Lesson 4

# If Our Class Were the World

## Goals

- Generate (orally and in writing) mathematical questions about the world's population, e.g., "How many people ...?"
- Interpret and approximate characteristics of the world's population using percentages and equivalent ratios.
- Present (using words and other representations) a comparison that uses the number of students in the class to represent the proportion of the world's population with a particular characteristic.

## Lesson Narrative

This lesson is optional. In this lesson, students explore what their class would be like if its ratios were equivalent to that of the world population. In the process, students reason abstractly and quantitatively with percentages that are not whole numbers, using knowledge gained in a previous unit. Moreover, the ratios will be "close" to being equivalent because the exact world population is not known, and all populations need to be whole numbers, which requires students to attend to precision. The activities in this lesson could take more than one day, depending on how much time is available and how far the class takes it. Earlier activities are needed for later ones in this lesson.

## Student Learning Goal

Let's use math to better understand our world.

## Lesson Timeline

| 10 min | 10 min | 30 min |
|---|---|---|
| Warm-up | Activity 1 | Activity 2 |

### Access for Students with Diverse Abilities

- Action and Expression (Activity 2)

### Access for Multilingual Learners

- MLR8 : Discussion Supports (Warm-up)

### Required Materials

**Materials to Gather**

- Four-function calculators: Warm-up, Activity 2
- Internet-enabled device: Activity 2
- Tools for creating a visual display: Activity 2

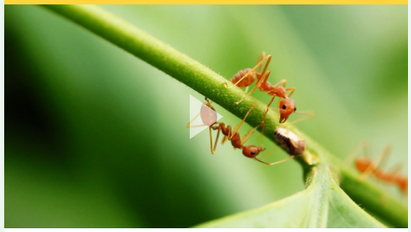
### Required Preparation

**Activity 2:**
Internet-enabled devices are necessary only if students will conduct research to find quantities that they need to know. As an alternative, you can supply the information when they ask for it.

Tools for creating a visual display are needed only if you would like students to present their work in an organized way and have the option of conducting a *Gallery Walk*.

**Inspire Math**

**Ants video**

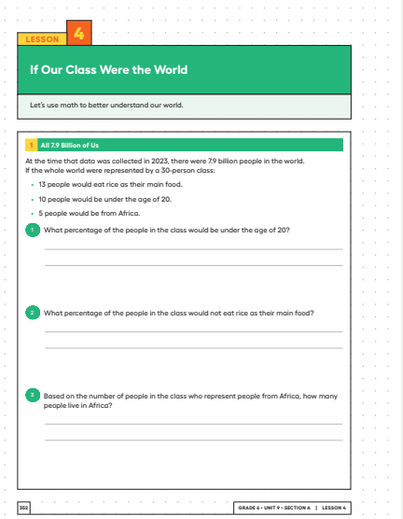


**Go Online**
Before the lesson, show this video to reinforce the real-world connection.

**ilclass.com/l/614222**

Please log in to the site before using the QR code or URL.

**Student Workbook**



LESSON 4

If Our Class Were the World

Let's use math to better understand our world.

1 All 7.9 Billion of Us

At the time that data was collected in 2023, there were 7.9 billion people in the world. If the whole world were represented by a 30-person class:

- 13 people would eat rice as their main food.
- 10 people would be under the age of 20.
- 5 people would be from Africa.

1. What percentage of the people in the class would be under the age of 20?
2. What percentage of the people in the class would not eat rice as their main food?
3. Based on the number of people in the class who represent people from Africa, how many people live in Africa?



## Warm-up

## All 7.9 Billion of Us

10 min

### Activity Narrative

In this activity, students apply their understanding of percentages to answer questions about the world population. It also gives them a framework for thinking about the next activity. Students have to decide how to treat a situation in which ratios are approximately equivalent. Students attend to precision as they work with large numbers and decide how to round numbers appropriately to represent whole numbers of people.

### Launch

Give students 5 minutes of quiet think time followed by a whole-class discussion. Provide access to four-function calculators.

### Student Task Statement

At the time that data was collected in 2023, there were 7.9 billion people in the world. If the whole world were represented by a 30-person class:

- 13 people would eat rice as their main food.
- 10 people would be under the age of 20.
- 5 people would be from Africa.

1. What percentage of the people in the class would be under the age of 20?

   About 33% since 10 ÷ 30, which is approximately 0.33

2. What percentage of the people in the class would *not* eat rice as their main food?

   About 57%
   There are 30 students, and 13 eat rice as their main food, so the other 17 do not eat rice as their main food. 17/30 = 0.567, which is about 57%.

3. Based on the number of people in the class who represent people from Africa, how many people live in Africa?

   About 1.3 billion
   About 16.7% of the world's population live in Africa since 5 ÷ 30 = 0.167, and 16.7% of 7.9 billion is about 1.3 billion.

### Activity Synthesis

The purpose of this discussion is to make sure students recognize that only whole numbers are appropriate when dealing with numbers of people, which necessitates rounding and less precision in answers. Here are some questions for discussion:

- *"Would it be reasonable to say 3.2 of the 30 people in the class live in the southern hemisphere?"*

  No, people must be represented with whole numbers so this would be rounded to 3 people.

  *"Does knowing that about 33% of people in the world are under the age of 20 tell us exactly how many people are in that age range?"*

  No, the world population and the number of people under the age of 20 are approximations, so 33% of those numbers will also be approximations rather than exact answers.

### Activity 1

### About the People in the World

10 min

### Activity Narrative

In this activity, students brainstorm additional quantitative questions that could be asked about the world population. These questions will be used in a subsequent activity, where students will research and represent the ratios they gather in terms of the people in their class, as shown in "All 7.9 Billion of Us." Compile all of the questions into one document, removing inappropriate questions.

Note that some questions in which students are interested may be challenging to research (for example, "how many people in the world have a car?"). If there is no chance to gather data beforehand, encourage students to make some simplifying assumptions about the data that they do find.

### Launch

Arrange students in groups of 2–4. Tell students that they are going to investigate some characteristics about the world population. Ask students,

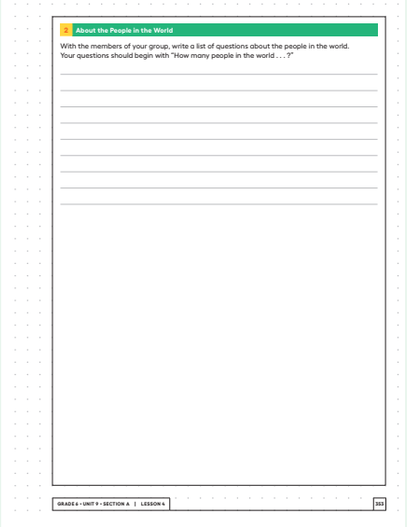
- *"What are some other things about the people of the world that you would like to know?"*

**Access for Multilingual Learners (Warm-up, Synthesis)**

**MLR8: Discussion Supports.** Revoice student ideas to demonstrate and amplify mathematical language use. For example, revoice the student statement "17 people don't eat rice because the others do" as "17 people don't eat rice as their main food because 13 of the 30 people do, and 30 – 13 = 17."

*Advances: Speaking*

**Student Workbook**


About the People in the World

With the members of your group, write a list of questions about the people in the world. Your questions should begin with "How many people in the world . . . ?"

### Student Task Statement

With the members of your group, write a list of questions about the people in the world. Your questions should begin with "How many people in the world ...?"

Sample responses:

- How many people in the world live on each continent?
- How many people in the world are adults?
- How many people in the world own a car?
- How many people in the world can read?
- How many people in the world speak more than one language?
- How many people in the world have a mobile phone?
- How many people in the world play, or have played, soccer?

## Activity Synthesis

The goal of this discussion is to help students narrow down the questions to investigate and then to consider next steps, preparing them for the work in an upcoming activity.

Give each group a minute to identify 3–4 questions that they are most interested in investigating. Invite students to share the questions they identified.

Here are some questions for discussion:

- *"Now that you have questions to investigate, how can you learn more about each topic?"*

  We can use the internet to research the answers.

- *"Are you expecting to find exact answers?"*

  No, any answer will be an estimate.

- *"What is a reasonable prediction for one of your questions?"*

Consider compiling all of the questions into one document, removing inappropriate questions.

## Activity 2
## If Our Class Were the World

30 min

### Activity Narrative

In this activity, students investigate answers to questions about the number of people in the world with certain characteristics. Then they find equivalent ratios that could describe these quantities if their class represented the world. Students can either use the questions previously selected by their group or choose 3–4 questions from a list compiled by the teacher.

Afterward, each group creates a graphical display to illustrate their findings for some or all of the questions. Encourage the students to be creative with their displays. For example, if students are examining the question "How many people would live on each continent?" they might sketch the continents and place stick figures on the continents to represent the class. They might also draw a bar graph showing the same information in a different way.

As students work to express real-world ratios in terms of the number of students in their class and represent the information diagrammatically, they practice reasoning quantitatively and abstractly. As they translate quantities from a global scale to the scale of a class, they attend to precision.

### Launch

Tell students that they will now answer 3–4 questions that their group has selected. Alternatively, invite them to choose from a previously compiled class list. Keep students in the same groups of 2–4 from the previous activity. Provide access to four-function calculators and tools for making a visual display. If students are doing their own research, provide access to internet-enabled devices.

To give students a sense of the magnitude of the world versus the classroom, consider using a computer program or website to zoom in from Earth to North America, the United States, your state, your city, and finally your school.

### Student Task Statement

Suppose your class represents all the people in the world.

Choose 3–4 of your questions about the world's population to investigate. For each question:

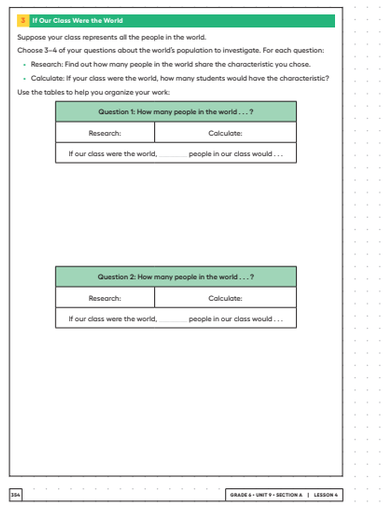
- Research: Find out how many people in the world share the characteristic you chose.
- Calculate: If your class were the world, how many students would have the characteristic?

### Building on Student Thinking

If students have trouble using percentages to compare large and small numbers, consider asking:

*"How many people does 100% of the world represent? What about 100% of our class?"*
*"How many people does 50% of the world represent? What about 50% of our class?"*
*"Suppose 790 million people in the world live on a certain continent. What percentage of the world's population is that?"*
*"If our class were the world, the same percentage would live on that continent. How many people in the class would that be?"*

### Student Workbook



3 If Our Class Were the World

Suppose your class represents all the people in the world.

Choose 3–4 of your questions about the world's population to investigate. For each question:

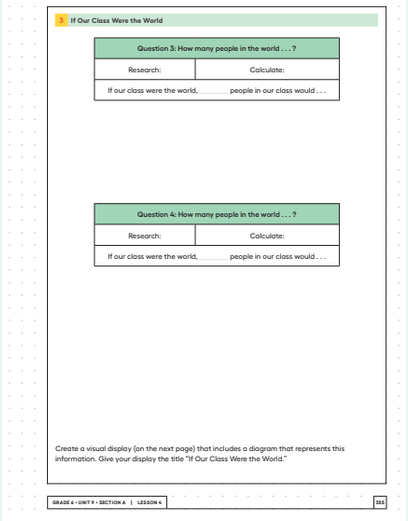
- Research: Find out how many people in the world share the characteristic you chose.
- Calculate: If your class were the world, how many students would have the characteristic?

Use the tables to help you organize your work:

| Question 1: How many people in the world . . . ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would . . . | |

| Question 2: How many people in the world . . . ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would . . . | |

**Student Workbook**


3 If Our Class Were the World

Question 3: How many people in the world . . . ?

Research: | Calculate:

If our class were the world, _____ people in our class would . . .

Question 4: How many people in the world . . . ?

Research: | Calculate:

If our class were the world, _____ people in our class would . . .

Create a visual display (on the next page) that includes a diagram that represents this information. Give your display the title "If Our Class Were the World."

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Use the tables to help you organize your work:

| Question 1: How many people in the world … ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would … | |

| Question 2: How many people in the world … ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would … | |

| Question 3: How many people in the world … ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would … | |

| Question 4: How many people in the world … ? | |
|---|---|
| Research: | Calculate: |
| If our class were the world, _____ people in our class would … | |

Create a visual display that includes a diagram that represents this information. Give your display the title "If Our Class Were the World."

Sample response (based on a class of 25 students):

- 2 billion people do not have access to clean water. That is about 25% of the world population. If our class were the world, that would mean that about 6 of us (24%) would not have access to clean water.
- 250 million people play soccer. That's about 3% of the world population. If our class were the world, that would mean that 1 of us (4%) would play soccer.
- 2.6 billion people practice Christianity. That's about 33% of the world population. If our class were the world, 8 (32%) of us would practice Christianity.
- 4.8 billion people live in Asia. That's about 61% of the world population. If our class were the world, 15 (60%) of us would live in Asia.
- 6.8 billion people can read and write. That's about 86% of the world population. If our class were the world, 22 (88%) of us would be able to read and write.
- 2 billion people are children (under the age of 15). That's about 25% of the world population. If our class were the world, 6 (24%) of us would be children.

## Activity Synthesis

Invite groups to share their displays. Consider asking students to do a *Gallery Walk* and encouraging them to consider these questions as they visit the displays:

- *"Which of the findings surprise you?"*

  I was surprised that so many people are children.

- *"For which characteristics does our class actually represent the world?"*

  5 people in our class are vegetarian (20%) and about 19% of the world is vegetarian.

- *"For which characteristics does our class not really represent the world?"*

  25% of the world population do not have access to clean water but 100% of our class has access to clean water.

Students may point out that having a small class limits the percentages that correspond to whole numbers of people. This can make deciding how many students in the class have a particular characteristic difficult. If this idea comes up, consider asking:

- *"What percentages correspond to whole numbers of students in the class?"*

  For a class of 25 people, multiples of 4 up to 100

- *"There are 1 billion people living in the Americas. That's 13% of the world population. If our class were the world, how many students in our class would be from the Americas?"*

  3 students would be 12%, and 4 would be 16%. So 3 students is as close as we can get.

### Access for Students with Diverse Abilities (Activity 2, Synthesis)

**Action and Expression: Internalize Executive Functions.**
Invite students to verbalize their strategy for choosing which questions to answer and for researching to find their answer before they begin. Students can speak quietly to themselves, or share with a partner.

*Supports accessibility for: Organization, Conceptual Processing, Language*