RATIO PRACTICE:

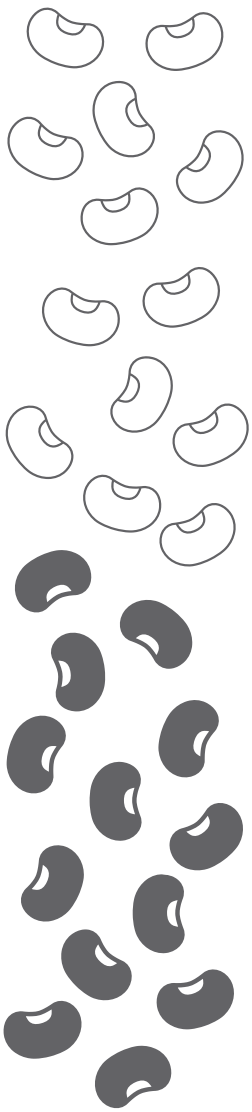
A Little Puddle at the Bottom of a Big Hill

Adapted from: Bay-sic Ratios and A Little Puddle at the Bottom of a Big Hill

Lesson Background

This lesson will help you review and practice ratios. Remember that ratios describe how much of one thing there is compared to another thing or the relative sizes of two or more values.

For example, in a high school classroom there are 13 boys and 12 girls. If I asked what the ratio of boys to girls is, it would be 13:12.



Prepare

Although the Chesapeake Bay is the largest estuary in North America (and the second largest in the world), spanning more than 200 miles, it contains relatively little water. With an average depth of only 21 feet, not much water lies between the bottom of the Bay and the water's surface. This shallowness allows the Bay to be incredibly rich with life. But these shallow waters are at the receiving end of 64,000 square miles of land and make the Bay vulnerable to pollution.

1. Review the Video

https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-ratios-intro/v/ratio-example-problems

2. Gather Materials

- ❑ Chesapeake Bay Watershed Map (provided)
- ❑ Watersheds of the World Map (provided)
- ❑ Land-to-Water Ratios Chart (provided)
- ❑ Small, countable objects like beans, M&Ms, Skittles, or pennies
- ❑ Scissors

3. Label the Chesapeake Bay Watershed Map

Identify and label at least five different features of the Chesapeake Bay watershed. Consider labeling rivers, your city or town, and the states in the watershed.

Investigate

1. Look at the Chesapeake Bay Watershed map. What features make up the boundaries of the Chesapeake Bay watershed?

2. Explain why you think all the rain that falls in the watershed flows toward the Bay and not into another watershed.

3. Use the information you gathered in #2 to explain how the Bay can be compared to a little puddle.

Refer to the Land-to-Water Ratio chart. For the Chesapeake Bay watershed, there are 2,743 square kilometers (km) of land for every 1 cubic km of water (for a ration of 2,743:1).

4. Use the Land-to-Water Ratio chart to identify and write down the land-to-water ratios for the following bodies of water (ROUND DECIMAL NUMBERS TO THE NEAREST WHOLE NUMBER).

5. Briefly describe where each body of water is located.

Hudson Bay land-to-water ratio location draw ratio below	**Gulf of California** land-to-water ratio location draw ratio below	**Gulf of Mexico** land-to-water ratio location draw ratio below

6. Using your materials (beans, pennies, or candy), create a simple model to represent the land-to-water ratio of the water bodies in #4. Keep some space between your models. You will have three models when you are finished. Draw your ratios in the space provided above.

7. Write a sentence to compare and contrast the differences between your models.

8. Consider that you would have needed 2,743 pieces of paper OR pieces of candy to model the ratio of land to water for the Chesapeake Bay watershed! Write a six-word (only six!) sentence that explains why the Chesapeake Bay is different from other watersheds in the world.

9. Using the four ratios you've looked at, predict which body of water is at risk for being most polluted by run-off and human activities.

Prediction:

Why did you pick this body of water to be the most polluted? Use specific details to support your reasoning.

Read the excerpt below, which describes the shallowness of the Bay.

> *The Chesapeake Bay is quite shallow. Nearly 200 miles (333 km) long and up to 30 miles (50 km) wide, it looks like a lot of water out there; but that water is spread thin. The average depth of this huge bay is around 21 feet (7 m) – less than halfway from home plate to first base. In this simple fact – that its bottom lies very near its top – lies much of the bay's uniqueness and also its vulnerability to modern pollution.*
>
> *(The Bay's) shallowness means that sunlight, the first essential for plant growth, can penetrate a large part of the bay's waters. This light and warmth combined with a continuous flow of nutrients, supports vast stocks of phytoplankton and huge underwater meadows of grasses. Collectively, these grasses are known as submerged aquatic vegetation (SAV). They are not only food for waterfowl but are high-quality habitats – nurseries, hiding places, breeding grounds – for shrimp, crabs, seahorses and a host of less familiar life forms in the food web.*
>
> (adapted from *Turning the Tide*, p. 22-23, Horton and Eichbaum, 1991).

10. Does the information you just read change your answer to #7 above or does it confirm that you made an accurate prediction? Use the space below to explain why.

DIVE DEEPER:

Create a short (under one minute) public service announcement (PSA) that explains why the Bay is unique when compared with other bodies of water. Use specific data, like those ratios you worked on, and other facts, including things you could do today from home, to protect this resource.

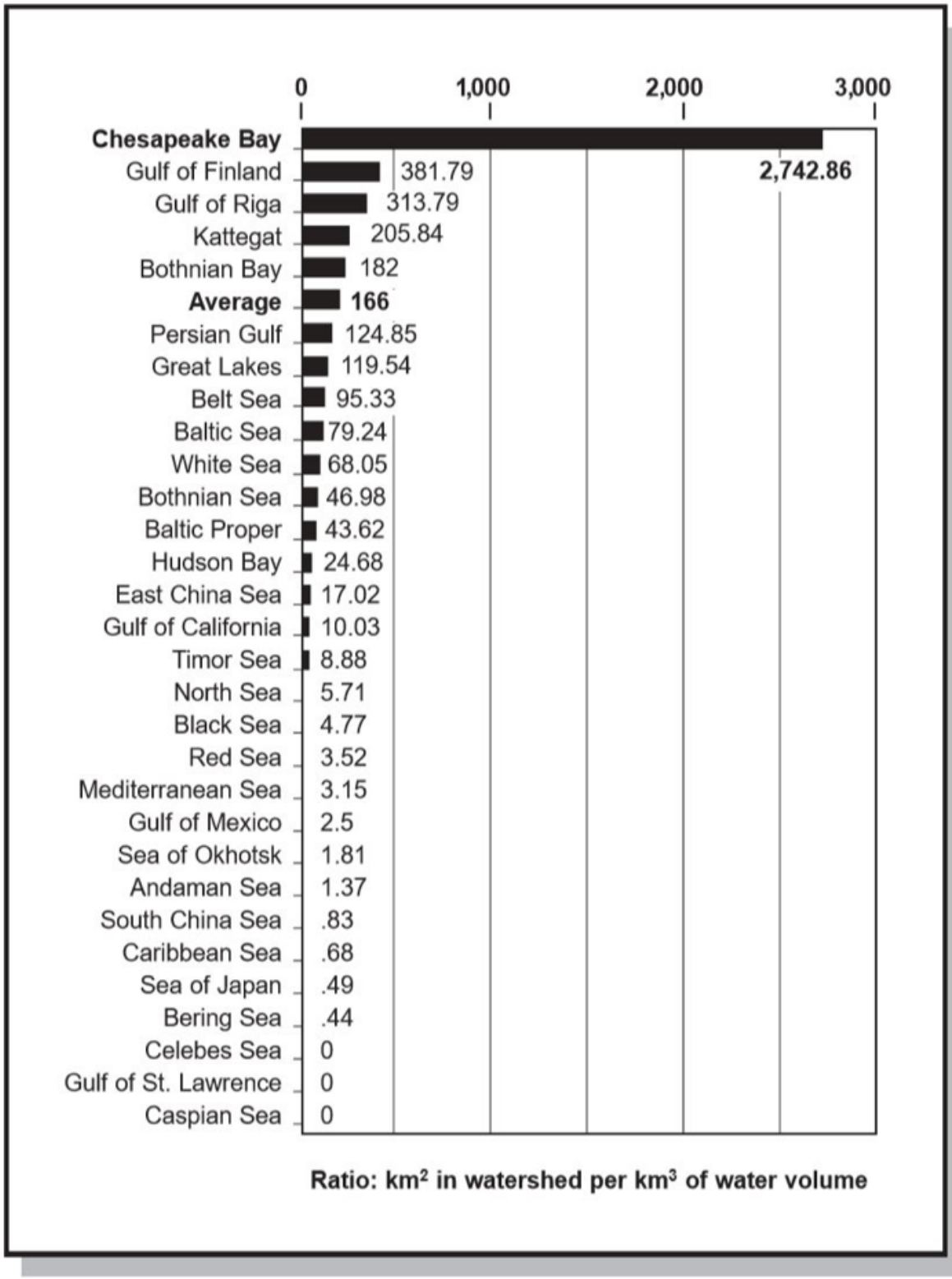
Below are a couple of examples.

Student-created PSA:
youtube.com/watch?v=94Ve2vctL9c&feature=youtu.be

Additional resources for creating a PSA (parent or teacher):
scholastic.com/teachers/blog-posts/kriscia-cabral/earth-day-public-service-announcements/

CHESAPEAKE BAY WATERSHED

LAND-TO-WATER RATIOS AROUND THE WORLD



THE SHALLOW, VULNERABLE BAY

The Chesapeake Bay, compared to other coastal and inland bodies of water, has a huge drainage basin for the amount of water it contains, a ratio of 2,742.86 square kilometers of land for every cubic kilometer of water. The principal reason is the Chesapeake's extreme shallowness – its average depth is less than 22 feet.

SOURCE: R. Costanza, Chesapeake Biological Laboratory, University of Maryland

WATERSHEDS OF THE WORLD