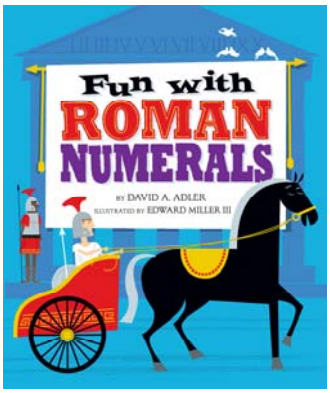


FUN WITH ROMAN NUMERALS

DAVID A. ADLER
ILLUSTRATED BY EDWARD MILLER III

About the Book

Page IV. Super Bowl XLV. Built in MMVII. Roman numerals are everywhere: on clocks, in books, and on buildings. But what do Roman numerals mean, and how do you use them?

GRADES 1-5

SUGGESTED CLASSROOM ACTIVITIES

Mathematics

Roman Numerals Game—Students can work in pairs. Each student can write an Arabic numeral on a sheet of paper and then his/her partner can write the corresponding Roman numeral. The students can take turns creating numbers and continue for 10 to 15 minutes for extended practice. This can also be done in reverse, with the student writing the Roman numeral first and the partner writing the Arabic numeral.

Roman Numerals Diary—Students can create their own "Roman Numerals Diary." They can search for Roman numerals used in various places, such as book page numbers, copyright dates, watches and clocks, ancient coins, sundials, chapters in books, film sequels (e.g., *Rocky III*), credits at the end of TV shows or movies, cornerstones of buildings, crossword puzzle clues, events (e.g., Super Bowl XX), and in other places they may discover on their own. For each entry they should record: 1) the date they found it; 2) where they found it; 3) the Roman numeral; 4) the corresponding Arabic numeral. (Hint: They should number their pages with Roman numerals.) They can add illustrations if they choose to do so.

Class Birthday Book—Students can convert their birthdays to Roman numerals—for example, August 20, 1937, would become XX August MCMXXXVII. They can write the "Roman" birthday at the top of a page and the Arabic equivalent at the bottom. In between they can draw a self-portrait and include their name. These can be compiled into a book in chronological order.

Class Address Book—Students can convert their home addresses to Roman numerals—for example, 3422 Elm Street would become MMMCDXXII Elm Street. They can write the information on a sheet of paper, showing the Roman and Arabic equivalents, along with an illustration of where they live; and these can be compiled into a book.

Multiplication Tables—Students can create their own Roman numerals charts and practice their multiplication tables at the same time by recording the multiplication tables in Roman numerals. For example, the '2s Chart' would show: II, IV, VI, VIII, X, XII, XIV, XVI, XVIII, XX, etc. They can do the same for numbers 3 through 12. They can do this individually or in partners or small groups.

Art

Students can search *Google Images* for pictures of ancient Rome. Some key words to enter are: Roman soldiers, Roman chariots, Roman costumes, Roman buildings, Roman jewelry, Roman coins, etc. They can compare their findings with the illustrations by Edward Miller III in *Fun with Roman Numerals.*

Students can find books about ancient Rome in their school or public library and compare the illustrations with those in David Adler's book. They can also search for Roman numerals in the book illustrations.

Literature

Students can find and read other books by author David A. Adler and discuss what other subjects he has written about. Are most of his books fiction or nonfiction?

Students can search for other books about numerals, number systems, and counting in their school or public library.

Online Resources

http://literacy.kent.edu/Minigrants/Cinci/romanchart.htm • Presents a **Roman numerals chart showing 1 to 100** with examples from 500 to 900.

www.math.wichita.edu/history/topics/num-sys.html • **Information and charts of the Inca, Maya, Egyptian, Greek, and Babylonian** number systems.

http://mathforum.org/alejandre/numerals.html • Presents links to **information on many number systems**—from Drexel University School of Education.

http://www.romannumerals.co.uk/roman-numerals/numerals-history.html • The **history and use of Roman numerals**. Click on *chart* to see Roman numerals from 1 to 5,000.

http://42explore.com/number.htm • Presents a wealth of information and **links to number systems from a variety of cultures throughout history**.

For Further Reading

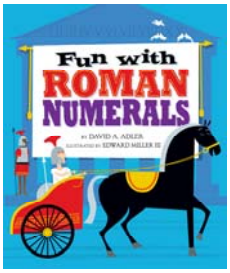
Calculator Riddles by David A. Adler, illustrated by Cynthia Fisher
Fraction Fun by David A. Adler, illustrated by Nancy Tobin
How Tall, How Short, How Faraway by David A. Adler, illustrated by Nancy Tobin
Of Numbers and Stars: The Story of Hypatia by D. Anne Love, illustrated by Pam Paparone

Visit **www.holidayhouse.com** for more math books from Holiday House!

About the Author and Illustrator

David A. Adler is a former math teacher and beloved author of more than a hundred children's books. He enjoys helping kids understand that math can be easy and fun too. Learn more about David at **www.davidaadler.com.**

Edward Miller III writes a Roman numeral whenever he signs his name. He is an author, illustrator, and designer of many books, including *The Tooth Book: A Guide to Healthy Teeth and Gums* and *The Monster Health Book: A Guide To Eating Healthy, Being Active & Feeling Great For Monsters & Kids!*. Visit him online at **www.edmiller.com.**



FUN WITH ROMAN NUMERALS
David A. Adler • Illustrated by Edward Miller III
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Classroom activities prepared by Sandy Schuckett, school library consultant.

Great Estimations

A Lesson for Grade 3

Maryann Wickett

Featured in *Math Solutions Online Newsletter,* Issue 37

Overview of Lesson

In this lesson, the marbles and beans, along with the book Great Estimations by Bruce Goldstone, are used to provide students with an opportunity to explore and apply strategies for estimation. Also, collections of grid paper with different-sized grids, measuring cups of various sizes, a few unifix cubes, and balance scales and masses provide engaging estimation tools for students.

Preparation

Before class, place one cup of kidney beans in each quart-size sandwich bag, filling enough bags for one bag per pair of students. Place the bags of beans in a large paper bag along with a pint-size and quart-size jar of marbles. Make sure you've counted the marbles in each jar.

Materials

- quart-size zip top sandwich bags, 1 per pair of students
- kidney beans, 1 cup per pair of students
- pint-size jar of marbles
- quart-size jar of marbles
- large paper bag
- the children's book *Great Estimations* by Bruce Goldstone (Square Fish, 2010)
- collections of grid paper (different-sized grids such as inch, half-inch, centimeter), measuring cups (various sizes), unifix cubes, and balance scales and masses

Lesson Outline

Focus or Warm-Up

1. Place the large paper bag on a table. Pull the pint-sized jar of marbles from the bag. Hold it so all students can see it. Ask students, "About how many marbles would you estimate are in the jar? To estimate means to make your best guess."
2. Listen as students make various guesses out loud. Write on the board *Estimates* and beneath it record the suggestions. This might inspire a few additional estimates.
3. Ask students to share their reasoning.

   From Maryann's Classroom:

   In my class, Tuheen shared, "Some marbles are hidden so I don't think I can make a good guess. I think there are more than twenty-three marbles because I could get about ten marbles in a handful and I know there are more than two handfuls in the jar. Two tens equal twenty so there must be more than twenty-three. But I don't know how many handfuls there could be. I was trying to think of how many of my fists could be in the jar, then I remembered that my fist is bigger than the handful so that won't work."

   Isabela shared, "I tried to picture the marbles if I dumped them out. It would be a big mess and it didn't help me think about how many, only about the mess!"

Introduction

4. After a moment, say something like this to your students, "Today we're going to explore a book about estimating called *Great Estimations* by Bruce Goldstone. As I read the book, listen carefully for strategies you could use to estimate. When you hear a strategy, tell me and I'll record it on the board. Later, we'll use one of the strategies to help us estimate the number of marbles in the jar. Finally, you'll have the chance to work with a partner to make some estimates."
5. Begin by reading aloud and sharing the illustrations on pages 3, 4, and 5.

From Maryann's Classroom:

Yainid shared the first strategy. "We have to see what ten of something looks like, then try to figure out how many tens." I recorded Yainid's suggestion on the board.

Tait said, "Hey, Yainid's idea is sort of like Tuheen's idea. He thought about ten marbles, like the book says, but then he couldn't figure out how many tens." Several students nodded in agreement.

6. Continue reading and recording estimation strategies as students notice them. Following is the list of strategies students may suggest:

Possible Strategies

- *Find what ten looks like.*
- *Find what one hundred looks like.*
- *Find what one thousand looks like.*
- *Compare what you are estimating to ten, one hundred, or one thousand.*
- *Make equal rows.*
- *Weighing.*
- *Clump counting.*
- *Box and count.*
- *Layers.*

Exploration 1

7. Ask students to choose strategies from the list to estimate the number of marbles in the jar. Record their reasoning on the board as appropriate.

   From Maryann's Classroom:

   Gaby thought making rows of ten would be helpful. I asked her to make a row of ten. Kaitlin said, "I noticed that when Gaby took out ten marbles it made a difference in the level of marbles in the jar. I think if we took out another ten marbles the jar would be about one-fourth empty." Garrett chimed in, "If Kaitlin is right, we could multiply twenty by four. I used twenty because that would be how many marbles were taken out of the jar for it to be one-fourth empty. I multiplied by four because there are four-fourths in the whole jar. That would be a good estimate of how many marbles were in the jar when it was full."
   I asked Kaitlin to try her idea for us by taking out ten more marbles to make a total of twenty marbles removed from the jar. The jar looked like it was more than three-fourths full so Kaitlin took out six more marbles for a total of twenty-six marbles. We agreed that it now looked about three-quarters full or one-fourth empty. Kaitlin said, "Using Garrett's idea, I think there are one hundred four marbles in the jar. Twenty-six plus twenty-six equals fifty-two so there are fifty-two marbles in one-half. Fifty-two and fifty-two equal one hundred four marbles." I recorded on the board:

   $26 + 26 = 52$

   $52 + 52 = 104$

   Austin said, "I agree with Kaitlin, but I changed twenty-six to twenty-five by subtracting one. I know that four twenty-fives is one hundred. It's like quarters in a dollar. Then I added four more because I changed twenty-six to twenty-five. I have to put back the one. Four times one equals four. One hundred plus four equals one hundred four." I recorded:

   $26 - 1 = 25$

   $4 \times 25 = 100$

$4 \times 1 = 4$

$100 + 4 = 104$

Safaa shared, "In my brain, I changed twenty-six to twenty plus six. Then I counted, 20, 40, 60, 80. I put the eighty in my memory. Then I counted 6, 12, 18, 24. I took the eighty out of my memory and added eighty and twenty-four. That's one hundred four." I recorded on the board:

$26 = 20 + 6$

20, 40, 60, 80

6, 12, 18, 24

$80 + 24 = 104$

8. Refocus the students' attention on the initial estimates shared. Ask the students, "How does our class estimate compare with the first estimates shared?"

   From Maryann's Classroom:

   In my class, our initial estimates were 1000, 23, 500, 145, 1,000,000, 779, 333, and 2057. Our class estimate was 104. Tim said, "Most of the first estimates are a lot bigger than what we just figured out."

   "I just picked a number," said Rocio.

   Jose offered, "When we had a way to think about it we could make a better estimate than just picking a number."

9. Finally, tell the students how many marbles you had counted when you filled the jar. To verify your count and to reinforce the value of using a strategy to make an estimation, count the marbles by placing them into groups of ten.

   From Maryann's Classroom:

   I had counted 112 marbles in the jar. My class counted 11 groups of ten with two extra to figure this out. The class strategy for estimating 104 marbles got them very close to the actual total of 112 marbles.

Exploration 2

10. Next, pull the quart-sized jar of marbles from the bag and hold it up. Ask, "Here is a quart-sized jar of marbles. How can you use what you know about the number of marbles in a pint to help you estimate the number of marbles in a quart?"

    From Maryann's Classroom:

    Malachi shared, "There are two pints in one quart. So if we know how many in a pint we can just double that to get a good estimate for how many in a quart." Using this information, the class quickly concluded that a quart jar would hold about 224 marbles: 2 × 112 = 224.

Exploration 3

11. Show students the bags of kidney beans, explaining that they'll be working with a partner to use a strategy for estimation from the book to estimate the number of beans in their bag.
12. Hold up the estimation tools: grid paper, measuring cups, unifix cubes, and balances and masses. Ask: How might these tools help you carry out the strategies listed on the board?

    From Maryann's Classroom:

    In my class, the students shared that the grid paper could be used with the box-and-count strategy, the balance and masses could help with the weighing strategy, and the measuring cups could help with thinking about how many tens or hundreds fit in a measuring cup or even a unifix cube if the items were small like popcorn or lentils.

    Katie had a new idea. She suggested that we could use the small geoboard rubber bands as a way to help with the clumping strategy. The class agreed this was a good idea and geoboard rubber bands were added to the estimation tools.

13. Give partners time to work together on recording their estimates and notes about what tool they used to make their estimate. When students finish, ask them to record their information on a class chart:

Estimation Tool	Estimate
groups of ten to figure 104	
how many in ¼ pint	

Summary

14. Gather students for a discussion. Focus the discussion on the similarity of the estimates. Each bag had approximately the same number of kidney beans. In most cases, the estimates were similar even though partner pairs used different estimation tools. This usually delights the students.

From Maryann's Classroom:

The students in my class concluded that differences in the estimations came from varying sizes of beans, how precisely the beans filled an area of measurement, how carefully people measured and counted, and how the number of beans in the bags varied.

Rylie asked, "Can we do this again tomorrow using different bags of stuff?" I nodded my head. I had already prepared bags of objects: quart-size bags of lima beans, cotton balls, teddy bear counters, macaroni, real pennies, and popcorn, along with snack-size bags of plastic counters, cotton swabs, base ten unit cubes, paper clips, and lentils.