

Contents

Introduction	1
Research on the Benefits of Manipulatives	2
How to Use This Book	6
A Walk Through a Lesson	8
NCTM Correlation Chart	10

Number and Operations 14

Lesson 1 Counting to 5 and Back	16
Lesson 2 Groups of 0 to 5	18
Lesson 3 Groups of 6 to 10	20
Lesson 4 Number Shapes	22
Lesson 5 Estimate and Count	24
Lesson 6 Comparing Groups	26
Lesson 7 Equal Groups	28
Lesson 8 More and Fewer	30
Lesson 9 Order of Numbers	32
Lesson 10 Ordinal Numbers	34
Lesson 11 Counting On	36
Lesson 12 Part-Part-Whole	38
Lesson 13 Joining Problems	40
Lesson 14 Using the Plus Sign	42
Lesson 15 Decomposing Numbers	44
Lesson 16 Separating Problems	46
Lesson 17 Using the Minus Sign	48
Lesson 18 Identifying Halves	50

Geometry 52

Lesson 1 Left and Right	54
Lesson 2 Attributes of Plane Shapes	56
Lesson 3 Plane Shapes and Real-Life Objects	58

Lesson 4 Exploring Shape Attributes	60
Lesson 5 Shape Attribute Riddles	62
Lesson 6 Cubes and Spheres	64
Lesson 7 Geometric Pictures and Designs	66
Lesson 8 Geometric Problems	68
Lesson 9 Top, Middle, and Bottom	70
Lesson 10 Positions in a Line	72
Lesson 11 Relative Locations	74
Lesson 12 Inside and Outside	76

Algebra 78

Lesson 1 Sort by One Attribute	80
Lesson 2 Sort by Two Attributes	82
Lesson 3 Determine the Sorting Rule	84
Lesson 4 Extend Color Patterns	86
Lesson 5 Extend Shape Patterns	88
Lesson 6 Extend Growing Patterns	90
Lesson 7 Translate Patterns	92
Lesson 8 Three-Object Patterns	94
Lesson 9 Arranging Sets of Objects	96

Measurement 98

Lesson 1 Nonstandard Measurement of Height	100
Lesson 2 Sorting by Height	102
Lesson 3 Sorting by Length	104
Lesson 4 Estimating and Measuring Length	106
Lesson 5 Exploring Perimeter	108
Lesson 6 Exploring Area	110

Lesson 7	Associative Property of Addition . . .	106
Lesson 8	Associative Property of Multiplication	108
Lesson 9	Distributive Property	110
Lesson 10	Input/Output Tables	112
Lesson 11	Addition and Subtraction	114
Lesson 12	Multiplication and Division	116
Lesson 13	Mathematical Reasoning	118

Measurement 120

Lesson 1	Telling Time	122
Lesson 2	Elapsed Time	124
Lesson 3	Estimating and Measuring	126
Lesson 4	Perimeter of Shapes	128
Lesson 5	Building Perimeter	130
Lesson 6	Finding Area	132
Lesson 7	Area of Irregular Figures	134
Lesson 8	Building Area	136
Lesson 9	Perimeter and Area	138
Lesson 10	Finding Volume	140
Lesson 11	Measure Weight	142

Data Analysis and Probability 144

Lesson 1	Find the Average	146
Lesson 2	Pictographs	148
Lesson 3	Bar Graphs	150
Lesson 4	Circle Graphs	152
Lesson 5	Line Graphs	154
Lesson 6	Probability	156
Lesson 7	Degrees of Probability	158
Lesson 8	Predictions and Outcomes	160
Lesson 9	Fairness	162

Blackline Masters

BLM 1	Number Forms Recording Sheet	164
BLM 2	Place-Value Chart	165
BLM 3	Hundred Chart	166
BLM 4	Factor Pairs Worksheet	167
BLM 5	Division Recording Sheet	168
BLM 6	Fraction Worksheet	169
BLM 7	Plane Shapes Recording Sheet	170
BLM 8	Geometric Solids Recording Sheet	171
BLM 9	Nets Worksheet	172
BLM 10	Coordinate Grid	173
BLM 11	Tangram Puzzle 1	174
BLM 12	Tangram Puzzle 2	175
BLM 13	Associative Property Worksheet	176
BLM 14	Input/Output Table	177
BLM 15	Missing Numbers Worksheet	178
BLM 16	Measurement Recording Sheet	179
BLM 17	Centimeter Grid	180
BLM 18	Inch Grid Paper	181
BLM 19	Graphing Grid	182
BLM 20	Prediction/Result Recording Sheet	183
BLM 21	Spinner Patterns	184

Glossary of Manipulatives	185
-------------------------------------	-----

Index	187
-----------------	-----

LESSON
4

Number and Operations

Estimating the Sum or Difference

Objective

Estimate the sum or difference in addition and subtraction problems.

Skills

- Adding
- Subtracting
- Estimating

NCTM Expectations

Number and Operations

- Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.
- Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.
- Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool.

As students become more familiar with adding and subtracting, they come to understand that sometimes a situation calls for an estimate rather than an exact answer. Estimates are helpful when dealing with very large numbers and save time when an exact answer is not needed.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *When is an estimate enough information to solve a problem?* Guide students to understand that when a problem asks for “about” how many, they can use an estimate.
- **Ask:** *What number did you round 104 to? How did you know to round down instead of up? What about 328? How did you know to round up?*
- **Ask:** *Was your estimate close to the exact answer? Will rounding always give you an estimate that is close to the exact answer? What if you rounded the same numbers to the closest hundred?*

Solve It

With students, reread the problem. Have students write to describe how they used Base Ten Blocks to help them estimate $104 + 328$. They should then write a sentence telling whether the class will have enough labels for a new computer.

More Ideas

For other ways to teach about estimating sums and differences—

- Have students use Base Ten Blocks to estimate differences. Give students a subtraction problem. Then ask them to round the numbers in the problem and subtract to find an estimate.
- Give students sample addition and subtraction word problems. Some problems should ask for an exact answer, while others should indicate that they require an estimate by using phrases such as “about how many.” Have students decide for each problem whether an exact answer or an estimate is needed. For problems requiring an estimate, have students estimate using mental math first. Then have them use Base Ten Blocks to check their answers.

Standardized Practice

Have students try the following problem.

Find the difference between 812 and 489. What is the answer rounded to the nearest 10?

- A. 300 B. 320 C. 420 D. 480

Try It! 25 minutes | Groups of 3

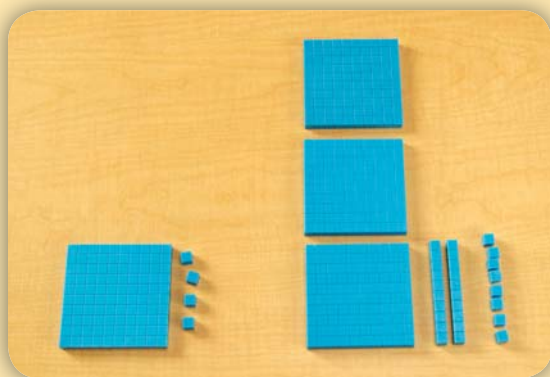
Here is a problem about estimating a sum.

Mrs. Vasquez's class is collecting box top labels for a new computer. The class collects 104 labels in September and 328 labels in October. They need 500 labels for a new computer. Can the students find out if they have enough labels without counting them or adding $104 + 328$?

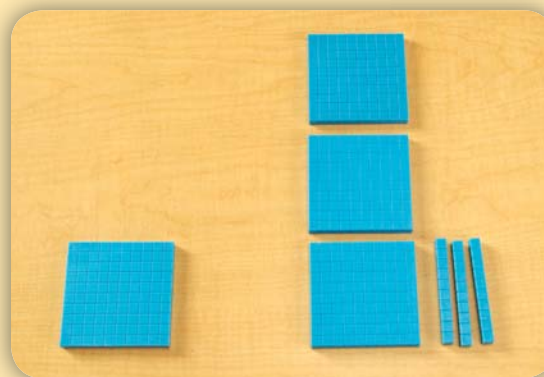
Introduce the problem. Then have students do the activity to solve the problem. Distribute Base Ten Blocks to students. Introduce the concept of rounding to students, and explain how they can use rounding to estimate sums and differences. With students, practice rounding one-, two-, three-, and four-digit numbers using 5 as the benchmark. Write the addition problem $104 + 328$ on the board.

Materials

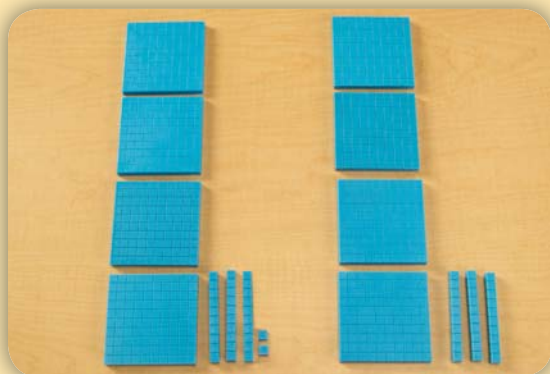
- Base Ten Blocks (5 flats, 10 rods, and 10 units per group)
- paper (1 sheet per group)
- pencils (1 per group)



1. Have students model the numbers 104 and 328 using blocks. Have students use these models to assist them in rounding to the tens place.



2. Students should then model the rounded numbers using blocks. Ask students to add the rounded numbers to find the sum. Have students write down the rounded sum.



3. Now ask students to find the exact answer using blocks. Have students write down their exact answer and compare it to their estimated answer.

⚠ Look Out!

Students may feel compelled to find an exact answer every time. Brainstorm with students to identify situations in which they need an estimate rather than an exact answer. Also, for students who are confused about when to round up or down, you may wish to draw a blank ten-frame on paper and use counters to illustrate the rule that numbers under 5 are rounded down, while numbers 5 and above are rounded up.