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AUTHORS

Maths the Write Way, Teacher Guide Level 3

Dr Brian E. Enright is an author and a national mathematics education consultant.

Dr Robert Gyles is the deputy superintendent for Community School District #4 in New York City.

Maxine Leonescu is the director of mathematics for Community School District #11 in New York City.

Fred I. Remer is the director of mathematics, science, and technology for Community School District #9 in New York City.

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E D U C A T I O N

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★ TO THE TEACHER ★

One of the most important aspects of teaching maths is communication. Writing, speaking, explaining, or drawing can help your students internalise what they have learned and clarify their own thinking. Communication can also act as a powerful tool for you to assess the thinking of your students.

Your students should be encouraged to use strategies that foster the art of communication. We have incorporated many of the following strategies for your students in ***Maths the Write Way***.

- ★ Write your own problems
- ★ Communicate orally
- ★ Identify key words, and explain their importance
- ★ Create your own game, puzzle, picture, poem or rap
- ★ Summarise your work
- ★ Investigate to find other ways to solve a problem
- ★ Make predictions and draw conclusions
- ★ Work with a group to share ideas and solve problems

Maths the Write Way contains seven lessons. Each lesson includes four Investigations and two Extensions to the Investigations. Hints are included to provide clues to the solutions. Each lesson also has four Assessments, two with open-ended responses and two with a multiple-choice format. Vocabulary activities, following Lesson 3 and Lesson 7, emphasise the importance of mathematical language. Finally, two mini reviews and a Final Review will help you assess the work of your students.

In ***Maths the Write Way***, we have provided a forum for you to instruct as well as assess. We encourage students to look for a variety of ways to solve problems. The process—not just the solution—must be emphasised. Working and sharing ideas in cooperative groups will enhance understanding and communication.

The Teacher Guide includes:

- ★ Listing of lesson objectives and necessary materials
- ★ Key vocabulary and concepts for the lesson
- ★ Suggestions for discussing key mathematical concepts
- ★ Sample solutions to all Investigations, Extensions and Assessments
- ★ Suggested strategies for solving problems
- ★ Reproducible pages for use with selected activities

We are sure you will find ***Maths the Write Way*** a valuable resource for supplementing and enhancing your mathematics instructional program.

Brian E. Enright
Robert Gyles
Maxine Leonescu
Fred I. Remer

Pages 2–5

Objectives

- ★ To round numbers to the nearest ten
- ★ To compare unit fractions
- ★ To reinforce basic facts in all operations

Vocabulary

Before beginning the lesson, you may wish to review the following maths terms: *balance, digit, round, rule, solution.*

Teacher Notes

There are many different techniques that can be used to help students gain a deeper understanding of mathematics concepts. Activities based on real data provide important connections that make maths more meaningful. Asking students to write their own rules instead of memorising given rules encourages them to interpret information and form generalisations. By looking for more than one way to solve a problem, students strengthen problem-solving skills. Examining inverse operations with basic skills helps students develop number sense and discourages memorisation.

You may wish to discuss the concept of average body length before assigning Investigation 1. Point out that these figures show typical (usual, normal) length of these animals.

Answers to Investigations, Extensions and Assessments will vary. Sample solutions are provided.

Part A

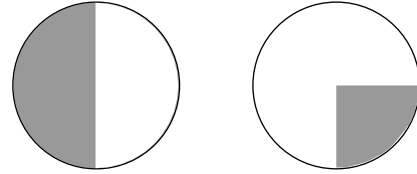
Pages 2–3

Investigation 1

When rounding to the nearest ten, look at the digit in the units place (ones). If the number in the units place is 5 or more, round up to the next ten. If the number in the units place is less than 5, round down. Examples: 27 rounds up to 30, and 23 rounds down to 20.

Investigation 2

Draw two circles. Divide one circle into two equal pieces (halves), then shade one piece or $\frac{1}{2}$. Divide the other circle into four equal pieces (quarters), then shade one piece or $\frac{1}{4}$. Compare the shaded pieces. The half piece is larger than the quarter piece. So, $\frac{1}{2} > \frac{1}{4}$.



Extension

The smallest whole number that rounds up to 150 is 147. The largest whole number that rounds down to 150 is 153. So, the animal could have a body length from 147-153 centimetres.

Assessment 1

B

Assessment 2

The numbers that round to 80 are 75, 79 and 83. Use the rules of rounding to find this answer. If the units digit is 5 or more, round up; 75 and 79 round up to 80. If the units digit is less than 5, round down; 83 rounds down to 80.

Part B

Pages 4–5

Investigation 3

One way to find the answer is to subtract 14 from 19: $19 - 14 = 5$. Another way to find the answer is to count up from 14 until you get to 19: 14 (+ 1), 15 (+ 1), 16 (+ 1), 17 (+ 1), 18 (+ 1), 19. To get from 14 to 19, you count up by one 5 times. ($14 + 5 = 19$)

Investigation 4

Both examples show a total of 12.

(••••) (••••) (••••) shows 3 sets of 4, or that 12 objects divided into 3 sets makes 4 in each set.

(•••) (•••) (•••) (•••) shows 4 sets of 3, or that 12 objects divided into 4 sets makes 3 in each set.

Extension

- A. First add $8 + 7$ (15). Then find two numbers that have a difference of 15, such as $16 - 1$.
($8 + 7 = 16 - 1$)
- B. First subtract $23 - 5$ (18). Then find two numbers that have a sum of 18, such as $9 + 9$.
($9 + 9 = 23 - 5$)

Assessment 1

D

Assessment 2

First subtract 18 from 32 (14). Ask: What number can be added to 14 to get 21? The answer must be 7.

LESSON 2

Data Analysis

Pages 6–9

Objectives

- ★ To find reasonable estimates
- ★ To collect and record real data in a frequency table
- ★ To interpret data
- ★ To create a bar graph based on data collected
- ★ To explore the concept of arrangements or combinations

Materials

- ★ bags of beans, each with approximately 50 beans (48, 53, 51, for example)
- ★ different sizes of cups, spoons and other containers that measure capacity
- ★ Reproducible 1: *Frequency Table*
- ★ Reproducible 2: *Class Birthdays*
- ★ Reproducible 3: *Bats and Balls*

Vocabulary

Before beginning the lesson, you may wish to review the following maths terms: *bar graph*, *combinations*, *estimate*, *frequency table*, *survey*, *tally*.

Teacher Notes

If students are given many estimation opportunities, they will strengthen their number sense. They will also gain an understanding of when estimates are appropriate and when exact numbers are needed. Conducting surveys, tallying information and creating graphs are all activities that provide real-world connections. Once students have collected and recorded data, they interpret and analyse the information. Doing this ensures comprehension of the data. You may wish to discuss other kinds of graphs, pointing out the importance of using the appropriate type of graph to display different kinds of data. Show students how to label graphs and include titles.

Students can collect data through surveys, either orally or by written questionnaires. The following are a few suggestions you can give for survey topics:

- ★ favourite sports
- ★ favourite hobbies or pastimes
- ★ favourite TV programs
- ★ favourite foods or snacks
- ★ favourite school subject

Give each group one bag of about 50 beans for Investigation 1. Distribute copies of Reproducible 1 for Investigation 2 and Part A Extension. You may want to make the data collection for Investigation 2 a whole-class activity. Distribute copies of Reproducible 2 for Investigation 3 and Reproducible 3 for Investigation 4 and Part B Extension.

Answers to Investigations, Extensions and Assessments will vary. Sample solutions are provided.

Part A

Pages 6–7

Investigation 1

To estimate the number of beans, find a container that holds about 10 beans. Keep filling the container with beans from the bag. Count the groups of 10. There are about 50 beans in the bag. Next multiply the group's estimate by the number of groups in the class. This should give a good estimate of the number of beans the class has in all.

Investigation 2

Month	Tally	Number
January		0
February	//	2
March	/	1
April	 	5
May	//	2
June	///	3
July	/	1
August		0
September	////	4
October	//	2
November	////	4
December	/	1

More classmates were born in April than in any other month. Twice as many classmates were born in November than in May. No students in the class were born in August or January.

Extension

Question: What is your favourite snack?

Sample survey data:

Favourite Snacks

Snack	Tally	Number
chips	 ///	8
fruit	 	5
biscuits	 /	6
popcorn	 //	7

The chips were the favourite snack.

Assessment 1

D

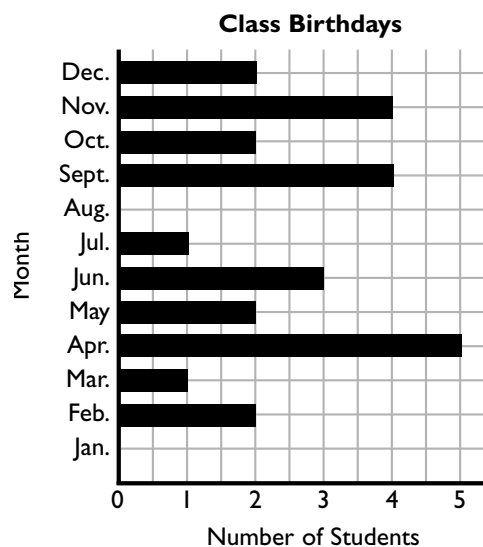
Assessment 2

Round to the nearest ten to find a number that is easy to work with. Each bag contains about 20 marbles, so 5 bags will contain about 100 marbles. ($5 \times 20 = 100$)

Part B

Pages 8–9

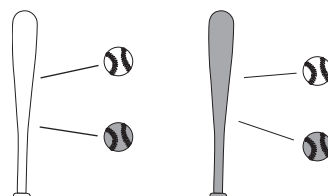
Investigation 3



The bottom side of the graph has numbers that show how many students have birthdays in each month of the year. The bar for each month lines up with the correct number on the bottom of the graph. For example: The bar for February lines up with the number 2 on the bottom of the graph.

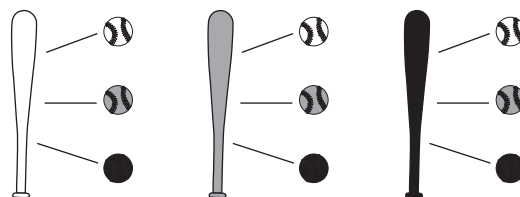
Investigation 4

Start with one bat and match it with each ball. Do the same with the second bat. There are 4 different ways to match the bats and balls.



Extension

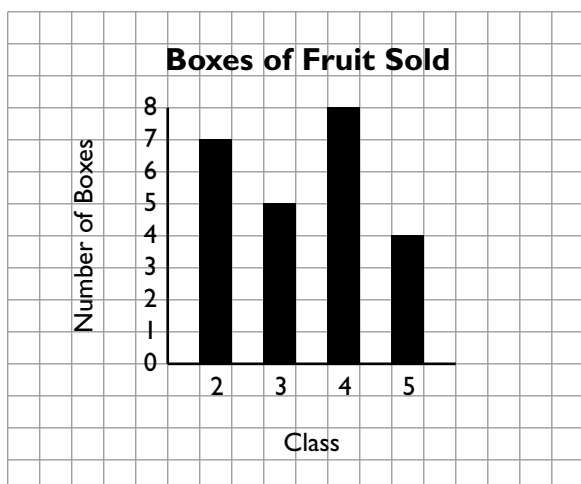
Match each ball with one bat to find that there are three possible combinations for each bat. Since there are 3 bats, there are 3×3 , or 9, total combinations possible.



Assessment 1

B

Assessment 2



LESSON 3

Operations

Pages 10–13

Objectives

- ★ To develop strategies for using mental maths
- ★ To write word problems that reinforce understanding of operations with whole numbers
- ★ To choose the appropriate operation for a situation
- ★ To write word problems based on ideas developed by interpreting information and drawing conclusions

Vocabulary

Before beginning the lesson, you may wish to review the following maths terms: *all together*, *cost*, *mental maths*, *multiplication*, *operation*.

Teacher Notes

Developing mental maths strategies is key to building confidence in mathematics ability. In Investigation 1, students explore multiples of ten. Multiples of ten are easy to remember and manipulate mentally and they are widely used as reference points. Remind

students of the rounding (to the nearest ten) activities in Lesson 1 and point out that the number 5 is also a useful reference point.

Throughout this lesson, students write their own problems. This activity helps to reinforce operations sense and shows the real-world applications of mathematics. In some activities, the answer to a problem is given, and students create a word problem based on that answer. This encourages students to think of different operations that can be used to find the given number or numbers. Suggest that students always share their word problems with other group members.

Answers to Investigations, Extensions, and Assessments will vary. Sample solutions are provided.

Part A

Pages 10–11

Investigation 1

In each example, one addend was rounded up or down to the nearest ten and the other addend was changed by the same amount, but in the opposite direction. These changes make it easier to do the addition (in problem B). The changes could be made so that the problems can be solved using mental maths.

Investigation 2

Carmen bought a box of raisins and a bag of sunflower seeds. How much did she spend all together? ($50¢ + 64¢ = \$1.14$)

Extension

First eliminate the possibility of buying the raisins and sunflower seeds together. The apple can be combined with either of the other two snacks. I would buy the sunflower seeds and the apple for a total of 89¢.

Assessment 1

C

Assessment 2

1. Round 38 to 40.
2. Subtract 2 from 44 to get 42.
3. Add $40 + 42$ to get 82.