MATH CYCLES

Problems and Quizzes that Strengthen Math Skills

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Aligns to National Council of Teachers of Mathematics Standards

GOOD YEAR BOOKS

GDY498 v1.11

Contents

Introduction

What Is *Math Cycles*?

Math Cycles presents third- and fourth-grade math concepts and skills in a spiral fashion so that those concepts and skills are introduced and then reinforced and expanded as a student moves systematically through the lessons, or "cycles." Basic concepts and skills are introduced at the earlier stages of the spiral, or the earliest cycles. As students work through the problems in each cycle, they find their mastery of the concepts and skills expand, becoming wider and deeper as the spiral runs through the book's sixty cycles. Therefore, the first thirty cycles are appropriate for third grade, and the second thirty cycles are appropriate for fourth grade.

Math Cycles and the Mathematics Standards

NCTM Standards

In its publication *Principles and Standards for School Mathematics*, the National Council of Teachers of Mathematics has defined five Content Strands for Grades 3 and 4: Number and Operations; Algebra (Patterns and Functions); Geometry; Measurement; and Data Analysis and Probability. *Math Cycles* breaks the five strands into twelve instructional "clusters" of math problems. All twelve clusters are represented in every two-page cycle. The standards and benchmarks for the twelve clusters are shown on the next two pages, in the same arrangement as they would appear in every cycle.

In addition, the twelve clusters are infused with elements of the NCTM's five Process strands: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation.

1

Computation

- Develop fluency in number facts
- Use mental math
- Develop fluency in computation of whole numbers (+, −, ×, and ÷).

2

Meaning of Number Operations

- Solve word problems using four operations
- Identify information needed to solve a problem
- Determine operations in multi-step problems
- Use problem-solving strategies

3

Data and Graphs

- Data-collecting methods for an investigation
- Represent data using tables and graphs: line plots, bar graphs, and line graphs
- Differentiate in representing categorical and numerical data

4

Patterns and Functions

- Describe the rules for a pattern sequence
- Create a pattern using specified units
- Create a function table
- Use algebraic symbols
- Use mathematical models to represent quantitative relationships

5

Measurement

- Understand such attributes as length, area, weight, and size of angle
- Become familiar with standard units
- Carry out simple unit conversion
- Estimate in measurement
- Develop and use formulas to find area of rectangles, triangles, and parallelograms

6

Place Value

- Name value of a digit in a numeral
- Read/write numerals in expanded form
- Understand numbers, ways of representing numbers, and the number system
- Identify place values to millions and thousandths

7

Geometry

- Analyze the properties of two- and three-dimensional geometric shapes
- Identify spatial relationship I using coordinated geometry
- Apply transformations and use symmetry to analyze mathematic situation
- Use visualization to solve problems

8

Fractions

- See fractions as parts of whole, parts of a set, location on the number line, and as division of whole numbers
- Compare fractions
- Add and subtract fractions
- Use equivalent form, decimals, and percent

9

Money

- Solve problems in buying situations
- Interpret charts with money
- Compute with money using four operations
- Estimate amount in problem settings
- Express money value using $ and ¢

10

Time and Properties of Number Operations

- Read clocks
- Understand elapsed time
- Use properties of operations: family facts, prime and composite numbers, factors and multiples, order of operation and distributive properties

11

Estimation

- Round a number to nearest certain place value
- Estimate by front-end method
- Estimate by rounding
- Develop strategies for estimating in measurement
- Use mental computation and estimation

12

Probability

- Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible
- Predict the probability of outcomes of simple experiments
- Understand that the likelihood of an event can be represented by a number from 0 to 1

State Standards

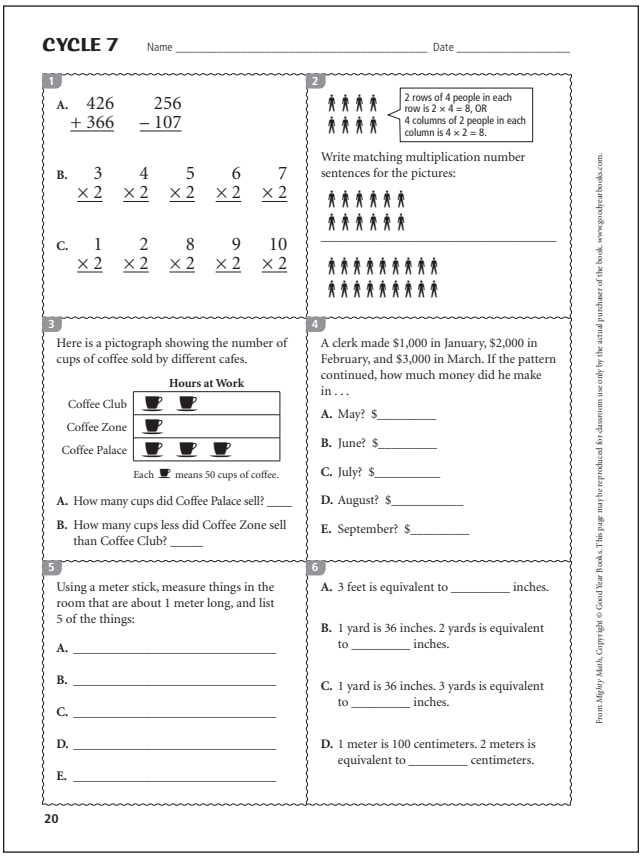
Math Cycles also aligns to many states' math standards. While there are some differences among the various states' academic content standards for third- and fourth-grade math, almost all of those standards are based on the NCTM's standards for grades 3–5. For example, some states place the concept of average or mean in third grade; other states place it in fourth grade, and still others place it in fifth grade. In this book, the concept of average is introduced in fourth grade in simple addition and division problems. In addition, the number of items in each cycle that correspond to a particular Content Strand approximates the emphasis placed on each strand by most states.

Using the Cycles with Your Current Math Program

As mentioned earlier, cycles are arranged into twelve boxes split evenly over two pages. Each cycle starts with a box of computation problems and ends with a box of probability problems. Below is a typical two-page cycle.

An Answer Key for the cycles starts on page 160. Students can use the Progression Chart: Cycles on page 204 to check their work against the Answer Key and record the results in the chart.

Note that even though higher-level concepts, such as fractions and probability, are introduced later in the school year, students can handle



CYCLE 7 Name _____ Date _____

1

A. 426 + 366 = ____ 256 − 107 = ____

B. 3 × 2 = ____ 4 × 2 = ____ 5 × 2 = ____ 6 × 2 = ____ 7 × 2 = ____

C. 1 × 2 = ____ 2 × 2 = ____ 8 × 2 = ____ 9 × 2 = ____ 10 × 2 = ____

2

2 rows of 4 people in each row is 2 × 4 = 8, OR 4 columns of 2 people in each column is 4 × 2 = 8.

Write matching multiplication number sentences for the pictures:

3

Here is a pictograph showing the number of cups of coffee sold by different cafes.

Hours at Work

Coffee Club ☕☕
Coffee Zone ☕
Coffee Palace ☕☕☕

Each ☕ means 50 cups of coffee.

A. How many cups did Coffee Palace sell? ____

B. How many cups less did Coffee Zone sell than Coffee Club? ____

4

A clerk made $1,000 in January, $2,000 in February, and $3,000 in March. If the pattern continued, how much money did he make in . . .

A. May? $_____

B. June? $_____

C. July? $_____

D. August? $_____

E. September? $_____

5

Using a meter stick, measure things in the room that are about 1 meter long, and list 5 of the things:

A. _____

B. _____

C. _____

D. _____

E. _____

6

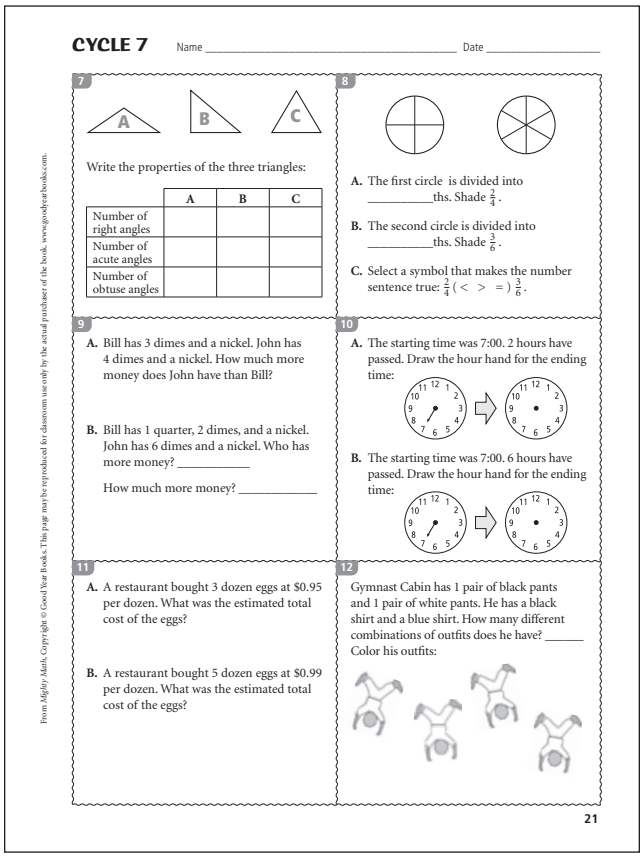
A. 3 feet is equivalent to _____ inches.

B. 1 yard is 36 inches. 2 yards is equivalent to _____ inches.

C. 1 yard is 36 inches. 3 yards is equivalent to _____ inches.

D. 1 meter is 100 centimeters. 2 meters is equivalent to _____ centimeters.

20



CYCLE 7 Name _____ Date _____

7

A B C

Write the properties of the three triangles:

	A	B	C
Number of right angles			
Number of acute angles			
Number of obtuse angles			

8

A. The first circle is divided into _____ths. Shade $\frac{2}{4}$.

B. The second circle is divided into _____ths. Shade $\frac{3}{6}$.

C. Select a symbol that makes the number sentence true: $\frac{2}{4}$ (< > =) $\frac{3}{6}$.

9

A. Bill has 3 dimes and a nickel. John has 4 dimes and a nickel. How much more money does John have than Bill?

B. Bill has 1 quarter, 2 dimes, and a nickel. John has 6 dimes and a nickel. Who has more money? _____

How much more money? _____

10

A. The starting time was 7:00. 2 hours have passed. Draw the hour hand for the ending time:

B. The starting time was 7:00. 6 hours have passed. Draw the hour hand for the ending time:

11

A. A restaurant bought 3 dozen eggs at $0.95 per dozen. What was the estimated total cost of the eggs?

B. A restaurant bought 5 dozen eggs at $0.99 per dozen. What was the estimated total cost of the eggs?

12

Gymnast Cabin has 1 pair of black pants and 1 pair of white pants. He has a black shirt and a blue shirt. How many different combinations of outfits does he have? _____ Color his outfits:

21

those problems in the early cycles. The key is that problems in earlier clusters are presented as an introduction to each concept and are based on common sense and earlier grade-level experiences.

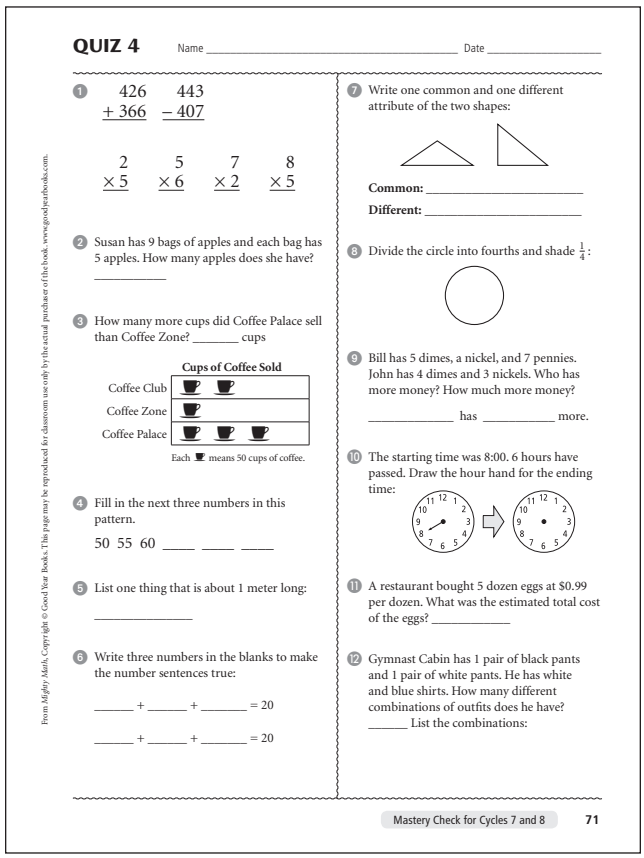
The beginning of a school year is a good time to begin using the cycles, but any time during the school year works. The problems are aligned with most textbooks. For consistent coverage of the cycles, it is a good idea to assign one page, or half a cycle, as homework for the first four days of the school week. Send the answer key to parents so they can help their children at home.

By assigning homework and encouraging parents to help their children, you expand the amount of time students spend learning the concepts and the time they spend reinforcing those concepts. Even when you can't cover more advanced concepts as thoroughly as you'd like—perhaps because you're spending more time on computation with some of your students—the cycles offer all students continued exposure to and practice in grade-appropriate math concepts.

If you use the cycles as homework assignments (one page per day), one grade's thirty cycles take about four months. You can also use the book as an intensive review for a test, such as a state-mandated test, for short periods of four to seven weeks. At a rate of one cycle per day, a fourth-grade teacher can review the fourth-grade cycles in two to three weeks.

Assessing Student Progress

Math Cycles contains thirty quizzes, which are meant to be administered after every even-numbered cycle. Below is a typical one-page quiz.



QUIZ 4 Name _____ Date _____

1. 426 + 366 = ____ ; 443 − 407 = ____

   2 × 5 = ____ ; 5 × 6 = ____ ; 7 × 2 = ____ ; 8 × 5 = ____

2. Susan has 9 bags of apples and each bag has 5 apples. How many apples does she have? _____

3. How many more cups did Coffee Palace sell than Coffee Zone? _____ cups

   Cups of Coffee Sold

Coffee Club	☕ ☕
Coffee Zone	☕
Coffee Palace	☕ ☕ ☕

   Each ☕ means 50 cups of coffee.

4. Fill in the next three numbers in this pattern.

   50 55 60 ____ ____ ____

5. List one thing that is about 1 meter long: _____

6. Write three numbers in the blanks to make the number sentences true:

   _____ + _____ + _____ = 20

   _____ + _____ + _____ = 20

7. Write one common and one different attribute of the two shapes:

   Common: _____

   Different: _____

8. Divide the circle into fourths and shade $\frac{1}{4}$:

9. Bill has 5 dimes, a nickel, and 7 pennies. John has 4 dimes and 3 nickels. Who has more money? How much more money?

   _____ has _____ more.

10. The starting time was 8:00. 6 hours have passed. Draw the hour hand for the ending time:

11. A restaurant bought 5 dozen eggs at $0.99 per dozen. What was the estimated total cost of the eggs? _____

12. Gymnast Cabin has 1 pair of black pants and 1 pair of white pants. He has white and blue shirts. How many different combinations of outfits does he have? _____ List the combinations:

Mastery Check for Cycles 7 and 8 71

If you work through two cycles per week, you can administer the quiz on the last day of every week to determine students' mastery of the concepts. For example, your first week of using *Math Cycles* would look like this:

Monday: Cycle 1, Problems 1–6

Tuesday: Cycle 1, Problems 7–12

Wednesday: Cycle 2, Problems 1–6

Thursday: Cycle 2, Problems 7–12

Friday: Quiz 1

An Answer Key for the quizzes starts on page 205. After students take a quiz, use the Progression Chart: Quizzes on page 220 to record and analyze their quiz results over a period of time and find their strengths and weaknesses among the twelve clusters. You can then offer remedial instruction in particular clusters based on your findings. Reviewing all of the problems in sequence is good remedial instruction for a cluster.

Transitioning from Grade 3 Cycles to Grade 4 Cycles

The transition from the third-grade cycles to the fourth-grade cycles is a continued step upward, with minor changes to the content of the problems. Fourth-grade teachers who want to begin with the fourth-grade materials will find that the multiplication and division number facts are systematically reintroduced so students can review and achieve fluency and mastery, if they have not yet done so. The only major difference between each grade's cycles is in Cluster 10. In Grade 3's cycles, Cluster 10 is Time. In Grade 4, this cluster becomes Properties of Number Operations, which deals with the relationships of number operations and number theories.

Using *Math Cycles* for Test Preparation

Math Cycles is an excellent source of review and preparation for any standardized test for Grades 3 and 4 because the cycles cover all areas of third- and fourth-grade math and the problems are based on test items from a number of state math tests. Even when class time is short, the cycles offer students exposure to and reinforcement of all areas of math for their grade level. Use the quizzes as a diagnostic tool to discover students' strengths and weaknesses in math concepts.

In addition, but just as important, you will find the problems in *Math Cycles* a great help when you have to make up math tests for your students. The sheer number of problems allow you the flexibility to adapt items for your students' needs.

As you work through the cycles with your students, *Math Cycles* will become an invaluable part of your math curriculum. With practice and reinforcement, your students will make these grade-appropriate math concepts their own.

Grade 3

1

A.

$$\begin{array}{rrr} 6 & 60 & 600 \\ +\,6 & +\,60 & +\,600 \end{array}$$

B.

$$\begin{array}{rrr} 12 & 120 & 1{,}200 \\ -\,6 & -\,60 & -\,600 \end{array}$$

C.

$$\begin{array}{rrr} 7 & 70 & 1{,}300 \\ +\,9 & +\,90 & -\,900 \end{array}$$

2

A. A company has 4 trucks. Each truck has 18 wheels. How many wheels is this in all?

B. A company has 6 trucks. Each truck has 18 wheels. How many wheels is this in all?

C. A company has 8 trucks. Each truck has 18 wheels. How many wheels is this in all?

3

The time line shows part of Ming's life.

A. How old was Ming when he came to the United States? _____

B. How old was Ming when he moved to Ohio? _____

4

A. Draw the next 3 shapes in the pattern.

△○○△○○ ____ ____ ____

B. Draw the next 3 shapes in the pattern.

△▽△○△▽ ____ ____ ____

C. Draw the next 3 shapes in the pattern.

△△▽△△ ____ ____ ____

5

Using a ruler, draw the following line segments starting at the ⋆ :

A. 1 inch
⋆

B. 2 inches
⋆

C. 3 inches
⋆

D. $1\frac{1}{2}$ inches
⋆

6

The number 30 is equivalent to 20 + 10, 40 – 10, and 5 × 6.

A. Write 4 equivalent forms for 12:

_____ _____

_____ _____

B. Write 4 equivalent forms for 36:

_____ _____

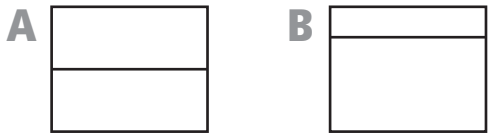
_____ _____

7

Write the properties and names of shapes A and B:

	A	B
Number of sides		
Number of angles		
Name		

8



Which one of the rectangles is not divided into halves? _____

Explain your choice:

9

A. Jim has 3 dimes and 2 nickels. Does he have enough money to buy a candy bar for 35¢? _____ Explain:

B. Sue has 1 quarter, 3 dimes, and 2 nickels. Does she have enough money to buy a candy bar for 85¢? _____ Explain:

10

Here is part of a calendar.

June

Sun	Mon	Tues	Wed	Thur	Fri	Sat
		1	2	3	4	5
6	7	8				

What will be the date on the third Friday in June?

11

A. Which is a reasonable estimate for the sum of 312 and 108?

a. 400
b. 500
c. 600

B. Which is a reasonable estimate for the sum of 390 and 188?

a. 400
b. 500
c. 600

12

You can make a sundae with only one flavor of ice cream and one topping.

Flavors	Toppings
chocolate	peanuts
vanilla	cherry

How many different sundaes can you make? _____ List them: