

# Elementary Mathematics

## Grade 2

As students develop strategies for learning basic facts, for solving problems, and for communicating, children discover that memory is a powerful tool and they grow to appreciate the variety of ways people solve problems.

### Learning Opportunities

Three main components of Mathland are used together. Students need the opportunity to practice skills and concepts taught in previous grades and to have an introduction to new skills and concepts.

#### **Basic skill practice and mental math**

(Daily Tune-ups and other games and resources)

#### **Mini Lesson, review of skills and concepts already taught or an introduction to new skills and concepts**

(Skill Power does a great job of keeping students working on skills taught in previous grades. Skill Power also provides new skills and concepts that can be introduced as a mini lesson. There may be times when teachers substitute for some Skill Power pages based on the needs of their students and the quality of the page.)

#### **Guided Lesson, Developing a deeper understanding of a mathematical concept through hands on exploration and problem solving**

(The Guidebook provides many rich opportunities for students to develop mathematical ideas. Some lessons may be extended or shortened, based on the needs of the students.)

## Standards

### Fields of Knowledge: Science, Mathematics, Technology

#### *Mathematical Understanding*

**7.6** Arithmetic, Number and Operation Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer.

**7.7** Geometric and Measurement Concepts: Students use geometric and measurement concepts.

**7.8** Function and Algebra Concepts: Students use function and algebra concepts.

**7.9** Statistics and Probability Concepts: Students use statistics and probability concepts.

#### *Mathematical Problem Solving and Reasoning*

**7.10** Applications: Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems.

### Vital Results: Reasoning and Problem Solving

#### *Problem Solving*

**2.5** Mathematics Dimensions: Students produce solutions to mathematical problems requiring decisions about approach and presentation, so that final drafts are appropriate in terms of these dimensions.

## **Content Knowledge and Skills**

### **7.6 Arithmetic, Number and Operation Concepts**

- Count, recognize, sequence, write, and compare whole numbers
- Develop algorithms to solve problems
- Use simple fractions to solve problems
- Explore beginning multiplication and division

### **7.7 Geometric and Measurement Concepts**

- Explore properties of 2 and 3 dimensional figures
- Demonstrate the attributes of length, width, weight, and girth
- Estimate and compute measurements
- Investigate, combining, subdividing, and changing shapes

### **7.8 Function and Algebra Concepts**

- Exploring relationships of operations
- Find the missing addend
- Using models, rules, and tables to show mathematical relationships
- Recognize, describe, create, and extend patterns

### **7.9 Statistics and Probability Concepts**

- Collect, organize, describe, and interpret data
- Interpret Venn diagrams using 2 or 3 sets
- Use a table or chart to solve a problem
- Predicting likely and unlikely outcomes based on collected data

### **7.10 Application of Mathematical Problem Solving and Reasoning**

- Solve problems by reasoning mathematically with concepts and skills excepted in grade two
- Determine what the question, or problem is really asking
- Create and using a variety of strategies
- Make connections between concepts in order to solve problems
- Extend concepts and generalizing results to other situations
- Make sensible, reasonable estimates

## Assessment Criteria

By the end of grade two, *students will be able to...*

### **7.6 Arithmetic, Number and Operation Concepts**

1. ...identify odd and even numbers
2. ...identify the place value of each digit in a 3-digit number, write it in expanded notation,
3. identify equivalent names for numbers (e.g.  $24 = 12 + 12$ ,  $24 = 30 - 6$ )
4. ...identify, read, and write numbers through 999
5. ...order numbers to 999 and identify missing numbers in a sequence
6. ...use greater than ( $>$ ), less than ( $<$ ), and equal to ( $=$ ) when comparing two numbers through 999
7. ...read and write through  $20^{\text{th}}$ , using an ordered set of numbers
8. ...count orally and write by twos, fives, and tens to 100 and recognize patterns (growing patterns and repeating pattern in the ones digit)
9. ...know basic addition facts, sums to 20, and the corresponding subtraction facts
10. ...use a variety of strategies to add 2 digit numbers: expanded notation ( $56+35=50+6+30+6=92$ ), base 10 blocks (modeling with), lead digit (adding larger numbers first) traditional and invented algorithms (any method for computing the correct answer that is efficient and generalizable)
11. ...understand and create fact families (e.g.  $2+3=5$ ,  $3+2=5$ ,  $5-3=2$ ,  $5-2=3$ )
12. ...know when an estimate is close enough and use it to find the sum or difference of numbers
13. ...identify the part of a set and/or region that represents one-half, one-third, one-fourth and write the corresponding fraction
14. ...count and state the value of a collection of coins to \$2.00
15. ...know exchanges among coins (e.g. 1 dime equals 2 nickels)
16. ...use the cent symbol ( $\text{¢}$ ), dollar sign ( $\text{\$}$ ) and decimal point ( $\text{\.}$ ) correctly
17. ...use mental math strategies to do a variety of number operations (e.g.  $23+36=59$ ,  $15-7=8$ )
18. ...use arithmetic, number and operations concepts above to represent, explain and solve problems
19. ...have a working vocabulary that consists of the following terms: digit, estimate, equivalent names, even numbers, odd numbers, mental math, addition fact, subtraction fact, sum, difference, equal to, greater than, less than, equal, two-digit number, place value, ones place, tens place, hundreds place, whole, part, half, fraction, numerator, denominator, decimal point

### 7.7 Geometric and Measurement Concepts

1. ...identify, classify, and name geometric shapes ( triangle, rectangle, circle, oval, square, trapezoid, rhombus, hexagon) by specific attributes and properties
2. ...recognize and identify line of symmetry in geometric figures and real life
3. ...use manipulatives to experiment with, and demonstrate simple understanding of congruence and similarity
4. ...estimate and measure using standard and nonstandard units
5. ...tell, write, and set the time on an analog clock to the hour, half hour, quarter hour, and five minutes
6. ...know the days of the week, months of the year and the seasons in order and know what comes before and after
7. ...use a variety of formats to write the date (04/08/03)
8. ...use two-dimensional coordinate system (x and y axes, quadrant 1)
9. ...use the geometry and measurement concepts to represent, explain and solve problems
10. ...have a working vocabulary that consist of the following terms: meter stick, yard stick, inch , foot, yard, half inch, thermometer, hour hand, minute hand, calendar, circle, oval, rectangle, square, hexagon, triangle, rhombus, trapezoid, angle, vertices, face, edge, point, cube, rectangular prism, cylinder, sphere, pyramid, symmetry, lines of symmetry, length, width, height, weight, distance, estimate, analog clock, digital clock

### 7.8 Function and Algebra Concepts

1. ...use the concept of variable to solve for missing addends and subtrahends (e.g.  $n-4=7$ ,  $6 + n + 3 = 13$ ,  $5 + n = 6 + 3$  )
2. ...create and extend a wide variety of patterns by identifying a rule that generates the pattern
3. ...use the hundreds chart to identify number patterns
4. ...find patterns for counting by 10's from any number
5. ...find and predict patterns that result from counting by any single digit number
6. ...identify a piece of a pattern
7. ...demonstrate understanding of the inverse relationship between addition and subtraction
8. ...demonstrate understanding of equality ( balancing number sentences such as  $3+4=5=2$  )
9. ...write number sentences to match problems and write problems to match number sentences

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- 10....use the pattern and algebra concepts above to represent, explain and solve problems
- 11....have a working vocabulary that consist of the following terms: repeating pattern, growing pattern, predict, extend, rule, odd, even, double, triple, half, function machine

### **7.9 Statistics and Probability Concepts**

1. ...tally and graph results of a simple survey
2. ...display data using tallies, line plots, pictographs, bar graphs, and data tables
3. ...use data to answer questions accurately
4. ...make predictions based on a data set
5. ...sort, classify, count, and arrange real and/or pictorial objects
6. ...record data from a simple probability experiments and use the data to predict which of the two events is more likely to occur if the experiment is repeated
7. ...use the statistics and probability concepts to explain, represent and solve problems
8. ...have a working vocabulary that consists of the following terms: alike, different, data, collect, organize, sort, chart, graph, tally, survey, bar graph, line plot, pictograph

### **7.10 Assessment to be integrated in the other standards**

#### **Reasoning and Problem Solving**

##### **2.5 Mathematics Dimensions**

Approach and Reasoning	Level 3
Connections	Level 2
Solution	Level 3
Mathematical Language	Level 2
Mathematical Representation	Level 3
Documentation	Level 3

These levels are based the Vermont State Problem Solving Rubric and standards set by Vermont teachers.

**Assessment Portfolio Requirements** Scored using the Vermont State Scoring Guide and given a performance level for each problem

- One Number and operation problem 7.6
- One Geometry or Measurement problem 7.7
- One Algebra problem 7.8
- One Statistics or Probability problem 7.9

## **Resources**

Grade two Mathland  
  Guidebook  
  Teacher's Resource manual  
  Daily Tune-Ups  
  Skill power  
  Arithmetwists  
  Smart Strands  
Mathland materials kit  
Calculators