

The Napa “Tiny Bubbles” Cover Sheet

Introduction: The following lessons introduces students to algebra equations in order to determine oxygen loading rates for an activated sludge system, conversion of a flow and concentration into pound and mathematic ratios.

Materials:

- Projector connected to a computer with internet to play video of incident
- Copies of each of the following:
 - Warm-Up and Exit Ticket
 - The Napa Shake up Worksheet
 - Applied Wastewater Math Formula Sheet and Conversion Factors
 - Student Surveys

Estimated Timeframe:

- 45 minutes to an hour, depending on how you spread and imbed your think time

Prior Knowledge/Skills Needed:

Before this application lesson, students must be able to:

- Calculate the result of an algebra equation using multiplication
- Calculate the result of one equation divided into another
- Calculate the ratio of one equation over another
- Conversion of a percentage to a decimal

Common Core State Standards:

CCSS.MATH.HS.A-CED.2: Create equations in two or more variables to represent relationships between quantities;

CCSS.MATH.HS.A-REI.3: Solve linear equations and inequalities in one variable, including equations with coefficient represented by letters.

Additional Common Core State Standards:

CCSS.MATH.HS.N-1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;

CCSS.MATH.HS.A-CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

Implementation Suggestions:

- Ask students to think/write/pair/share often so students can verbalize and communicate their mathematics
- Students should do work on the board in groups or pairs

Accommodations/Modifications:

- For English Language Learners:
 - Be sure to have precise definitions of content vocabulary ready ahead of time.
 - Be sure to include think time when appropriate
 - Ask students to Think/Write/Share between for each question
- SPED/504:
 - Allow students to use a calculator for calculations
 - Allow students to use applied math formula sheet
 - Focus on having students verbalize the process in their own words
 - While students are finding solutions you may ask students for estimated solutions first, this helps students see if they are headed in the right direction with their answers

Extensions: