

Goal

Use the range to estimate the size of intervals to construct a bar graph.

Prerequisite Skills/Concepts

- Create and interpret a bar graph with intervals.
- Calculate the range.
- Make a tally chart.

Expectations

- 5m109** interpret displays of data and present the information using mathematical terms
5m110 evaluate and use data from graphic organizers
5m114 display data on graphs by hand and by using computer applications
5m116 explain the choice of intervals used to construct a bar graph or the choice of symbols on a pictograph
5m119 construct labelled graphs both by hand and by using computer applications

Assessment for Feedback		What You Will See Students Doing...
Students will	When Students Understand	If Students Misunderstand
<ul style="list-style-type: none"> • construct a bar graph with intervals 	<ul style="list-style-type: none"> • Students will identify the range of numbers, construct appropriate intervals, and label graphs completely and accurately. 	<ul style="list-style-type: none"> • Students may not choose appropriate intervals. Suggest they round the range to a number that is easily divisible. Students may not include all necessary labels on the graph. Have them make and follow a checklist for graph-making.

Preparation and Planning

Pacing	5–10 min Introduction 15–20 min Teaching and Learning 20–30 min Consolidation
Materials	<ul style="list-style-type: none"> • grid paper (1 sheet/student) • ruler (1/student) • pencil crayons • dice
Masters	<ul style="list-style-type: none"> • 1 cm Grid Paper, Masters Booklet p. 29 • <i>Optional</i>: Chapter 3 Mental Math p. 64
Workbook	p. 23
Vocabulary/Symbols	bar graph, interval, range
Key Assessment of Learning Question	Question 5, Application of Procedures, Communication

Meeting Individual Needs**Extra Challenge**

- Challenge students to take their own surveys and create their own bar graphs with intervals. They can show their graphs with different intervals to see how the graph changes in appearance.

Extra Support

- Help students to complete their graph by following a step-by-step checklist:
 - ☐ Find the range of numbers (smallest to largest).
 - ☐ Choose intervals that are easy to work with.
 - ☐ Choose a scale.
 - ☐ Label the axes.
 - ☐ Create the bar graphs.
 - ☐ Add a title.

1. Introduction (Whole Class)

5–10 min

Have students toss a pair of dice 20 times and record the results. Ask them to sort the numbers rolled into four intervals (e.g., 1–3, 4–6, 7–9, and 10–12) and make a bar graph of the results. Discuss the graph.

Sample Discourse

“How did you choose your intervals?”

- *The numbers went from 1 to 12, so it made sense to make four intervals of three numbers.*

“What would happen if you sorted the numbers into two intervals?”

- *Our bar graph would have only two bars, and they would be much taller.*

Tell students that, in this lesson, they will be working with intervals.

CHAPTER 3

4

Bar Graphs with Intervals



Use the range to estimate the size of intervals to construct a bar graph.

Akiko collected the heart rates for the 28 students in her class.

Heart Rates (beats in one minute)

70	60	53	76	84	68	62
80	74	70	84	60	76	68
70	72	78	66	54	72	56
68	72	70	60	78	80	76



You will need

- grid paper
- a ruler
- pencil crayons

What intervals can Akiko use for a heart-rate bar graph?



Akiko's Method

I'll use the **range** and number of **intervals** to estimate the size of each interval on my bar graph.

The range in heartbeats is 53 to 84, or about 30.

I think I'll choose three or four intervals and make three or four bars on my bar graph. Each interval will be 10. The first will be 50 to 59.

A. What other intervals and endpoints can Akiko use for her bar graph?

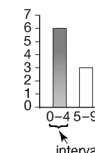
B. Make a tally chart with intervals to organize the heart-rate data.

C. Use your tally chart to make a bar graph.

Interval

The distance between two endpoints on a graph scale. Intervals on a graph should be equal.

This graph shows intervals of 5.



The endpoints of this interval are 0 and 4.

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NEL

2. Teaching and Learning (Whole Class) 15–20 min

Ask students to turn to Student Book page 68. Review with students the Heart Rates data. As a class, read the central question and then work through Akiko's Method. Draw attention to the highlighted definition and explain that intervals are used when determining the scale for a graph. Discuss the bar graph presented below the definition and discuss how it is different from other bar graphs students have used.

Ensure that students can determine range and intervals, and stress that the intervals on a graph should be equal. Draw attention to the beginning and end points that Akiko used.

Discuss prompt A together. Review with students how to create a tally chart and refer them to Akiko's chart for guidance. You may choose to have students work through prompts B and C in small groups and share the results with the class.

Reflecting

Use these questions to ensure that students can determine the range of data and choose appropriate intervals for a bar graph. Remind students that even though not all numbers are directly labelled, all exist somewhere within one of the number intervals. Discuss the questions, encouraging varied examples.

Sample Discourse

- *I find the highest number and the lowest number, and I find the difference between them. That's the range.*
 - *I look for the highest number. That's 84. Then I look for the lowest number. That's 53. Then I subtract 53 from 84 and I get 31. That's the range.*
 - *I look at my range, 31. I would round that up to 35. 35 divided by 5 is 7. I would make a bar graph with 7 bars, and my intervals will be 5.*
- *If you make the interval larger, then you will have a bar graph with fewer bars.*

Reflecting

- How can you determine the range of the data?
 - How can you use the range and number of intervals to determine the size of each interval?
- Describe how a bar graph changes if you increase the size of the intervals.

Checking

- A veterinarian recorded the heart rates of 20 hamsters in a petting zoo.

Hamster Heart Rates
(beats in one minute)

450	410	400	450	460
470	430	435	450	450
440	480	499	455	450
450	450	460	470	400

- What is the range of the data?
- How many intervals or bars would you use for a bar graph of the data? Explain how to use the range to estimate the size of each interval on a bar graph.

Practising

- Make a tally chart and a bar graph of the hamster heart-rate data. Use the intervals you chose in Question 3.
 - Would it make sense to choose an interval size of 5 to graph the data? Why or why not?

- Fawn showed her class a baby blanket that her mother made. She asked the 22 students to look at the blanket and estimate the number of rhombus patches. She recorded the 22 estimates.

Estimates of Number of Rhombus Patches

150	75	300	84	95	150	160	300	100	115	150
250	120	120	180	204	123	125	240	240	145	150

- What is the range of the data?
- Choose a number of bars for a bar graph of the data. Explain how to use the range to determine the size of each interval on your bar graph.
- Make a tally chart and a bar graph of the data.



Key Assessment of Learning Question (See chart on page 28.)

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3. Consolidation 20–30 min

Checking (Pairs)

For intervention strategies, refer to Meeting Individual Needs or the Assessment for Feedback chart.

- Ask students to consider various possible numbers of bars (intervals) before choosing the size of the interval.

Practising (Individual)

- Students are required to make a tally chart and bar graph for both questions. Remind students to work carefully, and to make sure they have included all the data in their tally chart before they begin to graph the data. They can check by totalling the number of tallies and comparing it to the number of data points in the table.

Closing (Whole Class)

Have students summarize their learning by asking, “What should you think about when choosing the number of intervals for a bar graph?”

- You look at the range of your data and think about how many bars you'd like to have. Then you divide the range by that number and that's your interval.

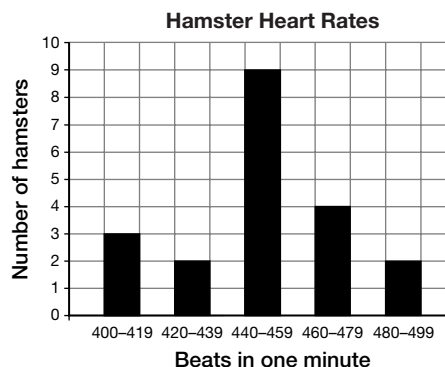
- For example, there would be fewer bars.

- 400 to 499, or 99

- For example, I would use about 5 bars, so $100 \div 5 = 20$. My interval will be 20. You can use the range to estimate by rounding it to a number that is easy to divide by the number of bars.

- For example,

400–419	///
420–439	//
440–459	///
460–479	///
480–499	//



- For example, no. An interval size of 5 would mean there would be 20 bars on one graph. That's a lot of bars to compare.

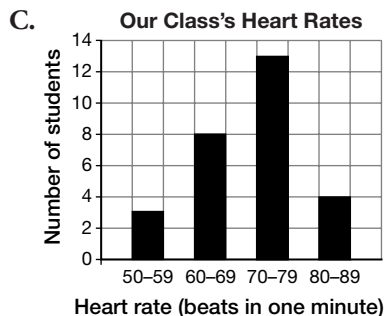
(Lesson 4 Answers continued on p. 80)

Answers

- For example, she could use intervals of 5. Her endpoints would be 50–54, 55–59, 60–64, and so on.

B.

50–59	///
60–69	///
70–79	///
80–89	///



- For example, you find the lowest and highest heart rates and subtract the lowest heart rate (53) from the highest heart rate (84), which is 31.
 - For example, divide the range by the number of intervals and pick a number that's close the quotient as the interval size.

Assessment of Learning—What to Look for in Student Work...

Assessment Strategy: written answer

Application of Procedures, Communication

Key Assessment Question 5

- Fawn showed her class a baby blanket that her mother made. She asked the 22 students to look at the blanket and estimate the number of rhombus patches. She recorded the 22 estimates.
 - What is the range of the data?
 - Choose a number of bars for a bar graph of the data. Explain how to use the range to determine the size of each interval on your bar graph.
 - Make a tally chart and a bar graph of the data.

1	2	3	4
Application of Procedures			
<ul style="list-style-type: none"> makes major errors and/or omissions when determining the range of the data, making a tally chart, and creating a bar graph for the given data 	<ul style="list-style-type: none"> makes several errors and/or omissions when determining the range of the data, making a tally chart, and creating a bar graph for the given data 	<ul style="list-style-type: none"> makes only a few minor errors and/or omissions when determining the range of the data, making a tally chart, and creating a bar graph for the given data 	<ul style="list-style-type: none"> makes almost no errors when determining the range of the data, making a tally chart, and creating a bar graph for the given data
Communication			
<ul style="list-style-type: none"> provides an incomplete or inaccurate explanation for the calculation of the size of each interval uses few conventions (e.g., labels, axes, etc.) correctly 	<ul style="list-style-type: none"> provides a partial explanation for the calculation of the size of each interval uses some conventions correctly 	<ul style="list-style-type: none"> provides a complete, clear, and logical explanation for the calculation of the size of each interval uses most conventions correctly 	<ul style="list-style-type: none"> provides a thorough, clear, and insightful explanation for the calculation of the size of each interval uses almost all conventions correctly

Extra Practice and Extension

- You might assign any of the questions related to this lesson, which are cross-referenced in the chart below.

Mid-Chapter Review	Student Book p. 73, Question 3
Skills Bank	Student Book p. 84, Question 3
Problem Bank	Student Book p. 86, Question 2
Chapter Review	Student Book p. 88, Question 2
Workbook	p. 23, all questions
Nelson Web Site	Visit www.mathK8.nelson.com and follow the links to <i>Nelson Mathematics 5</i> , Chapter 3.

At Home

- Students could look at home for interval bar graphs, using resources such as encyclopedias. Students could share their findings and discuss how a change in the range or interval scale would affect the graph.

1 cm Grid Paper, Masters Booklet p. 29

