



# Micro-Lesson

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<b>LESSON NAME</b>	<p><b>Trawling the Harbor Simulation</b>  <b>Just what IS below the surface of those waters?</b>  <i>Inspired by Heartbeats in the Muck by John Waldman</i></p>
<b>SUMMARY</b>	<p>As an introduction to familiarize themselves with the varied inhabitants of New York Harbor and working in groups, students will “trawl” trays of water (darkened with food coloring) using fish tank gravel rakes (cat litter scoops or oversized tweezers can work for more accessibility). Their finds? Teacher-created waterproof cards containing images of an assortment of associate and predator organisms, as well as strays like car tires and tin cans.</p> <p>For each card drawn, students will role a pair of six-sided dice to represent the “quantity” of that find in the simulation sample. Students will continue trawling cards, rolling the dice and documenting the data in the provided graphic organizer. Students will then choose two organisms, create a rate table, determine a unit rate, graph the relationship and craft an equation representing the proportional relationship.</p> <p>As an extension, student groups will compare their finds with the rest of the class to merge and analyze the class data in this simulated sample. Students can push themselves further by developing ratios of associates to predators, by exploring ways to make the simulation activity a game, and by investigating how they can use the real data from fieldwork to alter rules of the simulation to make it more representational of an actual sample population.</p> <p>Lastly for homework, students will each “adopt” one organism, research it and create a one-page fact sheet with drawing to be added to a laminated classroom “handbook” of harbor inhabitants.</p>
<b>OBJECTIVES</b>	<ol style="list-style-type: none"> <li>1. To introduce students to the myriad inhabitants of New York Harbor through an engaging, hands-on activity with multiple entry points for students of varied skills</li> <li>2. To practice data documentation/analysis and further our mastery of working with ratios, proportions and linear equations</li> <li>3. To create a laminated student-generated handbook of harbor inhabitants to be used as a future reference during restoration station fieldwork</li> </ol>
<b>SHARED LEARNING TARGETS</b>	<ol style="list-style-type: none"> <li>1. Students will be able to start identifying — and crafting a comprehensive list of — organisms found in New York Harbor and the East River</li> <li>2. Students will be able to document data based on hands-on exploration, do analysis and identify patterns in that data</li> <li>3. Students will be able to create classroom resources based on research about particular organisms</li> </ol>
<b>NEXT GENERATION SCIENCE STANDARDS</b>	<p><u><a href="#">MS-LS2-1</a></u> - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p>

<p><b>COMMON CORE STATE MATH STANDARDS</b></p>	<p><b>7.RP.1 &amp; 7RP.2: Ratios and Proportions</b>  <b>Analyze proportional relationships and use them to solve real-world and mathematical problems.</b>  1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.  2. Recognize and represent proportional relationships between quantities.  <b>7.EE.4: Expressions and Equations</b>  <b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b>  4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p>
<p><b>NEW YORK SCIENCE SCOPE AND SEQUENCE</b></p>	<p><b>Grade 7 - Unit 4 Dynamic Equilibrium – Other Organisms</b></p>
<p><b>MATERIALS</b></p>	<p>Large water trays, food coloring, plastic fish tank gravel rakes, dice, teacher-created data collection worksheets/graphic organizers, teacher-generated organism cards (images taken from the Oyster Gardening Manual)</p>
<p><b>BACKGROUND</b></p>	<p>To most students, as well as adults living in New York City, the Harbor — and the diverse and active population that it supports — is a mystery. This introduction allows students to begin understanding what’s below the Harbor’s dark surface before being challenged with finding ways to help protect it.</p>
<p><b>INSTRUCTIONAL PLAN</b></p>	<p><b>Engage</b>  Students will be given copies of Saul Steinberg’s illustration for Joseph Mitchell’s classic <i>Bottom of the Harbor</i> 1959 and be asked to discuss the artist’s perspective on NY Harbor. Working in pairs, students will then be asked to generate a list of things that, in their opinion, could be found below the surface of NY Harbor. (or simply have a <i>Turn &amp; Talk</i> activity)</p>



### Explore

Working in groups, students will “trawl” trays of water (darkened with food coloring) using fish tank gravel rakes. Their finds? Teacher-created waterproof cards containing images of an assortment of associate and predator organisms, as well as strays like car tires and tin cans.

### Elaborate

For each card drawn, students will roll a pair of six-sided dice to represent the “quantity” of that find in the simulation sample. Students will continue trawling cards, rolling the dice and documenting the data in the provided graphic organizer. Students will then choose two organisms, create a rate table, determine a unit rate, graph the relationship and craft an equation representing the proportional relationship.

As an extension, student groups will compare their finds with the rest of the class to merge and analyze the class data in this simulated sample. Students can push themselves further by developing ratios of associates to predators, by exploring ways to make the simulation activity a game, and by investigating how they can use the real data from fieldwork to alter rules of the simulation to make it more representational of an actual sample population.

### Evaluate

As students explore and document their findings, the teacher will run a small ratio & proportion review workshop, which students can make the choice to join or not. The classroom teaching assistant or paraprofessional can circulate to assist other more confident students and keep them on task. All worksheets/graphic organizers are collected at the end of the period and reviewed by the teacher.

For homework, students will each “adopt” one organism, research it and create a one-page fact sheet with drawing to be added to a laminated classroom “handbook” of harbor inhabitants.

	<p>Students can formally present their fact sheets to the class before it is added to the handbook. Once complete, the handbook can be shared with lower grades.</p>
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