

# Chapter 7

## Graphs

### Chapter Overview

Lesson 1: Reading Block Graphs

Lesson 2: Bar Graphs

### Note for Teachers

In this chapter, students learn to read block graphs. Block graphs are used to show a small set of information because each block represents 1 unit. Students also learn to read bar graphs. Bar graphs can be used to show a large set of information because of the scale on the axes. Students will need to use their knowledge of the multiplication tables of 2, 5 and 10 when they interpret bar graphs with scales of 2, 5, 10 or greater. They will utilize the reading and interpreting skills acquired in the earlier graph chapters to help them solve problems on information presented in a bar graph. Students need to be familiar with bar graphs in order to transfer information from a bar graph to a table and complete a bar graph using information given in a table in Grade 4.

### Recall Prior Knowledge

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#### From PR1ME Mathematics Interactive Edition:

Let's Remember (CB p. 154)

Assign the tasks to students as classwork to identify gaps in students' understanding. Use the objectives and chapter references given for each task in the corresponding lesson notes to address remediation needs.

Distribute a copy of Let's Remember Worksheet (WS7.1) to each student. Have students attempt the worksheet to help them recall these previously acquired related knowledge:

- Reading and interpreting a picture graph (CWB 2B Chapter 14)

For answers, go to CW Manual p. 159.

### Lesson 1: Block Graphs

**Duration:** 1 h

❖ Blended Learning Program ❖

#### From PR1ME Mathematics Interactive Edition:

Let's Learn (CB p. 155)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

### Learn

#### Reading block graphs (CWB p. 147–149)

#### Learning Outcome:

- Read and interpret a block graph in which 1 square represents 1 unit

#### Stage: Pictorial Representation

In the earlier grades, students were introduced to information collection and methods of presenting information in picture graphs. In this stage, students will learn to present information in block graphs where 1 square is used to represent 1 unit. This knowledge helps to build their foundation in learning to read and interpret information presented in a bar graph later on.

- Have students look at the picture graph on CWB p. 147.
- Get students to talk about what the picture graph shows and what each oval in the graph stands for.
- Get students to answer questions about the number of each type of animal. For e.g., how many students own birds? How many students own hamsters?
- Explain to students that the same information can be presented in a block graph.
- Tell students that they can use 1 square to represent 1 animal in a block graph.
- Guide students to draw the block graph using information from the picture graph on the board.
- Start by drawing a horizontal line across the board and writing the labels of the five animals below the line. Remind students to write the title of the block graph.
- Starting from the left, guide students to see that 2 students have birds, so they will have to draw 2 squares to represent 2 birds.
- Go through the same process for each of the remaining animals until the block graph is completely drawn.

#### Stage: Abstract Representation

In this stage, students will learn to interpret information presented in the block graph. This is an important skill that allows students to solve problems involving interpreting information presented in bar graphs later on.

- Reiterate to students that each square stands for 1 animal in the block graph and they can read the information by counting the number of squares.
- Get students to answer questions about the information presented in the block graph. For e.g., which pet is the most popular? Which pet is the least popular?

❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**

Let's Do (CB p. 156)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercise 1 (PB pp. 138–139)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

**From PR1ME Mathematics Coursework Book:**

Coursework Book Practice 1 (CWB pp. 148–149)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

**Practice 1 (CWB pp. 148–149)**

**Class practice (For Print-based Program):**

Task 1 requires students to read a block graph in which 1 square represents 1 unit. Students are required to interpret the information in the block graph to answer the questions.

**Remediation**

Task 1: Copy the block graph onto the board. Have students count the number of squares for each child and write down the number below the respective name on the graph.

**Teaching tips**

**Task 1**

- When reteaching, follow the same procedure as the teaching example in Learn (CWB p. 147). Reiterate to students that each square in the block graph stands for 1 book.

**Independent practice (For Print-based Program):**

Task 2 requires students to read a block graph in which 1 square represents 1 unit. Students are required to interpret the information in the block graph to answer the questions.

For answers, go to CW Manual p. 158.

❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**

Practice 1 (CB p. 156)

Assign the tasks to students as classwork for summative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

## Lesson 2: Bar Graphs

**Duration:** 4 h 40 min

❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**

Let's Learn (CB pp. 157–158)

Go through the teaching examples with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

**Learn**

**Reading bar graphs (CWB p. 150)**

**Learning Outcomes:**

- Read a bar graph

**Stages: Pictorial Representation**

In this stage, students will apply the information reading and interpretation skills acquired in the lesson on block graphs to read bar graphs. Instead of counting squares to find the number of units, students will gradually learn to read a quantity from an axis of a bar graph. They will first be introduced to a bar graph with a scale of 1. In this example, square grid lines on the bar graph allow students to see the similarity between a block graph and a bar graph, making it easier for them to understand how a bar graph is derived. Students will be able to see that 1 square on the grid stands for 1 unit.

- Copy the block graph in the thought bubble on CWB p. 150 onto the board.
- Guide students to see that the block graph shows the number of students who received four different grades for a test.
- Get students to answer questions about the information presented in the block graph. For e.g., how many students got Grade A? How many students got Grade B?
- Reiterate to students that 1 square represents 1 student in the block graph.
- Refer students to the bar graph on the page. Explain that the same information can be presented in the form of a bar graph.
- Go through the steps of drawing the bar graph with students on the board.
- First, draw the horizontal and vertical axes and draw the square grid lines. Then, write the title of the graph and label the horizontal and vertical axes as shown.
- Point to the vertical axis and tell students that the axis shows the number of students.
- Highlight to students that each notch on the vertical axis stands for 1 student.
- Point to the horizontal axis and tell students that the axis shows the four different grades.
- Starting from the left, guide students to see that since 5 students got Grade A, a bar that spans the height of 5 squares on the grid should be drawn. Draw the bar on the board.

- Go through the same process for each of the remaining grades.
- Using a marker in a different color, draw a horizontal line from the top of the first bar to the number 5 on the vertical axis. Guide students to see that they can read the number of students who got Grade A this way.
- Guide students to find the number of students for each of the remaining grades. Then, write the numbers above their respective bars on the board.

#### Stages: Abstract Representation

In this stage, students will learn to read and interpret information presented in a bar graph with a scale of 1. It is important for students to be able to interpret information correctly at this stage in order to be able to interpret information presented in bar graphs with a scale of more than 1 later on.

- Reiterate to students that the vertical axis of the bar graph shows the number of students. Students can read the information by drawing a horizontal line from the top of each bar to the scale on the vertical axis.
- Get students to answer questions about the information presented in the bar graph. For e.g., how many students got Grade A? How many students got Grade B?
- Point out to students that they can tell that more students got Grade C than Grade D by looking at the heights of the two bars.
- Then, get students to find how many more students got Grade C than Grade D.
- If necessary, guide them to see that 7 students got Grade C and 4 students got Grade D. So, 3 more students got Grade C than Grade D.
- Get students to answer other similar comparison questions based on the bar graph. For e.g., are there more or less students who got Grade A than Grade B? How many more or less students got Grade A than Grade B?

#### ❖ Blended Learning Program ❖

##### From PR1ME Mathematics Interactive Edition:

##### Practice 1 (CB p. 156)

Assign the tasks to students as classwork for summative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

#### ❖ Blended Learning Program ❖

##### From PR1ME Mathematics Interactive Edition:

##### Let's Learn (CB p. 159)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

## Learn

### Reading and interpreting bar graphs (CWB p. 151)

#### Learning Outcomes:

- Read the scale on the axis of a bar graph
- Read and interpret a bar graph
- Solve a problem using information presented in a bar graph

#### Stages: Pictorial Representation

The concept development for this chapter parallels the Graphs chapter in Grade 2 where students are first introduced to picture graphs with a scale of 1 before proceeding to read graphs with a scale of more than 1. In this stage, students will learn to read information presented in a bar graph where the scale is more than 1. In this example, square grid lines on the bar graph allow students to relate 1 square to 2 students. Reiterate the importance of reading the scale correctly before proceeding to compare the information presented in a bar graph.

- Have students look at the bar graph on CWB p. 151.
- Guide students to see that the bar graph shows the number of students who would like to visit four countries.
- Go through the steps of drawing the bar graph with students on the board.
- First, draw the horizontal and vertical axes and draw the square grid lines. Then, write the title of the graph and label the axes as shown.
- Point to the vertical axis and ask students what it shows. They should be able to tell that the vertical axis shows the number of students.
- Highlight to students that each notch on the vertical axis stands for 2 students, and not 1 student. Thus, the vertical axis shows a scale of 2.
- If necessary, lead students to see that 1 square on the grid stands for 2 students.
- Next, point to the horizontal axis and tell students that the axis shows the four different countries.
- Starting from the left, draw a bar that spans the height of 5 squares on the grid.
- Go through the same process for each of the remaining countries.
- Using a marker in a different color, draw a horizontal line from the top of the first bar to the number 10 on the vertical axis. Guide students to see that they can read the number of students who would like to visit South Korea this way.
- Guide students to find the number of students who would like to visit each country. Then, write the numbers above their respective bars on the board.

#### Stages: Abstract Representation

In this stage, students will learn to read and interpret information presented in the bar graph with a scale of 2.

- Get students to compare the number of students who would like to visit each country. Start by comparing the numbers for France and New Zealand.

- Guide students to find the difference in the number of students who would like to visit France and the number of students who would like to visit New Zealand.
- Write ' $18 - 16 = 2$ ' on the board.
- Conclude that 2 more students would like to visit New Zealand than France.
- Next, get students to compare the numbers for Turkey and New Zealand.
- Write ' $18 \div 6 = 3$ ' on the board.
- Conclude that 3 times as many students like to visit New Zealand as Turkey.
- Finally, guide students to find the total number of students in the group.
- Write ' $10 + 16 + 6 + 18 = 50$ ' on the board.
- Conclude that there are 50 students in the group.
- Get students to answer other comparison questions based on the bar graph. For e.g., how many more or less students would like to visit France than South Korea?

#### ❖ Blended Learning Program ❖

##### **From PR1ME Mathematics Interactive Edition:**

Let's Do (CB pp. 160–161)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

#### ❖ Blended Learning Program ❖

##### **From PR1ME Mathematics Interactive Edition:**

Let's Learn (CB p. 162)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

### Learn

#### **Reading and interpreting bar graphs (CWB p. 152)**

##### **Learning Outcomes:**

- Read and interpret a bar graph with intermediate values on the scale
- Solve a problem using information presented in a bar graph

##### **Materials:**

- 1 copy of Think About It Worksheet (WS7.2) per student

##### *Stages: Pictorial Representation*

In this stage, students will continue to read information presented in a bar graph where the scale is more than 1. Advancing from the preceding example, square grid lines are now replaced with horizontal lines. This allows students to focus on practicing to read information by looking at the scale from the top of each bar instead of relying on square grids.

- Copy the bar graph on CWB p. 152 onto the board. Write the title of the graph and label the horizontal and vertical axes as shown.
- Guide students to see that the bar graph shows the number of five different types of vehicles that went through a tunnel.
- Have students identify the tallest bar in the bar graph and lead them to realize that the number of motorcycles that went through the tunnel was the greatest.
- Get students to answer other similar comparison questions based on the lengths of the bars alone. For e.g., which vehicle type went through the tunnel the least? Did more or less buses than cars go through the tunnel?
- Point to the vertical axis and ask students what it shows. They should be able to tell that the vertical axis shows the number of vehicles.
- Lead students to see that each notch on the vertical axis stands for 20 vehicles and the bar graph has a scale of 20.
- Starting from the left, draw a horizontal line from the top of the first bar to the number 60 on the vertical axis. Guide students to see that 60 buses went through the tunnel.
- For the second bar, draw a horizontal line from the top of the bar to the notch between the numbers 140 and 160. Guide students to see that the notch is halfway between 140 and 160. So, 150 motorcycles went through the tunnel.
- Go through the same process to guide students to find the number of each remaining type of vehicle that went through the tunnel. Then, write the numbers above their respective bars on the board.

##### *Stages: Abstract Representation*

In this stage, students will learn to read and interpret information presented in the bar graph with a scale of 20.

- Get students to compare the number of each type of vehicle. Start by comparing the number of cars and the number of motorcycles.
- Guide students to find the difference in the number of cars and the number of motorcycles that went through the tunnel.
- Write ' $150 - 120 = 30$ ' on the board.
- Conclude that 30 fewer cars than motorcycles went through the tunnel.
- Next, get students to find the difference in the number of buses and the number of trucks.
- Write ' $60 - 10 = 50$ ' on the board.
- Conclude that 50 more buses than trucks went through the tunnel.
- Then, guide students to compare the number of buses and the number of trucks again.
- Write ' $60 \div 10 = 6$ ' on the board.
- Conclude that 6 times as many cars went through the tunnel as buses.
- Get students to answer other similar comparison questions based on the bar graph. For e.g., how many more or less buses than motorcycles went through the tunnel?

❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**

Let's Do (CB p. 163)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercises 2–3 (PB pp. 140–144)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

**From PR1ME Mathematics Coursework Book:**

Coursework Book Practice 2 (CWB pp. 153–158)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

**Practice 2 (CWB pp. 153–158)**

**Class practice (For Print-based Program):**

Task 1 requires students to read and interpret a vertical bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 2.

Task 3 requires students to read and interpret a horizontal bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 50.

**Remediation**

Task 1: Copy the bar graph onto the board. Have students look at the square grid lines and count the number of squares for each type of sandwich. Highlight that 1 square stands for 2 sandwiches. Then, write the number of each type of sandwich above the respective bar on the board.

Task 3: Copy the bar graph onto the board. Students may be unfamiliar with the presentation of a bar graph in the horizontal form. Guide them to see that the scale of the bar graph appears on the horizontal axis instead of the vertical axis. Also, guide students to see that the bar graph has a scale of 50 and each short notch between two long notches stands for 10 people. Then, guide them to read the number of people who went to the hospital for emergency treatment for each day and write the number at the end of the respective bar on the board.

**Teaching tips**

**Task 1**

- When reteaching, follow the same procedure as the teaching example in Learn (CWB p. 151).
- Reiterate to students the importance of checking the scale of the bar graph.

**Task 3**

- When reteaching, follow the same procedure as the teaching example in Learn (CWB p. 152).
- Reiterate to students that they should read a number on the scale from the end of each bar.

**Independent practice (For Print-based Program):**

Task 2 requires students to read and interpret a vertical bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 5.

Task 4 requires students to read and interpret a horizontal bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 10.

Task 5 requires students to read and interpret a vertical bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 20.

Task 6 requires students to read and interpret a horizontal bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 100, and each short notch between two long notches stands for \$20.

For answers, go to CW Manual p. 158.

**Think About It**

❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**

Think About It (CB p. 164)

Assign the task to students as classwork. Have them complete the task in groups. Facilitate discussions using the corresponding lesson notes.

Have students get into groups. Distribute a copy of Think About It Worksheet (WS7.2) to each group. Have them discuss the question presented. Ask a student from each group to present their answers before proceeding with the questions below.

- What does the bar graph show? (*The number of cars of different colors in a parking lot*)
- Are the widths of the bars the same? (*No*)
- Should the bars be drawn with the same width? (*Yes*)
- Is there a gap between the bar for yellow cars and the bar for green cars? (*No*)
- Should we have a gap between the bars? (*Yes*)

- Can we find the number of red cars? (No)
- Why not? (The height of the bar is taller than the vertical axis)

Conclude that Sam is correct. Lead students to see that the bars in the graph must be drawn with equal widths and there must be a gap between every two bars. The top of each bar must fall within the scale on the vertical axis so that the information can be read. Have students suggest how they can draw the bar graph correctly. (First, adjust the bars so that they have equal widths. Next, there should be an equal amount of space between the bars with no overlap. Then, extend the scale on the vertical axis so that the number of red cars can be read from the scale.)

#### ❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**  
Practice 2 (CB pp. 164–166)

Assign the tasks to students as classwork for summative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

### Chapter Wrap-up

#### ❖ Blended Learning Program ❖

Go through the following points with students to summarize the key learning points in this chapter.

Reiterate the following points:

- We read a block graph by counting the squares.
- We read a bar graph using the scales on the axis.
- The scale on an axis of a bar graph can be in steps of 1 or greater.
- We can read bar graphs with intermediate values on the scale.

#### ❖ Blended Learning Program ❖

**From PR1ME Mathematics Interactive Edition:**  
Review 3 (PB pp. 145–152)

Assign the tasks to students as classwork for summative assessment. Use the objectives and chapter references given for each task in the corresponding lesson notes to address remediation needs.

## Review 3

### Materials:

- 1 copy of Review 3 (WS7.3) per student

Task 1 requires students to add or subtract dollars and/or cents without regrouping. Tasks 1(e) and 1(f)

requires students to add or subtract dollars and cents without regrouping in the vertical form.

Task 2 requires students to add or subtract dollars and/or cents with regrouping. Tasks 2(e) and 2(f) requires students to add or subtract dollars and cents with regrouping in the vertical form.

Task 3 requires students to solve a 1-step word problem involving addition without regrouping. They can draw a part-whole bar model to help them solve the problem.

Task 4 requires students to solve a 1-step word problem involving subtraction with regrouping. They can draw a part-whole bar model to help them solve the problem.

Task 5 requires students to solve a 2-step word problem involving addition and subtraction with regrouping. They can draw a comparison bar model to help them solve the problem.

Task 6 requires students to add or subtract 2-digit numbers with regrouping mentally

Task 7 requires students to multiply tens or hundreds by 1-digit numbers mentally.

Task 8 requires students to divide tens or hundreds by 1-digit numbers mentally.

Task 9 requires students to read a block graph in which 1 square represents 1 unit. Students are required to interpret the information in the block graph to answer the questions.

Task 10 requires students to read and interpret a horizontal bar graph and solve problems using information presented in the bar graph. Students are required to see that the bar graph has a scale of 50.

For answers, go to CW Manual p. 159.