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# Elementary Mathematics

## Grade 3

By understanding the connections that exist within mathematical strands as well as between them, students become increasingly flexible in applying mathematical knowledge.

### 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**

- Use multiplication and division to solve problems
- Explore the relationship between multiplication and division
- Describe numbers in relation to other numbers
- Explore operations with fractions

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

- Measure objects to find the perimeter, area, and volume
- Choose a reasonable measurement unit for a given situation
- Use properties to classify shapes
- Solving problems that involve time

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

- Find missing numbers and symbols in equations
- Apply values to variables
- Recognizing patterns in multiplication

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

- Make and interpret graphs and charts
- Formulate and solving problems by collecting and analyzing data
- Carrying out simple probability experiments
- Use data to make predictions

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

- Solving problems by reasoning mathematically with concepts and skills excepted in grade three
- Determining what the question, or problem is really asking
- Creating and using a variety of strategies
- Making connections between concepts in order to solve problems
- Extending concepts and generalize results to other situations
- Making sensible, reasonable estimates

## Assessment Criteria

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

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

1. ...know addition facts, sums to 20 and the corresponding subtraction facts to 20
2. ...know and create related equations / fact families (e.g.  $21+39=60$ ,  $39+21=60$ ,  $60-21=39$ ,  $60-39=21$ )
3. ...identify the place value of each digit in a 4-digit number, write it in expanded form ( $3,428=3,000+400+20+8$ ) and identify equivalent names for number ( $3,428=2,000+1,000+200+30+2$  or  $3,500-72=3,428$ )
4. ...count and write by tens or hundreds starting from any given number ( $28,38,48...$  or  $743,843,943,...$ )
5. ...take numbers apart and represent them in a variety of ways (e.g.  $26=20+6$ ,  $26=10+10+6$ ,  $26=30-4$ )
6. ...add and subtract whole numbers, up to 3- digits, using a variety of approaches (e.g. mental math, traditional and nontraditional algorithms and calculators)(with and without regrouping)
7. ...name the tens, hundreds, or thousands before or after a given number
8. ...read and write numbers to 10,000
9. ...compare and order quantities using the correct symbols  $<$  ,  $>$  ,  $=$
- 10....model an understanding of the concept of multiplication as repeated addition, groups of objects and geometrically as an array
- 11....model the relationship between multiplication and division facts
- 12....create, model, and solve story problems involving addition, subtraction, multiplication and division
- 13....use common fractions to identify parts of sets or regions (e.g.  $1/3$  of the marbles or  $1/8$  of the pie)
- 14....describe and represent quantities by using common fractions (e.g. thirds, fourths, halves, etc.)
- 15....represent benchmark fractions ( $1/4$ ,  $1/2$ ,  $3/4$ ) with models, diagrams, explanations or placing fraction on a number line
- 16....know when estimate is appropriate and estimate within reason
17. Recognize the inverse relationship between addition and subtraction and use that knowledge to solve for missing numbers to 1000 (e.g.  $460+220=680$ ,  $680-___=460$ )
- 18....use dollar and cents notation correctly
- 19....give change for up to \$10.00
- 20....count coins and bills and group them for more efficient counting up to \$100.00
- 21...apply order of operations, with and without parenthesis
- 22....use arithmetic, number and operation concepts to represent, explain and solve problems

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23...have a working vocabulary that consist of the following terms: equal to, greater than, less than, fact family, decimal point, dollar sign, coins, equivalent, number pattern, even number, odd number, equation, equal groups, array, factor, product, estimate, division, divisor, remainder, ones, tens, hundreds, thousands, four-digit number, numerator, denominator, sum, difference

## 7.7 Geometric and Measurement Concepts

1. ...draw a two-dimensional representation of a simple three-dimensional figure that preserves its significant features from different perspectives
2. ...identify and draw points, lines, line segments and angles
3. ...identify, classify and name geometric figures such as a cube, rectangular prism, pyramid, cone, cylinder, sphere, parallelogram, trapezoid, square, triangle, rectangle, hexagon, and rhombus by specific attributes (e.g. 2-dimensional, 3-dimensioal, angle size, sides, symmetry, etc.)
4. ...determine the perimeter of polygons
5. determine the area of rectangles using a variety of models or manipulatives.
6. ...identify and describe congruence, similarity and symmetry in geometric figures
7. ...use two coordinates to locate a point on a grid
8. ...
9. ...use and identify the relationship between inches, feet, and yards
- 10...select and use an appropriate tool and unit with which to measure
11. ...estimate measurement and use actual standard and metric measuring devices (e.g. scales, thermometers, rulers) to record measurement
- 12...measure to an accuracy of  $\frac{1}{2}$  inch, 1 cm
13. ...use accurate abbreviations and symbols in measurement (e.g. in., ft.,yd.,a.m.,p.m.)
- 14...tell, write, and set time to the nearest minute
- 15...determines elapsed and accrued time to the  $\frac{1}{4}$  hour
- 16...use a scale on a map to determine distance
- 17...identify equivalent periods of time including relationships among days, months, years, minutes, hours
- 18...solves problems using a two-dimensional coordinate system (x and y axes) to locate and describe positions on a map **Not in mathland**
- 19...use the geometry and measurement concepts above to represent, explain, and solve problems
- 20...have a working vocabulary that consists of the following terms: perimeter, centimeter, area, meter, yard, estimate, square foot, square, inch, volume, cube, rectangular prism, pyramid, cone, cylinder, sphere, parallelogram, trapezoid, square, triangle, rectangle, hexagon, rhombus, line of symmetry, 3-dimensioal, solid, face, scale,, point, line, angle, 2-dimensioal, parallel, congruent, parallelogram, edge, vertex, coordinates, map scale, analog clock, digital clock

## 7.8 Function and Algebra Concepts

- 1...recognize a pattern, generalize that pattern(name the rule) and apply it in a variety of contexts
2. ...identify a linear pattern as a constant rate of change (growing pattern, plant grows 2 inches every month)
- 3...create and use tables / charts as a technique for describing, analyzing and reporting patterns
- 4...know the implications of changing the value of one side of an equal relationship (e.g.  $4 \times 3 = 6 + 6$ ,  $4 \times 3 - 2 = 6 + 6 - 2$ )
- 5...use the concept of variable to find a missing addends and subtrahends
- 6...use the conceptual understanding of equality by solving one-step equations involving whole number addition or subtraction
- 7...recognize the repeating unit in a linear pattern and identify the rule for continuing the pattern
- 8...solve the rule in a function machine and fill in the missing numbers
- 9...use the patterns and algebra concepts above to represent, explain, and solve problems
- 10...have a working vocabulary that consists of the following terms: predict, number pattern, skip count, even number, odd number, array, rule, extend, variable

## 7.9 Statistics and Probability Concepts

1. ...read and interpret data from a variety of representations (e.g. pictographs, bar graphs, line plots, Venn diagrams, tables, and charts)
2. ...collect, organize and display data with appropriate representations (pictographs, bar graphs, line plots, Venn diagrams, tables, and charts)
3. ...make predictions based on a set of data
4. ...create and conduct a survey
5. ...determine patterns, trends, and distribution of data by using mode (most frequent), least frequent, largest, smallest
6. ...conduct a probability experiment with concrete objects, record and interpret the outcomes
7. ...use the probability and statistics concepts above to represent, explain, and solve problems
8. ...have a working vocabulary that consists of the following terms: compare, data, collect, organize, sort, chart, graph, tally, survey, bar graph, prediction, line plot, Venn diagram, range, middle value, horizontal bar graph, double bar graph, frequency table, even, certain, uncertain, likely, unlikely, never

## 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. **Not set for Grade 3. Use these until Grade 3 has been set.**

**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
- One group problem from any standard

### **Assessment Materials**

- Daily Tune-up reviews
- Mathland unit tests
- Portfolio Pieces
- Quarterly computational checks (optional)
- Observations
- Sample student work

### **Resources**

Grade Three Mathland

Guidebook

Teacher's Resource manual

Daily Tune-Ups

Skill power

Arithmetwists

Smart Strands

Mathland materials kit

Calcuators