Teacher's Guide: Ratio and Proportional Reasoning: Food Labels

Recommended Grade Level: 5–8

(also applicable to grades 9–12 for students requiring significant support in learning)

Suggested Time: About 50–60 minutes spread over one or more class periods, plus additional time to complete a writing assignment

Goals

Following are the big ideas that students should take away after completing this lesson:

- We use the information on food labels to decide which foods are healthy.
- We use proportional reasoning to figure out how much salt, sugar, and vitamins are in more than one serving of a certain food.

Vocabulary

(See definitions on page 6.)

- nutrients
- percentage
- proportion
- proportional reasoning
- ratio

Key Literacy Strategies

Following are the primary literacy strategies students will use to complete this activity:

- Using background knowledge (screen 2)
- Determining important information (screens 4, 7, 9, and 10; final assignment 2)
- Making inferences (screen 9; final assignment 2)
- Categorizing basic facts and ideas (screen 10)
- Constructing summaries (final assignments 1 and 3)

Note: In addition to the key literacy strategies listed above, students will also use each of these strategies to complete this lesson:

- Monitoring comprehension
- Synthesizing
- Making predictions
- Developing vocabulary
- Connecting prior knowledge to new learning
- Developing a topic in writing
- Identifying and using text features (photographs, captions, diagrams, and/or maps)

Overview

Ratio and Proportional Reasoning: Food Labels is a student-directed learning experience. However, while students are expected to work through the lesson on their own, teachers should be available to keep the lesson on track, organize groupings, facilitate discussions, answer questions, and ensure that students meet all learning goals.

The following is a summary of the lesson screens:

Screen 1: Students begin to think about how to make healthy choices when they shop for something to drink.

Screen 2: Students watch a video of teens discussing the importance of healthy eating and then write what it means for a food to be called "healthy."

Screen 3: Students learn what the goals are for the lesson, which strategies they will be using to complete the lesson, and the important vocabulary words they will use during the lesson.

Screen 4: Students watch a video about how to read nutritional labels, specifically the "Serving Size" and "Servings per Container" sections. They also learn that a ratio is a relationship between two amounts. Students write about how the serving size information on nutritional labels could be misleading.

Screen 5: Students learn that a proportion is made up of two equal ratios. They also learn to use multiplicative reasoning to find a missing value in a proportion.

Screen 6: Students answer three multiple-choice questions to demonstrate their comprehension of proportional reasoning and basic ideas about proper nutrition.

Screen 7: Students use their knowledge of proportions to think about percentages. They learn how to calculate the percentage of calories from fat using the data on nutritional labels.

Screen 8: Students complete an interactive vocabulary activity, and then choose two words from the vocabulary list and write a new sentence for each word. These tasks demonstrate their understanding of the meanings of the words.

Screen 9: Students learn where the "2%" in 2% milk comes from. While reading the passage, they consider how proportions can be used to understand the amount of calories and fat in 2% milk and whole milk and eventually learn that 2% milk is 2% fat by weight. Students then write down two to three sentences explaining why 2% milk is a healthier choice than whole milk for teens and adults.

Screen 10: Students use an interactive activity to sort information in a Venn diagram based on the caloric value of fat and sugar for different foods.

Final Assignment: Students select and complete a writing assignment about the lesson topic.

Before the Lesson

❑ Go through each screen of the lesson, including all the interactive activities, so that you can experience ahead of time what students will be doing. As you go through each screen, jot down your own expectations for students' responses.

❑ Determine if students will be working individually or in pairs on the lesson. Some students may be able to work independently with little or no support. Students who are less familiar with the subject area or who struggle with literacy skills may benefit from working with another student. An effective way to do this is to pair a stronger student with a less able reader. You can also have students work individually on certain tasks and in pairs on others,

depending on their experience and needs. If students will be working in pairs on any portion of the lesson, let them know if they will be expected to type in their notes individually or together.

❑ Provide instruction on key vocabulary (vocabulary words are defined in the lesson on screen 3, and on page 6 of this guide).

❑ Determine what students already know about ratio, proportions, and nutrition. Record their ideas on a chart. You may want to structure the chart with two questions: "What makes a food healthy?" and "How can you use math to tell if certain foods are good for you?" This will give you a sense of the background knowledge and possible misconceptions that students have before beginning this lesson. If time allows, return to the chart after students have completed the lesson to add new learning and correct misconceptions. Note: You may want to record their new learning in a different-colored ink so they can see how much they've learned.

❑ Arrange computers with Internet access so students can work individually or in pairs.

❑ Before students begin, suggest a timeline for completing the lesson, mention the different types of media they will encounter, and let them know how you expect them to submit their work. You may want to provide an outline of this information on a chart, chalkboard, or whiteboard, or as a handout.

Lesson Assessments

The following are descriptions of the lesson features that will be part of the packet of materials that students will submit. Students will use the packet for reference when writing their final assignment. It also serves as a formative assessment tool to monitor students' work as they are progressing through the lesson.

- **Notes** – Students take notes on screens 2, 4, 7, and 9. If time allows, review their notes before students begin their writing assignment.
- **Multiple-choice questions** – Students complete the three questions on screen 6. Walk around to make sure students answer all three questions before they continue. If students click to go to the next page before they finish, their work will not be saved.
- **Match It! -** Students complete an interactive vocabulary activity on screen 8. They begin by dragging the vocabulary terms into the correct sentences. After they finish and save their work, they will be able to check their answers against an answer key. When they are done, they will be asked to choose two vocabulary words and write a new sentence for each word. Sentences should demonstrate a clear understanding of the meaning of each word. An inappropriate response would be "He gave 50%." An appropriate response would be "He gave 50% of his candy to his brother so that they each got half."
- **Arrange It! -**Students complete the concept map activity Arrange It! on screen 10. Students will categorize different snacks according to their nutritional information and may need either a pencil and paper or a calculator to determine their answers. Students will not be able to check their answers online, so you will need to provide them with correct answers when they are finished with the lesson. You can choose to review the

answers as a class or return the corrected packet of materials to students before they begin the final assignment.

The proper distribution of answers is as follows:

Category 1: LESS THAN 20% CALORIES FROM FAT

10 baby carrots, 40 calories, 0 grams fat, 5 grams sugar

1 small apple, 55 calories, 0.2 grams fat, 11 grams sugar

Category 2: LESS THAN 20% CALORIES FROM SUGAR

10 tortilla chips, 74 calories, 3 grams fat, 0.1 grams sugar

1 cup macaroni and cheese, 250 calories, 12 grams fat, 5 grams sugar

BELONGING TO BOTH SETS (Overlap)

3" plain bagel, 146 calories, 1 gram fat, 3 grams sugar

- **Final Assignment** – Students complete one final writing assignment. You can choose to let students make their own selection or assign one according to your goals for the lesson. Use the rubric on page 7 to assess the writing assignments.

Lesson Aids and Extensions

Use the following suggestions to help students if they are stuck on a particular screen, to prepare students for completing their writing assignments, or as follow-up discussions to reinforce learning.

- **Watching Videos** – Encourage students to watch the videos more than once. After the initial viewing, provide students with a specific content focus to frame their next viewing(s) of the video. This will help them draw connections between the main topic and the information that the videos have to offer.
- **Participating in Discussions** – Organize class discussions or encourage students to talk about their questions in pairs. You may want to use the following discussion starters:
    - o How would you explain proportional reasoning to someone who did not know what it is?
    - o How do you decide what is healthy to eat, and what is not healthy?
    - o Why is it important to check the nutrition labels on food before we buy it?
    - o What other types of information should food labels include?
    - o Explain the term "percentage" to the person next to you. What do percentages measure, and how do they relate to proportions?
- **Reading the PDF Text** – Before they read the PDF text on screen 9, ask students to state some reasons why they think 2% milk is called by that name. Solicit ideas about how whole, 2%, 1%, and skim milk might be different—and why that difference is important. You may want to revisit these questions after they read the passage to clarify any misconceptions.

- **Sharing Student Work** – It may be motivational, and a further learning opportunity, for students to post their final essays so that their classmates, peers, and/or parents can see them. This may also provide an opportunity for students to comment on and discuss each other's essays.

  If you do not already have access to an online writing community, Teaching Matters™ provides TeXT, free classroom publishing tools that allow teachers and students to create and publish their own online eZine. More information and a free signup are available at Teaching Matters: TeXT (http://text.teachingmatters.org).

- **Reflection and Self-Assessment** – After students have turned in their writing assignments, you can choose to have them assess their learning. Bring students together as a whole class or in small groups to discuss the questions below. You may want to return to the chart of their ideas developed before the lesson and record their new learning. You may also have students respond individually to the questions and then convene the class to discuss the chart.
  - o What did you learn?
  - o What was surprising?
  - o What questions do you still have?
  - o What was the easiest for you to understand and do?
  - o What was the most difficult?

Vocabulary Definitions

nutrients

Substances contained in foods that give the body energy and help it grow.

percentage

A ratio that compares an amount to 100. For example, if 30% of a food's calories come from fat, then the ratio of fat calories to total calories in that food is 30 to 100.

proportion

A statement that two ratios are equal. For example, 2/3 = 6/9.

proportional reasoning

A mathematical way of comparing amounts by using ratios.

ratio

A comparison of two related amounts. For example, if a recipe uses 1 cup of flour and 2 cups of oats, the ratio of flour to oats is 1 to 2. The ratio can also be written 1:2 or 1/2.

Final Assignment Rubric
Ratio and Proportional Reasoning: Food Labels

1. In your own words, describe the following:
   - The kind of information you can find on food labels.
   - How you would use that information to choose healthy foods.
   - What calculations you can do to help you make your decisions.
2. The nutritional labels of three items are shown below (refer to chart in the final assignment document). If you wanted to choose a healthy snack, which one would you choose?
   - Use what you have learned in this lesson to discuss why your choice is a healthy one.
   - Then describe what would be your second choice and why.
   - Why is it important to pay attention to the amount of sugar and calories in the foods you eat?

4	3	2	1
Provides a clear and accurate response to the question. Ideas are elaborated, with three or more relevant supporting details from the reading passage, video, and other materials in the lesson.	Provides an adequate response to the question. Topic and ideas are generally well organized, with two relevant supporting details from the reading passage, video, and other materials in the lesson.	Provides a generally accurate response, with one supporting detail from the reading passage, video, and other materials in the lesson.	Provides an inaccurate response to the question or fails to address the question. May include misinterpretations. Understanding of the topic is not apparent.
Uses at least three vocabulary words (or a form of the vocabulary words) from the lesson, and uses them all correctly.	Uses two vocabulary words (or a form of the vocabulary words) from the lesson, and uses them both correctly.	Uses one vocabulary word (or a form of the vocabulary word) from the lesson, and uses it correctly.	Does not use any vocabulary words, or uses vocabulary words incorrectly.

Scoring the Rubric

Here are two suggestions for scoring the final assignment rubric. Select the option that best meets your needs or develop your own grading system.

Option 1: This option provides one score for each submitted assignment.

Assign a score of 4 or below for the written response (first row of the rubric) and a score of 4 or below for the use of vocabulary (second row of the rubric), for a total maximum score of 8. The interpretation of scores is as follows:

Score	Grade	Narrative Interpretation
7-8	A	Excellent
5-6	B	Good
4	C	Adequate (Fair)
3 or below	D	Minimal

Option 2: This option provides two scores for each submitted assignment: one for written content and one for the use of key vocabulary. An advantage of separate scores is that you can weight students' comprehension and composition differently than you do their knowledge of vocabulary. It can also help you identify specific needs for future instruction.

Assign a score of 4 or below for the written response (first row of the rubric) and a score of 4 or below for the use of vocabulary (second row of the rubric) and then score them separately. The interpretation of scores is as follows:

Score	Grade	Narrative Interpretation
4	A	Excellent
3	B	Good
2	C	Adequate (Fair)
1	D	Minimal

The final grade may look like this: A/B (A for content and B for vocabulary use).