!

When you are finished, look up speeds of different animals (land and water) and compare them to your speeds. Figure out their speed using the same equation you used for your speed.

Animal Chosen:_____

Land/Water Speed:_____

<u>Equation:</u>_____

Conclusion: Are you faster than a cheetah? A dog? A cat? A mouse? An ant? A shark? ☺
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