

A Correlation of

SCOTT FORESMAN ■ ADDISON WESLEY

Mathematics

to the

**New York
Archdiocese**

**Essential Learnings for Mathematics
Grades K-6**



O/M-151

Introduction

This document demonstrates the high degree of success students will achieve when using **Scott Foresman – Addison Wesley Mathematics** in meeting the objectives of *the New York Archdiocese Essential Learnings for Mathematics*. Correlation page references are to the Teacher Edition, which contains facsimile Pupil Edition pages.

Scott Foresman – Addison Wesley Mathematics was carefully developed to reflect the specific needs of students and teachers at every grade level, while maintaining an overall primary goal: to have math make sense from every perspective. This program is based on scientific research that describes how children learn mathematics well and on classroom-based evidence that validates proven reliability.

● Reaching All Learners

Scott Foresman – Addison Wesley Mathematics addresses the needs of every student through structured instruction that makes concepts easier for students to grasp. Lessons provide step-by-step examples that show students how to think about and solve the problem. Built-in leveled practice in every lesson allows the teacher to customize instruction to match students' abilities. Reaching All Learners, featured in the Teacher Edition, helps teachers meet the diverse needs of the classroom with fun and stimulating activities that are easy to incorporate directly into the lesson plan.

● Test Prep

Scott Foresman - Addison Wesley Mathematics builds understanding through connections to prior knowledge, math strands, other subjects and the real world. It provides practice for maximum results and offers assessment in a variety of ways. Besides carefully placed reviews at the end of each Section, an important Test Prep strand runs throughout the program. Writing exercises prepare students for open-ended and short-or extended-response questions on state and national tests. Spiral review in a test format help students keep their test-taking skills sharp.

● Priority on problem solving:

Problem-solving instruction is systematic and explicit. Reading connections help children with problem-solving skills and strategies for math. Reading for Math Success encourages students to use the reading skills and strategies they already know to solve math problems.

● Instructional Support

In the Teacher Edition, the Lesson Planner provides an easy, at-a-glance planning tool. It identifies objectives, math understandings, focus questions, vocabulary, and resources for each lesson in the chapter. Professional Development at the beginning of each chapter in the Teacher Edition includes a Skills Trace as well as Math Background and Teaching Tips for each section in the chapter.

Ancillaries help to reach all learners with practice, problem solving, hands-on math, language support, assessment and teacher support. Technology resources for both the student and the teacher provide a whole new dimension to math instruction by helping to create motivating and engaging lessons.

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**Scott Foresman – Addison Wesley Mathematics
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Kindergarten

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Recognize geometric shapes in pictures and real life.**
K: 197A-197B, 197-198, 199A-199B, 199-200, 201A-201B, 201-202, 203A-203B, 203-204, 205A-205B, 205-206
- **Classify information.**
K: 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34
- **Recognize, copy, create and extend patterns.**
K: 35A-35B, 35-36, 37A-37B, 37-38, 39A-39B, 39-40, 41A-41B, 41-42, 43A-43B, 43-44, 45A-45B, 45-46

Key Idea 2

NUMBER AND NUMERATION

2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES

Students will:

- **Count up to 20.**
K: 53A-53B, 53-54, 57A-57B, 57-58, 77A-77B, 77-78, 79A-79B, 79-80, 83A-83B, 83-84, 103A-103B, 103-104

- **Explore higher counting skills.**
K: 115A-115B, 115-116, 289A-289B, 289-290
- **Understand that the last number they say in counting tells them how many they have.**
K: 53A-53B, 53-54, 57A-57B, 57-58, 77A-77B, 77-78, 79A-79B, 79-80, 83A-83B, 83-84, 103A-103B, 103-104, 115A-115B, 115-116
- **Further their understanding of the calendar.**
K: 161A-161B, 161-162, 163A-163B, 163-164, 165A-165B, 165-166, 167A-167B, 167-168
- **Create groups of one, two, and three.**
K: 55A-55B, 55-56
- **Classify objects according to their characteristics, such as triangle, tricycle.**
K: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18
- **Understand that objects can be sorted according to their properties.**
K: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18
- **Use ordinal numbers, e.g. first, second, third, etc.**
K: 69A-69B, 69-70, 93A-93B, 93-94
- **Demonstrate one-to-one relationship.**
K: 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34
- **Order objects according to size or specified pattern.**
K: 18, 37A-37B, 37-38, 39A-39B, 39-40
- **Use mathematical vocabulary.**
K: 23-24, 49-50, 73-74, 99-100, 129-130, 157-158, 193-194, 221-222, 241-242, 261-262, 283-284, 301-302
- **Understand that a whole can be divided into equal parts.**
K: 213A-213B, 213-214, 215A-215B, 215-216

**Scott Foresman – Addison Wesley Mathematics
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Grade One

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjecture, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Participate in a large group learning situation in which data is collected, organized into tables, charts and graphs and generalizations/conclusions are made.**
1: 307B, 309B, 311B, 313B
- **Work in cooperative learning groups to interpret data from a picture/diagram graph or chart in order to solve problems.**
1: 307B, 309B, 311B, 313B
- **Create real life stories to correspond to pictures/diagrams in order to solve problems. Explain their solution process.**
1: 1P, 43L, 89L, 123L, 155L, 203L, 239L, 279L, 329L, 363L, 415L, 457L
- **Solve word problems presented orally and in writing using a variety of problem solving strategies.**
1: 7A-7B, 7-8, 21A-21B, 21-22, 33A-33B, 33-34, 57A-57B, 57-58, 71A-71B, 71-72, 79A-79B, 79-80, 99A-99B, 99-100, 111A-111B, 111-112, 113-113B, 113-114, 133A-133B, 133-134, 143A-143B, 143-144, 145A-145B, 145-146, 177A-177B, 177-178, 191A-191B, 191-192, 193A-193B, 193-194, 215A-215B, 215-216, 223A-223B, 223-224, 229A-229B, 229-230, 251A-251B, 251-252, 261A-261B, 261-262, 269A-269B, 269-270, 291A-291B, 291-292, 317A-317B, 317-318, 319A-319B, 319-320, 339A-339B, 339-340, 351A-351B, 351-352, 353A-353B, 353-354, 369A-369B, 369-370, 379A-379B, 379-380, 405A-405B, 405-406, 431A-431B, 431-432, 445A-445B, 445-446, 447A-447B, 447-448, 467A-467B, 467-468, 481A-481B, 481-482, 483A-483B, 483-484

- **Choose the correct operation to solve a problem.**
1: 71A-71B, 71-72, 143A-143B, 143-144
- **Write number sentences/equations for word and picture problems presented orally and in writing.**
1: 57A-57B, 57-58
- **Solve multiple-step problems, and explain orally the thinking strategies used.**
1: 445A-445B, 445-446
- **Identify patterns in sequence of number, objects, letters and geometric shapes and extend the patterns. Explain their understanding of the patterns found and apply to mathematical situations.**
1: 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Develop original pattern problems for others to solve.**
1: 5A-5B, 5-6
- **Use visual patterns in creative art projects and models.**
1: 3A-3B, 3-4, 5A-5B, 5-6
- **Use models, facts and relationships to draw conclusions about mathematics and explain their thinking.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Identify necessary/unnecessary information in word problems.**
1: 99A-99B, 99-100
- **Estimate reasonable answers and justify solutions.**
1: 141A-141B, 141-142, 249A-249B, 249-250, 439A-439B, 439-440
- **Order events in proper time sequences.**
1: 219A-219B, 219-220
- **Solve problems that have more than one correct solution.**
1: 21A-21B, 21-22
- **Use logical reasoning to reach simple conclusions.**
1: 177A-177B, 177-178

Key Idea 2**NUMBER AND NUMERATION**

2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Use manipulatives and whole numbers to count, order, measure distance and identify location.**
1: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18, 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 241A-241B, 241-242, 267A-267B, 267-268, 315A-315B, 315-316, 317A-317B, 317-318
- **Orally express an understanding of ordinal numbers to tenth position.**
1: 267A-267B, 267-268
- **Use concrete and pictorial models to represent numbers and number relationships.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Express number value as a word and as a numeral.**
1: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18
- **Demonstrate an understanding of place value (tens, ones) using manipulatives.**
1: 281A-281B, 281-282, 283A-283B, 283-284, 284A-284B, 284-285, 287A-287B, 287-288
- **Read and write whole numbers.**
1: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18, 241A-241B, 241-242
- **Participate in daily oral counting drills.**
1: 243A-243B, 243-244, 247A-247B, 247-248, 257A-257B, 257-258
- **Explore characteristics of even/odd numbers using manipulatives, drawings, and numerical symbols.**
1: 265A-265B, 265-266

- **Relate counting and grouping using manipulatives.**
1: 243A-243B, 243-244, 247A-247B, 247-248, 249A-249B, 249-250, 257A-257B, 257-258
- **Use number lines and manipulatives to compare and order numbers.**
1: 29A-29B, 29-30, 31A-31B, 31-32, 297A-297B, 297-298, 301A-301B, 301-30
- **Use manipulatives, diagrams, models and drawings to demonstrate an understanding of greater than, less than and equal.**
1: 297A-297B, 297-298
- **Use coins and play money to show how numbers are related to money.**
1: 331A-331B, 331-332, 333A-333B, 333-334, 335A-335B, 335-336, 337A-337B, 337-338, 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348
- **Use concrete objects to identify halves, thirds and fourths.**
1: 183A-183B, 183-184
- **Conceptualize fractions as part of a whole.**
1: 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186
- **Use a calculator or computer to explore numbers,**
1: 36, 74, 128, 168, 204, 240, 284, 334, 384, 420, 460, 494
- **Recognize and create sets that have a 1-to-1 correspondence.**
1: 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18
- **Compare groups of objects for relative quantity.**
1: 295A-295B, 295-296, 297A-297B, 297-298
- **Explore the concept of rounding.**
1: preparation: 249A-249B, 249-250

Key Idea 3**OPERATIONS**

3. Students use mathematical operations and relationships to understand mathematics.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Conceptualize addition as combining two sets of objects.**
1: 45A-45B, 45-46
- **Conceptualize subtraction as removing a group of objects from a set.**
1: 61A-61B, 61-62
- **Demonstrate mastery of basic addition and subtraction facts up to 18.**
1: 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130, 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440
- **Use the number line to count forward and backwards to show addition and subtraction.**
1: 97A-97B, 97-98, 125A-125B, 125-126
- **Recognize plus and minus signs.**
1: 53A-53B, 53-54, 57A-57B, 57-58, 69A-69B, 69-70
- **Use manipulatives and diagrams to demonstrate the relationship between addition and subtraction.**
1: 141A-141B, 141-142
- **Express the relationships of addition and subtraction in fact families to demonstrate the commutative property of addition and the identity property of zero.**
1: 137A-137B, 137-138, 139-139B, 139-140, 141A-141B, 141-142
- **Develop strategies for selecting the appropriate operation required to solve a problem.**
1: 71A-71B, 71-72, 143A-143B, 143-144

- **Recognize and write equations presented in both horizontal and vertical formats.**
1: preparation: 53A-53B, 53-54, 57A-57B, 57-58, 65A-65B, 65-66, 69A-69B, 69-70
- **Solve addition and subtraction problems that are presented orally.**
1: 45A-45B, 45-46, 61A-61B, 61-62
- **Add and subtract money (up to two digit amounts) using cent sign.**
1: preparation: 345A-345B, 345-346, 353A-353B, 353-354
- **Express orally and in writing an understanding of the inverse relationship between addition and subtraction and apply this relationship in checking addition and subtraction solutions.**
1: 141A-141B, 141-142, 439A-439B, 439-440
- **Add and subtract two digit numbers without regrouping.**
1: 459A-459B, 459-460, 461A-461B, 461-462, 463A-463B, 463-464, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476
- **Add and subtract with and without visual aids.**
1: 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130, 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440, 459A-459B, 459-460, 461A-461B, 461-462, 463A-463B, 463-464, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476
- **Solve equations with missing addends, minuends, and subtrahends.**
1: preparation: 53A-53B, 53-54, 57A-57B, 57-58, 65A-65B, 65-66, 69A-69B, 69-70
- **Create visual demonstrations of addition and subtraction problems.**
1: 111A-111B, 111-112, 431A-431B, 431-432, 481A-481B, 481-482
- **Participate in frequent mental drills to review basic addition and subtraction facts.**
1: 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130, 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440

- **Use concrete and pictorial models to explore multiplication and division.**
1: preparation: 247A-247B, 247-248, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Write and draw number stories relating to addition and subtraction.**
1: 1P, 43L, 89L, 123L, 415L, 457L
- **Explain and demonstrate the strategies used to learn addition and subtraction.**
1: 45A-45B, 45-46, 61A-61B, 61-62, 75A-75B, 75-76
- **Add doubles and doubles plus one.**
1: 103A-103B, 103-104, 105A-105B, 105-106, 417A-417B, 417-418, 419A-419B, 419-420
- **Add a list of three numbers (1 digit and 2 digit numbers).**
1: 427A-427B, 427-428
- **Explore the concept of regrouping in addition and subtraction.**
1: 465A-465B, 465-466, 477A-477B, 477-478
- **Solve problems requiring multiple operations.**
1: 445A-445B, 445-446

Key Idea 4

MODELING/MULTIPLE REPRESENTATIONS

4. Students use mathematical modeling/multiple representations to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use concrete materials and drawings to model spatial relationships and mathematical understandings.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Use a bar graph to demonstrate comparisons and differences.**
1: 311A-311B, 311-312

- **Construct tables, charts, and graphs to display, analyze, and explain real world data.**
1: 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314
- **Use multiple representations as tools to explain the operation of everyday procedures as well as mathematical operations and relationships.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Use variables to predict changes over time.**
1: preparation: 309-310, 311-312, 313-314
- **Use physical materials, pictures, diagrams, drama, and artistic expression to explain mathematical ideas and processes to demonstrate geometric concepts, to solve problems, and to derive conclusions.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Use a literary work to explain a mathematical concept.**
1: 1Q-1P, 43K-43L, 89K-89L, 123K-123L, 155K-155L, 203K-203L, 239K-239L, 279K-279L, 329K-329L, 363K-363L, 425K-415L, 457K-457L
- **Translate drawings and physical representations into mathematical representations/language.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Relate mathematics and music through songs.**
1: 200
- **Model real life purchasing using coins and dollars.**
1: 353A-353B, 353-354
- **Use cubes, tile squares, tangrams and geoboards to copy and build two- and three-dimensional geometric designs/shapes.**
1: 157B, 158, 161B
- **Use number lines to represent mathematical operations and numerical relationships.**
1: 97A-97B, 97-98, 125A-125B, 125-126, 299A-299B, 299-300

- **Use simulations, manipulatives, pictures and diagrams to represent mathematical operations and relationships.**
1: 11-12, 13-14, 15-16, 17-18, 25-26, 27-28, 47-48, 63-64, 75-76, 97-98, 125-126, 245-246, 291-292, 309-310, 311-312, 313-314, 431-432, 481-482
- **Use height, weight, and hand size to predict changes over time.**
1: related material: 371A-371B, 371-372, 373A-373B, 373-374, 391A-391B, 391-392
- **Use photographs of family members to display growth and change and to predict future changes.**
1: related material: 371A-371B, 371-372, 373A-373B, 373-374
- **Use classroom objects, architecture and measurements to explain geometric concepts.**
1: 157A-157B, 157-158, 159A-159B, 159-160, 161A-161B, 161-162, 165A-165B, 165-166, 167A-167B, 167-168
- **Express mathematical relationships, geometric designs and problem solving through art and design.**
1: 157B, 158, 161B, 165B, 173B
- **Use geometric shapes and models to determine lines of symmetry.**
1: 171A-171B, 171-172
- **Use coins and pictures of coins to represent values of money.**
1: 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348
- **Use geometric shapes to represent fractions.**
1: 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186, 187A-187B, 187-188
- **Dramatize word problems to enhance understanding of addition and subtraction.**
1: 57A-57B, 57-58, 71A-71B, 71-72, 79A-79B, 79-80, 99A-99B, 99-100, 111A-111B, 111-112, 113-113B, 113-114, 133A-133B, 133-134, 143A-143B, 143-144, 145A-145B, 145-146, 431A-431B, 431-432, 445A-445B, 445-446, 447A-447B, 447-448, 467A-467B, 467-468, 481A-481B, 481-482, 483A-483B, 483-484
- **Create a classroom store where simple items are bought and sold, using coins and dollar bills.**
1: 347B

Key Idea 5**MEASUREMENT**

5. Students use both Metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Perform measurement activities using standard and non-standard instruments of measure framed in practical problem-solving situations.**
1: 365A-365B, 365-366, 369A-369B, 369-370, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 385A-385B, 385-386, 387A-387B, 387-388, 389A-389B, 389-390, 391A-391B, 391-392, 393A-393B, 393-394, 397A-397B, 397-398
- **Demonstrate knowledge of measuring in daily activities.**
1: 405-406, 412
- **Explore various instruments of measure.**
1: 397A-397B, 397-398
- **Measure time using various instruments.**
1: 205A-205B, 205-206, 207A-207B, 207-208, 209A-209B, 209-210, 211A-211B, 211-212
- **Use computer software to practice measuring.**
1: related material: 234
- **Measure temperature, weight and capacity using standard and non-standard units of measure.**
1: 383A-383B, 383-384, 385A-385B, 385-386, 387A-387B, 387-388, 389A-389B, 389-390, 391A-391B, 391-392, 393A-393B, 393-394, 395A-395B, 395-396
- **Describe situations and develop problems in which only estimated measurements are called for and situations in which exact measurements are required.**
1: 365-366, 371-372, 373-374, 375-376, 383-384, 389-390

- **Use instruments of measure to explore and compare the relationships between English and Metric measure/Fahrenheit and Celsius scales.**
1: 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 385A-385B, 385-386, 387A-387B, 387-388, 391A-391B, 391-392, 393A-393B, 393-394
- **Use concrete and pictorial models to develop an understanding of area/perimeter.**
1: 377A-377B, 377-378
- **Use standard and nonstandard units of measure to estimate measurement.**
1: 365-366, 371-372, 373-374, 375-376, 383-384, 389-390
- **Measure cost using coins and dollar bills, identifying which object costs more/less.**
1: 353A-353B, 353-354
- **Participate in “sing-song” rote drills to demonstrate knowledge of measurements.**
1: related material: 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 385A-385B, 385-386, 387A-387B, 387-388, 391A-391B, 391-392, 393A-393B, 393-394
- **Explore, identify and copy various geometric shapes.**
1: 157A-157B, 157-158, 159A-159B, 159-160, 161A-161B, 161-162, 165A-165B, 165-166, 167A-167B, 167-168
- **Recognize congruent and non-congruent shapes.**
1: 169A-169B, 169-170
- **Recognize symmetry in geometric shapes, in art and in common objects.**
1: 171A-171B, 171-172
- **Measure quantity and relative size using statistical charts and graphs.**
1: 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316

Key Idea 6**UNCERTAINTY**

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations

TEACHING/LEARNING STRATEGIES***Students will:***

- **Make predictions and record outcomes from problem-solving situations, explain the thinking from which the predictions evolved and compare with actual results.**
1: 369-370, 403A-403B, 403-404, 410
- **Estimate measurements of household/school areas and objects. Compare with actual measures. Discuss ways to improve accuracy of estimated measurement.**
1: 365-366, 371-372, 373-374, 375-376, 383-384, 389-390
- **Make predictions and record outcomes of science experiments via simple graphs or drawings.**
1: related material: 403A-403B, 403-404, 410
- **Explore permutations using manipulatives.**
1: preparation: 369-370
- **Recognize situations where exactness is not required.**
1: 467A-467B, 467-468
- **Develop a wide variety of estimation skills and strategies.**
1: 141A-141B, 141-142, 249A-249B, 249-250, 365-366, 371-372, 373-374, 375-376, 383-384, 389-390, 439A-439B, 439-440
- **Determine the reasonableness of results/the likelihood of results.**
1: 401A-401B, 401-402, 403A-403B, 403-404

Key Idea 7**PATTERNS/FUNCTIONS**

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Recognize, describe, extend and create a wide variety of patterns.**
1: 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Represent and describe mathematical relationships.**
1: 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Use a variety of manipulative materials and technologies to explore patterns.**
1: 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Explore and develop relationships among two- and three-dimensional geometric shapes.**
1: 161A-161B, 161-162
- **Discover patterns in nature, art, music and literature.**
1: 3B, 5B, 200
- **Identify and complete visual, geometric and number patterns.**
1: 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Write number sentences and fact families that represent described relationships between numbers and operations.**
1: 137A-137B, 137-138, 139A-139B, 139-140, 425A-425B, 425-426, 437A-437B, 437-438

- **Identify two- and three-dimensional geometric shapes by using manipulatives and drawings.**
 - **two-dimensional**: triangle, rectangle, square, pentagon, hexagon, octagon
 - **three-dimensional**: cube, cylinder, sphere, cone, rectangular prism.

1: 157A-157B, 157-158, 159A-159B, 159-160, 161A-161B, 161-162, 165A-165B, 165-166, 167A-167B, 167-168
- **Reproduce and create patterns using manipulatives, art materials, numbers, music, natural objects, technology, and two- and three-dimensional figures.**

1: 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- **Use building blocks and geoboards to model patterns.**

1: 3A-3B, 3-4, 5A-5B, 5-6
- **Use a calculator to recognize patterns in skip counting, to discover the relationship of multiplication to addition and to explore the relationship of addition to subtraction.**

1: 274
- **Recognize patterns in music, art, nature and literature.**

1: 3B, 5B, 200

**Scott Foresman – Addison Wesley Mathematics
to the
New York Archdiocese
Essential Learnings for Mathematics**

Grade Two

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Participate in cooperative learning groups to collect data, organize the data into tables, charts and graphs and draw conclusions/make generalizations based upon the data.**
2: 311B, 313B, 315B
- **Work in cooperative learning groups to interpret data from a picture, diagram, graph or chart in order to solve problems.**
2: 311B, 313B, 315B
- **Work in teams to create real life situations and corresponding pictures and/or diagrams in order to solve problems.**
2: 311B, 313B, 315B
- **Use a variety of problem-solving strategies to solve word problems: which are presented both orally and in writing.**
2: 9A-9B, 9-10, 19A-19B, 19-20, 31-32, 57A-57B, 57-58, 67A-67B, 67-68, 69-70, 89A-89B, 89-90, 105A-105B, 105-106, 123-124, 155A-155B, 155-156, 161A-161B, 161-162, 163-164, 189A-189B, 189-190, 197A-197B, 197-198, 199-200, 221A-221B, 221-222, 233A-233B, 233-234, 235-236, 251A-251B, 251-252, 265A-265B, 265-266, 279-280, 311A-311B, 311-312, 327A-327B, 327-328, 329-330, 351A-351B, 351-352, 377A-377B, 377-378, 379-380, 405A-405B, 405-406, 413A-413B, 413-414, 415-416, 439A-439B, 439-440, 453A-453B, 453-454, 455-456, 479A-479B, 479-480, 487A-487B, 487-488, 489-490

- **Translate oral and written word problems into numerical expressions and numerical expressions into word problems.**
2: 9A-9B, 9-10, 17A-17B, 17-18, 57A-57B, 57-58221A-221B, 221-222, 485A-485B, 485-486
- **Choose the correct operation needed to solve a problem.**
2: 19A-19B, 19-20, 487A-487B, 487-488
- **Solve multiple-step problems, and explain orally the thinking strategies used.**
2: 377A-377B, 377-378
- **Identify patterns in sequences of numbers and/or objects and extend the patterns. Show an understanding of patterns found by applying them to mathematical situations.**
2: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468
- **Develop original pattern problems to solve.**
2: related material: 413A-413B, 413-414
- **Use visual patterns in creative art projects and models.**
2: 413B
- **Identify necessary/unnecessary information in word problems.**
2: 233A-233B, 233-234
- **Analyze a problem to determine if too much/too little information is provided.**
2: 233A-233B, 233-234
- **Estimate to determine reasonable answers and to justify solutions.**
2: 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 227A-227B, 227-228
- **Solve problems that have more than one correct solution.**
2: 89A-89B, 89-90
- **Order events in proper time sequences.**
2: related material: 301A-301B, 301-302
- **Use logical reasoning to reach simple conclusions.**
2: 265A-265B, 265-266

- **Use problem-solving strategies such as trial and error, making a list/table, drawing a diagram, looking for a pattern or word clue, experimentation, or using manipulatives.**
2: 9A-9B, 9-10, 19A-19B, 19-20, 31-32, 57A-57B, 57-58, 67A-67B, 67-68, 69-70, 89A-89B, 89-90, 105A-105B, 105-106, 123-124, 155A-155B, 155-156, 161A-161B, 161-162, 163-164, 189A-189B, 189-190, 197A-197B, 197-198, 199-200, 221A-221B, 221-222, 233A-233B, 233-234, 235-236, 251A-251B, 251-252, 265A-265B, 265-266, 279-280, 311A-311B, 311-312, 327A-327B, 327-328, 329-330, 351A-351B, 351-352, 377A-377B, 377-378, 379-380, 405A-405B, 405-406, 413A-413B, 413-414, 415-416, 439A-439B, 439-440, 453A-453B, 453-454, 455-456, 479A-479B, 479-480, 487A-487B, 487-488, 489-490

- **Solve problems and define mathematical concepts by sorting, making patterns and arrangements, and using diagrams, drawings and manipulatives.**
2: 67A-67B, 67-68, 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440, 479A-479B, 479-480

Key Idea 2

NUMBER AND NUMERATION

2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES

Students will:

- **Count, order, identify locations and measure distances using manipulatives and whole numbers.**
2: 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 95A-95B, 95-96, 101A-101B, 101-102, 103A-103B, 103-104

- **Represent numbers (whole, fractional and money) and place value using concrete and pictorial models.**
2: 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 91A-91B, 91-92, 117A-117B, 117-118, 271A-271B, 271-272, 273A-273B, 273-274

- **Demonstrate understanding of place value by writing numbers in expanded notation.**
2: 81A-81B, 81-82, 83A-83B, 83-84
- **Read and write whole numbers.**
2: 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 95A-95B, 95-96, 101A-101B, 101-102, 103A-103B, 103-104
- **Compare and order whole numbers, and fractions using number lines and manipulatives.**
2: 15A-15B, 15-16, 91A-91B, 91-92, 399A-399B, 399-400, 409A-409B, 409-410
- **Show how place value and decimals are related to money using coins and play money.**
2: 121A-121B, 121-122
- **Relate decimals to money by examining the numerical expression of dollars and cents on receipts and bills.**
2: preparation: 121A-121B, 121-122
- **Relate decimals (money) to fractions and fractions to decimals (money).**
2: preparation: 121A-121B, 121-122
- **Use a calculator to explore numbers.**
2: 36, 74, 128, 168, 204, 240, 420, 460, 494
- **Explore the concept of rounding.**
2: 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 227A-227B, 227-228

Key Idea 3**OPERATIONS**

3. Students use mathematical operations and relationships among them to understand mathematics.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Add and subtract whole numbers.**
2: 43A-43B, 43-44, 45A-45B, 45-46, 47A-47B, 47-48, 49A-49B, 49-50, 51A-51B, 51-52, 53A-53B, 53-54, 57A-57B, 57-58, 61A-61B, 61-62, 63A-63B, 63-64, 65A-65B, 65-66, 135A-135B, 135-136, 137A-137B, 137-138, 139A-139B, 139-140, 141A-141B, 141-142, 145A-145B, 145-146, 147A-147B, 147-148, 149A-149B, 149-150, 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 433A-433B, 433-434, 435A-435B, 435-436, 449A-449B, 449-450
- **Demonstrate mastery of basic addition and subtraction facts up to 20.**
2: 43A-43B, 43-44, 45A-45B, 45-46, 47A-47B, 47-48, 49A-49B, 49-50, 51A-51B, 51-52, 53A-53B, 53-54, 57A-57B, 57-58, 61A-61B, 61-62, 63A-63B, 63-64, 65A-65B, 65-66
- **Develop strategies for selecting the appropriate operation required to solve a problem.**
2: 487A-487B, 487-488
- **Demonstrate an understanding of renaming/regrouping through use of manipulatives, diagrams, and numbers.**
2: 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 211A-211B, 211-212, 213A-213B, 213-214, 215A-215B, 215-216, 217A-217B, 217-218, 225A-225B, 225-226, 227A-227B, 227-228, 229A-229B, 229-230, 231A-231B, 231-232, 433A-433B, 433-434, 435A-435B, 435-436, 449A-449B, 449-450, 451A-451B, 451-452
- **Recognize equations presented in both horizontal and vertical formats.**
2: 5A-5B, 5-6, 9A-9B, 9-10, 17A-17B, 17-18

- **Demonstrate how addition/subtraction are related to and different from each other through the use of manipulatives and diagrams.**
2: 227A-227B, 227-228
- **Express addition/subtraction relationships in fact families to demonstrate the commutative, associative and zero properties of addition.**
2: 27A-27B, 27-28, 227A-227B, 227-228
- **Express orally, and in writing, an understanding of the inverse relationship between addition and subtraction and apply this relationship in checking addition and subtraction solutions.**
2: 227A-227B, 227-228
- **Solve addition and subtraction problems that are presented orally.**
2: 43A-43B, 43-44, 45A-45B, 45-46, 47A-47B, 47-48, 49A-49B, 49-50, 51A-51B, 51-52, 53A-53B, 53-54, 57A-57B, 57-58, 61A-61B, 61-62, 63A-63B, 63-64, 65A-65B, 65-66
- **Add and subtract 2 and 3 digit numbers with and without regrouping.**
2: 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 433A-433B, 433-434, 435A-435B, 435-436, 449A-449B, 449-450
- **Solve equations with missing addends, minuends, and subtrahends.**
2: 29A-29B, 29-30
- **Participate in frequent timed mental drills to review basic addition and subtraction facts.**
2: 43A-43B, 43-44, 45A-45B, 45-46, 47A-47B, 47-48, 49A-49B, 49-50, 51A-51B, 51-52, 53A-53B, 53-54, 57A-57B, 57-58, 61A-61B, 61-62, 63A-63B, 63-64, 65A-65B, 65-66
- **Use manipulatives and diagrams to develop the multiplication algorithms.**
2: 467A-467B, 467-478, 469A-469B, 469-470, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476
- **Solve problems requiring multiple operations.**
2: 377A-377B, 377-378

Key Idea 4**MODELING/MULTIPLE REPRESENTATIONS**

4. Students use mathematical modeling/multiple representations to provide a means of presenting, communicating and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Model spatial relationships and mathematical understandings using concrete materials and drawings.**
2: 67A-67B, 67-68, 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440, 479A-479B, 479-480
- **Explain the operation of everyday procedures as well as mathematical operations and relationships using multiple representations as tools.**
2: 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440
- **Predict changes over time using variables.**
2: preparation: 323A-323B, 323-324
- **Translate drawings and physical representations into mathematical representations and/or language.**
2: 67A-67B, 67-68, 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440, 479A-479B, 479-480
- **Model real life purchasing using coins and dollars.**
2: 113B, 119A-119B, 119-120
- **Use physical materials, pictures, diagrams, drama and artistic expression to explain mathematical ideas and progresses, to demonstrate geometric concepts, to solve problems, and to derive conclusions.**
2: 67A-67B, 67-68, 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440, 479A-479B, 479-480

- **Use cubes, tile squares, geoboards and tangrams to copy and build two- and three-dimensional geometric designs/shapes.**
2: 249B, 251B, 255B, 255-256, 257B, 258
- **Construct tables, charts and graphs to display, analyze and explain real world data.**
2: 311A-311B, 311-312, 321A-321B, 321-322
- **Express mathematical relationships, geometric designs and problem solving through art and design.**
2: 249B, 251B, 255B, 255-256, 257B, 258
- **Use geometric shapes and models to determine lines of symmetry.**
2: 261A-261B, 261-262
- **Use coins and pictures of coins to represent values of money.**
2: 109A-109B, 109-110, 111A-111B, 111-112, 113A-113B, 113-114, 115A-115B, 115-116
- **Dramatize word problems to enhance understanding of addition and subtraction.**
2: 9A-9B, 9-10, 19A-19B, 19-20, 31-32, 57A-57B, 57-58, 67A-67B, 67-68, 69-70, 155A-155B, 155-156, 161A-161B, 161-162, 163-164, 189A-189B, 189-190, 197A-197B, 197-198, 199-200, 221A-221B, 221-222, 233A-233B, 233-234, 235-236, 439A-439B, 439-440, 453A-453B, 453-454, 455-456
- **Create a classroom store where simple items are bought and sold, using coins and dollar bills.**
2: 113B
- **Use simulations, manipulatives, pictures and diagrams to explain mathematical operations and relationships.**
2: 67A-67B, 67-68, 81A-81B, 81-82, 99A-99B, 99-100, 115A-115B, 115-116, 189A-189B, 189-190, 251A-251B, 251-252, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316, 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 439A-439B, 439-440, 479A-479B, 479-480
- **Use number lines to represent mathematical operations and numerical relationships.**
2: 61A-61B, 61-62

Key Idea 5**MEASUREMENT**

5. Students use both Metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING / LEARNING STRATEGIES***Students will:***

- **Use standard and non-standard instruments of measure to perform measurement activities framed in practical problem-solving situations.**
2: 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368, 369A-369B, 369-370
- **Use diagrams and written descriptions in math journals to express an understanding of each type of measurement.**
2: 348, 354, 362, 370, 372
- **Perform various measurement activities and document the results**
2: 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368
- **Explore situations in which only estimated measurements are called for and situations where exact measurement is needed**
2: 297A-279B, 297-298, 341A-341B, 341-342
- **Explore and compare the relationships between English and Metric measure/Fahrenheit and Celsius temperature using instruments of measure.**
2: 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368
- **Develop understanding of area and volume using concrete and pictorial models.**
2: 359A-359B, 359-360
- **Collect scientific data, statistics, and other real life information using tally marks, and frequency charts.**
2: 311A-311B, 311-312, 313A-313B, 313-314

- **Examine Metric measuring instruments and use them to measure temperature, length, weight, and capacity of familiar objects in real life situations. Choose the correct units to use.**
2: 347A-347B, 347-348, 357A-357B-357-358, 367A-367B, 367-368
- **Use clock faces with moveable hands and various traditional and digital clocks to tell and express time.**
2: 291A-291B, 291-292, 293A-293B, 293-294, 295A-295B, 295-296
- **Practice estimating elapsed and predicted time in real life situations.**
2: 297A-297B, 297-298, 299A-299B, 299-300
- **Use calculators to explore and express understandings of days, weeks and months.**
2: related material: 303-304, 334
- **Use tables, charts and graphs to represent real life data.**
2: 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B, 325-326, 327A-327B, 327-328
- **Use computer software related to measurement statistics and geometric shapes.**
2: 284, 334, 384
- **Name various geometric shapes and examine familiar objects for the presence of these shapes: (triangle, square, rectangle, circle, cone, cylinder, sphere, and cube).**
2: 247A-247B, 247-248, 249A-249B, 249-250, 255A-255B, 255-256
- **Identify and draw lines of symmetry.**
2: 261A-261B, 261-262
- **Find the perimeter and area of a shape using standard and non-standard units of measure.**
2: 351A-351B, 351-352
- **Combine geometric shapes to form new shapes.**
2: 255A-255B, 255-256
- **Solve real life problems involving time and temperature.**
2: 299A-299B, 299-300, 303A-303B, 303-304, 369A-369B, 369-370
- **Identify various household measuring instruments.**
2: 355A-355B, 355-356, 357A-357B-357-358

- **Identify closed figures and open figures.**
2: 247A-247B, 247-248, 255A-255B, 255-256

Key Idea 6

UNCERTAINTY

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

TEACHING/LEARNING STRATEGIES

Students will:

- **Make predictions from problem-solving situations involving real life situations and stories. Explain the thinking from which the predictions evolved and compare with actual results.**
2: 373A-373B, 373-374, 375A-375B, 375-376
- **Estimate measurements of household and/or school areas and objects comparing them with actual measures. Discuss ways to improve the accuracy of estimated measurement.**
2: 297A-279B, 297-298, 341A-341B, 341-342
- **Discuss the probable outcomes of science experiments and record them.**
2: related material: 373A-373B, 373-374, 375A-375B, 375-376
- **Recognize situations where only an estimate is required.**
2: 453A-453B, 453-453
- **Develop a wide variety of estimation skills and strategies.**
2: 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 227A-227B, 227-228
- **Determine the reasonableness of results/the likelihood of results.**
2: 141A-141B, 141-142, 149A-149B, 149-150, 191A-191B, 191-192, 229A-229B, 229-230, 429A-429B, 429-430, 445A-445B, 445-446

Key Idea 7**PATTERNS/FUNCTIONS**

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics and construct generalizations that describe patterns simply and efficiently.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Recognize, describe, extend and create a wide variety of patterns**
2: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468
- **Represent and describe mathematical relationships.**
2: 99A-99B, 99-100, 467A-467B, 467-468
- **Use a variety of manipulative materials and technologies to explore patterns.**
2: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468
- **Explore and develop relationships among two- and three- dimensional geometric shapes.**
2: 249A-249B, 249-250
- **Discover patterns in nature, art, music and literature.**
2: 413B
- **Identify and complete visual geometric and number patterns.**
2: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468
- **Write number sentences and fact families that represent described relationships between numbers and operations.**
2: 5A-5B, 5-6, 9A-9B, 9-10, 17A-17B, 17-18, 27A-27B, 27-28
- **Use manipulatives and drawings to identify two -and three-dimensional geometric shapes.**
 - two-dimensional: triangle, rectangle, square, pentagon, hexagon, octagon**
 - three-dimensional: cube, cylinder, sphere, cone, rectangular prism**

- **Copy and create patterns using manipulatives, art materials, numbers, music, natural objects, technology, and two/three-dimensional figures.**
2: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468

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Grade Three

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Participate in cooperative group learning situations to collect and organize data into tables, charts, and graphs to interpret the data, and to draw conclusions and generalizations.**
3: 204B, 208B, 212B, 224B, 226B, 228B, 232B
- **Work in cooperative learning groups to interpret data from a picture/diagram, graph or chart in order to solve problems.**
3: 204B, 208B, 212B, 224B
- **Work in teams to create real life stories and corresponding pictures/diagrams in order to solve problems.**
3: 204B, 208B, 212B, 224B, 226B, 228B, 232B
- **Translate word problems into numerical expressions and numerical expressions into word problems.**
3: 76A-76B, 76-77, 404A-404B, 404-405
- **Explain orally and in writing the thinking strategies used to solve multiple step problems.**
3: 284A-284B, 284-285, 528A-528B, 528-529
- **Use patterns and relationships of numerical objects to analyze mathematical situations.**
3: 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345
- **Develop pattern problems for others to solve.**
3: 24-27, 332A-332B, 332-335

- **Use visual patterns in creative art projects.**
3: 332B

- **Solve problems using patterns, logical reasoning, experimentation, drawings, diagrams and manipulatives.**
3: 14A-14B, 14-15, 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 76A-76B, 76-77, 102A-102B, 102-103, 104-105, 140A-140B, 140-143, 160A-160B, 160-161, 170-171, 216A-216B, 216-217, 236A-236B, 236-237, 238-239, 270A-270B, 270-273, 284A-284B, 284-285, 294-295, 332A-332B, 332-333, 346A-346B, 346-347, 348-349, 380A-380B, 380-381, 404A-404B, 404-405, 406-407, 436A-436B, 436-439, 474A-474B, 474-475, 476-477, 528A-528B, 528-529, 540A-540B, 540-541, 578A-578B, 578-579, 588A-588B, 588-589, 590-591, 644A-644B, 644-645, 656A-656B, 656-657, 658-659, 698A-698B, 698-699, 708A-708B, 708-709, 710-711

- **Use estimation to determine reasonable answers and to justify solutions.**
3: 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161

- **Use problem-solving strategies such as trial and error, making a list/table, drawing a diagram, looking for pattern or word clues, experimentation, using manipulatives.**
3: 14A-14B, 14-15, 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 76A-76B, 76-77, 102A-102B, 102-103, 104-105, 140A-140B, 140-143, 160A-160B, 160-161, 170-171, 216A-216B, 216-217, 236A-236B, 236-237, 238-239, 270A-270B, 270-273, 284A-284B, 284-285, 294-295, 332A-332B, 332-333, 346A-346B, 346-347, 348-349, 380A-380B, 380-381, 404A-404B, 404-405, 406-407, 436A-436B, 436-439, 474A-474B, 474-475, 476-477, 528A-528B, 528-529, 540A-540B, 540-541, 578A-578B, 578-579, 588A-588B, 588-589, 590-591, 644A-644B, 644-645, 656A-656B, 656-657, 658-659, 698A-698B, 698-699, 708A-708B, 708-709, 710-711

- **Solve problems and define mathematical concepts by sorting, making patterns and arrangements, and using diagrams, drawings and manipulatives.**
3: 140A-140B, 140-143, 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273

Key Idea 2**NUMBER AND NUMERATION**

2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Use manipulatives and numbers to count, order and identify locations and measure distances.**
3: 4A-4B, 4-5, 6A-6B, 6-7, 10A-10B, 10-11, 12A-12B, 12-13, 538A-538B, 538-539
- **Use concrete and pictorial models to represent numbers (whole, fractional, decimal) and place value.**
3: 140A-140B, 140-143, 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273
- **Demonstrate understanding of place value by writing numbers in expanded notation.**
3: 6A-6B, 6-7, 10A-10B, 10-11, 12A-12B, 12-13
- **Read and write numbers to hundred thousands.**
3: 4A-4B, 4-5, 6A-6B, 6-7, 10A-10B, 10-11, 12A-12B, 12-13
- **Develop a strategy for rounding numbers.**
3: 28A-28B, 28-31
- **Explore characteristics of even/odd numbers using manipulatives, drawings, and numerical symbols.**
3: 24A-24B, 24-27
- **Identify numbers as factors/multiples depending upon function. Demonstrate understanding orally and in writing.**
3: related material: 332A-332B, 332-335
- **Relate decimals to money by examining the numerical expression of dollars and cents on receipts and bills.**
3: 36A-36B, 36-39, 40A-40B, 40-41

- **Relate decimals to fractions and fractions to decimals.**
3: 564A-564B, 564-565, 566A-566B, 566-567
- **Explore numbers using a calculator.**
3: 39, 89, 131, 195, 207, 231, 291, 327, 401, 449, 467, 501, 571, 621, 693

Key Idea 3

OPERATIONS

3. Students use mathematical operations and relationships among them to understand mathematics.

TEACHING/LEARNING STRATEGIES

Students will:

- **Add, subtract, multiply and divide whole numbers,**
3: 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167, 276A-276B, 276-279, 280A-280B, 280-281, 282A-282B, 282-283, 286A-286B, 286-287, 288A-288B, 288-291, 292A-292B, 292-293, 316A-316B, 316-317, 318A-318B, 318-319, 320A-320B, 320-323, 324A-324B, 324-327, 328A-328B, 328-331, 386A-386B, 386-387, 388A-388B, 388-389, 390A-390B, 390-391, 392A-392B, 392-393, 396A-396B, 396-397, 402A-402B, 402-403
- **Demonstrate mastery of basic addition facts up to 20.**
3: 66A-66B, 66-69, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 94A-94B, 94-95, 96A-96B, 96-97
- **Develop strategies for selecting the appropriate operation required to solve a problem.**
3: 346A-346B, 346-347
- **Use manipulatives, diagrams, and numbers to demonstrate understanding of renaming/regrouping.**
3: 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167

- **Recognize equations presented in both horizontal and vertical format.**
3: 76A-76B, 76-77
- **Use manipulatives and diagrams to demonstrate how the four operations are related to and are different from each other.**
3: 70A-70B, 70-71, 260A-260B, 260-261, 372A-372B, 372-373, 384A-384B, 384-385
- **Demonstrate the commutative and associative properties, the properties of 0 and the properties of 1.**
3: 286A-286B, 286-287, 396A-396B, 396-397
- **Express orally and in writing an understanding of the inverse relationship between addition/subtraction and multiplication/division using fact families. Apply this relationship in checking solutions.**
3: 70A-70B, 70-71, 384A-384B, 384-385
- **Add and subtract 3 digit numbers with and without regrouping.**
3: 132A-132B, 132-133, 136A-136B, 136-139, 152A-152B, 152-155
- **Solve equations with missing addends, minuends, subtrahends, and factors.**
3: 344A-344B, 344-345
- **Demonstrate mastery of multiplication facts to the 10s table.**
3: 276A-276B, 276-279, 280A-280B, 280-281, 282A-282B, 282-283, 286A-286B, 286-287, 288A-288B, 288-291, 292A-292B
- **Manipulate concrete models to understand factoring.**
3: preparation: 384A-384B, 384-385
- **Use manipulatives and diagrams to develop the multiplication and division algorithms.**
3: 260A-260B, 260-261, 262A-262B, 262-265, 370A-370B, 370-371, 372A-372B, 372-373
- **Solve multiplication problems multiplying three-digit factors by one-digit factors.**
3: 636A-636B, 636-637
- **Solve division problems dividing by a one-digit divisor.**
3: 648A-648B, 648-649, 650A-650B, 650-651, 652A-652B, 652-653

- **Use calculators to explore patterns in multiplying by multiples of ten.**
3: related material: 612A-612B, 612-615

Key Idea 4

MODELING/MULTIPLE REPRESENTATIONS

4. Students use mathematical modeling/multiple representations to provide a means of presenting, interpreting, and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use concrete materials and drawings to model spatial relationships and mathematical understandings.**
3: 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273, 432A-432B, 432-435
- **Use multiple representations as tools to explain the operation of everyday procedures as well as mathematical operations and relationships.**
3: 140A-140B, 140-143, 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273
- **Use variables to predict changes over time.**
3: related material: 222A-222B, 222-223
- **Use physical materials, pictures, diagrams, drama, and artistic expression to explain mathematical ideas and processes, to demonstrate geometric concepts, to solve problems, and to derive conclusions.**
3: 140A-140B, 140-143, 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273
- **Translate drawings and physical representations into mathematical representations/language.**
3: 140A-140B, 140-143, 204A-204B, 204-207, 208A-208B, 208-211, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235, 236A-236B, 236-237, 270A-270B, 270-273

- **Model real life purchasing using coins and dollars.**
3: 36A-36B, 36-39, 40A-40B, 40-41
- **Use cubes and tile squares to build two- and three-dimensional geometric designs/shapes.**
3: 436A-436B, 436-439
- **Construct tables, charts and graphs to display, analyze and explain real world data.**
3: 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235
- **Locate points on a two-dimensional graph when given the coordinates (e.g. (4,5)).**
3: 218A-218B, 218-221
- **Conduct surveys (use tally marks to collect and display data).**
3: 204A-204B, 204-207
- **Collect scientific data, statistics and other real life information. Record using tally marks and organize into a chart. Draw conclusions based on the chart.**
3: 204A-204B, 204-207
- **Bring in examples and displays of statistical diagrams from newspapers and magazines. Explain orally and in writing, the meaning of the diagrams. Draw conclusions based on the display of data.**
3: 212A-212B, 212-215
- **Make predictions and summarize results.**
3: 700A-700B, 700-701, 704A-704B, 704-707
- **Use geometric shapes and models to determine lines of symmetry and to represent fractions.**
3: 460A-460B, 460-461, 498A-498B, 498-501, 502A-502B, 502-503
- **Use number lines to represent mathematical operations and numerical relationships.**
3: 20, 22A-22B, 22-23, 24, 29, 512A-512B, 512-513, 568A-568B, 568-570, 575
- **Use charts, drawings, and manipulatives to demonstrate understanding of decimals.**
3: 564A-564B, 564-565, 566A-566B, 566-567, 568A-568B, 568-571

- **Copy maps and make scale drawings (e.g. of a room) using the concept of ratios to represent real objects or planes.**
3: preparation: 518A-518B, 518-519
- **Use factor trees to model and visualize the process of prime factorization.**
3: preparation: 320A-320B, 320-323

Key Idea 5

MEASUREMENT

5. Students use both Metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING/LEARNING STRATEGIES

Students will:

- **Perform measurement activities using standard and non-standard instruments of measure.**
3: 464A-464B, 464-465, 468A-468B, 468-471, 472A-472B, 472-473, 532A-532B, 532-533, 534A-534B, 534-535, 536A-536B, 536-537, 538A-538B, 538-539, 680A-680B, 680-683, 684A-684B, 684-687, 690A-690B, 690-693, 694A-694B, 694-695
- **Use diagrams and written descriptions in student math journals to express understanding of each type of measurement.**
3: 474-475
- **Develop a classroom display of various instruments of measure.**
3: 680B
- **Use computer software to practice measuring.**
3: 693
- **Develop an understanding of situations in which only estimated measurements are called for.**
3: 533, 535, 582-583, 628, 681, 682, 685, 691, 697

- **Use instruments of measure to explore and compare the relationships between English and Metric measure/Fahrenheit and Celsius temperatures.**
3: 582A-582B, 582-583, 584A-584B, 584-587, 680A-680B, 680-683, 684A-684B, 684-687, 690A-690B, 690-693, 694A-694B, 694-695, 696A-696B, 696-697
- **Use concrete and pictorial models to develop an understanding of perimeters, area and volume.**
3: 464A-464B, 464-467, 468A-468B, 468-471, 472A-472B, 472-473
- **Use clock faces with moveable hands and various traditional and digital clocks to tell and express time.**
3: 192A-192B, 192-195, 196A-196B, 196-197
- **Use calendars to explore and express understandings of days, weeks, months, and to convert these measures.**
3: 200A-200B, 200-201
- **Use tables, charts and graphs to analyze and explain real world data.**
3: 204A-204B, 204-207, 208A-208B, 208-211, 212A-212B, 212-215, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235
- **Recognize congruent figures.**
3: 456A-456B, 456-459
- **Recognize geometric shapes in familiar objects (e.g. triangles, squares, rectangles, circles, cones, cylinders, spheres, and cubes).**
3: 428B, 429-430, 453
- **Identify and draw lines of symmetry.**
3: 460A-460B, 460-461
- **Find the perimeter and area of a shape using standard and non-standard units of measure**
3: 464A-464B, 464-467, 468A-468B, 468-471
- **Solve real life problems involving time and temperature (including below zero).**
3: 192A-192B, 192-195, 196A-196B, 196-197, 198A-198B, 198-199 ,200A-200B, 200-201, 696A-696B, 696-697
- **Collect and demonstrate the use of appropriate measuring implements (including household measuring containers).**
3: 534-535, 680-683, 684-685

Key Idea 6**UNCERTAINTY**

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Make predictions and record outcomes from problem solving situations involving balls, counters, index cards, coins, numbers, etc. Explain the thinking from which the predictions evolved and compare with actual results.**
3: 700A-700B, 700-701, 704A-704B, 704-707
- **Estimate measurements of household/school areas and objects. Compare with actual measures. Discuss ways to improve the accuracy of estimated measurement.**
3: 533, 535, 582-583, 628, 681, 682, 685, 691, 697
- **Recognize situations where only an estimate is required.**
3: 160A-160B, 160-161
- **Develop a wide variety of estimation skills and strategies.**
3: 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161
- **Determine the reasonableness of results/the likelihood of results.**
3: 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161, 700A-700B, 700-701, 704A-704B, 704-707

Key Idea 7**PATTERNS/FUNCTIONS**

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics and construct generalizations that describe patterns simply and efficiently.

TEACHING/LEARNING STRATEGIES**Students will:**

- **Recognize, describe, extend and create a wide variety of patterns.**
3: 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345
- **Represent and describe mathematical relationships.**
3: 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345
- **Use a variety of manipulative materials and technologies to explore patterns.**
3: 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345
- **Explore and develop relationships among two- and three- dimensional geometric shapes.**
3: 432A-432B, 432-435
- **Discover patterns in nature, art, music, and literature.**
3: 334
- **Create original musical and artistic pattern designs.**
3: 332B, 332-335
- **Collect examples of patterns found in nature, art, music and literature.**
3: 334
- **Present cultural art as examples of design patterns.**
3: 332B
- **Use calculator function keys to develop an understanding of numerical functions.**
3: related material: 344-345
- **Use input-output boxes to represent functions.**
3: 344A-344B, 344-345

- **Use equations, variables and open sentences to represent mathematical relationships.**
3: 404A-404B, 404-405
- **Solve for variables in equations, algorithms and manipulatives.**
3: preparation: 168A-168B, 168-169, 260A-260B, 260-261, 262A-262B, 262-265, 286A-286B, 286-287, 342A-342B, 342-343, 384A-384B, 384-385, 404A-404B, 404-405
- **Solve equations and open sentences by substituting a given numerical value for an unknown.**
3: preparation: 344A-344B, 344-345
- **Represent mathematical relationships (greater than, less than, equal to, “five more than”, etc.) using numerical expressions and equations (e.g. $x > 5$, $x + 5$).**
3: 18A-18B, 18-21, 506A-506B, 506-509, 568A-568B, 568-571
- **Interpret graphs, charts and tables to describe and represent patterns.**
3: 24-27, 332A-332B, 332-335, 340-341, 344-345
- **Copy geometric patterns and shapes using geoboards, graph paper, calculators, computers, etc.**
3: 332A-332B, 332-335
- **Use manipulatives and drawings to identify, explore and develop relationships of two- and three-dimensional geometric shapes:**
 - two-dimensional:** triangle, quadrilateral (square, rectangle, rhombus, trapezoid, parallelogram), pentagon, hexagon, octagon, circle.
 - three-dimensional:** cube, cylinder, sphere, cone, rectangular prism, triangular prism, sphere.
- 3: 428A-428B, 428-431, 442A-442B, 442-443, 444A-444B, 444-445, 446A-446B, 446-449, 450A-450B, 450-453, 454A-454B, 454-455
- **Explain and demonstrate the difference between two- and three-dimensional figures.**
3: 432A-432B, 432-435

- **Apply the concept of similarity when exploring similar and congruent triangles and polygons.**
3: 456A-456B, 456-459

- **Classify polygons and triangles using the properties of their sides and angles.**
3: 446A-446B, 446-449, 450A-450B, 450-453, 454A-454B, 454-455

- **Use the relationships between points, lines, angles, and planes to explore and verify geometric figures.**
3: 442A-442B, 442-443, 444A-444B, 444-445

**Scott Foresman – Addison Wesley Mathematics
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Essential Learnings for Mathematics**

Grade Four

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use models, diagrams, graphs, oral language and journal writing to explain and justify mathematical thinking and problem-solving approaches, and to verify solutions.**
4: 12A-12B, 12-13, 24A-24B, 24-25, 38A-38B, 38-39, 40-41, 90A-90B, 90-91, 94A-94B, 94-95, 102-103, 140A-140B, 140-143, 156A-156B, 156-157, 168-169, 198A-198B, 198-199, 222A-222B, 222-223, 234-235, 278A-278B, 278-281, 290A-290B, 290-291, 292-293, 326A-326B, 326-329, 342A-342B, 342-343, 344-345, 384A-384B, 384-385, 396A-396B, 396-399, 412-413, 460A-460B, 460-461, 474A-474B, 474-477, 478-479, 512A-512B, 512-513, 538A-538B, 538-539, 540-541, 584A-584B, 584-858, 600A-600B, 600-601, 602-603, 648A-648B, 648-649, 662A-662B, 662-663, 666-667, 696A-696B, 696-697, 714A-714B, 714-715, 716-717
- **Construct and solve math problems based on real life situations that are related to and have meaning for students using whole numbers, fractions and decimals.**
4: 40-41, 102-102, 1681-69, 234-235, 292-293, 344-345, 412-413, 540-541, 602-603, 666-667
- **Create real life word problems from mathematical equations.**
4: 100A-100B, 100-101, 166A-166B, 166-167

- **Perform problem-solving/mathematical reasoning tasks in cooperative learning groups, including project problems that require more than one class period.**
4: 12B, 24B, 38B, 90B, 94B, 140B, 156B, 198B, 222B, 278B, 290B, 326B, 342B, 384B, 396B, 460B, 474B, 512B, 538B, 584B, 600B, 648B, 662B, 696B, 714B
- **Find patterns in sequences of numbers and expand these patterns using other numbers. Explain the pattern and write rules for sequences.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Use addition, subtraction and multiplication to continue a number pattern.**
4: 90A-90B, 90-91, 366A-366B, 366-367
- **Solve problems that have more than one correct solution. Explain/demonstrate why each solution is acceptable.**
4: 326A-326B, 326-329
- **Create and solve problems in which clues are given for mystery numbers and shapes.**
4: 584A-584B, 584-585
- **Use data presented in tables, charts and graphs: to explain and interpret the relationships between and among numbers, to make conclusions/generalizations and to solve problems.**
4: 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221, 226A-226B, 226-229, 230A-230B, 230-231, 232A-232B, 232-233
- **Design experiments, collect and organize data in tally charts, bar graphs and pictographs.**
4: 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221, 226A-226B, 226-229
- **Estimate reasonable answers to mathematical problems. Identify unreasonable answers and explain/demonstrate why they are unreasonable.**
4: 62A-62B, 62-63, 64A-64B, 64-67, 68A-68B, 68-71, 72A-72B, 72-73, 258A-258B, 258-261, 316A-316B, 316-319, 368A-368B, 368-371, 636A-636B, 636-637
- **Explain and illustrate, with concrete examples, concepts of distance, average, tax and discount.**
4: 226A-226B, 226-229

- **Conduct experiments focusing on geometric relationships and study the effect of changing the dimensions or the position of the shape.**
4: 452A-452B, 452-455
- **Use calculators to explore number relationships and draw conclusions.**
4: 37, 85, 127, 219, 267, 319, 377, 389, 411, 455, 519, 581

Key Idea 2

NUMBER AND NUMERATION

2. Students use number sense and numeration to develop an understanding of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use manipulatives, diagrams, number lines and drawings to order and model numbers and number relationships, correspondence for whole numbers, common fractions, mixed numbers and decimals.**
4: 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 16A-16B, 16-19, 34A-34B, 34-37, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 522A-522B, 522-523, 524A-524B, 524-527, 534A-534B, 534-536, 624A-624B, 624-627, 630A-630B, 630-631
- **Practice skip counting to develop number sense.**
4: related material: 128A-128B, 128-131
- **Use student math journals to demonstrate and explain the steps used in comparing numbers, and to describe the relative size of numbers.**
4: 16A-16B, 16-19, 522A-522B, 522-523, 524A-524B, 524-527, 534A-534B, 534-536, 630A-630B, 630-631
- **Color in/block out diagrams containing 100 squares to demonstrate understanding of percent.**
4: preparation: 624A-624B, 624-627
- **Participate in games and other activities that emphasize the reasonableness of measurements and the relative size of larger numbers.**
4: 588-589, 592-593, 594-595, 596-599, 652-653, 654-655, 656-657, 658-659

- **Explore number relationships using a calculator and draw conclusion.**
4: 37, 85, 127, 219, 267, 319, 377, 389, 411, 455, 519, 581
- **Prepare exhibits, demonstrations and graphs in which whole numbers, fractions, mixed numbers and decimals are used to quantify groups of objects.**
4: 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221
- **Demonstrate and explain ways of comparing fractions, identifying equivalent fractions and identifying fractions in simplest terms.**
4: 516A-516B, 516-519, 520A-520B, 520-521, 522A-522B, 522-523, 524A-524B, 524-527
- **Devise a strategy for determining the comparative size of decimals.**
4: 630A-630B, 630-631
- **Explain how counting is related to place value.**
4: 10A-10B, 10-11
- **Explain the rounding process both orally and in writing.**
4: 20A-20B, 20-21
- **Interpret maps and charts on which whole numbers, fractions, mixed numbers and decimals are used to identify locations and measure distances.**
4: 692A-692B, 69-2965
- **Use charts, writing and oral language to describe the history and development of Roman numerals. Translate Roman numerals up to D, C, and M to Arabic numerals and vice versa.**
4: 195
- **Illustrate understanding of set theory using stories, diagrams and manipulatives.**
4: 502A-502B, 502-503
- **Describe uses of fractions, decimals, positive and negative numbers in daily life (e.g. temperature).**
4: 590A-590B, 590-591, 592A-592B, 592-593, 594A-594B, 594-595, 652A-652B, 652-653, 654A-654B, 654-655, 656A-656B, 656-657, 664A-664B, 664-665

- **Explore the characteristics of even/odd numbers and identify a list of numbers as “all odd numbers” or “all even numbers”.**
4: related material: 10-11
- **Explore the characteristics of prime numbers, factors and multiples. Reflect on these characteristics in math journals and illustrate in diagrams.**
4: 402A-402B, 402-403, 406A-406B, 406-407

Key Idea 3

OPERATIONS

3. Students use mathematical operations and relationships among them to understand mathematics.

TEACHING/LEARNING STRATEGIES

Students will:

- **Explain and demonstrate the strategies used to learn single digit addition, subtraction, multiplication and division facts.**
4: 62A-62B, 62-63, 64A-64B, 64-65, 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 124A-124B, 124-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-153
- **Explain the meaning of addition, subtraction, multiplication and division algorithms using manipulatives, drawings and numbers.**
4: 62A-62B, 62-63, 64A-64B, 64-65, 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 124A-124B, 124-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-153
- **Use math journals to document a growing understanding of math operations and their applications to whole numbers, fractions and decimals.**
4: 198-199, 342-343, 460-461, 538-539, 662-663
- **Devise and demonstrate alternative strategies for mental computation such as rounding and regrouping.**
4: 62A-62B, 62-63, 64A-64B, 64-65, 262A-262B, 262-263, 366A-366B, 366-367

- **Perform exploratory investigations using whole numbers and the four operations. Compare and contrast the effects of addition and multiplication, subtraction and division, on whole numbers. Explore the effects of increasing one addend/factor by one and decreasing the second addend/factor by one, etc. Perform these investigations individually, in pairs, and in small groups.**
4: 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 270A-270B, 270-273, 274A-274B, 274-277, 332A-332B, 332-335, 336A-336B, 336-337, 380A-380B, 380-383, 386A-386B, 386-389, 390A-390B, 390-391
- **Using oral and written language, models and manipulatives, explain and give examples of the properties of addition and multiplication.**
4: 124A-124B, 124-127, 146A-146B, 146-147, 166A-166B, 166-167
- **Explain the relationships between operations and demonstrate these relationships using models and manipulatives.**
4: 100A-100B, 100-101, 148A-148B, 148-149, 166A-166B, 166-167
- **Draw pictures and tell stories which relate to and exemplify written equations.**
4: 100A-100B, 100-101, 166A-166B, 166-167
- **Create and solve multiple step problems involving at least two operations. Estimate answers to determine reasonableness of results.**
4: 156A-156B, 156-157
- **Make generalizations about the types of problem-solving situations that call for addition, subtraction, multiplication and division; for example, joining, separating, comparing and equalizing situations.**
4: 290A-290B, 290-291
- **Use student math journals to document a growing understanding of math operations and their applications to whole numbers, fractions and decimals.**
4: 198-199, 342-343, 460-461, 538-539, 662-663
- **Demonstrate understanding of fractions, mixed numbers and decimals, and explore their relationships using diagrams, manipulatives, models and entries in math journals.**
4: 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 508A-508B, 508-511, 516A-516B, 516-519, 520A-520B, 520-521, 522A-522B, 522-523, 524A-524B, 524-527, 530A-530B, 530-533, 534A-534B, 534-535, 624A-624B, 624-627, 628A-628B, 628-629, 630A-630B, 630-631

- **Collect measuring implements that display fractional units of measure and demonstrate their practical uses.**
4: 590A-590B, 590-591, 592A-592B, 592-593, 594A-594B, 594-595
- **Bring in examples of decimals as used in newspaper and magazine articles. Explain the meaning of the decimals in context.**
4: related material: 627
- **Write and solve real world problems containing fractions, mixed numbers and decimals.**
4: 567, 571, 577, 583, 591, 593, 595, 647, 653, 655, 657

Key Idea 4

MODELING/MULTIPLE REPRESENTATIONS

4. Students use mathematical modeling/multiple representations to provide a means of presenting, interpreting and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use concrete materials and drawings to model spatial relationships and mathematical understandings.**
4: 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37, 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 212A-212B, 212-213, 216A-216B, 216-221, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 624A-624B, 624-627
- **Construct tables, charts and graphs to display, represent and explain real world data.**
4: 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221
- **Use multiple representations as tools to explain the operation of everyday procedures as well as mathematical operations and relationships.**
4: 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37, 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 212A-212B, 212-213, 216A-216B, 216-221, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507

- **Use physical materials, pictures, diagrams, models, drama and artistic expression to explain mathematical ideas and processes, to demonstrate geometric concepts, to solve problems and to derive conclusions.**
4: 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37, 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 212A-212B, 212-213, 216A-216B, 216-221, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 624A-624B, 624-627
- **Translate drawings and physical representations into mathematical representations/language.**
4: 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37, 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 212A-212B, 212-213, 216A-216B, 216-221, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 624A-624B, 624-627
- **Use variables: (height, weight, and hand size) to predict changes over time.**
4: related material: 216-219
- **Use square tiles and unit cubes to model area and volume of geometric shapes (two- and three-dimensional).**
4: 468A-468B, 468-471, 476A-476B, 476-477
- **Construct models, make drawings, fold paper, create shapes on the computer, use blocks, geoboards and graph paper: to compare shapes and figures, to determine the properties of lines, rays, triangles, right triangles, hexagons, pentagons and circles.**
4: 434A-434B, 434-437, 438A-438B, 438-439, 440A-440B, 440-443, 444A-444B, 444-447, 448A-448B, 448-449
- **Locate points on a two-dimensional graph when given an ordered pair (coordinates) (e.g. 4, 5).**
4: 212A-212B, 212-215
- **Express mathematical relationships, geometric designs and problem solving through art, design and music.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Use geometric shapes and models to determine lines of symmetry.**
4: 456A-456B, 456-457

- **Draw, sketch, diagram, model and find examples of objects which illustrate the following geometric concepts: radius, diameter, circumference, edge, face, vertex, parallel, perpendicular, intersecting lines, right angles, parallelogram, diagonal, polygon, area and perimeter.**
4: 434A-434B, 434-437, 438A-438B, 438-439, 440A-440B, 440-443, 444A-444B, 444-447, 448A-448B, 448-449, 452A-452B, 452-455, 456A-456B, 456-457, 458A-458B, 458-459, 464A-464B, 464-467, 468A-468B, 468-471
- **Use factor trees to model and visualize the process of prime factorization.**
4: 124A-124B, 124-127

Key Idea 5

MEASUREMENT

5. Students use both Metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING/LEARNING STRATEGIES

Students will:

- **Measure objects and areas within the classroom, school and home to determine length, area, weight, volume and perimeter.**
4: 476A-476B, 476-477, 592A-592B, 592-593, 594A-594B, 594-595, 654A-654B, 654-655, 656A-656B, 656-657
- **Use measuring activities such as those described above to develop the geometric formulas for finding volume and area and perimeter of squares and rectangles.**
4: 464A-464B, 464-467, 468A-468B, 468-471, 476A-476B, 476-477
- **Select appropriate standard (ruler, compass, protractor, household and other Metric) and non-standard (paper clips, finger width, hand span, foot length, etc.) measures to estimate and find measurements of real objects and areas, using appropriate measurement vocabulary.**
4: 476A-476B, 476-477, 592A-592B, 592-593, 594A-594B, 594-595, 654A-654B, 654-655, 656A-656B, 656-657

- **Describe the relationships between standard and non-standard units of measure.**
4: 588A-588B, 588-589, 592A-592B, 592-593, 594A-594B, 594-595, 652A-652B, 652-653, 654A-654B, 654-655, 656A-656B, 656-657
- **Collect and demonstrate the use of appropriate measuring implements (including household measuring containers) which display whole, fractional and Metric units of measure.**
4: 588A-588B, 588-589, 592A-592B, 592-593, 594A-594B, 594-595, 652A-652B, 652-653, 654A-654B, 654-655, 656A-656B, 656-657
- **Solve real life problems involving measurement to determine the importance of estimation, and to understand that measurement is approximate, never exact.**
4: 665
- **Describe everyday situations in which only an estimated measurement is required, describe situations in which the measurement needs to be more accurate.**
4: 665
- **Examine objects such as cereal boxes, vases, rugs, poles, table tops, etc. to determine their measurable attributes: capacity, volume, length, width, area, weight (mass), perimeter.**
4: 464A-464B, 464-467, 468A-468B, 468-471, 476A-476B, 476-477
- **Use measuring experiences with found objects to build measuring vocabulary and understandings. Illustrate these understandings through journal writing and drawing.**
4: 476A-476B, 476-477, 592A-592B, 592-593, 594A-594B, 594-595, 654A-654B, 654-655, 656A-656B, 656-657
- **Collect data from students within the class or among classes within the school. Create a chart to display the results of the survey.**
4: 230A-230B, 230-231
- **Illustrate understanding of average and range of data through oral and written explanations, diagrams, and the creation of problems calling for the determination of each of these concepts.**
4: 226A-226B, 226-229
- **Create and solve real life problems involving time and temperature using Celsius and Fahrenheit.**
4: 664A-664B, 664-665

- **Use calendars to measure and compute the length of long periods of time.**
4: 201A-201B, 201-202
- **Through many measurement activities develop a standard process for measuring.**
4: 476A-476B, 476-477, 592A-592B, 592-593, 594A-594B, 594-595, 654A-654B, 654-655, 656A-656B, 656-657
- **Use measuring instruments, manipulatives, and measuring activities to determine equivalent measures, including English and Metric units.**
4: 596A-596B, 596-599, 658A-658B, 658-661
- **Use square corner to compare sizes of angles in geometric drawing and figures. Find similar angles in the classroom and at home; classify angles.**
4: 440A-440B, 440-443
- **Construct a definition of symmetry from examining symmetrical drawings. Illustrate the concept of symmetry by drawing symmetrical objects.**
4: 456A-456B, 456-457
- **Construct models, make drawings, fold paper, create shapes on the computer, use blocks, geoboards and graph paper to compare shapes and figures, to determine the properties of lines, rays, triangles, right triangles, hexagons, pentagons, octagons, circles.**
4: 434A-434B, 434-437, 438A-438B, 438-439, 440A-440B, 440-443, 444A-444B, 444-447, 448A-448B, 448-449
- **Conduct experiments focusing on geometric relationships.**
 - change the shape of an object to see how this relates to a change in size.
 - use the computer to reproduce a pattern block design.
 - combine two shapes to form a new shape.
 - predict the effect of changing the number of sides.
 - draw a shape after it has been rotated a quarter or $\frac{1}{2}$ turn.
 - explore what happens when the dimensions of a shape are changed.
 - decide which two dimensional patterns can be folded to produce three-dimensional shapes.4: 452A-452B, 452-455
- **Draw, sketch, diagram, model and find examples of objects which illustrate the following geometric concepts, radius, edge, face, vertex, parallel, perpendicular, intersecting lines, parallelogram, diagonal, polygon, chord. Create and solve problems in which these concepts are used appropriately.**
4: 438A-438B, 438-439, 440A-440B, 440-443, 444A-444B, 444-447, 448A-448B, 448-449

Key Idea 6**UNCERTAINTY**

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations

TEACHING/LEARNING STRATEGIES***Students will:***

- **Illustrate understandings of average, arithmetical mean, and range through oral and range through oral and written explanations, diagrams and the creation of problems calling for the determination of each of the above concepts.**
4: 226A-226B, 226-229
- **Estimate the length of a room, its area, the amount of paint needed to cover the walls of the classroom, the weight of lunch boxes, textbooks, etc. before actually measuring. Compare actual results to estimates.**
4: 588A-588B, 588-589
- **Describe everyday situations in which only mathematical estimation is required.**
4: 600A-600B, 600-601
- **Demonstrate a wide variety of estimation skills and strategies when predicting answers to problems and performing mental math. Explain these strategies and describe appropriate times to use various strategies; rounding, front end (use of highest digit in each number), using patterns, choosing compatible numbers, experimenting, chunking (estimating the whole by estimating its parts).**
4: 62A-62B, 62-63, 64A-64B, 64-67, 68A-68B, 68-71, 72A-72B, 72-73, 258A-258B, 258-261, 316A-316B, 316-319, 368A-368B, 368-371, 636A-636B, 636-637
- **Working cooperatively in pairs or small groups, use spinners, dice, coin collections, balls, candies, slips of paper, etc., to make predictions and determine probabilities.**
4: 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713
- **Based on experiences completing the above activities, develop strategies for determining probabilities. Explain these strategies orally.**
4: 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713

Key Idea 7**PATTERNS AND FUNCTIONS**

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently.

TEACHING / LEARNING STRATEGIES***Students will:***

- **Use manipulatives, symbols, numbers, geometric figures and drawings to identify pattern cores (repetition, growth, etc.) and to extend and create patterns. Explain orally and in writing the thinking processes used.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Use basic addition, subtraction, multiplication and division facts and the properties of operations to illustrate numerical patterns and relationships. Explore in pairs and in small groups. Document findings with illustrations in student journals.**
4: 128A-128B, 128-131, 256A-256B, 256-257, 366A-366B, 366-367
- **Translate data from a student survey into graphs, charts and tables. Describe how the patterns of the graph, chart and table help to interpret the data.**
4: 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221, 226A-226B, 226-229
- **Identify patterns in sequences of numbers (triangular numbers, square numbers).**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Correlate common fraction notation for tenths, hundredths, and thousandths with decimal notation.**
4: 624A-624B, 624-627
- **Solve practical problems where the solution requires pattern identification.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Use the calculator function key to construct a table of input and output numbers. Express the relationship in an open sentence. Graph the sets of numbers to see the number relationships in another format.**
4: 164A-164B, 164-165, 692A-692B, 692-695

- **Collect and display patterns found in nature, art, music and literature.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Study cultural art such as American Indian art, to discover patterns used. (Bring illustrations or sample designs to show the class, pointing out design patterns).**
4: related material: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Create original pattern designs using art materials. Write a description of the design pattern. Ask classmates to explain the patterns used.**
4: related material: 90A-90B, 90-91
- **Explore and express relationships/differences among two-and three-dimensional geometric shapes (e.g. between squares and cubes).**
4: 434A-434B, 434-347
- **Recognize, describe, extend and create numerical, geometric, musical and artistic patterns.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Use equations, variables (mystery numbers) and open sentences to represent mathematical relationships.**
4: 164A-164B, 164-165, 692A-692B, 692-695
- **Create original patterns and copy patterns using various manipulatives (pattern blocks, tangrams, and tiles), numbers, drawings, geoboards and graph paper.**
4: 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641
- **Represent mathematical relationships (greater than, less than, equal to, “five more than”, etc.) using numerical expressions and equations (e.g. $x - 5$, $x + 5$).**
4: 16A-16B, 16-19, 522A-522B, 522-523, 524A-524B, 524-527, 534A-534B, 534-536, 630A-630B, 630-631
- **Color sets of multiples on a hundreds board to illustrate various patter. Compare the patterns to discover relationships.**
4: 128A-128B, 128-131, 256A-256B, 256-257

- Use manipulatives and drawings to identify two- and three-dimensional geometric shapes:
 - two-dimensional: triangle, rectangle, square, pentagon, hexagon, octagon, parallelogram.
 - three dimensional: cube, cylinder, sphere, cone, rectangular prism, triangular prism, pyramid.
- 4:** 434A-434B, 434-437, 438A-438B, 438-439, 440A-440B, 440-443, 444A-444B, 444-447, 448A-448B, 448-449

**Scott Foresman – Addison Wesley Mathematics
to the
New York Archdiocese
Essential Learnings for Mathematics**

Grade Five

Key Idea 1

MATHEMATICAL REASONING

Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Apply a variety of reasoning strategies for problem solving (e.g. using manipulatives, using trial and error, making a list or table, drawing a diagram, looking for a pattern, looking for word clues).**
5: 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 80A-80B, 80-81, 104A-104B, 104-105, 110-111, 144A-144B, 144-145, 168A-168B, 168-169, 180-181, 210A-210B, 210-211, 226A-226B, 226-227, 238-239, 276A-276B, 276-279, 272A-272B, 272-273, 306-307, 352A-352B, 352-355, 356A-356B, 356-357, 372-373, 406A-406B, 406-407, 434A-434B, 434-437, 438-439, 484A-484B, 484-487, 504A-504B, 504-505, 506-507, 558A-558B, 558-559, 570A-570B, 570-571, 572-573, 606A-606B, 606-607, 624A-624B, 624-625, 626-627, 660A-660B, 660-661, 664A-664B, 664-665, 676-677, 706A-706B, 706-709, 720A-720B, 720-721, 730-731
- **Make conclusions based on inductive reasoning.**
5: 80A-80B, 80-81, 434A-434B, 434-437
- **Justify conclusions involving simple and compound (i.e. and/or) statements.**
5: 292A-292B, 292-293, 356A-356B, 356-357, 570A-570B, 570-571, 664A-664B, 664-665, 720A-720B, 720-721
- **Perform problem-solving mathematical reasoning tasks in cooperative learning groups, including project problems, which require more than one class period (i.e. extended task).**
5: 32B, 42B, 80B, 104B, 144B, 168B, 210B, 226B, 276B, 272B, 352B, 356B, 406B, 434B, 484B, 504B, 558B, 570B, 606B, 624B, 660B, 664B, 706B, 720B

- **Solve problems that have more than one correct solution; explain/demonstrate why each solution is acceptable.**
5: 80A-80B, 80-81
- **Separate necessary from unnecessary information in word problems and find clues to appropriate operations.**
5: 406A-406B, 406-407, 504A-504B, 504-504
- **Design experiments to collect and organize data in tally charts, bar graphs and pictographs.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275
- **Estimate reasonable answers to mathematical problems, identify unreasonable answers and explain/demonstrate why they are unreasonable.**
5: 28A-28B, 28-31, 68A-68B, 68-70, 86A-86B, 86-87, 138A-138B, 138-143, 204A-204B, 204-209, 474A-474B, 474-475, 494A-494B, 494-495, 672A-672B, 672-675
- **Explain the solution of multiple step problems both orally and in writing (student math journals).**
5: 226A-226B, 226-227, 570A-570B, 570-571, 664A-664B, 664-665

Key Idea 2

NUMBER AND NUMERATION

2. Students use number sense and numeration to develop an understanding of the multiple use of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use whole numbers, decimals, fractions and mixed numbers to identify locations, to quantify groups of objects and to measure distances.**
5: 26A-26B, 26-27, 84A-84B, 84-85, 394A-394B, 394-397, 398A-398B, 398-399, 400A-400B, 400-401, 404A-404B, 404-405

- **Identify and apply ratios (Gr. 5), proportions (Gr. 6), fractions (Gr. 5), mixed numbers (Gr. 5), decimals (Gr. 5) and percents (Gr. 6) through a wide variety of hands-on exploration.**
5: 26A-26B, 26-27, 84A-84B, 84-85, 394A-394B, 394-397, 398A-398B, 398-399, 400A-400B, 400-401, 404A-404B, 404-405, 646A-646B, 646-647, 648A-648B, 648-651, 652A-652B, 652-653, 654A-654B, 654-655, 662A-662B, 662-663, 668A-668B, 668-669, 670A-670B, 670-671, 672A-672B, 672-675
- **Relate counting to grouping and to place value up to:**
 - one billion (Gr. 5).
 - hundred billions (Gr. 6).
 - trillions (Gr. 7).5: 4A-4B, 4-5, 6A-6B, 6-7
- **Relate decimals to money, fractions (Gr. 5) and to percents (Gr. 6).**
5: 160A-160B, 160-161, 232A-232B, 232-233, 426A-426B, 426-429, 430A-430B, 430-433, 668A-668B, 668-669
- **Compare and order whole numbers, integers (Gr. 6), fractions, mixed numbers and decimals.**
5: 6A-6B, 6-7, 12A-12B, 12-13, 418A-418B, 418-419, 420A-420B, 420-423, 430A-430B, 430-433, 712A-712B, 712-715
- **Recognize order relations for decimals, integers (Gr. 6) and rational numbers (Gr. 7).**
5: 6A-6B, 6-7, 12A-12B, 12-13, 418A-418B, 418-419, 420A-420B, 420-423, 430A-430B, 430-433, 712A-712B, 712-715
- **Explore number relationships using a calculator; draw conclusions.**
5: 11, 91, 167, 221, 273, 305, 367, 397, 481, 567, 601, 651, 715
- **Apply rounding strategies to decimals and whole numbers as they relate to real life.**
5: 26A-26B, 26-27
- **Develop an understanding of the significance of the average number (Gr. 5) and absolute value of a number (Gr. 7).**
5: 282A-282B, 282-285
- **Use charts, written and oral language to describe the history and development of Roman numerals.**
See SFAW Mathematics Grade 4: 195

- **Use and interpret Roman numerals across the curriculum.**
See SFAW Mathematics Grade 4: 195
- **Describe scenarios from daily life in which numerals can be used to represent positive and negative values (Gr. 6).**
5: 568A-568B, 568-569
- **Explore the characteristics of even and odd numbers; positive and negative numbers (Gr. 6); factors (Gr. 5) and multiples (Gr. 5) of given numbers.**
5: 162A-162B, 162-163, 164A-164B, 164-167, 712A-712B, 712-715
- **Develop an understanding of number theory: primes, factors, multiples, squares (Gr. 6), and square roots (Gr. 7 & 8).**
5: 162A-162B, 162-163, 164A-164B, 164-167
- **Explore the characteristics of factors, multiples and powers of given numbers (Gr. 7 & 8).**
5: 162A-162B, 162-163, 164A-164B, 164-167
- **Explain the reason why zero can never be a denominator in a fraction (Gr. 7 & 8).**
5: 394A-394B, 394-397
- **Perceive variability in a set of numbers and compare sets of numbers for relative variability (Gr. 8).**
5: preparation: 728A-728B, 728-279
- **Expand knowledge of numbers to include reals, rationals and irrationals (Gr. 8).**
5: 712A-712B, 712-715
- **Expand knowledge of percents to include percents greater than 100% (Gr. 8).**
5: preparation: 668A-668B, 668-669, 670A-670B, 670-671, 672A-672B, 672-675
- **Describe scenarios from daily life in which numerals can be used to represent positive and negative values.**
5: 568A-568B, 568-569
- **Explore the characteristics of even and odd numbers (Gr. 5, 6, & 7).**
See SFAW Mathematics Grade 3: 24A-24B, 24-27

- **Explore the characteristics of factors and multiples of given numbers (Gr. 5, 6, & 7).**
5: 162A-162B, 162-163, 164A-164B, 164-167
- **Explore number relationships using a calculator; draw conclusions.**
5: 11, 91, 167, 221, 273, 305, 367, 397, 481, 567, 601, 651, 715
- **Recognize decimal numbers to millionths place, relating decimals to money, decimals to fractions and decimals to percents (Gr. 8).**
5: 8A-8B, 8-11, 160A-160B, 160-161, 232A-232B, 232-233, 426A-426B, 426-429, 430A-430B, 430-433, 668A-668B, 668-669
- **Apply rounding strategies to decimals and whole numbers; understand the practicality in the real world (Gr. 8).**
5: 26A-26B, 26-27
- **Develop an understanding of the significance of the average number and absolute value of a number (Gr. 8).**
5: 282A-282B, 282-285
- **Use charts, written and oral language to describe the history and development of Roman numerals.**
See SFAW Mathematics Grade 4: 195
- **Translate Roman numerals to Arabic numerals and vice versa (up to M).**
See SFAW Mathematics Grade 4: 195

Key Idea 3

OPERATIONS

3. Students use mathematical operations and relationships among them to understand mathematics.

TEACHING/LEARNING STRATEGIES

Students will:

- **Demonstrate mastery of single digit addition, subtraction, multiplication and division facts through timed speed tests.**
5: 36A-36B, 36-37, 66A-66B, 66-67, 136A-136B, 136-137

- **Use mathematical operations and relationships among them to understand mathematics.**
5: 38A-38B, 38-39, 40A-40B, 40-41, 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-483
- **Use models and diagrams to demonstrate algorithms for addition, subtraction, multiplication, and division of whole numbers and fractions.**
5: 38A-38B, 38-39, 40A-40B, 40-41, 72A-72B, 72-75, 152A-152B, 152-155
- **Use student math journals and oral presentations to document an understanding of operational algorithms through oral and written language.**
5: 38A-38B, 38-39, 40A-40B, 40-41, 72A-72B, 72-75, 152A-152B, 152-155
- **Use student math journals to document a growing understanding of math operations and their applications to whole numbers, fractions, decimals, and percents.**
5: 36A-36B, 36-37, 38A-38B, 38-39, 40A-40B, 40-41, 88A-88B, 88-91, 94A-94B, 94-97, 152A-152B, 152-155, 156A-156B, 156-157, 158A-158B, 158-159, 160A-160B, 160-161, 202A-202B, 202-203, 214A-214B, 214-217, 218A-218B, 218-221, 224A-224B, 224-225, 230A-230B, 230-231, 232A-232B, 232-233, 234A-234B, 234-237
- **Use base ten blocks and place value sheets to plot hundred-thousands.**
5: 4A-4B, 4-5
- **Use almanac or road atlas, and calculator to find exact distance (cooperative group travel plans).**
5: related material: 528A-528B, 528-531, 534A-534B, 534-535
- **Use newspaper ads and play money to calculate costs, change, etc.**
5: related material: 160A-160B, 160-161, 232A-232B, 232-233
- **Work in groups to present solutions to a problem using more than one method.**
5: 32B, 42B, 80B, 104B, 144B, 168B, 210B, 226B, 276B, 272B, 352B, 356B, 406B, 434B, 484B, 504B, 558B, 570B, 606B, 624B, 660B, 664B, 706B, 720B
- **Continue to explore methods of collecting and organizing data.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 282A-282B, 282-285, 286A-286B, 286-287

- **Use tables, graphs, and diagrams to represent data.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 282A-282B, 282-285, 286A-286B, 286-287
- **Continue to investigate logic concepts.**
5: 80A-80B, 80-81, 434A-434B, 434-437
- **Develop bulletin boards illustrating commutative and associative properties for addition and multiplication.**
5: 22A-22B, 22-25, 66A-66B, 66-67, 70A-70B, 70-71, 696A-696B, 696-699

Key Idea 4

MODELING/MULTIPLE REPRESENTATIONS

4. Students use mathematical modeling/multiple representations to provide a means of presenting, communicating, and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use simulations, manipulatives, picture diagrams, drawings and models to explain mathematical ideas, relationships, operations, and processes and to demonstrate geometrical concepts.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557
- **Use art, design and music to express mathematical relationships, geometric designs and problem solving.**
5: 31, 97, 155, 221, 285, 345, 429, 499, 545, 597, 675, 727
- **Use concrete materials to model spatial relationships.**
5: 328A-328B, 328-331, 332A-332B, 332-335, 336A-336B, 336-337, 340A-340B, 340-341
- **Use concrete materials and diagrams to describe the operation of real world processes and to solve real world problems**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557

- **Construct tables charts and graphs to display, analyze and communicate real world data.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 282A-282B, 282-285, 286A-286B, 286-287
- **Use computers, calculators and models to visualize, represent and transform two- and three-dimensional shapes.**
5: 367
- **Represent numerical relationships in one- and two-dimensional graphs.**
5: 262A-262B, 262-265, 266A-266B, 266-269, 724A-724B, 724-727, 728A-728B, 728-729
- **Use appropriate tools to construct and verify geometric relationships.**
5: 336A-336B, 336-337, 360A-360B, 360-363
- **Construct models, make drawings, fold paper and use graph paper to:**
 - compare shapes and figures
 - determine the properties of lines, rays, triangles, quadrilaterals, pentagons, hexagons, octagons and circles.5: 328A-328B, 328-331, 332A-332B, 332-335, 336A-336B, 336-337, 340A-340B, 340-341, 342A-342B, 342-345, 346A-346B, 346-351
- **Draw, sketch, diagram, model, and find examples of objects which illustrate the following geometric concepts: radius, diameter, edge, face, vertex, parallel, perpendicular, intersecting lines, angles, parallelograms, diagonals, polygons, area, perimeter and volume (cube and rectangular prism only).**
5: 328A-328B, 328-331, 332A-332B, 332-335, 336A-336B, 336-337, 340A-340B, 340-341, 342A-342B, 342-345, 346A-346B, 346-351, 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613
- **Use the coordinate plane to explore geometric ideas.**
5: 724A-724B, 724-727
- **Use diagrams, manipulatives, models and oral language to explore the relationships of fractions, mixed numbers, decimals and percents.**
5: 410A-410B, 410-411, 412A-412B, 412-413, 416A-416B, 416-417, 426A-426B, 426-429

- **Use geometric designs, charts, drawings, shading and manipulatives to demonstrate understanding of equivalent fractions, mixed numbers, ratios, percents and decimals.**
5: 400A-400B, 400-401, 410A-410B, 410-411, 412A-412B, 412-413, 646A-646B, 646-647, 648A-648B, 648-651, 652A-652B, 652-653, 654A-654B, 654-655, 662A-662B, 662-663, 668A-668B, 668-669, 670A-670B, 670-671, 672A-672B, 672-675
- **Use magazines and newspaper articles to explain the meaning of decimals in context.**
5: related material: 84A-84B, 84-85
- **Use factor trees to model and visualize the process of prime factorization.**
5: 162A-162B, 162-163
- **Use and copy maps and/or make scale drawings using the concept of ratio to represent real objects or places.**
5: 662A-662B, 662-663
- **Use a compass and straight edge to construct:**
 - various geometrical shapes (Gr. 6)
 - bisecting lines and angles (Gr. 7)
 - congruent and similar polygons (Gr. 8)5: 332A-332B, 332-335, 371
- **Use geometrical shapes and models to determine lines of symmetry. (Gr. 6, 7, & 8)**
5: 368A-368B, 368-370
- **Use variables to represent mathematical relationships. (Gr. 6, 7, & 8)**
5: 100A-100B, 100-103, 104A-104B, 104-105
- **Use input and output boxes to model and visualize the process of functions. (Gr. 6, 7, & 8)**
5: 106A-106B, 106-107, 136A-136B, 136-137, 728A-728B, 728-729
- **Use tree diagrams and sample spaces to explore probability. (Gr. 6, 7, & 8)**
5: 300A-300B, 300-301
- **Use graphing on a number line to visualize the solution to equations and inequalities. (Gr. 7, & 8)**
5: 728A-728B, 728-279

- **Use a two dimension graph to locate points when given an ordered pair (coordinates) and to identify an ordered pair from a point on the graph. (Gr. 7, & 8)**
5: 724A-724B, 724-727
- **Use charts, drawings and manipulatives to demonstrate an understanding of decimals. (Gr. 7, & 8)**
5: 84A-84B, 84-85
- **Develop models that do and do not rely on chance. (Gr. 7, & 8)**
5: 296A-296B, 296-299

Key Idea 5

MEASUREMENT/GEOMETRY/STATISTICS

5. Students use both Metric and English measurements to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING/LEARNING STRATEGIES

Students will:

- **Estimate, make and use measurement in real world situations.**
5: 332A-332B, 332-335, 532A-532B, 532-533, 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557
- **Develop measurement skills and informally derive and apply formulas in direct measurement activities using appropriate vocabulary (see vocabulary list).**
5: 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613
- **Recognize that measurement is approximate and never exact.**
5: 532A-532B, 532-533
- **Describe real life situations where estimations are sufficient and situations where more accurate measurements are needed.**
5: 532A-532B, 532-533

- **Select appropriate standard and non-standard measurement units and tools to measure to a desired degree of accuracy (include whole, fractional and Metric units).**
5: 332A-332B, 332-335, 532A-532B, 532-533, 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557
- **Develop critical judgment for the reasonableness of measurement.**
5: 332A-332B, 332-335, 532A-532B, 532-533, 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557
- **Apply the attributes of area, length, capacity (liquid volume), weight, volume, time, temperature, and angle in problem solving.**
5: 332A-332B, 332-335, 532A-532B, 532-533, 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613
- **Estimate and find measures such as length, perimeter, area and volume using standard and non-standard units.**
5: 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613
- **Apply statistical methods such as measures of central tendency (average, range of data), graphs, tables, and charts to display, describe and compare data.**
5: 282A-282B, 282-285
- **Explore and produce graphic representations of data using calculators and/or computers.**
5: 273
- **Demonstrate use of standard household and scientific measuring implements and non-standard measurement objects to measure length, weight and volume/capacity (liquid volume).**
5: 528A-528B, 528-531, 532A-532B, 532-533, 534A-534B, 534-535

Key Idea 6**UNCERTAINTY**

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Collect and organize data and compare the following:**
 - **Bar graph**
 - **Line graph**
 - **Pictograph**
 - **Frequency table****5:** 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287

- **Construct and read a circle graph using fractional parts.**
5: 286A-286B, 286-287

- **Use a compass and protractor to construct a circle graph.**
5: 286A-286B, 286-287

- **Create a Venn diagram.**
5: 103

- **Predict equally likely or not equally likely outcomes using a spinner.**
5: 296A-296B, 296-299

- **Use spinners, dice, coins, playing cards, jars of candies, marbles, etc. to represent random choice of selections.**
5: 296A-296B, 296-299, 302A-302B, 302-305

- **Construct a tree diagram to find all possible outcomes for flipping 2 coins (or 2-sided counters).**
5: 300A-300B, 300-301

- **Randomly select playing cards one at a time, discarding the card already selected (dependent events).**
5: 302A-302B, 302-305

- **Toss a die to equal “7” to show events having the probability of zero.**
5: 302A-302B, 302-305
- **Select a red object when all the objects are red to show events have a probability of one (certainty).**
5: 296A-296B, 296-299, 302A-302B, 302-305
- **Select a red object from a box with red, blue and green objects having a probability between one and zero.**
5: 302A-302B, 302-305
- **Determine the number of ways three items can be ordered/arranged.**
5: 300A-300B, 300-301
- **Using a collection of data, develop an understanding of the significance of the:**
 - **Average (mean)**
 - **Median**
 - **Mode**
 - **Range****and discuss uses of this information**
5: 282A-282B, 282-285
- **Construct a logic table to solve problems involving logical reasoning.**
5: 434A-434B, 434-437

Key Idea 7

PATTERNS/FUNCTIONS

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics and construct generalizations that describe patterns simply and efficiently.

TEACHING/LEARNING STRATEGIES

Students will:

- **Recognize, describe, extend and create numerical, geometric, musical and artistic patterns.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729

- **Create original patterns and copy patterns using various manipulatives (e.g. tangrams, tiles, graph paper), numbers, geometric figures, drawings and technological tools.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 728A-728B, 728-729
- **Discover and collect examples of patterns in nature, art, music and literature.**
5: related material: 144A-144B, 144-145
- **Present cultural art as examples of design patterns.**
5: related material: 144A-144B, 144-145
- **Use a variety of manipulative materials and technologies to explore patterns.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729
- **Use patterns and functions to represent and solve problems and to describe mathematical relationships.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729
- **Develop methods to solve basic linear equations (Gr. 6, 7, & 8).**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705
- **Use calculator function keys to develop an understanding of numerical functions.**
5: 106A-106B, 106-107, 728A-728B, 728-729
- **Use equations, variables (mystery numbers) and open sentences to represent mathematical relationships.**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705
- **Verify the results of substituting variables (mystery numbers) in equations (Gr. 6, 7, & 8).**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705
- **Describe and represent patterns using tables, charts and graphs, rules and verbal descriptions.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729

- **Interpret graphs, charts and tables to describe and represent patterns.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729
- **Represent mathematical relationships (greater than, less than, equal to, “five more than”, etc.) using numerical expressions and equations (e.g. $x > 5$, $x + 5$).**
5: 6A-6B, 6-7, 12A-12B, 12-13, 418A-418B, 418-419, 420A-420B, 420-423, 430A-430B, 430-433
- **Copy geometric patterns and shapes using geoboards, graph paper, calculators, computers, etc.**
5: 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 144A-144B, 144-145, 728A-728B, 728-729
- **Use manipulatives and drawings to identify, explore and develop relationships of two- and three-dimensional geometric shapes.**
5: 598A-598B, 598-601
- **Explore the concept of similarity in relevant situations.**
5: 360A-360B, 360-363, 662A-662B, 662-663
- **Apply the concept of similarity when exploring similar and congruent triangles and polygons.**
5: 360A-360B, 360-363, 662A-662B, 662-663
- **Classify polygons and triangles using the properties of their sides and angles.**
5: 340A-340B, 340-341, 342A-342B, 342-345, 346A-346B, 346-349
- **Use the relationships between points, lines, angles, and planes to explore and verify geometric figures.**
5: 328A-328B, 328-331, 332A-332B, 332-335
- **Develop an understanding of functions through input – output boxes. (Gr. 5, 6, 7, 8).**
5: 106A-106B, 106-107, 728A-728B, 728-729
- **Solve for unknowns using manipulative materials. (Gr. 6, 7, 8).**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705
- **Use equations and open sentences by substituting a given numerical value to solve an unknown. (Gr. 6, 7, 8).**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705

- **Solve for variables in equations using algorithms and manipulatives. (Gr. 6, 7, 8).**
5: 108A-108B, 108-109, 700A-700B, 700-701, 702A-702B, 702-705
- **Explore transformations through geometric manipulations (rotation, reflection, translation) using graph paper and computer.**
5: 364A-264B, 364-367
- **Develop an understanding of functions and functional relationships: that a change in one quantity (variable) results in a change in another. (Gr. 6, 7, & 8).**
5: 106A-106B, 106-107, 728A-728B, 728-729
- **Investigate number patterns through palindromes. (Gr. 7, & 8).**
5: 144A-144B, 144-145
- **Explore and develop basic concepts of a right triangle; trigonometry. (Gr. 8).**
5: preparation: 554-557
- **Develop and apply the Pythagorean principle in the solution of problems using appropriate terminology: hypotenuse and legs. (Gr. 8).**
5: preparation: 554-557
- **Find the sine, cosine and tangent of an angle in a right triangle. (Gr. 8).**
5: preparation: 554-557
- **Determine if a triangle is a right triangle using the Pythagorean Theorem. (Gr. 8).**
5: preparation: 342A-342B, 342-345, 554-557
- **Find the missing side of a right triangle using the Pythagorean Theorem. (Gr. 8).**
5: preparation: 554-557

**Scott Foresman – Addison Wesley Mathematics
to the
New York Archdiocese
Essential Learnings for Mathematics**

Grade Six

Key Idea 1

MATHEMATICAL REASONING

1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

TEACHING/LEARNING STRATEGIES

Students will:

- **Apply a variety of reasoning strategies for problem solving (e.g. using manipulatives, using trial and error, making a list or table, drawing a diagram, looking for a pattern, looking for word clues).**
6: 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 54-55, 98A-98B, 98-99, 116A-116B, 116-119, 120-121, 156A-156B, 156-157, 180A-180B, 180-181, 182-183, 212A-212B, 212-213, 226A-226B, 226-227, 228-229, 230-231, 264A-264B, 264-265, 278A-278B, 278-279, 280-281, 312A-312B, 312-313, 324A-324B, 324-235, 334-335, 362A-362B, 362-363, 374A-374B, 374, 375, 388-389, 414A-414B, 414-415, 434A-434B, 434-436, 450-451, 490A-490B, 490-491, 512A-512B, 512-513, 520-521, 560A-560B, 560-561, 582A-582B, 582-583, 598-599, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711, 724-725
- **Make and evaluate conjectures and arguments using appropriate language (see vocabulary list).**
6: 278A-278B, 278-279, 324A-324B, 324-325, 362A-362B, 362-363, 512A-512B, 512-513, 674A-674B, 674-675
- **Make conclusions based on inductive reasoning.**
6: 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 98A-98B, 98-99, 116A-116B, 116-119, 156A-156B, 156-157, 180A-180B, 180-181, 212A-212B, 212-213, 226A-226B, 226-227, 264A-264B, 264-265, 278A-278B, 278-279, 312A-312B, 312-313, 324A-324B, 324-235, 362A-362B, 362-363, 374A-374B, 374-375, 414A-414B, 414-415, 434A-434B, 434-436, 490A-490B, 490-491, 512A-512B, 512-513, 560A-560B, 560-561, 582A-582B, 582-583, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711

- **Justify conclusions involving simple and compound (i.e. and/or) statements.**
6: 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 98A-98B, 98-99, 116A-116B, 116-119, 156A-156B, 156-157, 180A-180B, 180-181, 212A-212B, 212-213, 226A-226B, 226-227, 264A-264B, 264-265, 278A-278B, 278-279, 312A-312B, 312-313, 324A-324B, 324-235, 362A-362B, 362-363, 374A-374B, 374-375, 414A-414B, 414-415, 434A-434B, 434-436, 490A-490B, 490-491, 512A-512B, 512-513, 560A-560B, 560-561, 582A-582B, 582-583, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711
- **Perform problem-solving/mathematical reasoning tasks in cooperative learning groups, including project problems, which require more than one class period.**
6: 20B, 36B, 52B, 98B, 116B, 156B, 180B, 212B, 226B, 264B, 278B, 312B, 324B, 362B, 374B, 414B, 434B, 490B, 512B, 560B, 582B, 648B, 674B, 676B, 706B, 710B
- **Solve problems that have more than one correct solution.**
6: 156A-156B, 156-157
- **Design experiments to collect and organize data in tally charts, bar graphs and pictographs.**
6: 624A-624B, 624-627, 628A-628B, 628-631, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647
- **Estimate reasonable answers to mathematical problems; identify unreasonable answers and explain/demonstrate why they are unreasonable.**
6: 16A-16B, 16-17, 18A-18B, 18-19, 216A-216B, 216-217, 256A-256B, 256-257, 368A-368B, 368-369
- **Explain the solution of multiple step problems both orally and in writing (student math journals).**
6: 180A-180B, 180-181

Key Idea 2**NUMBER AND NUMERATION**

2. Students use number sense and numeration to develop an understanding of the multiple use of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Use whole numbers, decimals, fractions and mixed numbers to identify locations, to quantify groups of objects and to measure distances.**
6: 76A-76B, 76-77, 160A-160B, 160-163, 408A-408B, 408-409
- **Identify and apply ratios (Gr. 5), proportions (Gr. 6), fractions (Gr. 5), mixed numbers (Gr. 5), decimals (Gr. 5) and percents (Gr. 6) through a wide variety of hands-on exploration.**
6: 76A-76B, 76-677, 160A-160B, 160-163, 168A-168B, 168-169, 300A-300B, 300-301, 302A-302B, 302-305, 316A-316B, 316-317, 318A-318B, 318-321, 322A-322B, 322-323, 354A-354B, 354-357, 358A-358B, 358-361, 366A-366B, 366-367, 368A-368B, 368-369, 370A-370B, 370-373, 380A-380B, 380-383, 384A-384B, 384-385, 386A-386B, 386-387
- **Relate counting to grouping and to place value up to:**
 - one billion (Gr. 5).
 - hundred billions (Gr. 6).
 - trillions (Gr. 7).6: 4A-4B, 4-7
- **Relate decimals to money, fractions (Gr. 5) and to percents (Gr. 6).**
6: 86A-86B, 8-689, 90A-90B, 90-93, 94A-94B, 94-97, 172A-172B, 172-175, 358A-358B, 358-361
- **Compare and order whole numbers, integers (Gr. 6), fractions, mixed numbers and decimals.**
6: 12A-12B, 12-13, 78A-78B, 78-79, 176A-176B, 176-179, 410A-410B, 410-411
- **Recognize order relations for decimals, integers (Gr. 6) and rational numbers (Gr. 7).**
6: 12A-12B, 12-13, 78A-78B, 78-79, 176A-176B, 176-179, 410A-410B, 410-411

- **Explore number relationships using a calculator; draw conclusions**
6: 43, 109, 163, 167, 209, 255, 333, 357, 425, 499, 519, 575, 593, 597, 627, 641, 661
- **Apply rounding strategies to decimals and whole numbers as they relate to real life.**
6: 16A-16B, 16-17, 80A-80B, 80-81
- **Develop an understanding of the significance of the average number (Gr. 5) and absolute value of a number (Gr. 7).**
6: 408A-408B, 408-409, 624A-624B, 624-627
- **Use charts, written and oral language to describe the history and development of Roman numerals.**
6: 7
- **Use and interpret Roman numerals across the curriculum.**
6: 7
- **Describe scenarios from daily life in which numerals can be used to represent positive and negative values (Gr. 6).**
6: 722A-722B, 722-723
- **Explore the characteristics of even and odd numbers; positive and negative numbers (Gr. 6); factors (Gr. 5) and multiples (Gr. 5) of given numbers.**
6: 142A-142B, 142-145, 146A-146B, 146-149, 150A-150B, 150-151, 152A-152B, 152-155
- **Develop an understanding of number theory: primes, factors, multiples, squares (Gr. 6), and roots (Gr. 7 & 8).**
6: 142A-142B, 142-145, 146A-146B, 146-149, 150A-150B, 150-151, 152A-152B, 152-155
- **Explore the characteristics of factors, multiples and powers of given numbers (Gr. 7 & 8).**
6: 142A-142B, 142-145, 146A-146B, 146-149, 150A-150B, 150-151, 152A-152B, 152-155
- **Explain the reason why zero can never be a denominator in a fraction (Gr. 7 & 8).**
6: 160A-160B, 160-163

- **Perceive variability in a set of numbers and compare sets of numbers for relative variability (Gr. 8).**
6: preparation: 624A-624B, 624-627
- **Expand knowledge of numbers to include reals, rationals and irrationals (Gr. 8).**
6: 8A-8B, 8-11, 110A-110B, 110-111, 408A-408B, 408-409
- **Expand knowledge of percents to include percents greater than 100% (Gr. 8).**
6: 354A-354B, 354-357, 358A-358B, 358-361, 366A-366B, 366-367, 368A-368B, 368-369, 370A-370B, 370-373, 380A-380B, 380-383, 384A-384B, 384-385, 386A-386B, 386-387
- **Explore set theory as it applies to sets of numbers including the concepts of subsets and disjoint sets (Gr. 8).**
6: preparation: 89, 624A-624B, 624-627
- **Describe scenarios from daily life in which numerals can be used to represent positive and negative values.**
6: 722A-722B, 722-723
- **Explore the characteristics of even and odd numbers (Gr. 5, 6, & 7).**
6: related material: 142A-142B, 142-145
- **Explore the characteristics of factors and multiples of given numbers (Gr. 5, 6, & 7).**
6: 142A-142B, 142-145, 146A-146B, 146-149, 150A-150B, 150-151, 152A-152B, 152-155
- **Explore number relationships using a calculator; draw conclusions.**
6: 43, 109, 163, 167, 209, 255, 333, 357, 425, 499, 519, 575, 593, 597, 627, 641, 661
- **Recognize decimal numbers to millionths place, relate decimals to money, decimals to fractions and decimals to percents (Gr. 8).**
6: 76A-76B, 76-77, 86A-86B, 8-689, 90A-90B, 90-93, 94A-94B, 94-97, 172A-172B, 172-175, 358A-358B, 358-361
- **Apply rounding strategies to decimals and whole numbers; understand the practicality in the real world (Gr. 8).**
6: 16A-16B, 16-17, 80A-80B, 80-81
- **Develop an understanding of the significance of the average number and absolute value of a number (Gr. 8).**
6: 408A-408B, 408-409, 624A-624B, 624-627

- **Use charts, written and oral language to describe the history and development of Roman numerals.**
6: 7
- **Translate Roman numerals to Arabic numerals and vice versa (up to M).**
6: 7

Key Idea 3

OPERATIONS

3. Students use mathematical operations and relationships among them to understand mathematics.

TEACHING/LEARNING STRATEGIES

Students will:

- **Explain the governing algorithm for addition, subtraction, multiplication and division of whole numbers, fractions and decimals.**
6: 86A-86B, 86-89, 90A-90B, 90-93, 94A-94B, 94-97, 100A-100B, 100-103, 204-205, 206A-206B, 206-211, 218A-218B, 218-219, 220A-220B, 220-223, 248A-248B, 248-251, 252A-252B, 252-255, 258A-258B, 258-259, 266A-266B, 266-267, 270A-270B, 270-271
- **Demonstrate mastery of single digit addition, subtraction, multiplication and division facts using timed oral and written tests.**
6: 16A-16B, 16-17, 18A-18B, 18-19
- **Use oral and written language, models and manipulatives to explain and give examples of the properties of the four operations.**
6: 28A-28B, 28-29, 30A-30B, 30-31, 44A-44B, 44-47
- **Use manipulatives to demonstrate commutative and associative properties for addition and multiplication.**
6: 28A-28B, 28-29, 30A-30B, 30-31, 44A-44B, 44-47
- **Use student math journals to document a growing understanding of math operations and their applications to whole numbers, fractions, decimals, and percents.**
6: 28A-28B, 28-29, 30A-30B, 30-31, 44A-44B, 44-47

- **Use student math journals and oral presentations to document an understanding of operational algorithms through oral and written language.**
6: 86A-86B, 86-89, 90A-90B, 90-93, 94A-94B, 94-97, 100A-100B, 100-103, 204-205, 206A-206B, 206-211, 218A-218B, 218-219, 220A-220B, 220-223, 248A-248B, 248-251, 252A-252B, 252-255, 258A-258B, 258-259, 266A-266B, 266-267, 270A-270B, 270-271
- **Work in groups to present solutions to a problem using more than one method.**
6: 20B, 36B, 52B, 98B, 116B, 156B, 180B, 212B, 226B, 264B, 278B, 312B, 324B, 362B, 374B, 414B, 434B, 490B, 512B, 560B, 582B, 648B, 674B, 676B, 706B, 710B
- **Develop bulletin boards illustrating commutative and associative properties for addition and multiplication.**
6: 28A-28B, 28-29, 30A-30B, 30-31, 44A-44B, 44-47
- **Demonstrate mastery of single digit addition, subtraction, multiplication and division facts using timed speed drills.**
6: 16A-16B, 16-17, 18A-18B, 18-19

Key Idea 4

MODELING/MULTIPLE REPRESENTATION

4. Students use mathematical modeling/multiple representations to provide a means of presenting, communicating, and connecting mathematical information and relationships.

TEACHING/LEARNING STRATEGIES

Students will:

- **Use simulations, manipulatives, picture diagrams, drawings and models to explain mathematical ideas, relationships, operations, processes and to demonstrate geometrical concepts.**
6: 628A-628B, 628-631, 632A-632B, 632-633, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647, 650A-650B, 650-651, 69A-698B, 698-699, 718A-718B, 718-121
- **Use art, design and music to express mathematical relationships, geometric designs and problem solving.**
6: 35, 103, 175, 223, 269, 309, 383, 466, 479, 557, 645, 721

- **Use concrete materials to model spatial relationships.**
6: 472-472B, 472-475, 484A-484B, 484-489
- **Use concrete materials and diagrams to describe the operation of real world processes and to solve real world problems.**
6: 628A-628B, 628-631, 632A-632B, 632-633, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647, 650A-650B, 650-651, 69A-698B, 698-699, 718A-718B, 718-721
- **Construct tables, charts and graphs to display, analyze and communicate real world data.**
6: 624A-624B, 624-627, 628A-628B, 628-631, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647
- **Use computers, calculators and models to visualize, represent and transform two and three-dimensional shapes.**
6: 499, 519
- **Represent numerical relationships in one and two-dimensional graphs.**
6: 638A-638B, 638-641, 642A-642B, 642-647
- **Use appropriate tools to construct and verify geometric relationships.**
6: 480A-480B, 480-483, 506A-506B, 506-509
- **Construct models, make drawings, fold paper and use graph paper to:**
 - compare shapes and figures
 - determine the properties of lines, rays, triangles, quadrilaterals, pentagons, hexagons, octagons and circles.6: 472A-472B, 472-475, 476A-476B, 476-479, 480A-480B, 480-483, 484A-484B, 484-489
- **Draw, sketch, diagram, model, and find examples of objects which illustrate the following geometric concepts: radius, diameter, edge, face, vertex, parallel, perpendicular, intersecting lines, angles, parallelograms, diagonals, polygons, area, perimeter and volume (cube and rectangular prism only).**
6: 472A-472B, 472-475, 476A-476B, 476-479, 480A-480B, 480-483, 484A-484B, 484-489, 564A-564B, 564-567, 568A-568B, 568-569, 570A-570B, 570-571, 572A-572B, 572-575, 576A-576B, 576-579, 580A-580B, 580-581, 590A-590B, 590-593, 594A-594B, 594-597
- **Use the coordinate plane to explore geometric ideas.**
6: 510A-510B, 510-511

- **Use diagrams, manipulatives, models and oral language to explore the relationships of fractions, mixed numbers, decimals and percents.**
6: 172A-172B, 172-175, 168A-168B, 168-169, 358A-358B, 358-361
- **Use geometric designs, charts, drawings, shading and manipulatives to demonstrate understanding of equivalent fractions, mixed numbers, ratios, percents and decimals. Use magazines and newspaper articles to explain the meaning of decimals in context.**
6: 172A-172B, 172-175, 168A-168B, 168-169, 300A-300B, 300-301, 302A-302B, 302-305, 316A-316B, 316-317, 318A-318B, 318-321, 322A-322B, 322-323, 354A-354B, 354-357, 358A-358B, 358-361, 366A-366B, 366-367, 368A-368B, 368-369, 370A-370B, 370-373, 380A-380B, 380-383, 384A-384B, 384-385, 386A-386B, 386-387
- **Use factor trees to model and visualize the process of prime factorization.**
6: 142A-142B, 142-145, 146A-146B, 146-149, 150A-150B, 150-151, 152A-152B, 152-155
- **Use and copy maps and/or make scale drawings using the concept of ratio to represent real objects or places.**
6: 330A-330B, 330-333
- **Use a compass and straight edge to construct:**
 - various geometrical shapes (Gr. 6)
 - bisect lines and angles (Gr. 7)
 - construct congruent and similar polygons (Gr. 8)6: 484A-484B, 484-487
- **Use geometrical shapes and models to determine lines of symmetry. (Gr. 6, 7, & 8)**
6: 514A-514B, 514-515
- **Use variables to represent mathematical relationships. (Gr. 6, 7, & 8)**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Use input and output boxes to model and visualize the process of functions. (Gr. 6, 7, & 8)**
6: 444A-444B, 444-447, 448A-448B, 448-449
- **Use tree diagrams and sample spaces to explore probability. (Gr. 6, 7, & 8)**
6: 658A-658B, 658-661

- **Use graphing on a number line to visualize the solution to equations and inequalities. (Gr. 7, & 8)**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Use a two dimension graph to locate points when given an ordered pair (coordinates) and to identify an ordered pair from a point on the graph. (Gr. 7, & 8)**
6: 440A-440B, 440-443
- **Use charts, drawings and manipulatives to demonstrate understanding of decimals. (Gr. 7, & 8)**
6: 76A-76B, 76-77
- **Develop models that do and do not rely on chance.(Gr. 7, & 8)**
6: 662A-662B, 662-663

Key Idea 5

MEASUREMENT/GEOMETRY/STATISTICS

5. Students use both Metric and English measurements to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

TEACHING/LEARNING STRATEGIES

Students will:

- **Estimate, make and use measurement in real world situations.**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551
- **Develop measurement skills and informally derive and apply formulas in direct measurement activities using appropriate vocabulary (see vocabulary list).**
6: 564A-564B, 564-567, 568A-568B, 568-569, 570A-570B, 570-571, 572A-572B, 572-575, 576A-576B, 576-579, 580A-580B, 580-581, 590A-590B, 590-593, 594A-594B, 594-597
- **Recognize that measurement is approximate and never exact.**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551

- **Describe real life situations where estimations are sufficient and situations where more accurate measurements are needed.**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551
- **Select appropriate standard and non-standard measurement units and tools to measure to a desired degree of accuracy (include whole, fractional and Metric units).**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551
- **Develop critical judgment for the reasonableness of measurement.**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551
- **Apply the attributes of area, length, capacity (liquid volume), weight, volume, time, temperature, and angle in problem solving.**
6: 564A-564B, 564-567, 568A-568B, 568-569, 570A-570B, 570-571, 572A-572B, 572-575, 576A-576B, 576-579, 580A-580B, 580-581, 590A-590B, 590-593, 594A-594B, 594-597
- **Estimate and find measures such as length, perimeter, circumference, area, volume and surface area using standard and non-standard units.**
6: 564A-564B, 564-567, 568A-568B, 568-569, 570A-570B, 570-571, 572A-572B, 572-575, 576A-576B, 576-579, 580A-580B, 580-581, 590A-590B, 590-593, 594A-594B, 594-597
- **Apply statistical methods such as measures of central tendency (average, mean, range of data), graphs, tables, and charts to display, describe and compare data.**
6: 624A-624B, 624-627, 628A-628B, 628-631, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647
- **Explore and produce graphic representations of data using calculators and/or computers.**
6: 627, 641, 661
- **Demonstrate use of standard household and scientific measuring implements and non-standard measurement objects to measure length, weight and volume/capacity (liquid volume).**
6: 542A-542B, 542-545, 546A-546B, 546-549, 550A-550B, 550-551

Key Idea 6**UNCERTAINTY**

6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

TEACHING/LEARNING STRATEGIES***Students will:***

- **Conduct a survey to gather data for an experiment.**
6: 620A-620B, 620-623
- **Construct a pictograph, line graph, bar graph, and circle graph to report results of a survey.**
6: 620A-620B, 620-623, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647
- **Use average (mean) to interpret data.**
6: 624A-624B, 624-627
- **Divide a collection of data into quartiles (box and whisker plot).**
6: 631
- **Identify the upper/lower extremes of a collection of data.**
6: 624A-624B, 624-627
- **Interpret double and triple line graphs.**
6: 638A-638B, 638-641
- **Randomly select playing cards one at a time and list possible outcomes (independent events).**
6: 662A-662B, 662-663, 664A-664B, 664-665
- **Randomly select playing cards one at a time, discarding the card already selected (dependent events).**
6: 662A-662B, 662-663, 664A-664B, 664-665
- **Use a spinner with equal parts to predict equally likely outcomes.**
6: 662A-662B, 662-663, 664A-664B, 664-665
- **Use spinners, dice, coins, playing cards, jars or candies, marbles, etc. to represent random choice of selection.**
6: 662A-662B, 662-663, 664A-664B, 664-665

- **Make predictions for larger samples (e.g. 200 lefthanders, 1000 spins).**
6: 664A-664B, 664-665
- **Determine the number of ways three items can be ordered/arranged (permutations).**
6: 654A-654B, 654-657, 658A-658B, 658-661
- **Explore various ways of determining the number of possible combinations (tree diagram, sample space, multiplication principle).**
6: 654A-654B, 654-657, 658A-658B, 658-661

Key Idea 7

PATTERNS/FUNCTIONS

7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics and construct generalizations that describe patterns simply and efficiently.

TEACHING/LEARNING STRATEGIES

Students will:

- **Recognize, describe, extend and create numerical, geometric, musical and artistic patterns.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Create original patterns and copy patterns using various manipulatives (e.g. tangrams, tiles, graph paper), numbers, geometric figures, drawings and technological tools.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Discover and collect examples of patterns in nature, art, music and literature.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Present cultural art as examples of design patterns.**
6: related material: 212A-212B, 212-213, 444A-444B, 444-447
- **Use a variety of manipulative materials and technologies to explore patterns.**
6: 212A-212B, 212-213, 444A-444B, 444-447

- **Use patterns and functions to represent and solve problems and to describe mathematical relationships.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Develop methods to solve basic linear equations (Gr. 6, 7, & 8).**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Use calculator function keys to develop an understanding of numerical functions.**
6: 444A-444B, 444-447, 448A-448B, 448-449
- **Use equations, variables (mystery numbers) and open sentences to represent mathematical relationships.**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Verify the results of substituting variables (mystery numbers) in equations (Gr. 6, 7, & 8).**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Describe and represent patterns using tables, charts and graphs, rules and verbal descriptions.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Interpret graphs, charts and tables to describe and represent patterns.**
6: 212A-212B, 212-213, 444A-444B, 444-447
- **Represent mathematical relationships (greater than, less than, equal to, “five more than”, etc.) using numerical expressions and equations (e.g. $x > 5$, $x + 5$).**
6: 12A-12B, 12-13, 78A-78B, 78-79, 176A-176B, 176-179, 410A-410B, 410-411
- **Copy geometric patterns and shapes using geoboards, graph paper, calculators, computers, etc.**
6: 212A-212B, 212-213
- **Use manipulatives and drawings to identify, explore and develop relationships of two- and three-dimensional geometric shapes.**
6: 586A-586B, 586-589
- **Explore the concept of similarity in relevant situations.**
6: 330A-330B, 330-333, 506A-506B, 506-509
- **Apply the concept of similarity when exploring similar and congruent triangles and polygons.**
6: 506A-506B, 506-509

- **Classify polygons and triangles using the properties of their sides and angles.**
6: 494A-494B, 494-495, 496A-496B, 496-499, 500A-500B, 500-501
- **Use the relationships between points, lines, angles, and planes to explore and verify geometric figures.**
6: 472A-472B, 472-475, 476A-476B, 476-479, 480A-480B, 480-483
- **Develop an understanding of functions through input – output boxes. (Gr. 5, 6, 7, & 8).**
6: 444A-444B, 444-447, 448A-448B, 448-449
- **Solve for unknowns using manipulative materials. (Gr. 6, 7, & 8).**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Use equations and open sentences by substituting a given numerical value to solve an unknown. (Gr. 6, 7, & 8).**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Solve for variables in equations using algorithms and manipulatives. (Gr. 6, 7, & 8).**
6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715
- **Explore transformations through geometric manipulations (rotation, reflection, translation) using graph paper and computer.**
6: 510A-510B, 510-511, 516A-516B, 516-519
- **Develop an understanding of functions and functional relationships: that a change in one quantity (variable) results in a change in another. (Gr. 6, 7, & 8).**
6: 444A-444B, 444-447, 448A-448B, 448-449
- **Investigate number patterns through palindromes.(Gr. 7 & 8).**
6: 212A-212B, 212-213
- **Explore and develop basic concepts of a right triangle; trigonometry. (Gr. 8)**
6: preparation: 496-499, 572-575
- **Develop and apply the Pythagorean principle in the solution of problems using appropriate terminology: hypotenuse and legs. (Gr. 8)**
6: 499

- **Find the sine, cosine and tangent of an angle in a right triangle. (Gr. 8)**
6: preparation: 496-499, 572-575

- **Determine if a triangle is a right triangle using the Pythagorean Theorem. (Gr. 8)**
6: preparation: 496-499, 572-575

- **Find the missing side of a right triangle using the Pythagorean Theorem. (Gr. 8).**
6: 499