

Scaled Picture Graphs

Standards

- Building On 2.NBT.B.5
- Addressing 3.MD.B
- Building Toward 3.MD.B.3

Instructional Routines

- Number Talk

Goals

- Comprehend (in spoken language) the meaning of the term “scaled picture graph.”
- Interpret scaled picture graphs and ask questions (orally and in writing) about the data.

Student Facing Learning Goals

- Let’s explore scaled picture graphs.

Lesson Purpose

The purpose of this lesson is for students to read and answer questions about scaled picture graphs.

Narrative

In previous lessons, students reviewed how to create and interpret single-unit scale picture graphs. In this lesson, students learn that a **scaled picture graph** is a picture graph where each picture represents an amount other than 1. Students read, interpret, and answer questions about scaled picture graphs with a scale of 2 and 5. They also generate questions that can be answered by these graphs.

Math Community

Tell students that, at the end of the lesson, they will be asked to identify specific actions from their “Doing Math” list that they personally experienced.

Access for Students with Disabilities

- Representation

Access for English Learners

- MLR8

Required Materials

Materials to Gather

- Math community poster: Lesson

Lesson Timeline

Warm-up	10 min
Activity 1	15 min

Teacher Reflection Questions

In this lesson, students make sense of scaling a picture graph by a number other than 1. How does this support the work that students will do with multiplication later in this unit?



Activity 2	20 min
Synthesis Estimate	10 min
Cool-down	5 min

 10 min

Warm-up

Number Talk: Addition

Standards

Building On 2.NBT.B.5

Instructional Routines

- Number Talk

The purpose of this *Number Talk* is to elicit strategies and understandings students have for adding within 100. These understandings help students develop fluency and will be helpful later in this lesson when students need to add to find the total number of students represented in a picture graph. When students use strategies based on place value to add, they look for and make use of structure (MP7).

This is the first time students experience the *Number Talk* routine in IM Grade 3. Students should be familiar with this routine from a previous grade. However, they may benefit from a brief review of the steps involved.

Student Task Statement

Find the value of each expression mentally.

- $50 + 10$
- $50 + 12$
- $60 + 13$
- $65 + 13$

Launch

- Display the first expression.
- “Give me a signal when you have an answer and can explain how you got it.”
- 1 minute: quiet think time

Activity

- Record answers and strategies.
- Keep expressions and work displayed.
- Repeat with each expression.

Activity Synthesis

- “How was place value helpful as you added these numbers?” (I was able to use tens and ones to help me find the sum.)
- Consider asking:
 - “Who can restate ____’s reasoning in a different way?”
 - “Did anyone use the same strategy but would explain it differently?”
 - “Did anyone approach the problem in a different way?”

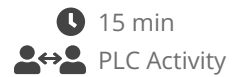
Student Response

- 60: 5 tens and 1 ten make 6 tens, which is 60.
- 62: It’s just like the first one, but there are 2 ones, so it is 62.
- 73: It’s like the second problem, but there’s 1 more ten and 1 more one. So each digit goes up by 1 and that’s 73.
- 78: There are 7 tens and 8 ones, so it’s 78.



Activity 1

So Many Responses



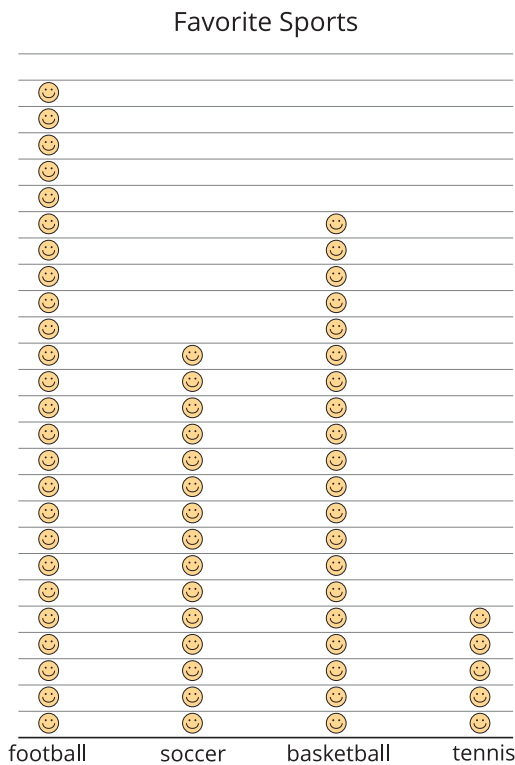
Standards

Addressing **3.MD.B**
 Building Toward **3.MD.B.3**

The purpose of this activity is for students to read a scaled picture graph. A scale of 5 is used to encourage skip-counting because students skip-counted by 5 in grade 2. The questions in the task focus on the structure of a scaled picture graph and the strategies students can use to read them.

Student Task Statement

1. A group of students were asked, “Which of these 4 sports is your favorite?” Their responses are shown in this picture graph:



Each 😊 represents 1 student.

How many students are represented in the graph? _____

Launch

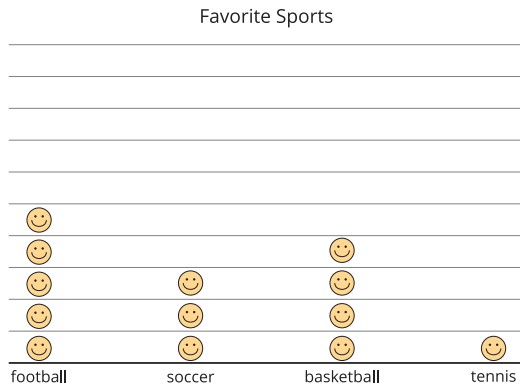
- Groups of 2
- “What is your favorite sport or activity outside of school?”
- Share responses.
- Display the first image of the single-unit scale picture graph.
- “What do you notice? What do you wonder?” (The graph is about students’ favorite sports. There are a lot of smiley faces. Each smiley face represents 1 student. It takes a lot of time to count the students in each category. How many student responses are shown in the whole graph? How could we make the graph take up less space?)
- 1 minute: quiet think time
- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Share and record responses.

Activity

- “Work with your partner to find how many students are represented in the graph.”
- 3–5 minutes: partner work time
- Monitor for students who group the smiley faces by 2, 5, or 10 to make them easier to count.
- Have students who grouped the smiley faces share their strategies for how they found the total number



2. The students' responses are also shown in this picture graph:



Each 😊 represents 5 students.

How is counting the total number of students in this graph different from counting the total number of students in the first graph?

of students represented in the graph.

- If no students use this strategy ask, “How could grouping the pictures in the graph make them easier to count?” (We could circle tens so we could count by ten. It would be easier to keep track of your count than by counting by 1.)
- Display the second image of the scaled picture graph.
- “How could we count the total number of students in this graph?”
- 2 minutes: partner work time

Activity Synthesis

- “In a graph where there’s a lot of data, we can adjust the scale so each picture represents more than 1 object. When each picture represents something other than 1, we say that it’s a **scaled picture graph**. The key tells us that in this graph, each smiley face represents 5 students.”

Student Response

1. 65 students
2. Sample response: We count by 5 to find the total instead of counting by 1. We are able to count to find the total a lot faster.

Advancing Student Thinking

If students count the students in the scaled picture graph and get a total other than 65, consider asking:

- “How did you find the total number of students represented in the graph?”
- “How could you use counting by 5 to find the total number of students represented in the graph?”

Activity 2

🕒 20 min

Questions about Scaled Picture Graphs

Standards

Addressing **3.MD.B**
Building Toward **3.MD.B.3**

The purpose of this activity is for students to interpret a scaled picture graph and write questions that can be asked based on the data represented in a scaled picture graph.





Access for English Language Learners

MLR8 Discussion Supports. Use multimodal examples to show the meaning of a symbol. Use verbal descriptions along with gestures, drawings, or concrete objects to show how each flower on the graph is a symbol that represents 5 flowers that were seen on the way home.

Advances: Listening, Representing



Access for Students with Disabilities

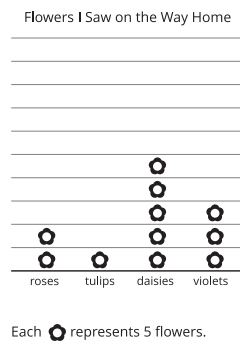
Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were needed to solve the problem. Display the sentence frame, “The next time I read a scaled picture graph I will pay attention to . . .”

Supports accessibility for: Conceptual Processing



Student Task Statement

1. Andre collects data about 4 types of flowers he sees on the way home. The data is shown in this picture graph:



- a. How many of each type of flower did Andre see on the way home?

roses	tulips	daisies	violets
_____	_____	_____	_____
 - b. Write 2 questions that can be answered by reading the graph.
2. A group of students were asked, “Which is your favorite type of book?” Their responses are shown in this picture graph:

Launch

- Groups of 2
- Display the graphs for all to see.
- “What are some strategies you could use to read the graphs?” (In the Flowers I Saw on the Way Home graph I could count by 5 to find the number for each category because each picture represents 5 flowers.)
- 1 minute: quiet think time
- Share and record responses.

Activity

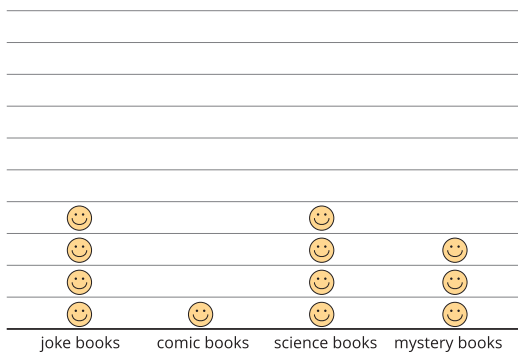
- “Now, we’re going to answer some questions about the scaled picture graphs. You will also have a chance to write your own question that can be asked based on each graph.”
- 8–10 minutes: partner work time
- If there is time, have groups trade books and answer each other’s questions.

Activity Synthesis

- Invite students to share responses to the questions they answered and explain their reasoning.
- Consider asking:
 - “How did you use the key to answer the questions?” (I counted by the number that each picture represents—by 5 for the flowers and by 2 for the students.)
- Share a variety of student written questions.
- Consider asking:



Favorite Type of Books



Each 😊 represents 2 students.

- How many students chose each type of book? How do you know?
- Write 2 questions that can be answered by reading the graph.

- “How did you know your question could be answered with the graph?” (The data needed to answer the question is shown in the graph.)
- If time allows, ask, “What questions cannot be answered by this graph?” (How many students' favorite type of book is graphic novels?)

Student Response

- 10 roses, 5 tulips, 25 daisies, 15 violets
 - Sample responses: How many more roses did Andre see than tulips? How many fewer violets did Andre see than daisies?
- 8 chose joke books, 2 chose comic books, 8 chose science books, and 6 chose mystery books. Sample response: Each smiley face represents 2 students, so to find the number in each category I counted by 2.
 - Sample responses: How many more students chose science books than mystery books? How many students chose joke books or comic books?

Advancing Student Thinking

If students answer questions about the graph with numbers that don't match the graph, consider asking:

- “How did you answer the questions about the graph?”
- “What does the key tell us about each picture in the graph?”

Lesson Synthesis

Display the images of the two “Favorite Sports” graphs.

“Today we learned about scaled picture graphs. Why would we make a scaled picture graph?” (When there is a lot of



data to represent, it is faster to use a scale greater than 1.)

“How is reading scaled picture graphs different from reading picture graphs that have a scale of 1?” (In a scaled picture graph, each picture doesn’t represent 1 thing, so you need to use the key. In a scaled picture graph, you can count by a number greater than 1 to find the total in each category.)

Math Community

After the *Cool-down*, ask students to individually reflect on the questions “Which ‘Doing Math’ action did you feel was most important in your work today? Why?” Students can write their responses on the bottom of their *Cool-down* paper, on a separate sheet of paper, or in a math journal.

Collect and read their responses after class. These responses will offer insight into how students feel about their own mathematical work and how you make personal connections to the norms students will create during Days 4–6.

Suggested Centers

- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Supporting)
- Capture Squares (1–5), Stage 3: Add within 20 (Supporting)

Cool-down

 5 min

Birds in the Park



Standards

Addressing 3.MD.B





Student Task Statement

Jada collects data about 4 types of birds she sees on her way home.

The data is shown in this picture graph:

Birds I Saw on the Way Home



Each ✓ represents 2 birds.

Based on the data in the graph:

1. How many sparrows did Jada see on the way home?
2. Write one question you could ask about the birds Jada saw on the way home.

Student Response

1. 10 sparrows
2. Sample responses: How many birds did Jada see on the way home? How many blue jays and cardinals did Jada see on the way home?

Responding to Student Thinking

Students say 5 sparrows are represented in the graph.

Next Day Supports

Use the next day's *Warm-up* to practice counting by 5, and discuss how such counting could be used to read a scaled picture graph.

The work of this lesson builds from the categorical data concepts developed in a prior unit.

Prior-Unit Support

Grade 2, Unit 1, Section B Ways to Represent Data

