If Our Classroom Were the World

Proportions

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Grade Level	7th Grade	**Time Frame**	165–180 minutes
Subject	Mathematics	**Duration**	4 class periods
Course	Middle School Mathematics		

Essential Question

How can we use proportions to understand our world?

Summary

This lesson challenges students to write and solve proportions comparing the characteristics of a larger community with the characteristics of a smaller community. Students begin the lesson by listening to a story about what the world would look like and sound like if it were represented by 100 people. Students then explore the definitions of proportions and rations before applying their knowledge to solve various proportions that compare different populations.

Snapshot

Engage

Students demonstrate their prior knowledge of world populations in a Sticky Bars activity then listen to or read the book *If the World Were a Village*.

Explore

Students work in small groups and use proportions to determine what the classroom would look like if it were representative of the whole world.

Explain

Students share their approaches to solving proportions, then use their favorite approach to solve a problems.

Extend

Students solve proportions for a classroom representative of a given country and create a booklet to display their data.

Evaluate

Students take on the role of fact-checkers and verify the accuracy of their peers' work.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

AF401: Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and estimating by using a given average value in place of actual values
A501: Recognize that when numerical quantities are reported in real-world contexts, the numbers are often rounded

Oklahoma Academic Standards Mathematics (7th Grade)

7.N.1.2: Recognize and generate equivalent representations of rational numbers, including equivalent fractions.
7.A.2.3: Use proportional reasoning to solve problems involving ratios.
7.A.2.4: Use proportional reasoning to assess the reasonableness of solutions.

Attachments

- Globally Minded—If Our Classroom Were the World.docx
- Globally Minded—If Our Classroom Were the World.pdf
- Lesson Slides—If Our Classroom Were the World.pptx
- Our Global Village (Teacher Guide)—If Our Classroom Were the World.docx
- Our Global Village (Teacher Guide)—If Our Classroom Were the World.pdf
- Our Global Village—If Our Classroom Were the World.docx
- Our Global Village—If Our Classroom Were the World.pdf

Materials

- Lesson Slides (attached)
- Our Global Village handout (attached; one per student; print two-sided)
- Our Global Village (Teacher Guide) document (attached)
- Globally Minded handout (attached; one or two per class; print one-sided)
- *If the World Were a Village* (book by David J. Smith; one per teacher)
- Sticky notes (three per student)
- Posters or large chart papers (optional; three per class)
- Pencils
- Paper
- Student devices with internet access or the following materials:
    - Copy paper (optional; two sheets per student)
    - Coloring utensils (optional)

30 minutes

Engage

Teacher's Note: Lesson Prep

During the Extend phase of the lesson, students must create their own books about a given country. The attached **Globally Minded** handout contains data about 18 different countries. The handout contains 9 pages for student use, while page 10 contains citations for the data. To save paper, consider printing pages 1–9 for student use.

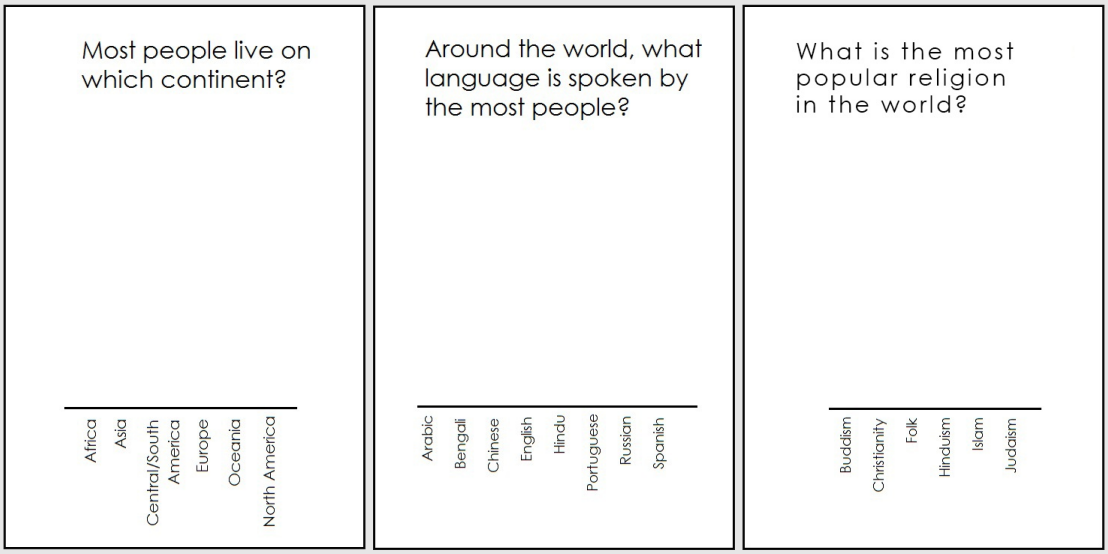
Print enough pages of the Globally Minded handout and cut the pages in half so that each student receives one half-page containing the data of one country.

Prior to the lesson, consider creating a sample book similar to the ones students must create in the Extend activity. A sample book may help you answer student questions and demonstrate expectations for the assignment. You may easily create a sample book about Japan using the information provided on **slides 21–29** and the directions available in the Extend portion. You may may create a book about any country of your choosing, but ensure that your chosen country is not one included in the Globally Minded handout.

Teacher's Note: Activity Prep

Prior to the lesson, divide a whiteboard or chalkboard into three sections or hang three large posters. Label the top of each section or paper with one of the three questions listed below. At the bottom, draw a horizontal line with the corresponding options for each question written below the line, as shown below.

- **Question 1:** Most people live on which continent?
  - **Options:** Africa, Asia, Central/South America, Europe, Oceania, North America
- **Question 2:** Around the world, which language is spoken by the most people?
  - **Options:** Arabic, Bengali, Chinese, English, Hindu, Portuguese, Russian, Spanish
- **Question 3:** Which is the most popular religion in the world?
  - **Options:** Buddhism, Christianity, Folk, Hinduism, Islam, Judaism



Introduce the lesson using the attached **Lesson Slides**. Show **slide 3** and display the essential question, "How can we use proportions to understand our world?" Show **slide 4** and share the learning objectives. Review these with your class to the extent you feel necessary.

Display **slide 5** and hand three sticky notes to each student. Preview the Sticky Bars strategy and guide students' attention to the space you prepared for the activity. Preview the activity by explaining to students that they are going to write their response to the question on the sticky note along with a sentence that explains how they know the answer to each question on the sticky notes. Point out to students that the available options are listed along the bottom of the bar graph. Ask students the first question on the slide, "Most people live on which continent?"

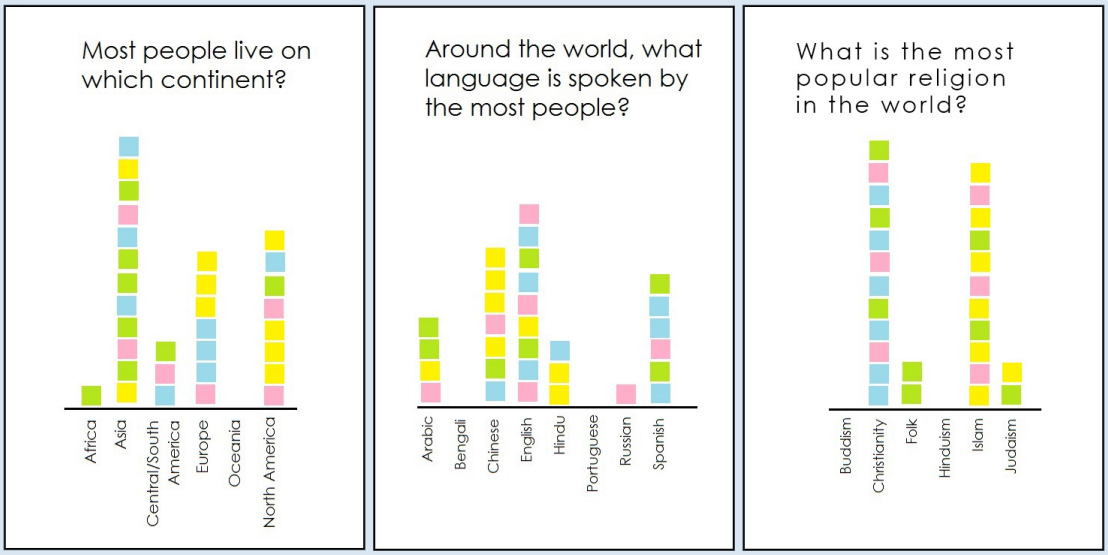
Repeat this process for **slides 6–7**, asking students to respond to the following questions:

- Around the world, which language is spoken by the most people?
- What is the most popular religion in the world?

Once students have completed their sticky notes, remind students where to place their sticky notes above each answer choice to create a bar graph.

Sample Completed Sticky Bar Activity

When complete, your bar graph may look something like this:



Teacher's Note: Purpose

The purpose of this activity is to have students consider statistics they already know about the world's population. The Sticky Bar activity also reinforces students' prior knowledge about bar graphs and and displays their prior knowledge in the form of a mathematical representation.

After each bar graph is complete, show **slide 8**. Give each student one copy of the attached **Our Global World** handout. Tell students that you'll read aloud the book ***If the World Were a Village***. Have them listen as you read and record as much mathematical information from the book as they can on their handouts. Let them know that it is okay if they can not record every numerical value, but that you would like them to do their best.

Read aloud the book *If the World Were a Village* by David J. Smith.

After reading the book, display **slide 9** and redirect students' attention to the results on the Sticky Bar graphs. Ask students what information they recorded from the book about the three questions on the slide. As students answer, record the information in a visible location. Refer to the attached **Our Global Village (Teacher Guide)** document for a list of the numerical information presented in the book.

Discuss with the class whether their answers from the Sticky Bars activity were correct and ask what things may influence our perceptions of the world.

Possible Student Responses

Students may comment that they had incorrect perceptions about the world's population because the population of their local community, school, town, or state looks very different from the world population. They may also mention that they are only familiar with the population of North America because the news they read, watch, or listen to focuses on primarily North America.

Display **slide 10**. Explain to students that understanding mathematical concepts, like fractions, percentages (with which they should be familiar), and proportions (which they are about to explore) can help them make sense of the people and events in different parts of the world even if they do not have personal experience with those people and events.

45 minutes

Explore

Show **slide 11** and introduce the question, “What would our class look like and sound like if it represented the whole world?” Use the Think-Pair-Share instructional strategy to have students consider the prompt, share their ideas with a partner, then prepare to share their answers with the class.

Teacher's Note: Guiding the Activity

Many students will likely think about how many students in the classroom would speak certain language, how many would be from different continents, or how many would practice certain religions. As students respond, ask guiding questions to push students towards mathematically precise answers. For example, if a student says, “Many of us would be from Asia,” respond by asking, “How many? Would more than half us be from Asia?”

Press students to also explain how they know that answer. For example, if students respond that more than half of the classroom would be from Asia, ask them to share their reasoning. Students may respond by saying that 59% of people are from Asia based on the book, and 59% is more than half, or something similar.

This activity is meant to encourage students to precisely compare the numbers in the book to the numbers of students in your class. This comparison leads them to consider the idea of proportions.

If a student asks what the word “represented” means or if you notice the discussion coming to an end, display **slide 12**. If a student does not ask what “represented” means, pose the question to the class. Ask students what it means to “represent” the world. Students may answer that to represent the world you need the “right” or “same” number of people from each continent, language, etc. If they respond this way, ask them to define what they mean by “right” or “same.” Use these responses to begin to explore the definition of a proportion.

Show **slide 13**. Assist students in establishing the idea that the ratio (or fraction) of people with a given characteristic needs to be equal for the world and the class. Once students understand that fractions (or ratios) need to be equal, define “proportion” as an equation that sets two fractions (or ratios) as equal to each other.

Teacher's Note: Pacing

This may be an appropriate point at which to end the first day of the lesson. If you choose to end here, begin the next day by asking students to define a proportion in their own words.

Show **slide 14** and ask students how a proportion could be used to decide what the class might look like or sound like if it represented the whole world. Guide students in a discussion about what this proportion may look like until they are able to write a proportion that includes an unknown value represented by a blank, a variable, or a question mark.

Possible Class Discussion

Review the example below to see what the discussion might look like if students were attempting to determine how many students in a class of 28 would be from Asia. The discussion uses the statistic from the book that 59 out of 100 people are from Asia. You may choose to start with this information or any other data points you find interesting. Use your class size for the discussion rather than the example of 28 students.

- **Teacher:** *So we know we want to set two ratios equal to each other for our proportion. What ratios do we want to use?*
- **Student 1:** *Well, we want to use 59 for the people from Asia.*
- **Teacher:** *Okay, is 59 a ratio?*
- **Student 2:** *No, but the village was 100 people, so we can use the ratio 59 out of 100.*
- **Teacher (turning to student 1):** *Do you agree with that?*
- **Student 1:** *Yes.*
- **Teacher (writing on the board):** *Okay, so the first ratio is 59 out of 100. What could we use for a second ratio?*
- **Student 3:** *28. There are 28 people in this class.*
- **Student 2:** *But that's not a ratio either.*
- **Student 3:** *Well, it could be the top of the ratio, like 59 was out of 100.*
- **Student 1:** *That doesn't make sense. It would be 28 out of what?*
- **Student 3:** *Well, it's out of 28. 28 is the total.*
- **Student 1:** *Then it should be the bottom, not the top.*
- **Student 2:** *Yeah, that makes more sense.*
- **Teacher (turning to student 3):** *Does that make sense to you?*
- **Student 3 (long pause to think):** *Yeah, the bottom is the whole, the top is the part. 28 is the whole class, so it's on the bottom.*
- **Teacher (writing 28 in the appropriate place):** *Okay, so then what goes on top?*
- **Student 1:** *We don't know, that is what we want to figure out.*
- **Student 2:** *Oh! Then let's write an x since we don't know.*
- **Teacher:** *So what does that variable represent?*
- **Student 2:** *It's the part.*
- **Teacher:** *The part of what?*
- **Student 2:** *The part of the class.*
- **Teacher:** *What part of the class?*
- **Student 2:** *Ummm... the part of the class from Asia?*

Once you have written the first proportion with students, show **slide 15**. Have students form small groups of 2–4 students then work together to create strategies for finding the number of students who would represent the population of Asia if the class were representative of the whole world.

Teacher's Note: Student Problem-Solving

Do not provide a process for how to solve a proportion at this point in the lesson. Allow students to create their own methods. By allowing students to explore their own processes, they will see several different methods used to solve proportional problems in the Explain section of this lesson. Some students may use additive reasoning while others begin to explore multiplicative reasoning.

20 minutes

Explain

Display **slide 16**. Once most groups have found the value of *x*, or when groups grow too frustrated to be productive, lead a whole class discussion about the various approaches that different groups took.

Possible Student Strategies

- "I made 59 out of 100 into a decimal and got 0.59. This is more than half, so I knew I needed more than half of 28, which is 14. Therefore, I started with 15 out of 28. When I made that a decimal, I got about 0.54. That wasn't big enough, so I tried 16. Sixteen out of 28 is about 0.57, which is closer. However, 17 out of 28 is about 0.61, which was close too. I think 16 was the closest number without being too much."
- "I thought about equivalent fractions. I know that to get equivalent fractions, I can just multiply the numerator and denominator by the same thing. Therefore, I started to think about what to multiply 28 by in order to get 100. Since 100 divided by 28 is about 3.57, I can multiply 28 by 3.57 to get 100. That means I would also have to multiply whatever is on top by 3.57 to get 59.
  Now I have $3.57x = 59$, and I know how to solve for *x*. Since 59 divided by 3.57 is just over 16, I said 17 students would be from Asia, since you can't have part of a student."
- "I made a row of 28 boxes, and then started to think about how many rows I would need to make 100. I started by making three rows of boxes, but that only made 84. I made another row of half-boxes, and that added 28 half boxes (14 full boxes), so that there were now 98 in total. That was pretty close to 100. Then, I started shading boxes, going down the columns, until I shaded just over 59 boxes. That took 17 full columns, and since each column is 3.5 people, 17 columns was equal to 59.5 people."

In these examples, students are not finding "exact" values, which is okay. In this activity, students should focus on building a conceptual understanding of how to solve proportions. Students will work with more precision as they gain a better understanding of the approaches used to solve proportions and as the application of proportions becomes more abstract.

Have students present their work and results to the class. After each group presents, ask the whole class what they liked and what they found challenging about the approach.

If students did not think of an approach involving inverse operations, ask guiding questions to have students consider this method. Use **slide 17** to have students walk you through the process of solving a proportion using inverse operations similar to the example above. Have students consider the problem $x/28 = 59/100$. Ask students how they could use their knowledge of isolating variables to solve the problem. If students are unsure, ask them to read aloud the side with the variable, "*x* over 28" and ask what the operation "over" means. Once students read the side with the variable as "*x* divided by 28," ask them which operation would be the opposite of dividing by 28, then have them apply that operation to solve for *x*. Once students have arrived at an answer to the above problem, lead them in a discussion of whether decimals are appropriate or not in this context, because of what the number represents.

After all groups have presented, ask students to choose one method that they would like to use to solve another proportion. Remind students that there are multiple accurate approaches to solving proportions. Show **slide 18** and have students determine how people in the class would speak Chinese if the classroom were representative of the world.

Optional Proportions

You may choose to have students solve a different proportion relating to the class and the world population data from *If the World Were a Village*. For example, you could choose to have them write and solve a proportion to determine how many class members would be from Africa if the class represented the whole world. You could also task students with solving for how many people in a given country are over the age of 50.

Allow students time to try their chosen approaches, then discuss the final values students found. Discuss the various approaches different students used and guide students to find an approach that works best for them.

Teacher's Note: Guiding the Lesson

The end of the Explain portion of this lesson is a good place to pause the lesson for the day (usually for day two).

As students develop the new skill of solving proportions, be aware of the habits that students are forming. When you discuss an approach, ask guiding questions to determine if this approach will work to solve any proportion, rather than only the simple proportions students are currently working with.

The skills students learn in middle school are necessary for success in high school math courses, and the habits they develop will follow them through other courses. Guide students in understanding the value of an approach that always works instead of an approach that sometimes works. This method of thinking also applies to notation. It is best practice to use consistent and accurate notation to prevent students from developing bad habits. A common example of this is when students follow a procedure to solve for x in the numerator but do not write "$=x$." This habit can lead students to misunderstanding the difference between solving an equation and simplifying an expression. Help students understand that equations have equal signs in each step.

60 minutes

Extend

Teacher's Note: Activity Preparation

In this portion of the lesson, students apply their knowledge of solving proportions and create their own book. To save time, this activity has students create a digital book, or ebook, to avoid spending time on detailed illustrations.

Prior to the activity, decide whether you prefer students to create their book digitally in Canva or on paper with coloring utensils. Consider the needs of your students and the amount of class time available to make a decision, but both options are effective.

If you choose to use Canva, decide how you want students to share their completed ebooks. Communicate this expectation clearly when you issue the assignment.

Show **slide 19** and introduce the activity. Tell students that they will create a children's book modeled on the book read earlier in the lesson, *If the World Were a Village*. Tell students that they must create a book titled *If ___ Were a Classroom* which contains data about their assigned country. Explain that each person is expected to create a book in which they calculate data for a classroom that represents their given country.

Optional Slide

If you choose to have students create their books with paper, unhide and display **slide 20**. Give each student three pieces of copy paper and coloring utensils. Demonstrate to students how to stack two pages, fold them in half horizontally (hamburger fold), and staple along the crease to create the spine.

Transition to **slide 21** and give each student one half-page of the attached **Globally Minded** handout, so that each student has data from one country. Direct students to navigate to bit.ly/CountryBook, click the "Use template for new design" button, and log in to Canva. Students now have their own template necessary to create their ebook.

Display **slide 22** and introduce the expectations for the cover of the books. Have students include their book titles, "If ___ Were a Classroom" by filling in the blank with their given country. Tell them to also include one image that represents that country and include the author's name (their name).

Transition to **slide 23** and explain to students how to use the tools in Canva to create the cover of their books. Consider opening the ebook template yourself and demonstrating how to use the tool, especially if this is the first time students are using Canva. If you created a sample book, this would be an ideal time share it with students.

Once students have accessed the ebook template, direct their attention to the left side of their screens and point out the "Elements" and "Text" tabs. Explain to students that they can use these tabs to add backgrounds, shapes, graphics, text boxes, and more. Tell them that they are able to use the search bar to find their preferred images, text, and other components.

Encourage students to create a visually appealing cover. Use the *If the World Were a Village* book to model what a visually appealing cover might look like. To save time, consider limiting students to 10 minutes to create their covers.

After students complete their covers, transition through **slides 24–29** to show students the expectations for the interior pages in more detail.

Use slide 24 to explain to students that they should fill in the blank at the top of page 1 with the population of their given country and the top of page 2 with the classroom's population.

Have students fill in the information about the religions practiced in their given country on the first page. Tell them to then calculate and fill in the corresponding information for the classroom on the second inside page. Have students show their work on a separate piece of scratch paper.

Continue through the slides and demonstrate to students that they must complete pages 3–4 using the information about languages spoken in their given countries and complete pages 5–6 using information from the "Other" section of the Globally Minded handout. **Slides 25**, **27**, and **29** offer specific examples. The values on these slides are approximations from the 2024 edition of the CIA's *The World Factbook*.

As you share each slide, point out to students that the same type of information is listed first on both pages. For example, slide 25 has the number of people that practice Buddhism listed at the top of both pages. Help students understand that they are placing equivalent information in two columns, one column on each page. Stress to students that they should organize the information like this on each inside page of their books.

Optional Differentiation

In each section of the book (religions, languages, and other information), students must solve at least one proportion. This means that each student is solving a minimum of three proportions, but some are solving up to eleven. You can accommodate struggling students by decreasing the number of pages required for their books or by limiting the quantity of listed characteristics, thereby reducing the number of proportions they must solve (for example, have some students only list three religions at most). For advanced students, you may consider increasing the number of pages required for their books.

As students begin working, transition to **slide 30** to display a summary of the project requirements. Based on the needs of your students, check in with the whole class to gauge progress and answer questions.

Activity Options

You may consider dividing this activity among multiple class periods. A possible structure for the Extend activity may look like the following:

On the first day of this activity, give each student the Globally Minded handout and use slides 18–29 to introduce the activity. This single class period generally gives students enough time to create and solve the proportions on scratch paper, creating the necessary data for their books.

Have students record their calculated values in and illustrate their books either at home or during a dedicated class period.

20 minutes

Evaluate

Once students complete the inside pages of their books, display **slide 31** and direct students' attention to the back cover of their books. Introduce the I Used to Think... But Now I Know strategy to have students reflect on their knowledge of proportions. Have them respond to the prompts on the back cover of their books.

Display **slide 32** and share with students what a fact-checker is and what someone in that profession does. Transition to **slide 33** and create a scenario in which students assume the role of an author. Tell students that they must have the information in their books verified by a fact-checker prior to publication. Explain that each student will take on the role of a fact-checker in addition to having their own books reviewed.

Have students trade books with a partner. You may have students trade physical books (if you chose to have them create books on paper) or you may have them share their ebooks by trading devices or sharing links. Show **slide 34** and have students fact-check the statements on the second page by checking the proportion calculations. You may choose how many statements each student should fact-check based on your students' needs or the amount of class time available.

Notify students that if they find any mistakes as a fact-checker they should tell the author of the book. As time allows, consider having the fact-checkers review pages 4 and 6.

Optional Interactive Display

You may choose to attach a world map to a bulletin board and have students pin their completed books to the map to create an interactive display. This method allows you to display students' work and gives other students the opportunity to read the work of their peers, if they wish.

Resources

- Central Intelligence Agency. (n.d.). Explore all countries — Japan. *The World Factbook.* https://www.cia.gov/the-world-factbook/countries/japan/
- K20 Center. (n.d.). Canva. Tech Tools. https://learn.k20center.ou.edu/tech-tool/612
- K20 Center. (n.d.). I used to think... but now I know. Strategies. https://learn.k20center.ou.edu/strategy/137
- K20 Center. (n.d.). Sticky bars. Strategies. https://learn.k20center.ou.edu/strategy/129
- K20 Center. (n.d.). Think-Pair-Share. Strategies. https://learn.k20center.ou.edu/strategy/139
- Smith, D. (2019). *If the world were a village: A book about the world's people* (2nd ed.). Kids Can Press.