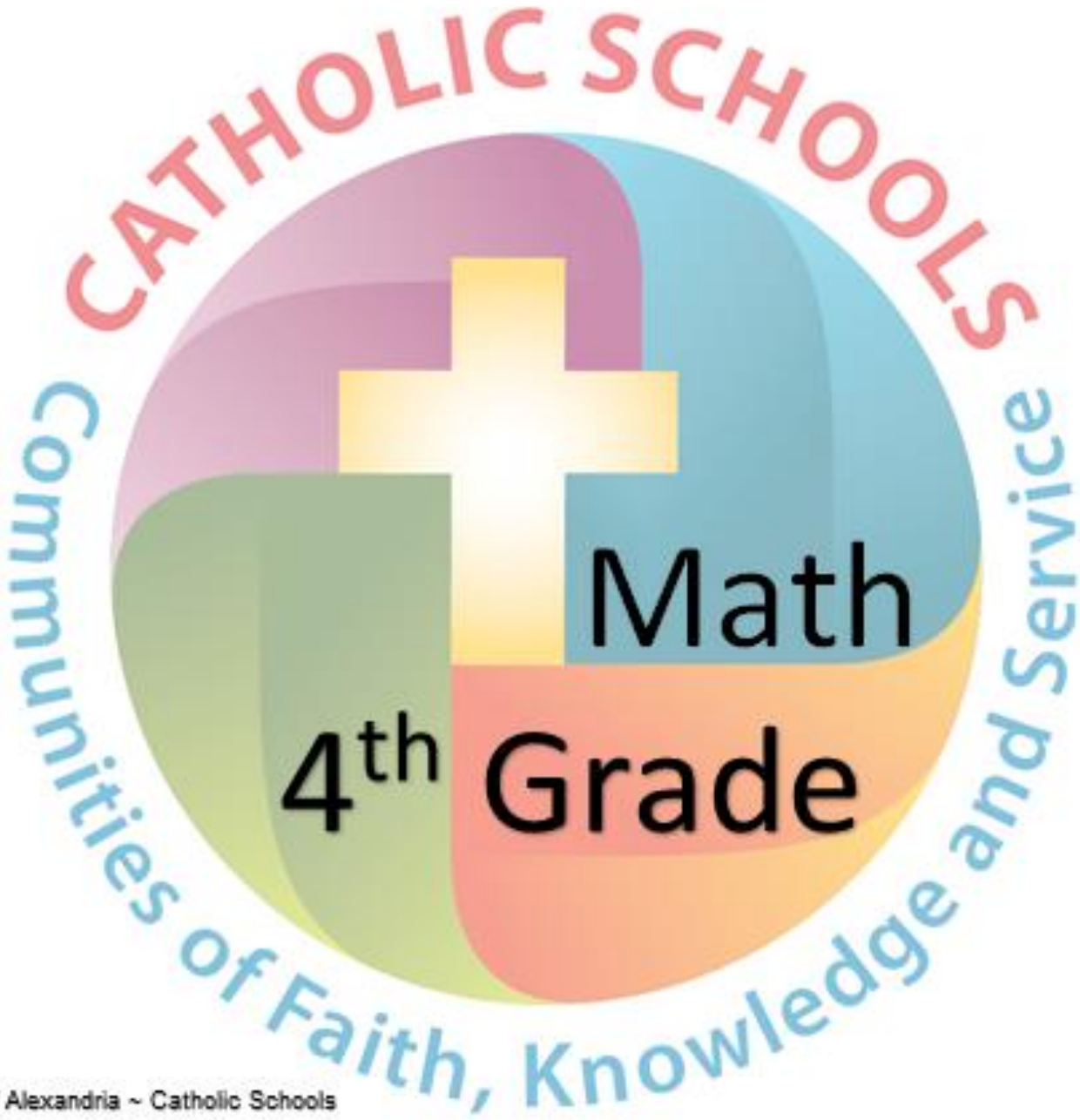


Diocese of Alexandria ~ Catholic Schools

Where faith and knowledge grow

DIOCESE OF ALEXANDRIA

As the Diocese of Alexandria seeks to provide a comprehensive learning environment, we are charged to "Teach More" by showing how all learning flows from and relates to our Creator. In this way, we will give our teaching a deeper meaning and purpose than simply the content itself. With this as our goal, the Catholic Schools Office has intertwined our selected curricular standards with the Catholic Standards developed by the Cardinal Newman Society. Through the merging of these two curricula, English Language Arts, Mathematics, Science, and Social Studies, teachers will be provided a roadmap to guide student's understanding and recognition of the relationship between learning and the connection to our God.

Thomas E. Roque, Sr.
Superintendent of Catholic Schools

DIOCESE OF ALEXANDRIA

Through comprehensive review of curricula from high performing districts throughout the United States in combination with parochial schools and Newman Cardinal Standards, the Curriculum Team for the Diocese of Alexandria has generated curricula for English Language Arts, Mathematics, Science, and Social Studies. The development of this framework is designed to guide the instructional path of teachers as they focus on the formation of their students in the areas of faith, academic excellence, responsible citizenry, and effective communication and collaboration. This process is a continuous improvement process with no defined beginning or end.

Barbara Forest, M.A..
Courtney Gistorb, M.Ed.

Denese Carter, M.Ed.
Tracy Bock, Ed.S.

THE DIOCESE of ALEXANDRIA

# FRAMEWORKS

## HOW TO USE

The frameworks are guides to instruction. The frameworks assist teachers in planning and pacing instruction. Specific dates or weeks that may be included in this document are for reference. Each school and teacher must consider the make-up of their students, focusing on the needs and strengths of each child when pacing and planning instruction.

The cycles for the year help pace instruction and ensure students have consistent coverage of the content. The duration (the suggested amount of time to spend on each cycle) does not accommodate for the scheduling of special events, inclement weather or school events. Teachers, with principal guidance, should adjust pacing as needed to accommodate for these events.

## RESEARCH-BASED HIGH-YIELD PRACTICES FOR INSTRUCTION

These strategies have proven effective in affecting student learning and achievement gains. As you plan daily instruction, consider how and where to integrate these strategies into the instructional sequence. Effect size is in parentheses. Please refer to the works of John Hattie for a complete description of instructional effect size.

- Classroom Discussion/Discourse (.82)
- Teacher Clarity/making the learning visible with expectations for learning (.75)
- Reciprocal Teaching (.74)
- Feedback (.73)
- Metacognitive Strategies (.69)

Student focusAreas

| Essential Questions |
| --- |
| • *How does mathematics help us understand God's creation?*<br>• *How does the use of math help us to understand the importance of clarity, reality and goodness?*<br>• *How do we solve addition and subtraction sentences to solve real world problems with and without concrete objects?*<br>• *What are the ethical, moral, and legal implications of Internet use?*<br>• *How does the study of mathematics enable us to understand, communicate, and live Gospel values?* |

| Catholic School – Math Standards (CS.GS) | |
| --- | --- |
| CS.M.K6.GS.1 | Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry, and reasoning. |
| CS.M.K6.GS.2 | Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false. |
| CS.M.K6.GS.3 | Recognize the power of the human mind as both a gift from God and a reflection of Him in whose image and likeness we were made. |
| CS.M.K6.GS.4 | Survey the truths about mathematical objects that are interesting in their own right and independent of human opinions. |

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Overview**

| Standards for Mathematical Content | Unit Focus | Standards for Mathematical Practice for ALL UNITS |
|---|---|---|
| **Unit 1 Place Value & Operations with Whole Numbers**<br><br>4.OA.B.4<br>4.OA.C.5<br>4.MD.A.1<br>4.OA.A.1<br>4.OA.A.2<br>4.NBT.A.1<br>4.NBT.A.2<br>4.NBT.A.3 | ▪ Gain familiarity with factors and multiples<br>▪ Generate and analyze patterns<br>▪ Solve problems involving measurement and conversion of measurements<br>▪ Use the four operations with whole numbers to solve problems<br>▪ Generalize place value understanding for multi-digit whole numbers | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.3 Construct viable arguments and critique the reasoning of others.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.6 Attend to precision.<br>MP.7 Look for and make use of structure.<br>MP.8 Look for and express regularity in repeated reasoning. |

***Unit 1: Suggested Open Educational Resources***

4.OA.B Identifying Multiples
4.OA.B Numbers in a Multiplication Table
4.OA.C.5 Double Plus One
4.MD.A.1 Who is the tallest?
4.OA.A.2 Comparing Money Raised
4.NBT.A.1 Thousands and Millions of Fourth Graders
4.NBT.A.2 Ordering 4-digit numbers
4.NBT.A.3 Rounding on the Number Line

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Overview**

| Standards for Mathematical Content | Unit Focus |
|---|---|
| **Unit 2 Multi-digit Arithmetic & Fraction Equivalence**<br><br>■ 4.NBT.B.4<br>■ 4.NBT.B.5<br>■ 4.NBT.B.6<br>■ 4.OA.A.3<br>□ 4.MD.A.3<br>■ 4.NF.A.1<br>■ 4.NF.A.2<br>■ 4.NF.B.3a-b | • Use place value understanding and properties of operations to perform multi-digit arithmetic<br>• Use the four operations with whole numbers to solve problems<br>• Solve problems involving measurement and conversion of measurements<br>• Extend understanding of fraction equivalence and ordering.<br>Build fractions from unit fractions |

***Unit 2: Suggested Open Educational Resources***

4.NBT.B To regroup or not to regroup
4.NBT.B.6 mental Division Strategy
4.OA.A.3, 4.MD.A.3 Karl's Garden
4.NF.A.1 Explaining Fraction Equivalence with Pictures
4.NF.A.1 Fractions and Rectangles
4.NF.A.2 Comparing Fractions Using Benchmarks Game
4.NF.A.2 Doubling Numerators and Denominators
4.NF.B.3a Comparing Sums of Unit Fractions
4.NF.B.3b making 22 Seventeenths in Different Ways

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Overview**

| Standards for Mathematical Content | Unit Focus |
|---|---|
| **Unit 3 Building Fractions & Decimal Notation**<br><br>■ 4.NF.B.3c-d<br>□ 4.MD.B.4<br>■ 4.NF.B.4a-c<br>■ 4.NF.C.5<br>■ 4.NF.C.6<br>■ 4.NF.C.7<br>□ 4.MD.A.2<br>■ 4.NBT.B.4 | • Build fractions from unit fractions<br>• Represent and interpret data<br>• Understand decimal notation for fractions and compare decimal fractions.<br>• Solve problems involving measurement and conversion of measurements<br>• Use place value understanding and properties of operations to add and subtract |

***Unit 3: Suggested Open Educational Resources***

4.NF.B.3c Cynthia's Perfect Punch
4.NF.B.3c Peaches
4.MD.B.4 Button Diameters
4.NF.B.4 Extending Multiplication From Whole Numbers to Fractions
4.NF.B.4c Sugar in six cans of soda
4.NF.C.5 Adding Tenths and Hundredths
4.NF.C.6 Dimes and Pennies
4.NF.C.6 Expanded Fractions and Decimals
4.NF.C.7 Using Place Value
4.MD.A.2 Margie Buys Apples

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Overview**

| Standards for Mathematical Content | Unit Focus |
|---|---|
| **Unit 4 Geometry and Measurement**<br><br>4.G.A.1<br>4.G.A.2<br>4.G.A.3<br>4.MD.C.5<br>4.MD.C.6<br>4.MD.C.7<br>4.OA.A.3<br>4.NBT.B.4 | • Draw and identify lines and angles, and classify shapes by properties of their lines and angles<br>• Understand concepts of angle and measure angles (Geometric measurement)<br>• Use the four operations with whole numbers to solve problems<br>• Use place value understanding and properties of operations to perform multi-digit arithmetic |

***Unit 4: Suggested Open Educational Resources***

4.G.A.1 The Geometry of Letters
4.G.A.1 What's the Point?
4.G.A.2 Are these right?
4.G.A.2 Defining Attributes of Rectangles and Parallelograms
4.G.A.3 Finding Lines of Symmetry
4.G.A.3 Lines of symmetry for triangles
4.MD.C.6, 4.MD.C.7, 4.G.A.1 Measuring Angles
4.MD.C.7, 4.G.A.2 Finding an unknown angle
4.OA.A.3 Carnival Tickets

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 1**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.OA.B.4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. | MP.2 Reason abstractly and quantitatively.<br>MP.7 Look for and make use of structure.<br>MP.8 Look for and express regularity in repeated reasoning. | Concept(s):<br>• Whole numbers are a multiple of each of its factors.<br>• Prime numbers do not have factors other than 1 and the number itself.<br>Students are able to:<br>• find all factor pairs for any whole number (between 1 and 100).<br>• given a one-digit number, determine whether a given whole number (between 1 and 100) is a multiple of the one-digit number.<br>• determine whether a given whole number (between 1 and 100) is prime or composite.<br><br>Learning Goal 1: Find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number and whether it is prime or composite. |
| 4.OA.C.5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.<br>*For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* | MP.8 Look for and express regularity in repeated reasoning. | Concept(s):<br>• Patterns contain features that are not explicitly stated in the rule defining the numerical pattern.<br>Students are able to:<br>• produce number patterns from a given rule.<br>• produce shape patterns from a given rule.<br>• analyze a sequence of numbers in order to identify features that are not obvious explicitly stated in the rule.<br><br>Learning Goal 2: Generate a number or shape pattern that follows a rule and identify features of the pattern that are not explicit in the rule. |

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 1**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.MD.A.1. Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36).* | MP.5 Use appropriate tools strategically.<br>MP.8 Look for and express regularity in repeated reasoning. | Concept(s):<br>• Relative sizes of measurements (e.g. a kilometer is 1000 times as long as a meter and 100,000 times as long as a centimeter).<br>Students are able to:<br>• express measurements of a larger unit in terms of a smaller unit (within a single measurement system) (e.g. convert hours to minutes, kilometers to centimeters, etc).<br>• generate a two-column table to record measurement equivalents.<br><br>Learning Goal 3: Express measurement in a larger unit in terms of a smaller unit and record equivalent measures in a two-column table. |
| 4.OA.A.1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. | MP.2 Reason abstractly and quantitatively.<br>MP.4 Model with mathematics. | Concept(s):<br>• Multiplication equations represent comparisons.<br>Students are able to:<br>• explain multiplication equations as comparisons.<br>• write multiplication equations given word problems indicating multiplicative comparison.<br><br>Learning Goal 4: Write multiplication equations from word problems indicating multiplicative comparisons and describe multiplication equations as comparisons. |

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 1**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.OA.A.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. | MP.1 Make sense of problems and persevere in solving them.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• multiply to solve word problems involving multiplicative comparison.<br>• divide to solve word problems involving multiplicative comparison.<br>• represent problems with drawings and equations, using a symbol for the unknown number.<br>• distinguish word problems involving multiplicative comparison from those involving additive comparison.<br><br>Learning Goal 5: Multiply and divide to solve word problems involving multiplicative comparisons and represent these problems with drawings and equations. |
| 4.NBT.A.1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.* [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s):<br>• A quantitative relationship exists between the digits in place value positions of a multi-digit number.<br>Students are able to:<br>• Explain that a digit in one place represents ten times what it would represent in the place to its right.<br><br>Learning Goal 6: For a whole number up to one million, explain that a digit in one place represents ten times what it would represent in the place to its right. |

# 4th Grade - Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 1**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| ■ 4.NBT.A.2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s):<br>• Multiple representations of whole numbers exist.<br>Students are able to:<br>• read and write multi-digit whole numbers using base-ten numerals.<br>• read and write multi-digit whole numbers using number names.<br>• read and write multi-digit whole numbers using expanded form.<br>• compare two multi-digit numbers using >, =, and < symbols.<br><br>Learning Goal 7: Compare two multi-digit whole numbers (up to one million) using >, =, and < for numbers presented as base ten numerals, number names, and/or in expanded form. |
| ■ 4.NBT.A.3. Use place value understanding to round multi-digit whole numbers to any place. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s):<br>• Estimation<br>Students are able to:<br>• round whole numbers to any place.<br><br>Learning Goal 8: Round multi-digit whole numbers up to one million to any place. |

| District/School Formative Assessment Plan | District/School Summative Assessment Plan |
|---|---|
| *Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.* | *Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NBT.B.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure.<br>MP.8 Look for and express regularity in repeated reasoning. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• add multi-digit whole numbers using the standard algorithm with accuracy and efficiency.<br>• subtract multi-digit whole numbers using the standard algorithm with accuracy and efficiency.<br><br>Learning Goal 1: Fluently add and subtract multi-digit whole numbers using the standard algorithm. |
| 4.NBT.B.5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• multiply a whole number of up to four digits by a one-digit whole number using strategies based on place values.<br>• multiply two two-digit numbers using strategies based on place value.<br>• represent these operations with equations, rectangular arrays, and area models.<br>• explain the calculation by referring to the model (equation, array, or area model).<br><br>Learning Goal 2: Multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers; represent and explain calculations using equations, rectangular arrays, and area models. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NBT.B.6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure.<br>MP.8 Look for and express regularity in repeated reasoning. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and the relationship between multiplication and division.<br>• represent these operations with equations, rectangular arrays, and area models.<br>• explain the calculation by referring to the model (equation, array, or area model).<br><br>Learning Goal 3: Divide a whole number of up to four-digits by a one-digit divisor; represent and explain the calculation using equations, rectangular arrays, and area models. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.OA.A.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.4 Model with mathematics.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Proper use of the equal sign<br>• Improper use of the equal sign (e.g. 3 + 7 = 10 – 5 = 5 is incorrect)<br>Students are able to:<br>• solve multi-step word problems involving any of the four operations.<br>• solve multi-step word problems involving interpretation (in context) of a remainder.<br>• write equations to represent multi-step word problems, using a letter to represent the unknown quantity.<br>• explain why an answer is reasonable.<br>• use mental computation and estimation strategies to determine whether an answer is reasonable.<br><br>Learning Goal 4: Write and solve each equation (including any of the four operations) in order to solve multi-step word problems, using a letter to represent the unknown; interpret remainders in context and assess the reasonableness of answers using mental computation with estimation strategies. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| ☐ 4.MD.A.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems.<br>*For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* | MP.2 Reason abstractly and quantitatively.<br>MP.5 Use appropriate tools strategically. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• solve real world and mathematical problems by finding the area of rectangles using a formula.<br>• solve real world and mathematical problems by finding the perimeter of rectangles using a formula.<br><br>Learning Goal 5: Solve real world problems with whole numbers by finding the area and perimeter of rectangles using formulas. |
| ■ 4.NF.A.1. Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.1 Make sense of problems and persevere in solving them.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.6 Attend to precision.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Equivalent fractions are the same size while the number and size of the parts differ.<br>Students are able to:<br>• explain, using visual fraction models, why two fractions are equivalent.<br>• generate equivalent fractions, using fraction $a/b$ as equivalent to fraction $(n \times a)/(n \times b)$.<br><br>Learning Goal 6: Recognize and generate equivalent fractions and explain why they are equivalent using visual fraction models. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NF.A.2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.1 Make sense of problems and persevere in solving them.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.6 Attend to precision.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Fractions may only be compared when the two fractions refer to the same whole.<br>Students are able to:<br>• create common denominators in order to compare two fractions.<br>• create common numerators in order to compare two fractions.<br>• compare two fractions with different numerators and different denominators by comparing to a benchmark fraction.<br>• record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.<br><br>Learning Goal 7: Compare two fractions with different numerators or different denominators, recording comparison with >, =, or <, and justifying the conclusion using visual fraction models. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 2**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NF.B.3. Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$.<br>4.NF.B.3a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.<br>4.NF.B.3b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*<br>[Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.3 Construct viable arguments and critique the reasoning of others.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.6 Attend to precision.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Some fractions can be decomposed.<br>• Addition/subtraction of fractions is joining/separating parts referring to the same whole.<br>Students are able to:<br>• decompose a fraction into a sum of fractions with the same denominator in more than one way.<br>• write decompositions of fractions as an equation.<br>• develop visual fraction models that represent decomposed fractions and use them to justify decompositions.<br><br>Learning Goal 8: Decompose a fraction into a sum of fractions with the same denominator in more than one way and record the decomposition as an equation; justify the decomposition with a visual fraction model. |

| District/School Formative Assessment Plan | District/School Summative Assessment Plan |
|---|---|
| *Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.* | *Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NF.B.3. Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$.<br>4.NF.B.3c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.<br>4.NF.B.3d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.<br>[Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.3 Construct viable arguments and critique the reasoning of others.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.6 Attend to precision.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Some fractions can be decomposed.<br>• Addition/subtraction of fractions is joining/separating parts referring to the same whole.<br>Students are able to:<br>• add and subtract fractions having like denominators in order to solve real world problems.<br>• develop visual fraction models and write equations to represent real world problems involving addition and subtraction of fractions.<br>• add and subtract mixed numbers with like denominators.<br><br>Learning Goal 1: Add and subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction or improper fraction.<br>Learning Goal 2: Solve word problems involving addition and subtraction of fractions having like denominators using visual fraction models and equations to represent the problem. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.MD.B.4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* | MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• given a data set consisting of measurements in fractions of a unit, create a line plot.<br>• using measurement information presented in line plots, add and subtract fractions with like denominators in order to solve problems.<br><br>Learning Goal 3: Make a line plot to display a data set in measurements in fractions of a unit (1/2, 1/4, 1/8) and use it to solve problems involving addition and subtraction of fractions with like denominators. |
| 4.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.<br>44.NF.B.4a. Understand a fraction $a/b$ as a multiple of $1/b$.<br>*For example, use a visual fraction model to represent 5/4 as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.*<br>4.F.4.B.4b. Understand a multiple of $a/b$ as a multiple of $1/b$, and use this understanding to multiply a fraction | MP.1 Make sense of problems and persevere in solving them.<br>MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Fraction Multiplication: any fraction $a/b$ as a multiple of fraction $1/b$.<br>• Fraction Multiplication: any multiple of fraction $a/b$ is also a multiple of fraction $1/b$.<br>Students are able to:<br>• represent $a/b$ as a x $(1/b)$ using a visual fraction model.<br>• represent $n \times (a/b)$ *as* $(n \times a)/b$ in a visual fraction model.<br>• multiply a fraction by a whole number.<br>• solve real world problems by multiplying a fraction by a whole number, using visual fraction models and equations to represent the problem.<br><br>Learning Goal 4: Multiply a fraction by a whole number using visual fraction models and equations, |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*<br>4.NF.4.B.4c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*<br>[Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | | demonstrating a fraction *a/b* as a multiple of 1/*b*.<br>Learning Goal 5: Multiply a fraction by a whole number, using a visual fraction model and equations to demonstrate that a multiple of *a/b* is the product of 1/*b* and a whole number.<br>Learning Goal 6: Solve 1-step word problems involving multiplication of a fraction by a whole number, using visual fraction models and equations to represent the problem |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NF.C.5. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.7 Look for and make use of structure. | Concept(s):<br>• Equivalent Fractions<br>Students are able to:<br>• add two fractions with respective denominators of 10 and 100 using equivalent fractions.<br><br>Learning Goal 7: Add two fractions with respective denominators of 10 and 100 by writing each fraction with denominator 100. |
| 4.NF.C.6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.* [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.7 Look for and make use of structure. | Concept(s):<br>• Relationship between place value (decimals) and fraction<br>Students are able to:<br>• write a decimal as a fraction that has a denominator of 10 or 100.<br><br>Learning Goal 8: Given decimal notation, write fractions having denominators of 10 or 100. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NF.C.7. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.] | MP.5 Use appropriate tools strategically.<br>MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• represent a decimal using a model.<br>• compare two decimals to hundredths by reasoning about their size.<br>• explain that comparisons are valid only when the two decimals refer to the same whole.<br>• record the results of comparisons with the symbols >, =, or <, and justify the conclusions (e.g., by using a visual model).<br><br>Learning Goal 9: Compare two decimals to hundredths by reasoning about their size, demonstrating that comparisons are valid only when the two decimals refer to the same whole; record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| ☐ 4.MD.A.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. | MP.4 Model with mathematics.<br>MP.5 Use appropriate tools strategically. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• solve word problems (using addition, subtraction and multiplication) involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals.<br>• solve word problems (using all four operations) involving whole number distances, intervals of time, liquid volumes, masses of objects, and money, including problems requiring expressing measurements given in a larger measurement unit in terms of a smaller measurement unit (conversion).<br>• construct diagrams (e.g. number line diagrams) to represent measurement quantities.<br><br>Learning Goal 10: Solve word problems involving simple fractions or decimals that incorporate measurement comparisons of like units (including problems that require measurements given in a larger unit in terms of a smaller unit). |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 3**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NBT.B.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• add using the standard algorithm with accuracy and efficiency.<br>• subtract using the standard algorithm with accuracy and efficiency.<br><br>Learning Goal 11: Fluently add and subtract multi-digit whole numbers using the standard algorithm. |

| District/School Formative Assessment Plan | District/School Summative Assessment Plan |
|---|---|
| *Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.* | *Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.G.A.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. | MP.5 Use appropriate tools strategically.<br>MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• draw points, lines, line segments and rays.<br>• draw angles (right, acute, obtuse).<br>• draw perpendicular and parallel lines.<br>• distinguish between lines, line segments, and rays.<br>• identify points, lines, line segment, rays, right angles, acute angles, obtuse angles, perpendicular lines and parallel lines in two-dimensional figures.<br>Learning Goal 1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines and identify these in two-dimensional figures. |
| 4.G.A.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles. | MP.5 Use appropriate tools strategically.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Trapezoid is a quadrilateral with at least one pair of parallel sides.<br>Students are able to:<br>• classify triangles based on the presence or absence of perpendicular lines and based on the presence or absence of angles of a particular size.<br>• classify quadrilaterals based on the presence or absence of parallel or perpendicular lines and based on the presence or absence of angles of a particular size.<br>Learning Goal 2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a particular size; recognize right angles as a category, and identify right, acute, obtuse, equilateral, isosceles, and scalene triangles. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.G.A.3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. | MP.5 Use appropriate tools strategically.<br>MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• fold a figure along a line in order to create matching parts.<br>• identify lines of symmetry as a line across the figure such that the figure can be folded along the line into matching parts.<br>• identify figures having line symmetry.<br>• draw lines of symmetry.<br><br>Learning Goal 3: Draw lines of symmetry and identify line-symmetric figures. |
| 4.MD.C.5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.<br>4.MD.C.5a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns | MP.2 Reason abstractly and quantitatively. | Concept(s):<br>• Angles are formed by two rays sharing a common endpoint and result from the rotation of one ray around the endpoint.<br>• Angle Measurement: An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.<br><br>Students are able to:<br>• describe an angle as measured with reference to a circle with the center of the circle being the common endpoint of the rays.<br>• explain a 'one-degree angle' and its relation to a circle; a "degree" is defined as 1/360 (one degree angle) of the entire circle.<br><br>Learning Goal 4: Explain angles as geometric shapes formed by two rays sharing a common |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.<br>4.MD.C.5b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. | | endpoint and explain the relationship between a one-degree angle, a circle, and angle measure. |
| 4.MD.C.6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. | MP.2 Reason abstractly and quantitatively.<br>MP.5 Use appropriate tools strategically. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• measure angles in whole-number degrees.<br>• given an angle measure, sketch the angle.<br><br>Learning Goal 5: Measure angles in whole number degrees using a protractor and sketch angles of specific measures. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.MD.C.7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. | MP.1 Make sense of problems and persevere in solving them.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Angle measures may be added; when an angle is decomposed into non-overlapping parts, the angle measure of the whole (original angle) is the sum of the angle measures of the parts.<br>Students are able to:<br>• add and subtract to find unknown angles on a diagram in real world and mathematical problems.<br>• write an equation with a symbol for the unknown angle measure.<br><br>Learning Goal 6: Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems using a symbol for an unknown angle measure. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.OA.A.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.4 Model with mathematics.<br>MP.7 Look for and make use of structure. | Concept(s):<br>• Proper use of the equal sign.<br>• Improper use of the equal sign (e.g. 3 + 7 = 10 – 5 = 5 is incorrect).<br>Students are able to:<br>• solve multi-step word problems involving any of the four operations.<br>• solve multi-step word problems involving interpretation (in context) of a remainder.<br>• write equations to represent multi-step word problems, using a letter to represent the unknown quantity.<br>• explain why an answer is reasonable.<br>• use mental computation and estimation strategies to determine whether an answer is reasonable.<br><br>Learning Goal 7: Write and solve each equation (including any of the four operations) in order to solve multi-step word problems, using a letter to represent the unknown; interpret remainders in context and assess the reasonableness of answers using mental computation with estimation strategies. |

# 4th Grade – Mathematics

THE DIOCESE of ALEXANDRIA

**Unit 4**

| Content Standards | Suggested Standards for Mathematical Practice | Critical Knowledge & Skills |
|---|---|---|
| 4.NBT.B.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.] | MP.7 Look for and make use of structure. | Concept(s): No new concept(s) introduced<br>Students are able to:<br>• add using the standard algorithm with accuracy and efficiency<br>• subtract using the standard algorithm with accuracy and efficiency<br><br>Learning Goal 8: Fluently add and subtract multi-digit whole numbers using the standard algorithm |

| District/School Formative Assessment Plan | District/School Summative Assessment Plan |
|---|---|
| *Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.* | *Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* |

# Operations and Algebraic Thinking (DOA.4.OA)

| STANDARDS | | ACT Reporting Category<br>*ACT Knowledge and Skills* |
|---|---|---|
| **Use the four operations with whole numbers to solve problems** | | |
| DOA.4.OA.A.1 | Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7, and 7 times as many as 5. | **Operations and Algebraic Thinking**<br>**Justification and Explanation**<br>**Modeling**<br>Operations & Number relationships<br>Whole Number Problem Solving |
| DOA.4.OA.A.2 | Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and/or equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more than). | |
| DOA.4.OA.A.3 | Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *Example: Twenty-five people are going to the movies. Four people fit in each car. How many cars are needed to get all 25 people to the theater at the same time?* | |
| **Gain familiarity with factors and multiples** | | |
| DOA.3.OA.B.4 | Using whole numbers in the range 1–100, | **Operations and Algebraic Thinking**<br>**Justification and Explanation**<br>**Modeling**<br>Operations & Number relationships<br>Whole Number Problem Solving |
| DOA.3.OA.B.4a | Find all factor pairs for a given whole number. | |
| DOA.3.OA.B.4b | Recognize that a given whole number is a multiple of each of its factors. | |
| DOA.3.OA.B.4c | Determine whether a given whole number is a multiple of a given one-digit number. | |
| DOA.3.OA.B.4d | Determine whether ta given whole number is prime or composite. | |
| **Generate and analyze patterns** | | |
| DOA.3.OA.C.5 | Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* | **Operations and Algebraic Thinking**<br>**Justification and Explanation**<br>**Modeling**<br>Operations & Number relationships<br>Whole Number Problem Solving |

# Number and Operations in Base Ten (DOA.4.NBT)

| STANDARDS | | ACT Reporting Category<br>*ACT Knowledge and Skills* |
|---|---|---|
| **Generalize place value understanding for multi-digit whole numbers** | | |
| DOA.4.NBT.A.1 | Recognize that in a multi-digit whole number less than or equal to 1,000,000, a digit in one place represents ten times what it represents in the place to its right. *For example, (1) recognize that 700 ÷ 70 = 10; (2) in the number 7,246, the 2 represents 200, but in the number 7,426 the 2 represents 20, recognizing that 200 is ten times as large as 20, by applying concepts of place value and division.* | **Number and Operations in Base Ten**<br>**Justification and Explanation**<br>**Modeling**<br>Whole Number Concepts<br>Whole Number Operations |
| DOA.4.NBT.A.2 | Read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. | |
| DOA.4.NBT.A.3 | Use place value understanding to round multi-digit whole numbers, less than or equal to 1,000,000, to any place. | |
| **Use place value understanding and properties of operations to perform multi-digit arithmetic** | | |
| DOA.4.NBT.B.4 | Fluently add and subtract multi-digit whole numbers with sums less than or equal to 1,000,000, using the standard algorithm. | **Number and Operations in Base Ten**<br>**Justification and Explanation**<br>**Modeling**<br>Whole Number Concepts<br>Whole Number Operations |
| DOA.4.NBT.B.5 | Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. | |
| DOA.4.NBT.B.6 | Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. | |

# Number and Operations – Fractions (DOA.4.NF)

| STANDARDS | | ACT Reporting Category<br>*ACT Knowledge and Skills* |
|---|---|---|
| **Extend understanding of fraction equivalence and ordering** | | |
| DOA.4.NF.A.1 | Explain why a fraction a/b is equivalent to a fraction (*n* □□*a*)/(*n* □□*b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100. | **Number and Operations Fractions**<br>**Justification and Explanation**<br>**Modeling**<br>Fraction Concepts<br>Fraction Problem Solving |
| DOA.4.NF.A.2 | Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) | |
| **Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers** | | |
| DOA.4.NF.B.3 | Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) | **Number and Operations Fractions**<br>**Justification and Explanation**<br>**Modeling**<br>Fraction Concepts<br>Fraction Problem Solving |
| DOA.4.NF.B.3a | Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. *Example: 3/4 = 1/4 + 1/4 + 1/4.* | |
| DOA.4.NF.B.3b | Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: $3/8 = 1/8 + 1/8 + 1/8$ ; $3/8 = 1/8 + 2/8$ ; $2\ 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.* | |
| DOA.4.NF.B.3c | Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. | |
| DOA.4.NF.B.3d | Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. | |

# Number and Operations – Fractions (DOA.4.NF) continued…

| STANDARDS | | ACT Reporting Category<br>*ACT Knowledge and Skills* |
|---|---|---|
| **Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers continued…** | | |
| DOA.4.NF.B.4 | Multiply a fraction by a whole number. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) | **Number and Operations Fractions**<br>**Justification and Explanation**<br>**Modeling**<br>Fraction Concepts<br>Fraction Problem Solving |
| DOA.4.NF.B.4a | Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 ×(1/4), recording the conclusion by the equation 5/4 = 5 ×(1/4),* | |
| DOA.4.NF.B.4b | Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 ×(2/5) as 6 ×(1/5), recognizing this product as 6/5. (In general, n ×(a/b) = (n ×a)/b.)* | |
| DOA.4.NF.B.4c | Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* | |
| DOA.4.NF.C.5 | Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[1] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* | **Number and Operations Fractions**<br>**Justification and Explanation**<br>**Modeling**<br>Fraction Concepts<br>Fraction Problem Solving |
| DOA.4.NF.C.6 | Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram; represent 62/100 of a dollar as $0.62.* | |
| DOA.4.NF.C.7 | Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model | |

[1] Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.

| Measurement and Data (DOA.4.MD) | | |
|---|---|---|
| **STANDARDS** | | **ACT Reporting Category**<br>***ACT Knowledge and Skills*** |
| **Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit** | | |
| DOA.4.MD.A.1 | Know relative sizes of measurement units within one system of units including ft, in; km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.) *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs* (*1, 12*), (*2, 24*), (*3, 36*). | **Measurement and Data**<br>**Justification and Explanation**<br>**Modeling**<br>Unit Conversions<br>Time and Money |
| DOA.4.MD.A.2 | Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving whole numbers and/or simple fractions (addition and subtraction of fractions with like denominators and multiplying a fraction times a fraction[2] or a whole number), and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. | **Measurement and Data**<br>**Justification and Explanation**<br>**Modeling**<br>Unit Conversions<br>Time and Money |
| DOA.4.MD.A.3 | Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Measurement of Figures |
| **Represent and interpret data** | | |
| DOA.4.MD.B.4 | Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Descriptive Statistics |

[2] Some students may be able to multiply a fraction by a fraction as a result of generating equivalent fractions; however, mastery of multiplying two fractions occurs in Grade 5

| Measurement and Data (DOA.4.MD) continued… | | |
|---|---|---|
| **STANDARDS** | | **ACT Reporting Category**<br>***ACT Knowledge and Skills*** |
| **Geometric measurement: understand concepts of angle and measure angles** | | |
| DOA.4.MD.C.5 | Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Measurement of Figures |
| DOA.4.MD.C.5a | An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where two rays intersect the circle. | |
| DOA.4.MD.C.5b | An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. | |
| DOA.4.MD.C.5c | An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. | |
| DOA.4.MD.C.6 | Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Measurement of Figures |
| DOA.4.MD.C.7 | Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems, e.g., by using an equation with a letter for the unknown angle measure. | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Measurement of Figures |
| **Relate area to operations of multiplication and addition** | | |
| DOA.4.MD.D.8 | Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems | **Measurement and Data**<br>**Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Measurement of Figures |

| Geometry (DOA.4.G) | | |
|---|---|---|
| **STANDARDS** | | **ACT Reporting Category**<br>***ACT Knowledge and Skills*** |
| **Reason with shapes and their attributes** | | |
| DOA.4.G.A.1 | Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. | **Geometry**<br>**Justification and Explanation**<br>**Modeling**<br>Figures and Their Properties<br>Measurement of Figures |
| DOA.4.G.A.2 | Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles. | |
| DOA.4.G.A.3 | Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. | |