Alexander County Schools 2013 - 2014

Unit: Factors, Multiples, and Arrays Unit 1 Approximately 20 days	■ **Q1** ☐ **Q2** ☐ **Q3** ☐ **Q4**

| **Common Core and/or Essential Standards:**

4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 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.

4.0A.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.

4.OA.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 answer using mental computation and estimation strategies including rounding.

4.OA.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.

4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. **This standard is addressed through 10-minute math and students practice pages and will be revisited more in depth in Unit 5. | **Transfer: Students will be able to independently use their learning to . . .**
• solve real world problems using multiplication

Possible "I Can" Statements:

I can interpret a multiplication equation as a comparison.

I can multiply to solve word problems involving multiplicative comparison.

I can find all factors for pairs of whole numbers from 1-100. I can determine multiples of one digit numbers and determine whether a number is prime or composite.

I can solve multi-step word problems, represent these problems using equations and assess the reasonableness of my answer by using estimation strategies. |

Meaning	
Understandings: Students will understand that . . . • verbal statements of multiplicative comparisons can be written as	**Essential Question(s):** • **How can situations in your life bring about the use of**

multiplication equations
- a whole number is a multiple of each of its factors
- there is a process of finding factor pairs
- there is a difference between multiples and factors although they are related
- multiples can be related to skip counting
- what makes a number prime, composite or neither
- there are a variety of strategies/methods to use when multiplying

multiplication?
- **Is it important to know a variety of processes to solve multiplication?**
- **How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)**

Acquisition

Students will know:
- how to identify and verbalize a quantity being multiplied and which number represents "how many" times to get a specified number.
- how to find factors and multiples of whole numbers.
- how to identify a number as prime, composite or neither.
- how to use a variety of strategies to multiply whole numbers.
- how to illustrate and explain the method/methods used to solve multiplication problems.

Students will be skilled at:
- writing and identifying equations and statements for multiplicative comparisons
- identifying and verbalizing which quantity is being multiplied
- multiplying
- skip counting
- identifying prime and composite numbers
- finding and identifying patterns when listing factors and multiples
- multiplying whole numbers
- using various strategies to solve problems
- illustrating their reasoning
- solving problems in and out of context

Essential Vocabulary:
Equation, multiplication, factors, products, array, mental computation, multiples, factor pairs, prime, composite, base ten blocks, place value, skip counting

IT Standards:
4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
   4.SI.1.1 Use various types of resources to gather information (including print and online media).
   4.SI.1.2 Use relevant sources of information for an assigned task.
   4.SI.1.2 Use reliable sources of information.
4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
   4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.

IT Strategies:
Students will use the Internet and other resources (Almanac) to research 3 facts that go with the number they are assigned for the summative project.

Students will use the Internet and other resources to find how the number they are assigned used in real world situations.

Students will choose how they display the number "family tree" for the summative project.

4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). **4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.** 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.	

Unit Title: Factors, Multiples, and Arrays Unit 1　　　　**Grade: 4th grade**　　　　　　　　**Subject: Math**

STAGE 2

Understandings:	Revised Blooms	Formative Assessments (Evidences)	Summative Assessment
Verbal statements of multiplicative comparisons can be written as multiplication equations. A whole number is a multiple of each of its factors. There is a process of finding factor pairs. There is a difference between multiples and factors although they are related. Multiples can be related to skip counting. What makes a number prime, composite or neither? There are a variety of strategies/methods to use when multiplying **Essential Questions:** How can situations in your life bring about the use of multiplication?	**Creating:** Can the student create new product or point of view? — assemble, construct, create, design, develop, formulate & write. **Evaluating:** Can the student justify a stand or decision? — appraise, argue, defend, judge, select, support, value & evaluate **Analyzing:** Can the student distinguish between the different parts? — appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test. **Applying:** Can the student use the information in a new way? — choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts from 4th Grade Math Drop Box and Promethean Planet Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes	**Individual/Group Project: "Choose a Number Project" Begin a project and will continue the project in units 3 & 8** 1) Teacher chooses numbers for students to draw from a container. (Numbers to Choose From—10, 12, 13, 14, 15, 16, 17, 18, 21, 24, 25, 27, 29, 33, 36, 38, 39, 40, 42, 45) 2) Students select a number from the container to represent and present in a "Family Tree" (to show the relationships of the number) using a format of their choice (flipchart, PowerPoint, poster, brochure, etc.). 3) Family Tree must include: **Factor pairs** to make the number. **Arrays** must be shown. - Is the number **odd or even**?; **prime or composite**?; is the number a **multiple** of 1,2,3,4,5,6,7,8 or 9? - One multiplicative comparison problem

				Additional assessment as needed (Investigations Assessments; Unit Test; enVision Exam View Test Generator, Moby Math, etc.)
Is it important to know a variety of processes to solve multiplication? How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)	**Understanding:** Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
	Remembering: Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		

Stage 3

Approximate number of days spent on unit: approximately 20 days
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

| **Resources:**
Investigations Units:
Unit 1 Factors, Multiples, and Arrays
Sessions to Skip: 3.1 (skip Activity 4 only) 3.2 (skip all)

enVision Lessons to supplement Investigations as needed:
(Remember these lessons are a starting point and may not cover all the standards in a cluster.)
3-1, 3-2, 3-3, 3-4, 3-5, 3-6

Web Resources:
Factor Trail Game (Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L719
Factor Findings (lesson from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L872
The Product Game (lesson from Illuminations exploring products, factors and multiples and the relationship between them)
http://illuminations.nctm.org/LessonDetail.aspx?id=U100 | **Strategies:**
Arrays
Flashcards
Timed Tests (fluency)
Skip Counting
Rhymes 'n Times
Wrap Ups

Use manipulatives to show arrays

Build arrays for equations to show the Commutative Property of Multiplication

Use word problems with multiplicative comparisons. Have students to draw a picture or create a model of the problem, write an equation and solve.
Give students a problem solving method to help them figure out how to solve word problems. |

Chairs Around the Table (pattern lesson from Illuminations http://illuminations.nctm.org/LessonDetail.aspx?id=L627 Patterns That Grow (number and shape pattern unit from Illuminations http://illuminations.nctm.org/LessonDetail.aspx?id=U103	"Count Around the Room"—give students a rule such as count by 3's

Chairs Around the Table (pattern lesson from Illuminations
http://illuminations.nctm.org/LessonDetail.aspx?id=L627
Patterns That Grow (number and shape pattern unit from Illuminations
http://illuminations.nctm.org/LessonDetail.aspx?id=U103

http://mathstory.com/mathlessons/arrayrace.htm
(short lesson and game for building arrays, writing equations and solving for a product)

www.k-5mathteachingresources.com
(has a collection of resources for each area taught)
http://www.mathplayground.com/wordproblems.html
(word problems with multiplicative comparison)
http://www.uen.org/3-6interactives/math.shtml#patterns
(interactive pattern games)

enVision eTools
Promethean Planet flipcharts

Picture books:
Anno's Magic Seeds by Mitsumasa Anno (pattern)
Anno's Mysterious Multiplying Jar by Masaichiro and Mitsumasa Anno (multiplication)
Amanda Bean's Amazing Dream by Cindy Neuschwander (multiplication)
The Grapes of Math by Greg Tang
If you were a Set by Marcie Aboff
If you were a Times Sign by Trisha Speed Shaskan
Minnie's Diner A Multiplying Menu by Dayle Ann Dodds
The Best of Times by Greg Tang
Equal Shmequal by Virginia Knoll

Other teaching resources:

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Number and Operations in Grades 3-5 by NCCTM

Alexander County Schools 2013 - 2014

Unit: Multiple Towers and Division Stories Unit 3 Approximately 22 days	■ **Q1** □ **Q2** □ **Q3** □ **Q4**

Common Core and/or Essential Standards:	**Transfer: Students will be able to independently use their learning to . . .**
4.NBT.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. **4.NBT.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. **4.OA.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 answer using mental computation and estimation strategies including rounding. Supporting Standards: 4.OA.1, 4.OA.2, 4.OA.4	• solve real world problems using multiplication and division **Possible "I Can" Statements:** I can solve multi-step word problems, represent these problems using equations and assess the reasonableness of my answer by using estimation strategies. I can multiply multi-digit numbers. I can use multiplication to help me solve division problems. I can make sense of remainders by thinking of the problem's context. I can multiply using multiples of ten.

Meaning	
Understandings: Students will understand that . . . • there are a variety of strategies/methods to use when multiplying and dividing (place value, equations, halving and doubling and/or array/area models) • remainders can be interpreted in different ways depending on the context of the question	**Essential Question(s):** • **How can situations in your life bring about the use of multiplication and division?** • **Is it important to know a variety of processes to solve multiplication and division?** • **How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)**

• multiplication can be used to help solve division problems • the effect of multiplying by multiples of ten (ex. 3 x 4 and 3 x 40)	

Acquisition	
Students will know: • how to use a variety of strategies to multiply whole numbers. • how to illustrate and explain the method/methods used to solve multiplication and division problems.	**Students will be skilled at:** • identifying and verbalizing which quantity is being multiplied • multiplying and dividing • skip counting • multiplying whole numbers • using various strategies to solve problems • illustrating their reasoning • solving problems in and out of context

Essential Vocabulary:
Equation, multiplication, factors, products, array, mental computation, multiples, factor pairs, prime, composite, division, partial products, area model, base ten blocks, place value, remainder, skip counting

IT Standards:
4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
    4.SI.1.1 Use various types of resources to gather information (including print and online media).
    4.SI.1.2 Use relevant sources of information for an assigned task.
    4.SI.1.2 Use reliable sources of information.
4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
    4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
    4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.).
4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
    4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
    4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.
	IT Strategies:
	
	Students will choose how they display the number "family tree" for the summative project.

Unit Title: Multiple Towers and Division Stories Unit 3   Grade: 4ᵗʰ grade   Subject: Math

Understandings:	Revised Blooms	Formative Assessments (Evidences)	Summative Assessment

There are a variety of strategies/methods to use when multiplying and dividing.
 	
Remainders can be interpreted in different ways depending on the context of the question.
 	
Multiples of ten can be used to multiply by multiples of ten.
 	
Essential Questions:
How can situations in your life bring about the use of multiplication and division?
 	
Is it important to know a variety of processes to solve multiplication and division?
 	
How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)
 	
      Essential Questions:
How can situations in your life bring about the use of multiplication and division?
 	
Is it important to know a variety of processes to solve multiplication and division?
 	
How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)
	Creating: Can the student create new product or point of view? — assemble, construct, create, design, develop, formulate & write.
	
	Evaluating: Can the student justify a stand or decision? — appraise, argue, defend, judge, select, support, value & evaluate
	
	Analyzing: Can the student distinguish between the different parts? — appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.
	
	Applying: Can the student use the information in a new way? — choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.
	
	Understanding: Can the student explain ideas or concepts? — classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase
	
	Remembering: Can the student recall or remember the information? — define, duplicate, list, memorize, recall, repeat, reproduce & state
		Oral Assessments
		Quizzes (teacher made & textbook)
		Skill Worksheets
		Flip Charts
		Active Votes
		Active Expressions
		Exit Cards
		Math Stations (from envisions/Investigations & other sources)
		Teacher Observation
		Anecdotal Notes
			Individual/Group Project: "Choose a Number Project" Continue project from Unit 1
			
			1)Teacher chooses numbers for students to draw from a container. (Numbers between 50 and 99)
			2) Students select a number from the container to represent and present in a "Family Tree" (to show the relationships of the number) using a format of their choice (flipchart, PowerPoint, poster, brochure, etc.).
			3) Family Tree must include:
			  • A pattern in which your number is the tenth **term** in a sequence of ten numbers
			  • Two different word problems in which your number is the **dividend in a division problem and a factor in a multiplication problem.**
			  • Solve the two word problems using two different strategies.
			
			Additional assessment as needed (Investigations Assessments; Unit Test; enVision Exam View Test Generator, Moby Math, etc.)

Stage 3

Approximate number of days spent on unit: approximately 22 days
W − **W**here are we going? **W**hy? **W**hat is expected?
H − How will we **H**ook and **H**old students?
E − How will we **E**quip students to **E**xplore and **E**xperience?
R − How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E − How will student self -**E**valuate and reflect on learning?
T − How will we **T**ailor learning to vary needs, interests, and styles?
O − How will we **O**rganize and sequence the learning?

Resources:	Strategies:
Investigations Units:	Arrays
Unit 3 Multiple Towers and Division Stories	Area Models
Do all sessions.	Cluster Problems
	Break One Apart
enVision Lessons to supplement Investigations as needed:	Multiplication Combinations
(Remember these lessons are a starting point and may not cover all the standards in a cluster.)	Fact Families to show relationship between division and multiplication
4-1, 4-2, 4-3, 4-4, 4-5, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 7-1, 7-2, 7-6	Flashcards
	Timed Tests (fluency)
	Skip Counting
Web Resources:	Rhymes 'n Times
Factor Trail Game (Illuminations)	Wrap Ups
http://illuminations.nctm.org/LessonDetail.aspx?id=L719	
Factor Findings (lesson from Illuminations)	Use manipulatives to show arrays
http://illuminations.nctm.org/LessonDetail.aspx?id=L872	
The Product Game (lesson from Illuminations exploring products, factors and multiples and the relationship between them)	Give students a problem solving method to help them figure out how to solve word problems.
http://illuminations.nctm.org/LessonDetail.aspx?id=U100	
Chairs Around the Table (pattern lesson from Illuminations	"Count Around the Room"—give students a rule such as count by 3's
http://illuminations.nctm.org/LessonDetail.aspx?id=L627	
Patterns That Grow (number and shape pattern unit from Illuminations	
http://illuminations.nctm.org/LessonDetail.aspx?id=U103	
http://mathstory.com/mathlessons/arrayrace.htm	
(short lesson and game for building arrays, writing equations and solving for a product)	
www.k-5mathteachingresources.com	

(has a collection of resources for each area taught)
http://www.mathplayground.com/wordproblems.html
(word problems with multiplicative comparison)
http://www.uen.org/3-6interactives/math.shtml#patterns
(interactive pattern games)

enVision eTools
Promethean Planet flipcharts

Picture books:
The Doorbell Rang by Pat Hutchins (division basics)
Anno's Magic Seeds by Mitsumasa Anno (pattern)
Anno's Mysterious Multiplying Jar by Masaichiro and Mitsumasa Anno (multiplication)
A Remainder of One by Elinor J. Pinczes
The Great Divide: A Mathematical Marathon by Dayle Ann Dodds
Amanda Bean's Amazing Dream by Cindy Neuschwander (multiplication)
The Grapes of Math by Greg Tang
If you were a Set by Marcie Aboff
If you were a Divided-By Sign by Trisha Speed Shaskan
If you were a Times Sign by Trisha Speed Shaskan
Minnie's Diner A Multiplying Menu by Dayle Ann Dodds
Divide and Ride by Stuart J. Murphy
One Hundred Hungry Ants by Elinor J. Pinczes
The Best of Times by Greg Tang
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Alexander County Schools 2012-2013

| Unit:
Multiplication and Division (Begin after Place Value and continue through the end of the 2nd Quarter)
4th Grade | ■ Q1   ■ Q2   ☐ Q3   ☐ Q4 |

Common Core and/or Essential Standards:

4.OA.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.

4.OA.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.

4.0A.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.

4.NBT.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.

4.NBT.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.

4.OA.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 answer using mental

Transfer: Students will be able to independently use their learning to…

- solve real world problems using multiplication and division

Possible "I Can" Statements:

I can interpret a multiplication equation as a comparison.

I can multiply or divide to solve word problems involving multiplicative comparison.

I can find all factors for pairs of whole numbers from 1-100. I can determine multiples of one digit numbers and determine whether a number is prime or composite.

I can solve multi-step word problems, represent these problems using equations and assess the reasonableness of my answer by using estimation strategies.

I can multiply multi-digit numbers.

I can use multiplication to help me solve division problems.

I can divide up to four digit dividends and explain my results.

I can make sense of remainders by thinking of the problem's context.

I can multiply using multiples of ten.

computation and estimation strategies including rounding.

4.OA.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.

Meaning	
Understandings: Students will understand that… • verbal statements of multiplicative comparisons can be written as multiplication equations • a whole number is a multiple of each of its factors • there is a process of finding factor pairs • there is a difference between multiples and factors although they are related • multiples can be related to skip counting • what makes a number prime, composite or neither • there are a variety of strategies/methods to use when multiplying and dividing	**Essential Question(s):** • **How can situations in your life bring about the use of multiplication and division?** • **Is it important to know a variety of processes to solve multiplication and division?** • **How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)**

Students will know: • how to identify and verbalize a quantity being multiplied and which number represents "how many" times to get a specified number. • how to find factors and multiples of whole numbers. • how to identify a number as prime, composite or neither. • how to use a variety of strategies to multiply whole numbers. • how to illustrate and explain the method/methods used to solve multiplication and division problems.	**Students will be skilled at:** • writing and identifying equations and statements for multiplicative comparisons • identifying and verbalizing which quantity is being multiplied • multiplying and dividing • skip counting • identifying prime and composite numbers • finding and identifying patterns when listing factors and multiples • multiplying whole numbers • using various strategies to solve problems • illustrating their reasoning • solving problems in and out of context

Essential vocabulary:
• Equation, multiplication, factors, products, array, mental computation, multiples, factor pairs, prime, composite, division, partial products, area model, base ten blocks, place value, remainder, skip counting

IT Standards:	**IT Strategies:**

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
    4.SI.1.1 Use various types of resources to gather information (including print and online media).
    4.SI.1.2 Use relevant sources of information for an assigned task.
	Students will use the Internet and other resources (Almanac) to research 3 facts that go with the number they are assigned for the summative project.

4.SI.1.2 Use reliable sources of information. **4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.** 4.IN.1.1 Implement appropriate reading strategies when reading for information. **4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.** 4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). **4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.** 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.	Students will use the Internet and other resources to find how the number they are assigned used in real world situations. Students will choose how they display the number "family tree" for the summative project.

Understandings:	Revised Blooms	Formative Assessments (Evidences)	Summative Assessment
Verbal statements of multiplicative comparisons can be written as multiplication equations. A whole number is a multiple of each of its factors. There is a process of finding factor pairs. There is a difference between multiples and factors although they are related. Multiples can be related to skip counting. What makes a number prime, composite or neither? There are a variety of strategies/methods to use when multiplying and dividing. **Essential Questions**: How can situations in your life bring about the use of multiplication and division? Is it important to know a variety of processes to solve multiplication and division? How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)	**Creating**: can the student create new product or point of view? / assemble, construct, create, design, develop, formulate, write. **Evaluating**: can the student justify a stand or decision? / appraise, argue, defend, judge, select, support, value, evaluate **Analyzing**: can the student distinguish between the different parts? / appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test. **Applying**: can the student use the information in a new way? / choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write. **Understanding:** can the student explain ideas or concepts? / classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase **Remembering:** can the student recall or remember the information? / define, duplicate, list, memorize, recall, repeat, reproduce state	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes	**Individual/Group Project: "Choose a Number Project"** 1) Teacher chooses numbers for students to draw from a container. (Numbers to Choose From—10, 12, 13, 14, 15, 16, 17, 18, 21, 24, 25, 27, 29, 33, 36, 38, 39, 40, 42, 45) 2) Students select a number from the container to represent and present in a "Family Tree" (to show the relationships of the number) using a format of their choice (flipchart, PowerPoint, poster, brochure, etc.). 3) Family Tree must include: • **Factor pairs** to make the number. **Arrays** must be shown. • Is the number **odd or even**?; **prime or composite**?; is the number a **multiple** of 1,2,3,4,5,6,7,8 or 9? • A pattern in which your number is the **fifth term** in a sequence of ten numbers • Four different word problems in which your number is the **sum**, **difference**, **product,** and **quotient.** • The written word (and/or symbol) in 3 foreign languages • 2 facts involving your number (a cheetah can run for short distances at 70 miles per hour). • 3 photographs, drawings

			or newspaper/magazine clippings showing where you have recently seen your number used in the **real world**
			• A drawing or design that you create that represents the number in a unique way
			Additional assessment as needed (Investigations Assessments; Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

Approximate number of days spent on unit: Approximately 12 weeks

W – Where are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self **E**valuate and reflect on learning?
T – How will we **T**ailor learning to varied needs, interests, styles?
O – How will we **O**rganize and sequence the learning?

Resources:	**Strategies:**
Investigations Units:	Arrays
Unit 1 Factors, Multiples, and Arrays	Area Models
Sessions 1.1-1.6A; Session 2.1-2.5; 3.1-3.4	Fact Families to show relationship between division and
Unit 3 Multiple Towers and Division Stories	multiplication
Sessions 1.1-1.5; 2.1-2.6; 3.1-3.4; 4.1-4.5	
Unit 8 How Many Packages? How Many Groups?	Flashcards
Sessions 1.1-1.5; 2.1-2.5; 3.1-3.6	Timed Tests (fluency)
	Skip Counting
enVision Lessons to supplement Investigations as needed:	Rhymes 'n Times
(Remember these lessons are a starting point and may not	Wrap Ups
cover all the standards in a cluster.)	
3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 4-1, 4-2, 4-3, 4-4, 4-5,5-1, 5-2, 5-3,	Use manipulatives to show arrays
5-4, 5-5, 5-6, 5-7, 5-8, 6-1, 6-2, 6-3, 6-4, 7-1, 7-2, 7-3, 7-4, 7-5, 7-	
7, 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10, 9-7, 16-12, 18-1,	Build arrays for equations to show the Commutative Property of
18-2, 18-3, 18-5	Multiplication
Web Resources:	Use word problems with multiplicative comparisons. Have
Factor Trail Game (Illuminations)	students to draw a picture or create a model of the problem, write
http://illuminations.nctm.org/LessonDetail.aspx?id=L719	an equation and solve.
Factor Findings (lesson from Illuminations)	Give students a problem solving method to help them figure out
http://illuminations.nctm.org/LessonDetail.aspx?id=L872	how to solve word problems.
The Product Game (lesson from Illuminations exploring products,	
factors and multiples and the relationship between them)	"Count Around the Room"—give students a rule such as count by
http://illuminations.nctm.org/LessonDetail.aspx?id=U100	3's
Chairs Around the Table (pattern lesson from Illuminations	
http://illuminations.nctm.org/LessonDetail.aspx?id=L627	
Patterns That Grow (number and shape pattern unit from	
Illuminations	
http://illuminations.nctm.org/LessonDetail.aspx?id=U103	

http://mathstory.com/mathlessons/arrayrace.htm
(short lesson and game for building arrays, writing equations and solving for a product)

www.k-5mathteachingresources.com
(has a collection of resources for each area taught)
http://www.mathplayground.com/wordproblems.html
(word problems with multiplicative comparison)
http://www.uen.org/3-6interactives/math.shtml#patterns
(interactive pattern games)

enVision eTools
Promethean Planet flipcharts

Picture books:
The Doorbell Rang by Pat Hutchins (division basics)
Anno's Magic Seeds by Mitsumasa Anno (pattern)
Anno's Mysterious Multiplying Jar by Masaichiro and Mitsumasa Anno (multiplication)
A Remainder of One by Elinor J. Pinczes
The Great Divide: A Mathematical Marathon by Dayle Ann Dodds
Amanda Bean's Amazing Dream by Cindy Neuschwander (multiplication)
The Grapes of Math by Greg Tang
If you were a Set by Marcie Aboff
If you were a Divided-By Sign by Trisha Speed Shaskan
If you were a Times Sign by Trisha Speed Shaskan
Minnie's Diner A Multiplying Menu by Dayle Ann Dodds
Divide and Ride by Stuart J. Murphy
One Hundred Hungry Ants by Elinor J. Pinczes
The Best of Times by Greg Tang
Equal Shmequal by Virginia Knoll

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Number and Operations in Grades 3-5 by NCCTM

Alexander County Schools 2013 - 2014

Unit 5: Landmarks and Large Numbers 2nd/3rd Quarter **Approximately 6 weeks**	☐ **Q1** ■ **Q2** ■ **Q3** ☐ **Q4**

Common Core and/or Essential Standards:

4.NBT.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.*

4.NBT.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.

4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

4.MD.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.

Transfer: Students will be able to independently use their learning to . . .
- understand the value of numbers in real world situations
- use mental math to solve addition and subtraction problems quickly in real world situations

Possible "I Can" Statements:

I can read, write, and sequence numbers to 1,000 and 10,000

I can add and subtract multiples of 10, 100, and 1,000

I can use multiples of 10 and 100 to find the difference between any 3-digit number and 1,000

I can explain the value of each digit in a multi-digit number as ten times the digit to the right.

I can read and write a multi-digit number in standard, expanded and written form.

I can use story contexts and representations to support explanations about equivalent additions expressions and about related subtraction expressions

I can understand the structure of 10,000 and its equivalence to one thousand 10s, one hundred 100s and ten 1,000s

I can explain how to use place value in order to round a multi-digit number.

I can understand the action of subtraction problems.

Meaning	
Understandings: Students will understand that . . . - place value is related to multiplying and dividing by multiples of 10. - multi-digit whole numbers can be written in different forms: traditional, expanded and written form. - rounding is deeper than using an algorithm. Number sense plays an important role in rounding numbers. - there are multiple strategies that help make sense of the standard addition and subtraction algorithm. - develop computational fluency (addition and subtraction) which means accuracy, efficiency and flexibility. - it is mathematically possible to subtract a larger number from a smaller number, but this would result in a negative number. - making connections to various strategies for addition and subtraction in order to develop fluency with the standard algorithms	**Essential Question(s):** - **Why is it possible to represent a multi-digit whole number in more than one way?** - **When comparing multi-digit whole numbers, how does place value affect the results?** - **What pattern exists between the digits in a multi-digit whole number?** - **Why would you round numbers in real life?** - **What strategies does someone need to efficiently and effectively solve addition and subtraction problems?** - **What is the structure of place value and the base ten system through 1,000,000?**

Acquisition	
Students will know: - place value (ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions) - comparison symbols and how to use comparison symbols to write an equation - the procedure/algorithm for rounding - how estimation can help with rounding - basic addition and subtraction facts - the standard algorithm for addition and subtraction there are negative numbers to the left of the zero on the number line	**Students will be skilled at:** - reading and writing number forms-traditional expanded, standard, word form & (285=28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones, etc…) - recognizing place versus value - skip counting & multiples - comparing place value - comparing multi-digit whole numbers - recording results of comparisons - locating place in a number for rounding - using a number line and hundreds chart to help with rounding explaining and reason the rounding process

Essential Vocabulary:
place value, multi-digit whole number, number forms (traditional expanded form, written form, standard form), round, <, >, =, less than, greater than, equal to, comparisons, compare, negative number, millions, ten thousands, thousands, hundred, sum, round, value, addition, subtraction, difference

| **IT Standards:**
- 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. | **IT Strategies:**

Students will choose program to complete the newspaper for summative |

4.TT.1.1 Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.). 4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.). 4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). 4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources. 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.	assessment; for example: Storybook Weaver; PowerPoint; Word; Publisher

Unit Title: Place Value   **Grade: 4th Grade**   **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
Place value is related to multiplying and dividing by multiples of 10. Multi-digit whole numbers can be written in different forms: traditional expanded and written form. There are appropriate symbols to use when comparing numbers. Rounding is deeper than using an algorithm. Number sense plays an important role in rounding numbers. There are multiple strategies that help make sense of the standard addition and subtraction algorithm. Fluently means accuracy, efficiency and flexibility. It is mathematically possible to subtract a larger number from a smaller number, but this would result in a negative number **Essential Questions:** Why is it possible to represent a multi-digit whole number in more than one way? When comparing multi-digit whole numbers, how does place value affect the results? What pattern exists between the digits in a multi-digit whole number?	**Creating:** Can the student create new product or point of view?	assemble, construct, create, design, develop, formulate & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes Regroup with base 10 blocks Regrouping (going from the model/manipulative to showing on paper); comparing numbers; rounding; adding and subtracting Writing standard, expanded and word forms of numbers; comparing numbers; rounding; adding and subtracting numbers Understanding of < (less than), > (greater than), = (equal to) Understanding of greater numbers	Your task is to become a journalist for the local newspaper. You have been asked to design a page of the newspaper which must include: a crossword puzzle where you have to create the clues, an advertisement for "Base 10 Blocks" that includes a description of how to use them and a picture, and a response to the Dear Math Wizard. Additional assessment as needed (Investigations Assessments, Unit Test; enVision Exam View Test Generator, ClassScape, etc.)
	Evaluating: Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
	Analyzing: Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
	Applying: Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
	Understanding: Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
	Remembering: Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		

Why would you round numbers in real life? What makes a computation strategy effective and efficient? What strategies does someone need to efficiently and effectively solve addition and subtraction problems?			

Stage 3

Approximate number of days spent on unit: approximately 6 weeks
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

Resources:	**Strategies:**
Investigations Materials that should be used: Unit 5 Landmarks and Large Numbers **Sessions 1.1-1.6; 2.1-2.6; 3.1-3.6A; 4.1-4.7** **enVision Lessons to supplement Investigations as needed:** **(Remember these lessons are a starting point and may not cover all the standards in a cluster.)** 1-1, 1-2, 1-3, 1-4, 2-1, 2-2, 2-4, 2-5, 2-6, 2-7 Teaching Student-Centered Mathematics by John Van de Walle Navigating Through Number and Operations in Grades 3-5 by NCCTM **Picture Books:** A Million Dots by Andrew Clements Earth Day—Hooray! By Stuart J. Murphy One Beyond a Million: an Amazing Math Journey by David M. Schwartz Betcha! By Stuart J. Murphy (estimating) Great Estimations by Bruce Goldstone If You Made a Million by David Schwartz How Much is a Million by David Schwartz Millions of Cats by Wanda Gag A Million Fish More or Less by McKissack **Web Resources:** www.k-5mathteachingresources.com (has a collection of resources for each area taught) http://www.funbrain.com/tens/index.html (identify the place a number a is in)	Base Ten Blocks and other materials to build number sense Place Value Chart Use dice to play "Who has the Largest Number?" Students draw 7 lines on their paper. You roll a die and they choose where they want to place the number you rolled in order to make the largest number. Once students place the number it cannot be moved. Continue rolling until all students have made a number. Then compare. "Human Place Value"-Make students become a place value board using number cards to build numbers and number sense. Students can use calculators to investigate the pattern in problems: $4 \times 10 = 40$ $40 / 10 = 4$ $4 \times 100 = 400$ $400 / 10 = 40$ $4 \times 1,000 = 4,000$ $4,000 / 10 = 400$ $4 \times 10,000 = 40,000$ $40,000 / 10 = 4,000$ Use a number line to help with rounding. Students will be able to see which benchmark number the number you are rounding is closest to.

http://gamequarium.com/placevalue.html (collection of place value games) http://www.topmarks.co.uk/interactive.aspx?cat=20 (different activities and tools to be used on Active Board) enVision eTools Promethean Planet flipcharts **Math Journal Topics** 4th Grade Math Journals which can be purchased from www.K-5mathteachingresources.com.	

Alexander County Schools 2012-2013

Unit: **Multiplication and Division (Begin after Place Value and continue through the end of the 2nd Quarter)** **4th Grade**	■ Q1 ■ Q2 □ Q3 □ Q4

Common Core and/or Essential Standards:

4.OA.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.

4.OA.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.

4.0A.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.

4.NBT.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.

4.NBT.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.

4.OA.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 answer using mental

Transfer: Students will be able to independently use their learning to…

- solve real world problems using multiplication and division

Possible "I Can" Statements:

I can interpret a multiplication equation as a comparison.

I can multiply or divide to solve word problems involving multiplicative comparison.

I can find all factors for pairs of whole numbers from 1-100. I can determine multiples of one digit numbers and determine whether a number is prime or composite.

I can solve multi-step word problems, represent these problems using equations and assess the reasonableness of my answer by using estimation strategies.

I can multiply multi-digit numbers.

I can use multiplication to help me solve division problems.

I can divide up to four digit dividends and explain my results.

I can make sense of remainders by thinking of the problem's context.

I can multiply using multiples of ten.

computation and estimation strategies including rounding.

4.OA.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.

Meaning	
Understandings: Students will understand that… • verbal statements of multiplicative comparisons can be written as multiplication equations • a whole number is a multiple of each of its factors • there is a process of finding factor pairs • there is a difference between multiples and factors although they are related • multiples can be related to skip counting • what makes a number prime, composite or neither • there are a variety of strategies/methods to use when multiplying and dividing	**Essential Question(s):** • **How can situations in your life bring about the use of multiplication and division?** • **Is it important to know a variety of processes to solve multiplication and division?** • **How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)**
Students will know: • how to identify and verbalize a quantity being multiplied and which number represents "how many" times to get a specified number. • how to find factors and multiples of whole numbers. • how to identify a number as prime, composite or neither. • how to use a variety of strategies to multiply whole numbers. • how to illustrate and explain the method/methods used to solve multiplication and division problems.	**Students will be skilled at:** • writing and identifying equations and statements for multiplicative comparisons • identifying and verbalizing which quantity is being multiplied • multiplying and dividing • skip counting • identifying prime and composite numbers • finding and identifying patterns when listing factors and multiples • multiplying whole numbers • using various strategies to solve problems • illustrating their reasoning • solving problems in and out of context

Essential vocabulary:
  • Equation, multiplication, factors, products, array, mental computation, multiples, factor pairs, prime, composite, division, partial products, area model, base ten blocks, place value, remainder, skip counting

| **IT Standards:**
4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
  4.SI.1.1 Use various types of resources to gather information (including print and online media).
  4.SI.1.2 Use relevant sources of information for an assigned task. | **IT Strategies:**

Students will use the Internet and other resources (Almanac) to research 3 facts that go with the number they are assigned for the summative project. |

4.SI.1.2 Use reliable sources of information. **4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.** 4.IN.1.1 Implement appropriate reading strategies when reading for information. **4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.** 4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). **4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.** 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.	Students will use the Internet and other resources to find how the number they are assigned used in real world situations. Students will choose how they display the number "family tree" for the summative project.

Understandings:	Revised Blooms	Formative Assessments (Evidences)	Summative Assessment
Verbal statements of multiplicative comparisons can be written as multiplication equations. A whole number is a multiple of each of its factors. There is a process of finding factor pairs. There is a difference between multiples and factors although they are related. Multiples can be related to skip counting. What makes a number prime, composite or neither? There are a variety of strategies/methods to use when multiplying and dividing. **Essential Questions**: How can situations in your life bring about the use of multiplication and division? Is it important to know a variety of processes to solve multiplication and division? How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)	**Creating**: can the student create new product or point of view? — assemble, construct, create, design, develop, formulate, write. **Evaluating**: can the student justify a stand or decision? — appraise, argue, defend, judge, select, support, value, evaluate **Analyzing**: can the student distinguish between the different parts? — appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test. **Applying**: can the student use the information in a new way? — choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write. **Understanding:** can the student explain ideas or concepts? — classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase **Remembering:** can the student recall or remember the information? — define, duplicate, list, memorize, recall, repeat, reproduce state	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes	**Individual/Group Project: "Choose a Number Project"** 1) Teacher chooses numbers for students to draw from a container. (Numbers to Choose From—10, 12, 13, 14, 15, 16, 17, 18, 21, 24, 25, 27, 29, 33, 36, 38, 39, 40, 42, 45) 2) Students select a number from the container to represent and present in a "Family Tree" (to show the relationships of the number) using a format of their choice (flipchart, PowerPoint, poster, brochure, etc.). 3) Family Tree must include: • **Factor pairs** to make the number. **Arrays** must be shown. • Is the number **odd or even**?; **prime or composite**?; is the number a **multiple** of 1,2,3,4,5,6,7,8 or 9? • A pattern in which your number is the **fifth term** in a sequence of ten numbers • Four different word problems in which your number is the **sum**, **difference**, **product,** and **quotient.** • The written word (and/or symbol) in 3 foreign languages • 2 facts involving your number (a cheetah can run for short distances at 70 miles per hour). • 3 photographs, drawings

			or newspaper/magazine clippings showing where you have recently seen your number used in the **real world** • A drawing or design that you create that represents the number in a unique way Additional assessment as needed (Investigations Assessments; Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

Approximate number of days spent on unit: Approximately 12 weeks

W – **W**here are we going? **W**hy? **W**hat is expected? H – How will we **H**ook and **H**old students? E – How will we **E**quip students to **E**xplore and **E**xperience? R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine? E – How will student self **E**valuate and reflect on learning? T – How will we **T**ailor learning to varied needs, interests, styles? O – How will we **O**rganize and sequence the learning?

Resources:	Strategies:
Investigations Units: Unit 1 Factors, Multiples, and Arrays **Sessions 1.1-1.6A; Session 2.1-2.5; 3.1-3.4** Unit 3 Multiple Towers and Division Stories **Sessions 1.1-1.5; 2.1-2.6; 3.1-3.4; 4.1-4.5** Unit 8 How Many Packages? How Many Groups? **Sessions 1.1-1.5; 2.1-2.5; 3.1-3.6** **enVision Lessons to supplement Investigations as needed:** **(Remember these lessons are a starting point and may not** **cover all the standards in a cluster.)** 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 4-1, 4-2, 4-3, 4-4, 4-5,5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 6-1, 6-2, 6-3, 6-4, 7-1, 7-2, 7-3, 7-4, 7-5, 7- 7, 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10, 9-7, 16-12, 18-1, 18-2, 18-3, 18-5 **Web Resources:** Factor Trail Game (Illuminations) http://illuminations.nctm.org/LessonDetail.aspx?id=L719 Factor Findings (lesson from Illuminations) http://illuminations.nctm.org/LessonDetail.aspx?id=L872 The Product Game (lesson from Illuminations exploring products, factors and multiples and the relationship between them) http://illuminations.nctm.org/LessonDetail.aspx?id=U100 Chairs Around the Table (pattern lesson from Illuminations http://illuminations.nctm.org/LessonDetail.aspx?id=L627 Patterns That Grow (number and shape pattern unit from Illuminations http://illuminations.nctm.org/LessonDetail.aspx?id=U103	Arrays Area Models Fact Families to show relationship between division and multiplication Flashcards Timed Tests (fluency) Skip Counting Rhymes 'n Times Wrap Ups Use manipulatives to show arrays Build arrays for equations to show the Commutative Property of Multiplication Use word problems with multiplicative comparisons. Have students to draw a picture or create a model of the problem, write an equation and solve. Give students a problem solving method to help them figure out how to solve word problems. "Count Around the Room"—give students a rule such as count by 3's

http://mathstory.com/mathlessons/arrayrace.htm
(short lesson and game for building arrays, writing equations and solving for a product)

www.k-5mathteachingresources.com
(has a collection of resources for each area taught)
http://www.mathplayground.com/wordproblems.html
(word problems with multiplicative comparison)
http://www.uen.org/3-6interactives/math.shtml#patterns
(interactive pattern games)

enVision eTools
Promethean Planet flipcharts

Picture books:
The Doorbell Rang by Pat Hutchins (division basics)
Anno's Magic Seeds by Mitsumasa Anno (pattern)
Anno's Mysterious Multiplying Jar by Masaichiro and Mitsumasa Anno (multiplication)
A Remainder of One by Elinor J. Pinczes
The Great Divide: A Mathematical Marathon by Dayle Ann Dodds
Amanda Bean's Amazing Dream by Cindy Neuschwander (multiplication)
The Grapes of Math by Greg Tang
If you were a Set by Marcie Aboff
If you were a Divided-By Sign by Trisha Speed Shaskan
If you were a Times Sign by Trisha Speed Shaskan
Minnie's Diner A Multiplying Menu by Dayle Ann Dodds
Divide and Ride by Stuart J. Murphy
One Hundred Hungry Ants by Elinor J. Pinczes
The Best of Times by Greg Tang
Equal Shmequal by Virginia Knoll

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Number and Operations in Grades 3-5 by NCCTM

Alexander County Schools 2013 - 2014

Unit: Unit 4: Size, Shape & Symmetry & Part of Unit 7: Moving Between Solids & Silhouettes Approximately 6 weeks	☐ **Q1** ■ **Q2** ☐ **Q3** ☐ **Q4**

Common Core and/or Essential Standards:

4.MD.1 Know relative sizes of measurement units within one system of units including 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. *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 forfeet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

4.MD.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.

4.MD.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.*

4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.

   4.MD.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 through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.

Transfer: Students will be able to independently use their learning to . . .

- apply knowledge of measurement in everyday life skills and real world problem solving
- describe, analyze, compare and classify two-dimensional shapes to deepen their understanding of the properties of two dimensional objects and use them to solve problems involving symmetry in real world situations

Possible "I Can" Statements:

I can develop and use benchmarks to help with measurement.

I can express measurements in larger and smaller terms and record equivalents in a table.

I can use the four operations to solve single-step and multi-step word problems and represent measurement in diagrams.

I can apply the area and perimeter formulas for rectangles in the real world.

I can draw and identify points, lines, line segments, rays, angles and parallel and perpendicular lines.

I can classify figures based on parallel and perpendicular lines and angles.

I can recognize and draw lines of symmetry.

I can recognize angles as shapes formed where two rays share an

4.MD.5b An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. **4.MD.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **4.MD.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. **4.G.1** Draw points, lines, line segments, rays, angles, (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **4.G.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 **4.G.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.	endpoint and understand the concepts of angle measurement. I can use a protractor to measure and sketch angles. I can solve addition and subtraction problems to find unknown angles.

Meaning

Understandings: Students will understand that . . . • larger units can be subdivided into equivalent units (partition) • the same unit can be repeated to determine the measure (iteration) • there is a relationship between the size of a unit and the number of units needed (compensatory principle) • everyday objects have a variety of attributes and can be measured in many ways • you can express measurements from a larger unit in terms of a smaller unit • number line diagrams that feature a measurement scale can represent measurement quantities (ex. ruler, volume measure on the side of a container, timetable showing hours, line plot, etc.)	**Essential Question(s):** • How do measurements solve real world problems? • When do you use area and perimeter in your everyday life? • How do points, lines, line segments, rays, angles, and perpendicular/parallel lines fit into the world around me? • Why would you need to classify shapes? • Where do you see symmetry in your environment? • When would you use an angle measurement in real life? • Why are precise measurements important? • When would decomposing angles be used in the real world?

- a formula can be used to calculate area and perimeter
- points and lines, line segments, angles, perpendicular, and parallel lines can come together and make 2-D figures
- 2-D figures can be classified using different characteristics such as parallel and perpendicular lines or angle measurement
- 2 lines are parallel if they never intersect and are equidistant
- 2 lines are perpendicular if they intersect in right angles (90 degrees)
- objects can be sorted based on parallelism, perpendicularity and angle types
- there are different types of right triangles
- regular and non-regular polygons can be symmetrical and non-symmetrical
- angles are connected to circular measurement (360 degrees)
- an angle is a series of "one-degree turns"
- unknown angle measures can be found by decomposing an angle into smaller parts

Acquisition	
Students will know:	**Students will be skilled at:**
- units of measurement and their relative size within one system of units (km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec) - the relationships between units of measure - how to use the four operations to solve word problems involving various forms of measurement - the formulas for area and perimeter and why they work - the different ways to classify 2-dimensional figures - how to recognize lines of symmetry - angle measurement is additive - how to identify parallel and perpendicular lines - real world problems can be solved with angles - how to use benchmark angle measurements to determine an estimated angle measure to classify an angle (90 degrees, 180 degrees, 45 degrees, etc) - how to use a diagram to write an equation using a symbol to form an addition or subtraction problem to find an unknown angle measurement.	- measuring objects accurately - recording measurement equivalents in a two-column table - converting units of measure within the same system - solving multi-step word problems involving measurement with distances, intervals of time, liquid volumes, masses of objects, money, simple fractions and/or decimals - calculating area and perimeter of rectangles using the correct formula - communicating their understanding of why the formulas work - measuring objects to an eighth, fourth and half of an inch - making a line plot - interpreting line plot data - drawing and identifying points, lines, line segments, rays, angles, perpendicular, and parallel lines. - identifying points, lines, line segments, rays, angles, perpendicular, and parallel lines in 2-dimensional figures. - classifying 2-D figures - recognizing right angles - sorting objects based on criteria - drawing lines of symmetry

	- recognizing lines of symmetry - measuring angles with a protractor - sketching a specific measured angle - adding and subtracting angle measurements

Essential Vocabulary:
measurement units (metric and customary), measurement categories (mass, length, capacity etc), unit conversions, operations (addition, subtraction, multiplication, division, number line, diagram, money, fraction, decimal, area, perimeter, formula, square unit, linear unit, measure, metric, customary, relative size, liquid volume, distance, kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in), foot (ft), yard (yd), mile (mi), ounce (oz), pound (lb), cup (c), pint (pt), quart (qt), gallon (gal), time, hour, minute, second, equivalent, length, polygon (regular an non-regular), rhombus, rectangle, square, triangle (right, isosceles, equilateral, scalene), quadrilateral, pentagon, hexagon, trapezoid, point, line, line segment, ray, angle, perpendicular line, parallel line, two-dimensional figure, acute angle, obtuse angle, right angle, symmetry, end point, angle measurement, reference to a circle, degrees, degrees of a circle, protractor, decompose, part/whole, classify shapes/ figures, vertex/vertices, line of symmetry, symmetric figures, attributes or features

IT Standards:	**IT Strategies:**

.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
    4.SI.1.1 Use various types of resources to gather information (including print and online media).
    4.SI.1.2 Use relevant sources of information for an assigned task.
    4.SI.1.2 Use reliable sources of information.
 4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
    4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
    4.TT.1.1Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.).
    4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.).
    4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.).
4.RP.1 Apply a research process as part of collaborative research.
    4.RP.1.1 Implement a research process by collaborating effectively with other students.
4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
    4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
	Students will research information on North Carolina to use in the brochure created as part of the summative assessment.
	
	Students will choose a program to complete the brochure for summative assessment; for example: Storybook Weaver; PowerPoint; Word; Publisher.
	
	Students will use different technology tools to help with their summative assessment project.

4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources. 4.SE.1.3 Understand internet safety precautions (personal information, passwords, etc.).	

Unit Title: Unit 4: Size, Shape & Symmetry & Part of Unit 7: Moving Between Solids & Silhouettes

Grade: 4th   **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
Larger units can be subdivided into equivalent units (partition). The same unit can be repeated to determine the measure (iteration). There is a relationship between the size of a unit and the number of units needed (compensatory principle). Everyday objects have a variety of attributes and can be measured in many ways. You can express measurements from a larger unit in terms of a smaller unit. Number line diagrams that feature a measurement scale can represent measurement quantities (ex. ruler, volume measure on the side of a container, timetable showing hours, line plot, etc.). A formula can be used to calculate area and perimeter. Points and lines, line segments, angles, perpendicular, and parallel	**Creating:** Can the student create new product or point of view?	assemble, construct, create, design, develop, formulate & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from enVisions & other sources) Teacher Observation Anecdotal Notes Measure objects accurately in customary and metric Use right tools to measure objects Convert units of measure within the same system Calculate area and perimeter using formulas and be able to explain why the formula works Solve multi-step word problems related to measurement Produce a 2-column table to show conversions from larger to smaller units and to show equivalent	**Students are to design an apartment (the futures channel) or a zoo with specifications. (For Area and Perimeter)** **Students will design a brochure about objects in North Carolina. (one side of brochure in metric and one side in customary)** 1) height of tallest lighthouse in North Carolina 2) weight or mass of sweet potatoes grown in a year in North Carolina 3) daily average capacity of milk produced by the dairy cow in North Carolina 4) car travel time from Murphy, NC to Manteo, NC at 60 mph 5) Find the value of the name "North Carolina" if the value of a consonant is $0.73 and a vowel is $0.54. Display this amount 3 different ways. Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.) **Student Created Scavenger Hunt (small group)** 1) Students will be placed in small groups.
	Evaluating: Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
	Analyzing: Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
	Applying: Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
	Understanding: Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		

lines can come together and make 2-D figures. 2-D figures can be classified using different characteristics such as parallel and perpendicular lines or angle measurement. 2 lines are parallel if they never intersect and are equidistant. 2 lines are perpendicular if they intersect in right angles (90 degrees). Objects can be sorted based on parallelism, perpendicularity and angle types. There are different types of right triangles: right, scalene, equilateral and isosceles. Regular and non-regular polygons can be symmetrical and non-symmetrical. Angles are connected to circular measurement (360 degrees). An angle is a series of "one-degree turns". Unknown angle measures can be found by decomposing an angle into smaller parts. **Essential Questions**: How do measurements solve real world problems? When do you use area and perimeter in your everyday life? How do points, lines, line segments, rays, angles, and	**Remembering:** Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state	measurements	2) They will choose a symbol to mark their objects. (example: star, circle, etc.) 3) Students will find the following in and around school: **(Choose 10 out of 20)** • Parallel • Perpendicular • Line Segment • Point • Right Angle • Acute Angle • Obtuse Angle • Right Triangle • Intersecting Lines • Line of Symmetry • Congruent Figures • Similar Figures • Rhombus • Trapezoid • Square • Rectangle • Pentagon • Hexagon • Octagon • Parallelogram 4) Students will write a clue to find their first object. At the object they will place their symbol to mark the object. They will place their next clue for their next object. **Clues must include how to find the object and a description of the geometry term they are finding.** 5) After students mark their hunt, another group will complete the scavenger hunt. *Teacher will decide how students will record what they found (for example-flip camera; draw what they found next to the clue, etc.). Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

| perpendicular/parallel lines fit into the world around me?

Why would you need to classify shapes?

Where do you see symmetry in your environment?

When would you use an angle measurement in real life?

Why are precise measurements important?

When would decomposing angles be used in the real world			

Stage 3

Approximate number of days spent on unit: Approximately 6 weeks
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

Resources:	**Strategies:**
Investigations Unit: Unit 4 (Size, Shape, and Symmetry) Investigation 1: Linear Measurement **Session 1.1-1.5** **Optional LogoPaths Software is included in the Investigations materials.** After session 1.5, you may need to add in hands-on measurement activities for linear measurement. "Step by Step: A Look at Linear Measurement" (found online) is a possible resource to use. You will need to discuss metric and customary units. You will need to add in	**Measurement Strategies:** Gallon Man-poster that can be purchased and students can make to help with gallons, pints, quarts and cups "Pound Cake"-poster that can be purchased to help with ounces and pounds

linear measurement conversion tables, conversions from larger to smaller and word problems. Introduction of Mass benchmarks is needed. "On the Mark: Mass Benchmarks" (found online) is a possible resource to use. Hands-on measuring activities with mass are also needed.

Unit 7 (Moving Between Solids and Silhouettes)
    Investigation 3: Understanding Volume (only) **Session 3.5A (in Common Core Supplement Book) (Activity 1 only)**
After session 3.5a activity 1, introduce capacity benchmarks and hands-on capacity measurement activities. "On the Mark: Capacity Benchmarks" (found online) is a possible resource to use. Then do Unit 7 Session 3.5 activity 2 only.

Unit 4 Size, Shape, and Symmetry
    Investigation 2: Polygons of Many Types **Sessions 2.1-2.5**
Additional Activities from Navigating Through Geometry (Roping in Quadrilaterals); Triangle Types-Brainpop Video
    Investigation 3: Measuring Angles **Sessions 3.1-3.4a**
Additional Activities for Understanding the concept of angle measurement and protractors: from Hardhatting in a Geo-World- "From Wedges to Wangles" & "Waxed Wangles"
    Investigation 4: Finding Area **Sessions 4.1, 4.2 & 4.5 only (Look at Randolph County pacing. Investigations uses "crazy cakes" to teach area. Common core calls for area of rectangles. Supplemental resources will need to be used.) Some resources: Area & Perimeter with Cheez-its; Area & Perimeter Task cards from Teachers Pay Teachers; Mrs. Burke's Area & Perimeter Rap on YouTube; Area Tiles Activities from AIMS) Symmetry Activities from Navigating Through Geometry & Finding Lines of Symmetry from NCCTM Illuminations**

Ideas with Food (2 lessons from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?ID=U78
Oil Oil Everywhere (Lesson on Area from Illuminations
http://illuminations.nctm.org/LessonDetail.aspx?id=L862
Four Square Galore (lesson on Area from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L860
How Long? How Tall? How Wide? How Deep? (lesson for measurement; goes along with the book How Big is a Foot?)
http://illuminations.nctm.org/LessonDetail.aspx?id=L635
Junior Architects (designing a club house has some geometry concepts from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U172
http://www.uen.org/3-6interactives/math.shtml#fractions
(interactive measurement activities)
http://nrich.maths.org/6923

"Yard Plant"-poster that can be purchased to help with yards and feet

Containers for Measuring

Scales and Weights

Use diagrams to help solve word problems.

Have students measure the length of the room with one-inch tiles, one foot rulers and with yardsticks. Do the same activity with centimeters and meters.

Area Tiles

"Mrs. Burke's Area and Perimeter Rap" on YouTube

Geometry Strategies:
Pretzel sticks
Toothpicks and Marshmallows
Licorice
Pattern Blocks
Geo Boards
Clocks

Body Symbols for line, point and ray

Build geometric shapes with toothpicks and marshmallows

Build geometric shapes with straws and pipe cleaners
"Spaghetti Drop"—give students dry spaghetti. Have them drop on floor and find all the geometric terms they can.

Examine and label the components of a circle

(Growing Rectangles-area) http://nrich.maths.org/2663 (Fence It-perimeter) http://www.jmathpage.com/JIMSMeasurementpage.html (various measurement activities) www.k-5mathteachingresources.com (has a collection of resources for each area taught) http://www.geogebra.org/cms/ (free mathematics software) http://www.uen.org/Lessonplan/preview.cgi?LPid=11235 (lesson to identify and describe attributes of two-dimensional geometric shapes) www.k-5mathteachingresources.com (word problems with multiplicative comparison) http://illuminations.nctm.org/LessonDetail.aspx?ID=L270 (polygon capture game) http://nrich.maths.org/1840 (lines of symmetry) http://www.innovationslearning.co.uk/subjects/maths/activities/year3/symmetry/shape_game.asp (symmetry) http://www.ixl.com/math/grade-4 (measuring angles) http://www.mathsisfun.com/angles.html (information about angles) http://www.mathopenref.com/ (reference tool)	Recognize angles formed when rays are drawn for the center of the circle Measure angles with a variety of degrees Using protractors, students draw an angle with missing measure and trade drawing. Partner finds the missing angle measure.

enVision eTools
Promethean Planet flipcharts

Picture books:
How Big is a Foot? By Rolf Myller
Jim and the Beanstalk by Raymond Briggs
About Time: A First Look at Time and Clocks by Bruce Koscielniak
Racing Around by Stuart J. Murphy (perimeter)
Bigger, Better, Best! by Stuart J. Murphy (area)
Area (My Path to Math) Math concepts Made Easy
Spaghetti and Meatballs for All! A Mathematical Story by Marilyn Burns (area and perimeter)
Game Time! by Stuart J. Murphy (time)
If you were a Quart or a Liter by Marcie Aboff
Inchworm and a Half by Elinor J. Pinczes

Polly's Pen by Stuart J. Murphy (metric)
Measuring Penny by Loreen Leedy
Millions to Measure by David M. Schwartz
Sir Cumference and the Isle of Immeter by Cindy Neuschwander
Grandfather Tang's Story by Ann Tompert
The Greedy Triangle by Marilyn Burns
Line, Segments, Rays, and Angles (My Path to Math) Math Concepts Made Simple
Polygons (My Path to Math) Math Concepts Made Simple
Hamster Champs by Stuart J. Murphy (angles)
If you were a Triangle by Marcie Aboff
If you were a Quadrilateral by Molly Blaisdell
If you were a Polygon by Marcie Aboff
Sir Cumference and the Great Knight of Angleland by Cindy Neuschwander
Sir Cumference and the First Round Table by Cindy Neuschwander

enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
16-1, 16-2, 16-3, 16-4, 16-5, 16-6, 16-7, 16-8, 16-9, 16-12, 11-4, 12-6, 13-7, 14-1, 14-2, 14-6
enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 19-4, 19-5

enVision eTools
Promethean Planet flipcharts

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Measurement in Grades 3-5 by NCCTM

Alexander County Schools 2012 - 2013

Unit: Decimals (second unit in 3rd Quarter after decimals) 4th Grade	☐ Q1 ☐ Q2 ■ Q3 ☐ Q4

Common Core and/or Essential Standards:	Transfer: Students will be able to independently use their learning to . . .
4.NF.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.	• use decimals in real world situations and apply their learning to real world word problems
4.NF.6 Use decimal notation for fractions with denominators 10 or 100.	**Possible "I Can" Statements**
4.NF.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 results of comparisons with symbols <,>,= and justify the conclusions, e.g. by using a visual model.	I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100!
	I can use decimal notation for fractions with denominators of 10 or 100!
	I can compare two decimals to the hundredths place!

Meaning	
Understandings: Students will understand that . . .	**Essential Question(s):**
• you can change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator • you can use base ten blocks, place value models and circle models to explore the relationship between fractions and decimals with denominators of 10 and 100 • there are connections between fractions with denominator of 10 and 100 and the place value chart • decimals can be represented on a number line • decimals can be compared with area and other models • when you compare decimals you need to justify your conclusions (with models) when comparing, you use the same whole	• **Why is it necessary to manipulate denominators of fractions?** • **Why would you need to change fractions to decimals?** • **Why is it important to produce models?**

Acquisition	
Students will know:	**Students will be skilled at:**
• a fraction can be written as a decimal and vice versa • how to manipulate fractions with 10 & 100 as denominators • how to manipulate fractions with 10 & 100 as denominators to	• using a decimal grid to shade decimals • finding equivalent fractions and decimals with denominators of 10 and 100

- decimals (both represent parts of a whole)
  - how to compare decimals to hundredths, using appropriate symbols and justify the results
  - that a number can be represented as both a fraction and a decimal

comparisons are only valid when they refer to the same whole

- reading fraction names with denominators of 10 and 100 and rewriting them as a decimal on place value models
- using strategies to compare decimals
- drawing decimal models
- writing a decimal as a fraction

Essential Vocabulary:

fraction, numerator, denominator, equivalent, reasoning, decimal, tenths, hundredths, multiplication, visual models (area models, decimal grids, number lines, circle models and meter sticks), same wholes, comparisons/compare, <, >, =

IT Standards:

4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
   4.TT.1.1 Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.).
   4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.).
   4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.).

4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
   4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
   4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.

IT Strategies:

(Students will choose program to complete the activity in and choose a way to display their data (brochure, poster, etc.) for summative assessment (Storybook Weaver; PowerPoint; Word; Publisher, etc.)

Unit Title: **Grade:**   **Subject:**

STAGE 2

Understandings:	Revised Blooms	Formative Assessments (Evidences)	Summative Assessment
You can change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator. You can use base ten blocks, place value models and circle models to explore the relationship between fractions and decimals with denominators of 10 and 100. There are connections between fractions with denominator of 10 and 100 and the place value chart. Decimals can be represented on a number line. Decimals can be compared with area and other models. When you compare decimals you need to justify your conclusions (with models). When comparing, you use the same whole. **Essential Questions:** Why is it necessary to manipulate denominators of fractions? Why would you need to change fractions to decimals? Why is it important to produce models?	**Creating:** Can the student create new product or point of view? — assemble, construct, create, design, develop, formulate & write. **Evaluating:** Can the student justify a stand or decision? — appraise, argue, defend, judge, select, support, value & evaluate **Analyzing:** Can the student distinguish between the different parts? — appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test. **Applying:** Can the student use the information in a new way? — choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write. **Understanding:** Can the student explain ideas or concepts? — classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase **Remembering:** Can the student recall or remember the information? — define, duplicate, list, memorize, recall, repeat, reproduce & state	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from enVisions & other sources) Teacher Observation Anecdotal Notes	**Relay Activity** 1) Students will calculate the decimal time (using stopwatch or timer) it takes to complete a teacher selected task-under a minute. (example-running relay, saying the abc's, blowing a bubble, etc.) 2) Students will take their time they completed the activity in and choose a way to display their data (brochure, poster, etc.) including all of the following ways: • **Fraction** • **Base ten blocks** • **On a number line** • **10x10 grid** • **Circle model** • **Compare their data with another student** • **Order their data with a group of students** 3) Select another task (over a minute) and repeat the above. Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

Stage 3

Approximate number of days spent on unit: Approximately 2 weeks

W – **W**here are we going? **W**hy? **W**hat is expected?

H – How will we **H**ook and **H**old students?

E – How will we **E**quip students to **E**xplore and **E**xperience?

R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?

E – How will student self -**E**valuate and reflect on learning?

T – How will we **T**ailor learning to vary needs, interests, and styles?

O – How will we **O**rganize and sequence the learning?

Resources:	Strategies:
Investigations Unit: **Unit 6 Fraction Cards and Decimal Squares** Investigation 3 Working with Decimals **Session 3.1-3.7** **enVisions Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)** 12-1, 12-2, 12-3, 12-4, 12-5 A Meter of Candy (Lesson on Decimals from Illuminations) http://illuminations.nctm.org/LessonDetail.aspx?id=L861 www.k-5mathteachingresources.com (word problems with multiplicative comparison) http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html?from=category_g_2_t_1.html (interactive manipulatives) EnVision eTools Promethean Planet flipcharts **Picture books:** Decimals (My Path to Math) Math Concepts Made Easy Piece=Part=Portion Fractions=Decimals=Percents by Scott Gifford Teaching Student-Centered Mathematics in Grades 3-5 by John Van de Walle Navigating Through Number and Operations in Grades 3-5 by NCCTM	10x10 grids Money Model tenths using dimes and hundredths with pennies Use grid paper to line up decimals to compare Use place value blocks (change the value-flat=1 whole; rod=1 tenth; units=1 hundredth) Number line Meter stick

Alexander County Schools 2012 - 2013

Unit: Fractions (first unit in 3rd Quarter) 4th Grade	☐ **Q1** ☐ **Q2** ■ **Q3** ☐ **Q4**

Common Core and/or Essential Standards:

4.NF.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.

4.NF.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.

4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

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.*

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.

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.

Transfer: Students will be able to independently use their learning to . . .

- use fractions in real world situations
- solve real world word problems involving addition and subtraction of fractions
- use fractions to aid in measurement skills

Possible "I Can" Statements:

I can explain, recognize and generate equivalent fractions.

I can compare fractions.

I can add and subtract fractions and mixed numbers.

I can multiply a fraction by a whole number.

I can multiply a fraction by a whole number.

I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100.

I can use decimal notation for fractions with denominators of 10 or 100.

I can compare two decimals to the hundredths place.

4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

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).*

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.)*

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?*

Meaning	
Understandings: Students will understand that . . . - the size of the whole affects the size of a fraction - visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts - equivalent fractions can be created by multiplying both the numerator and denominator by the same number - drawing fraction models can help them compare fractions - addition is the joining or composing of fractions - subtraction is the separating or decomposing of fractions - mixed numbers can be decomposed in more than one way (algorithm or models) - visual fraction models can be used to solve fraction word problems - a fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6) - adding and subtracting fractions is joining or separating parts that are referring to the same whole - multiplication is repeated addition, even when applied to fractions equations can be used to represent fraction word problems	**Essential Question(s):** **When would it be necessary to use equivalent fractions in the real world?** **How can a strong foundation of fractions determine fair shares?** **How can I use fractions in real life?** **What can drawing a model help to solve a problem?**

Acquisition	
Students will know: • how to explain equivalent fractions using fraction models • comparisons are only valid when the two fractions refer to the "same whole" • there are different strategies to find equivalent fractions (visual models, multiplication) • there are multiple strategies to compare fractions (using benchmark fractions, common denominators or numerators) • a fraction with a numerator of one is called a unit fraction • how to use visual models to help with decomposing fractions and multiplying a whole number by a fraction • how to use visual fraction models and equations to represent fraction word problems	**Students will be skilled at:** • drawing and explaining visual fraction models • creating equivalent fractions by multiplying the numerator/denominator by the same number • finding common numerators and denominators • drawing fraction models to compare fractions • justifying conclusions • recognizing benchmark fractions • comparing fractions • compose and decompose fractions of the same whole • solving addition/subtraction word problems of fractions with like denominators using visual fraction models • adding and subtracting mixed numbers with like denominators • creating visual models to multiply a whole number by a fraction • multiplying fractions by a whole number solving word problems involving fractions

Essential Vocabulary:
"same whole", visual fraction model, fraction, numerator, denominator, equivalent, multiplication, compare/comparison, <, >, =, partition(ed), unit fraction, multiple, reason, benchmark fraction, operations, addition/joining, subtraction/separating, decomposing, mixed number, properties-rules about how number work, equation

IT Standards:	IT Strategies:

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
    4.SI.1.1 Use various types of resources to gather information (including print and online media).
    4.SI.1.2 Use relevant sources of information for an assigned task.
    4.SI.1.2 Use reliable sources of information.
4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
    4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
    4.TT.1.1Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.).
    4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual
	Students will research recipes on the Internet or in books for the summative assessment. They will then display their new recipe using a program (Word, Publisher, etc.).

recording, online collaboration tools, etc.). **4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.** 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.3 Understand internet safety precautions (personal information, passwords, etc.).	

Unit Title: **Grade:**   **Subject:**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment

The size of the whole affects the size of a fraction.
 	
Visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts.
 	
Equivalent fractions can be created by multiplying both the numerator and denominator by the same number.
 	
Drawing fraction models can help compare fractions.
 	
Addition is the joining or composing of fractions.
 	
Subtraction is the separating or decomposing of fractions.
 	
Mixed numbers can be decomposed in more than one way (algorithm or models).
 	
Visual fraction models can be used to solve fraction word problems.
 	
A fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6).
 	
Adding and subtracting fractions is joining or separating parts that are referring to the same whole.
 	
Multiplication is repeated addition, even when applied to fractions.
	Creating:
	Can the student create new product or point of view?
		assemble, construct, create, design, develop, formulate & write.	Oral Assessments
			Quizzes (teacher made & textbook)
			Skill Worksheets
			Flip Charts
			Active Votes
			Active Expressions
			Exit Cards
			Math Stations (from enVisions & other sources)
			Teacher Observation
			Anecdotal Notes
			
			Make visual fraction models to represent fractions
			
			Addition of fractions with model and without model
			
			  When drawing a diagram to compare fractions, models are the same size
				Adjusting a Recipe Project
				1) Students will find a simple recipe in a book or on the Internet with at least four fractions in the ingredient list. They will write the original recipe.
				2) Students will rewrite the recipe for twice as many people. They will need to show their work and explain the strategy they used.
				3) Students will rewrite the recipe to cut it in half. They will need to show their work and explain the strategy they used.
				4) Students will rewrite the recipe to adjust the recipe to feed everyone in the class (including the teacher). Students will need to show their work and explain their strategy.
				5) Students will present their 3 recipes in a creative way.
				
				  Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

	Evaluating: Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
	Analyzing: Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
	Applying: Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
	Understanding: Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
	Remembering: Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		

Equations can be used to represent fraction word problems

Essential Questions:

When would it be necessary to use equivalent fractions in the real world?

How can a strong foundation of fractions determine fair shares?

How can I use fractions in real life?

What can drawing a model help to solve a problem? | | | |

Stage 3

Approximate number of days spent on unit: Approximately 7 weeks

W – **W**here are we going? **W**hy? **W**hat is expected?

H – How will we **H**ook and **H**old students?

E – How will we **E**quip students to **E**xplore and **E**xperience?

R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?

E – How will student self -**E**valuate and reflect on learning?

T – How will we **T**ailor learning to vary needs, interests, and styles?

O – How will we **O**rganize and sequence the learning?

Resources:	Strategies:

Investigations Materials that should be used:
Unit 6: Fraction Cards and Decimal Squares
    Investigation 1: Parts of Rectangles **Sessions 1.1-1.8A**
    Investigation 2: Ordering Fractions **Sessions 2.1-2.7A**
    Investigation 3A: Multiplying Fractions **Sessions 3A.1-3A.3**
 	
enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
10-4, 10-5, 10-6, 10-7, 10-8, 10-9, 11-1, 11-4
 	
Fun with Fractions (Fraction Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U152
Fun with Pattern Block Fractions (Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U113
Fraction Unit (from NYC schools)
http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf
Fraction Unit (DPI Wiki)
http://maccss.ncdpi.wikispaces.net/file/view/4thGradeUnit.pdf
 	
http://nlvm.usu.edu/en/nav/grade_g_2.html
(Virtual Manipulatives)
 	
www.k-5mathteachingresources.com
(has a collection of resources for each area taught)
	Models-fraction bars, Cuisenaire rods
	Grids
	
	Pattern Blocks (Example: If a red trapezoid is one whole, which block shows 1/3?)
	
	"Foldable Fraction Models": Students will make their own fraction models
	
	Using area models students can change a given fraction into an equivalent fraction by drawing addition vertical and or horizontal lines that result in equal parts of the whole.
	
	Fraction tiles and fraction circles
	
	Use a number line to compare fractions
	
	*Make sure to emphasize that comparing fractions cannot happen unless the fractions are part of the same whole when making diagrams to help.
	
	Illustrate **adding and subtracting fractions and mixed numbers** and **decomposing** using number lines, fraction strips, area models, set models, rulers, etc.
	
	Use number lines, fraction strips, area models, set models, rulers to show multiple addition of unit fractions. Then connect this to

enVision eTools Promethean Planet flipcharts **Picture books:** Piece=Part=Portion Fractions=Decimals=Percents by Scott Gifford If you were a Fraction by Trisha Speed Shaskan Apple Fractions by Jerry Pallotta Polar Bear Math by Ann Whitehead Nagda and Cindy Bickel Working With Fractions by David Adler Fraction Fun by David Adler Teaching Student-Centered Mathematics in Grades 3-5 by John Van de Walle Navigating Through Number and Operations in Grades 3-5 by NCCTM	multiplication of a fraction by a whole number.

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Unit 6: Fractions Cards and Decimal Squares 3rd/4th quarter Approximately 9 weeks	☐ Q1	☐ Q2	■ Q3	■ Q4

Common Core and/or Essential Standards:

4.NF.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.

4.NF.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.

4.NF.3 Understand a fraction *a/b* with *a* > 1 as a sum of fractions 1/*b*.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. 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.*

c. 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.

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using

Transfer: Students will be able to independently use their learning to . . .
- use fractions in real world situations
- solve real world word problems involving addition and subtraction of fractions
- use fractions to aid in measurement skills
- use decimals in real world situations and apply their learning to real world word problems
-

Possible "I Can" Statements:

I can explain, recognize and generate equivalent fractions.

I can compare fractions.

I can add and subtract fractions and mixed numbers.

I can multiply a fraction by a whole number.

I can multiply a fraction by a whole number.

I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100.

I can use decimal notation for fractions with denominators of 10 or 100.

I can compare two decimals to the hundredths place.

I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100!

I can use decimal notation for fractions with denominators of 10 or

visual fraction models and equations to represent the problem.	100! I can compare two decimals to the hundredths place!
4.NF.4 Apply and extend previous understandings of multiplication to multiply a fractions by a whole number. a. Understand a fraction a/b as a multiple of 1/b. b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. c. 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. **4.NF.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. *Example: express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100* **4.NF.6** Use decimal notation for fractions with denominators 10 or 100. *Example: rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram* **4.NF.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.	

Meaning	
Understandings: Students will understand that . . . • the size of the whole affects the size of a fraction • visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts • equivalent fractions can be created by multiplying both the numerator and denominator by the same number • drawing fraction models can help them compare fractions • addition is the joining or composing of fractions • subtraction is the separating or decomposing of fractions • mixed numbers can be decomposed in more than one way	**Essential Question(s):** • **When would it be necessary to use equivalent fractions in the real world?** • **How can a strong foundation of fractions determine fair shares?** • **How can I use fractions in real life?** • **What can drawing a model help to solve a problem?** • **Why is it necessary to manipulate denominators of fractions?** • **Why would you need to change fractions to decimals?** • **Why is it important to produce models?**

- (algorithm or models)
- visual fraction models can be used to solve fraction word problems
- a fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6)
- adding and subtracting fractions is joining or separating parts that are referring to the same whole
- multiplication is repeated addition, even when applied to fractions
- equations can be used to represent fraction word problems

Acquisition	
Students will know:	**Students will be skilled at:**
- how to explain equivalent fractions using fraction models - comparisons are only valid when the two fractions refer to the "same whole" - there are different strategies to find equivalent fractions (visual models, multiplication) - there are multiple strategies to compare fractions (using benchmark fractions, common denominators or numerators) - a fraction with a numerator of one is called a unit fraction - how to use visual models to help with decomposing fractions and multiplying a whole number by a fraction - how to use visual fraction models and equations to represent fraction word problems	- drawing and explaining visual fraction models - creating equivalent fractions by multiplying the numerator/denominator by the same number - finding common numerators and denominators - drawing fraction models to compare fractions - justifying conclusions - recognizing benchmark fractions - comparing fractions - compose and decompose fractions of the same whole - solving addition/subtraction word problems of fractions with like denominators using visual fraction models - adding and subtracting mixed numbers with like denominators - creating visual models to multiply a whole number by a fraction - multiplying fractions by a whole number - solving word problems involving fractions - using a decimal grid to shade decimals - finding equivalent fractions and decimals with denominators of 10 and 100 - reading fraction names with denominators of 10 and 100 and rewriting them as a decimal on place value models - using strategies to compare decimals - drawing decimal models - writing a decimal as a fraction

Essential Vocabulary: "whole", visual fraction model, fraction, numerator, denominator, equivalent, multiplication, compare/comparison, <, >, =, partition(ed), unit fraction, multiple, reason, benchmark fraction, operations, addition/joining, subtraction/separating, decomposing, mixed number, improper fraction, properties (rules about how numbers work), equation, decimal, tenths, hundredths, visual decimal model (area models, decimal grids, number lines, circle models and meter sticks)

IT Standards:	IT Strategies:

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
   4.SI.1.1 Use various types of resources to gather information (including print and online media).
   4.SI.1.2 Use relevant sources of information for an assigned task.
   4.SI.1.2 Use reliable sources of information.
4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
   4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
   4.TT.1.1Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.).
   4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.).
4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
   4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
   4.SE.1.3 Understand internet safety precautions (personal information, passwords, etc.).
	Students will research recipes on the Internet or in books for the summative assessment. They will then display their new recipe using a program (Word, Publisher, etc.).
	
	Students will choose program to complete the activity in and choose a way to display their data (brochure, poster, etc.) for summative assessment (Storybook Weaver; PowerPoint; Word; Publisher, etc.)

Unit Title: Fractions Cards and Decimal Squares   **Grade: 4**   **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
The size of the whole affects the size of a fraction.

Visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts.

Equivalent fractions can be created by multiplying both the numerator and denominator by the same number.

Drawing fraction models can help compare fractions.

Addition is the joining or composing of fractions.

Subtraction is the separating or decomposing of fractions.

Mixed numbers can be decomposed in more than one way (algorithm or models).

Visual fraction models can be used to solve fraction word problems.

A fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6).

Adding and subtracting fractions is joining or separating parts that are referring to the same whole.

Multiplication is repeated addition, | **Creating:**

Can the student create new product or point of view?

Evaluating:

Can the student justify a stand or decision?

Analyzing:

Can the student distinguish between the different parts?

Applying:

Can the student use the information in a new way?

Understanding:

Can the student explain ideas or concepts?

Remembering:

Can the student recall or remember the information? | assemble, construct, create, design, develop, formulate & write.

appraise, argue, defend, judge, select, support, value & evaluate

appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.

choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.

classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase

define, duplicate, list, memorize, recall, repeat, reproduce & state | Oral Assessments
Quizzes (teacher made & textbook)
Skill Worksheets
Flip Charts
Active Votes
Active Expressions
Exit Cards
Math Stations (from enVisions & other sources, such as Teachers Pay Teachers and/or Pinterest)
Teacher Observation
Anecdotal Notes

Make visual fraction models to represent fractions

Addition of fractions with model and without model

When drawing a diagram to compare fractions, models are the same size | **Adjusting a Recipe Project**
1) Students will find a simple recipe in a book or on the Internet with at least four fractions in the ingredient list. They will write the original recipe.
2) Students will rewrite the recipe for twice as many people. They will need to show their work and explain the strategy they used.
3) Students will rewrite the recipe to cut it in half. They will need to show their work and explain the strategy they used.
4) Students will rewrite the recipe to adjust the recipe to feed everyone in the class (including the teacher). Students will need to show their work and explain their strategy.
5) Students will present their 3 recipes in a creative way.

Relay Activity
1) Students will calculate the decimal time (using stopwatch or timer) it takes to complete a teacher selected task-under a minute. (example-running relay, saying the abc's, blowing a bubble, etc.)
2) Students will take their time they completed the activity in and choose a way to display their data (brochure, poster, etc.) including all of the following ways:
- **Fraction**
- **Base ten blocks**
- **On a number line** |

even when applied to fractions.

Equations can be used to represent fraction word problems.
You can change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator.

You can use base ten blocks, place value models and circle models to explore the relationship between fractions and decimals with denominators of 10 and 100.

There are connections between fractions with denominator of 10 and 100 and the place value chart.

Decimals can be represented on a number line.

Decimals can be compared with area and other models.

When you compare decimals you need to justify your conclusions (with models).

When comparing, you use the same whole.

Essential Questions:
When would it be necessary to use equivalent fractions in the real world?

How can a strong foundation of fractions determine fair shares?

How can I use fractions in real life?

What can drawing a model help to solve a problem?

- **10x10 grid**
- **Circle model**
- **Compare their data with another student**
- **Order their data with a group of students**

3) Select another task (over a minute) and repeat the above.

Additional assessment as needed (Unit Test; enVision Exam View Test Generator, etc.)

Why is it necessary to manipulate denominators of fractions? Why would you need to change fractions to decimals? Why is it important to produce models?			

Stage 3

Approximate number of days spent on unit: 45 days
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

Resources:

Investigations Materials that should be used:
Unit 6: Fraction Cards and Decimal Squares
   Investigation 1: Parts of Rectangles **Sessions 1.1-1.8A**
   Investigation 2: Ordering Fractions **Sessions 2.1-2.7A**
   Investigation 3A: Multiplying Fractions **Sessions 3A.1-3A.3**
   Investigation 3B: Working with Decimals **Sessions 3.1-3.7**

enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
10-4, 10-5, 10-6, 10-7, 10-8, 11-1, 12-1, 12-2, 12-3, 12-4, 12-5

Fun with Fractions (Fraction Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U152
Fun with Pattern Block Fractions (Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U113
Fraction Unit (from NYC schools) http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf
Fraction Unit (DPI Wiki) http://maccss.ncdpi.wikispaces.net/file/view/4thGradeUnit.pdf
http://nlvm.usu.edu/en/nav/grade_g_2.html
(Virtual Manipulatives)
www.k-5mathteachingresources.com
(Number and Operations-Fractions)
http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html?from=category_g_2_t_1.html
(interactive manipulatives)A Meter of Candy (Lesson on Decimals from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L861
enVision eTools
Promethean Planet flipcharts

Strategies:

Models-fraction bars, Cuisenaire rods
Grids

Pattern Blocks (Example: If a red trapezoid is one whole, which block shows 1/3?)

"Foldable Fraction Models": Students will make their own fraction models

Using area models students can change a given fraction into an equivalent fraction by drawing addition vertical and or horizontal lines that result in equal parts of the whole.

Fraction tiles and fraction circles

Use a number line to compare fractions

*Make sure to emphasize that comparing fractions cannot happen unless the fractions are part of the same whole when making diagrams to help.

Illustrate **adding and subtracting fractions and mixed numbers** and **decomposing** using number lines, fraction strips, area models, set models, rulers, etc.

Use number lines, fraction strips, area models, set

Picture books:

Piece=Part=Portion Fractions=Decimals=Percents by Scott Gifford

If you were a Fraction by Trisha Speed Shaskan

Apple Fractions by Jerry Pallotta

Polar Bear Math by Ann Whitehead Nagda and Cindy Bickel

Working With Fractions by David Adler

Fraction Fun by David Adler

Teaching Student-Centered Mathematics in Grades 3-5 by John Van de Walle

Navigating Through Number and Operations in Grades 3-5 by NCCTM

models, rulers to show multiple addition of unit fractions. Then connect this to multiplication of a fraction by a whole number.

10x10 grids

Money

Model tenths using dimes and hundredths with pennies

Use grid paper to line up decimals to compare

Use place value blocks (change the value-flat=1 whole; rod=1 tenth; units=1 hundredth)

Number line

Meter stick

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Unit 5: Landmarks and Large Numbers 2nd/3rd Quarter Approximately 6 weeks	☐ **Q1** ■ **Q2** ■ **Q3** ☐ **Q4**

Common Core and/or Essential Standards:

4.NBT.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.*

4.NBT.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.

4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

4.MD.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.

Transfer: Students will be able to independently use their learning to . . .
- understand the value of numbers in real world situations
- use mental math to solve addition and subtraction problems quickly in real world situations

Possible "I Can" Statements:

I can read, write, and sequence numbers to 1,000 and 10,000

I can add and subtract multiples of 10, 100, and 1,000

I can use multiples of 10 and 100 to find the difference between any 3-digit number and 1,000

I can explain the value of each digit in a multi-digit number as ten times the digit to the right.

I can read and write a multi-digit number in standard, expanded and written form.

I can use story contexts and representations to support explanations about equivalent additions expressions and about related subtraction expressions

I can understand the structure of 10,000 and its equivalence to one thousand 10s, one hundred 100s and ten 1,000s

I can explain how to use place value in order to round a multi-digit number.

I can understand the action of subtraction problems.

Meaning	
Understandings: Students will understand that . . . • place value is related to multiplying and dividing by multiples of 10. • multi-digit whole numbers can be written in different forms: traditional, expanded and written form. • rounding is deeper than using an algorithm. Number sense plays an important role in rounding numbers. • there are multiple strategies that help make sense of the standard addition and subtraction algorithm. • develop computational fluency (addition and subtraction) which means accuracy, efficiency and flexibility. • it is mathematically possible to subtract a larger number from a smaller number, but this would result in a negative number. • making connections to various strategies for addition and subtraction in order to develop fluency with the standard algorithms	**Essential Question(s):** • **Why is it possible to represent a multi-digit whole number in more than one way?** • **When comparing multi-digit whole numbers, how does place value affect the results?** • **What pattern exists between the digits in a multi-digit whole number?** • **Why would you round numbers in real life?** • **What strategies does someone need to efficiently and effectively solve addition and subtraction problems?** • **What is the structure of place value and the base ten system through 1,000,000?**

Acquisition	
Students will know: • place value (ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions) • comparison symbols and how to use comparison symbols to write an equation • the procedure/algorithm for rounding • how estimation can help with rounding • basic addition and subtraction facts • the standard algorithm for addition and subtraction there are negative numbers to the left of the zero on the number line	**Students will be skilled at:** • reading and writing number forms-traditional expanded, standard, word form & (285=28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones, etc…) • recognizing place versus value • skip counting & multiples • comparing place value • comparing multi-digit whole numbers • recording results of comparisons • locating place in a number for rounding • using a number line and hundreds chart to help with rounding explaining and reason the rounding process

Essential Vocabulary:
place value, multi-digit whole number, number forms (traditional expanded form, written form, standard form), round, <, >, =, less than, greater than, equal to, comparisons, compare, negative number, millions, ten thousands, thousands, hundred, sum, round, value, addition, subtraction, difference

| **IT Standards:**
 • 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. | **IT Strategies:**

 Students will choose program to complete the newspaper for summative |

4.TT.1.1 Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.). 4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.). 4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). 4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources. 4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources.	assessment; for example: Storybook Weaver; PowerPoint; Word; Publisher

Unit Title: Place Value **Grade: 4th Grade** **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
Place value is related to multiplying and dividing by multiples of 10.	**Creating:** Can the student create new product or point of view?	assemble, construct, create, design, develop, formulate & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes Regroup with base 10 blocks Regrouping (going from the model/manipulative to showing on paper); comparing numbers; rounding; adding and subtracting Writing standard, expanded and word forms of numbers; comparing numbers; rounding; adding and subtracting numbers Understanding of < (less than), > (greater than), = (equal to) Understanding of greater numbers	Your task is to become a journalist for the local newspaper. You have been asked to design a page of the newspaper which must include: a crossword puzzle where you have to create the clues, an advertisement for "Base 10 Blocks" that includes a description of how to use them and a picture, and a response to the Dear Math Wizard. Additional assessment as needed (Investigations Assessments, Unit Test; enVision Exam View Test Generator, ClassScape, etc.)
Multi-digit whole numbers can be written in different forms: traditional expanded and written form.				
There are appropriate symbols to use when comparing numbers.	**Evaluating:** Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
Rounding is deeper than using an algorithm. Number sense plays an important role in rounding numbers.				
There are multiple strategies that help make sense of the standard addition and subtraction algorithm.	**Analyzing:** Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
Fluently means accuracy, efficiency and flexibility.				
It is mathematically possible to subtract a larger number from a smaller number, but this would result in a negative number	**Applying:** Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
Essential Questions:	**Understanding:** Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
Why is it possible to represent a multi-digit whole number in more than one way?				
When comparing multi-digit whole numbers, how does place value affect the results?	**Remembering:** Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		
What pattern exists between the digits in a multi-digit whole number?				

Why would you round numbers in real life? What makes a computation strategy effective and efficient? What strategies does someone need to efficiently and effectively solve addition and subtraction problems?			

Stage 3

Approximate number of days spent on unit: approximately 6 weeks

W – **W**here are we going? **W**hy? **W**hat is expected?

H – How will we **H**ook and **H**old students?

E – How will we **E**quip students to **E**xplore and **E**xperience?

R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?

E – How will student self -**E**valuate and reflect on learning?

T – How will we **T**ailor learning to vary needs, interests, and styles?

O – How will we **O**rganize and sequence the learning?

Resources:	**Strategies:**
Investigations Materials that should be used: Unit 5 Landmarks and Large Numbers **Sessions 1.1-1.6; 2.1-2.6; 3.1-3.6A; 4.1-4.7** **enVision Lessons to supplement Investigations as needed:** **(Remember these lessons are a starting point and may not cover all the standards in a cluster.)** 1-1, 1-2, 1-3, 1-4, 2-1, 2-2, 2-4, 2-5, 2-6, 2-7 Teaching Student-Centered Mathematics by John Van de Walle Navigating Through Number and Operations in Grades 3-5 by NCCTM **Picture Books:** A Million Dots by Andrew Clements	Base Ten Blocks and other materials to build number sense Place Value Chart Use dice to play "Who has the Largest Number?" Students draw 7 lines on their paper. You roll a die and they choose where they want to place the number you rolled in order to make the largest number. Once students place the number it cannot be moved. Continue rolling until all students have made a number. Then compare. "Human Place Value"-Make students become a place value board using number cards to build numbers and number sense. Students can use calculators to investigate the pattern in problems: $4 \times 10 = 40$ $40 / 10 = 4$ $4 \times 100 = 400$ $400 / 10 = 40$

Earth Day—Hooray! By Stuart J. Murphy One Beyond a Million: an Amazing Math Journey by David M. Schwartz Betcha! By Stuart J. Murphy (estimating) Great Estimations by Bruce Goldstone If You Made a Million by David Schwartz How Much is a Million by David Schwartz Millions of Cats by Wanda Gag A Million Fish More or Less by McKissack **Web Resources:** www.k-5mathteachingresources.com (has a collection of resources for each area taught) http://www.funbrain.com/tens/index.html (identify the place a number a is in) http://gamequarium.com/placevalue.html (collection of place value games) http://www.topmarks.co.uk/interactive.aspx?cat=20 (different activities and tools to be used on Active Board) enVision eTools Promethean Planet flipcharts **Math Journal Topics** 4th Grade Math Journals which can be purchased from www.K-5mathteachingresources.com.	4 x 1,000 = 4,000 4,000 / 10 = 400 4 x 10,000 = 40,000 40,000 / 10 = 4,000 Use a number line to help with rounding. Students will be able to see which benchmark number the number you are rounding is closest to.

Alexander County Schools 2013 - 2014

Unit 6: Fractions Cards and Decimal Squares **3ʳᵈ/4ᵗʰ quarter** **Approximately 9 weeks**	☐ **Q1**	☐ **Q2**	■ **Q3**	■ **Q4**

Common Core and/or Essential Standards:

4.NF.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.

4.NF.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.

4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. 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.*

c. 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.

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using

Transfer: Students will be able to independently use their learning to . . .
- use fractions in real world situations
- solve real world word problems involving addition and subtraction of fractions
- use fractions to aid in measurement skills
- use decimals in real world situations and apply their learning to real world word problems
-

Possible "I Can" Statements:

I can explain, recognize and generate equivalent fractions.

I can compare fractions.

I can add and subtract fractions and mixed numbers.

I can multiply a fraction by a whole number.

I can multiply a fraction by a whole number.

I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100.

I can use decimal notation for fractions with denominators of 10 or 100.

I can compare two decimals to the hundredths place.

I can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100!

I can use decimal notation for fractions with denominators of 10 or

visual fraction models and equations to represent the problem.	100!
	I can compare two decimals to the hundredths place!
4.NF.4 Apply and extend previous understandings of multiplication to multiply a fractions by a whole number. a. Understand a fraction a/b as a multiple of 1/b.	
b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number.	
c. 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.	
4.NF.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. *Example: express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100*	
4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *Example: rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram*	
4.NF.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.	

Meaning	
Understandings: Students will understand that . . .	**Essential Question(s):**
- the size of the whole affects the size of a fraction - visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts - equivalent fractions can be created by multiplying both the numerator and denominator by the same number - drawing fraction models can help them compare fractions - addition is the joining or composing of fractions - subtraction is the separating or decomposing of fractions - mixed numbers can be decomposed in more than one way	**When would it be necessary to use equivalent fractions in the real world?** **How can a strong foundation of fractions determine fair shares?** **How can I use fractions in real life?** **What can drawing a model help to solve a problem?** **Why is it necessary to manipulate denominators of fractions?** **Why would you need to change fractions to decimals?** **Why is it important to produce models?**

(algorithm or models)
- visual fraction models can be used to solve fraction word problems
- a fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6)
- adding and subtracting fractions is joining or separating parts that are referring to the same whole
- multiplication is repeated addition, even when applied to fractions
- equations can be used to represent fraction word problems

Acquisition

Students will know:	Students will be skilled at:
- how to explain equivalent fractions using fraction models - comparisons are only valid when the two fractions refer to the "same whole" - there are different strategies to find equivalent fractions (visual models, multiplication) - there are multiple strategies to compare fractions (using benchmark fractions, common denominators or numerators) - a fraction with a numerator of one is called a unit fraction - how to use visual models to help with decomposing fractions and multiplying a whole number by a fraction - how to use visual fraction models and equations to represent fraction word problems	- drawing and explaining visual fraction models - creating equivalent fractions by multiplying the numerator/denominator by the same number - finding common numerators and denominators - drawing fraction models to compare fractions - justifying conclusions - recognizing benchmark fractions - comparing fractions - compose and decompose fractions of the same whole - solving addition/subtraction word problems of fractions with like denominators using visual fraction models - adding and subtracting mixed numbers with like denominators - creating visual models to multiply a whole number by a fraction - multiplying fractions by a whole number - solving word problems involving fractions - using a decimal grid to shade decimals - finding equivalent fractions and decimals with denominators of 10 and 100 - reading fraction names with denominators of 10 and 100 and rewriting them as a decimal on place value models - using strategies to compare decimals - drawing decimal models - writing a decimal as a fraction

Essential Vocabulary: "whole", visual fraction model, fraction, numerator, denominator, equivalent, multiplication, compare/comparison, <, >, =, partition(ed), unit fraction, multiple, reason, benchmark fraction, operations, addition/joining, subtraction/separating, decomposing, mixed number, improper fraction, properties (rules about how numbers work), equation, decimal, tenths, hundredths, visual decimal model (area models, decimal grids, number lines, circle models and meter sticks)

IT Standards:	IT Strategies:

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
    4.SI.1.1 Use various types of resources to gather information (including print and online media).
    4.SI.1.2 Use relevant sources of information for an assigned task.
    4.SI.1.2 Use reliable sources of information.
4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.
    4.IN.1.1 Implement appropriate reading strategies when reading for information.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
    4.TT.1.1Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.).
    4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.).
4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
    4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
    4.SE.1.3 Understand internet safety precautions (personal information, passwords, etc.).
	Students will research recipes on the Internet or in books for the summative assessment. They will then display their new recipe using a program (Word, Publisher, etc.).
	
	Students will choose program to complete the activity in and choose a way to display their data (brochure, poster, etc.) for summative assessment (Storybook Weaver; PowerPoint; Word; Publisher, etc.)

Unit Title: Fractions Cards and Decimal Squares   **Grade: 4**   **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
The size of the whole affects the size of a fraction.

Visual fraction models (area models, number lines or a collection/set model) can be used to find equivalent fractions by dividing a shaded region into various parts.

Equivalent fractions can be created by multiplying both the numerator and denominator by the same number.

Drawing fraction models can help compare fractions.

Addition is the joining or composing of fractions.

Subtraction is the separating or decomposing of fractions.

Mixed numbers can be decomposed in more than one way (algorithm or models).

Visual fraction models can be used to solve fraction word problems.

A fraction a/b is a multiple of 1/b (for example: 3/6 = 1/6 + 1/6 + 1/6 = 3 X (1/6).

Adding and subtracting fractions is joining or separating parts that are referring to the same whole.

Multiplication is repeated addition, | **Creating:**

Can the student create new product or point of view?

Evaluating:

Can the student justify a stand or decision?

Analyzing:

Can the student distinguish between the different parts?

Applying:

Can the student use the information in a new way?

Understanding:

Can the student explain ideas or concepts?

Remembering:

Can the student recall or remember the information? | assemble, construct, create, design, develop, formulate & write.

appraise, argue, defend, judge, select, support, value & evaluate

appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.

choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.

classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase

define, duplicate, list, memorize, recall, repeat, reproduce & state | Oral Assessments
Quizzes (teacher made & textbook)
Skill Worksheets
Flip Charts
Active Votes
Active Expressions
Exit Cards
Math Stations (from enVisions & other sources, such as Teachers Pay Teachers and/or Pinterest)
Teacher Observation
Anecdotal Notes

Make visual fraction models to represent fractions

Addition of fractions with model and without model

When drawing a diagram to compare fractions, models are the same size | **Adjusting a Recipe Project**
1) Students will find a simple recipe in a book or on the Internet with at least four fractions in the ingredient list. They will write the original recipe.
2) Students will rewrite the recipe for twice as many people. They will need to show their work and explain the strategy they used.
3) Students will rewrite the recipe to cut it in half. They will need to show their work and explain the strategy they used.
4) Students will rewrite the recipe to adjust the recipe to feed everyone in the class (including the teacher). Students will need to show their work and explain their strategy.
5) Students will present their 3 recipes in a creative way.

Relay Activity
1) Students will calculate the decimal time (using stopwatch or timer) it takes to complete a teacher selected task-under a minute. (example-running relay, saying the abc's, blowing a bubble, etc.)
2) Students will take their time they completed the activity in and choose a way to display their data (brochure, poster, etc.) including all of the following ways:
  • **Fraction**
  • **Base ten blocks**
  • **On a number line** |

even when applied to fractions.

Equations can be used to represent fraction word problems.
You can change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator.

You can use base ten blocks, place value models and circle models to explore the relationship between fractions and decimals with denominators of 10 and 100.

There are connections between fractions with denominator of 10 and 100 and the place value chart.

Decimals can be represented on a number line.

Decimals can be compared with area and other models.

When you compare decimals you need to justify your conclusions (with models).

When comparing, you use the same whole.

Essential Questions:
When would it be necessary to use equivalent fractions in the real world?

How can a strong foundation of fractions determine fair shares?

How can I use fractions in real life?

What can drawing a model help to solve a problem?

- **10x10 grid**
- **Circle model**
- **Compare their data with another student**
- **Order their data with a group of students**

3) Select another task (over a minute) and repeat the above.

Additional assessment as needed (Unit Test; enVision Exam View Test Generator, etc.)

Why is it necessary to manipulate denominators of fractions? Why would you need to change fractions to decimals? Why is it important to produce models?			

Stage 3

Approximate number of days spent on unit: 45 days
W − **W**here are we going? **W**hy? **W**hat is expected?
H − How will we **H**ook and **H**old students?
E − How will we **E**quip students to **E**xplore and **E**xperience?
R − How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E − How will student self -**E**valuate and reflect on learning?
T − How will we **T**ailor learning to vary needs, interests, and styles?
O − How will we **O**rganize and sequence the learning?

Resources:

Investigations Materials that should be used:
Unit 6: Fraction Cards and Decimal Squares
   Investigation 1: Parts of Rectangles **Sessions 1.1-1.8A**
   Investigation 2: Ordering Fractions **Sessions 2.1-2.7A**
   Investigation 3A: Multiplying Fractions **Sessions 3A.1-3A.3**
   Investigation 3B: Working with Decimals **Sessions 3.1-3.7**

enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
10-4, 10-5, 10-6, 10-7, 10-8, 11-1, 12-1, 12-2, 12-3, 12-4, 12-5

Fun with Fractions (Fraction Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U152
Fun with Pattern Block Fractions (Unit from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U113
Fraction Unit (from NYC schools) http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf
Fraction Unit (DPI Wiki) http://maccss.ncdpi.wikispaces.net/file/view/4thGradeUnit.pdf
http://nlvm.usu.edu/en/nav/grade_g_2.html
(Virtual Manipulatives)
www.k-5mathteachingresources.com
(Number and Operations-Fractions)
http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html?from=category_g_2_t_1.html
(interactive manipulatives)A Meter of Candy (Lesson on Decimals from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L861
enVision eTools
Promethean Planet flipcharts

Strategies:

Models-fraction bars, Cuisenaire rods
Grids

Pattern Blocks (Example: If a red trapezoid is one whole, which block shows 1/3?)

"Foldable Fraction Models": Students will make their own fraction models

Using area models students can change a given fraction into an equivalent fraction by drawing addition vertical and or horizontal lines that result in equal parts of the whole.

Fraction tiles and fraction circles

Use a number line to compare fractions

*Make sure to emphasize that comparing fractions cannot happen unless the fractions are part of the same whole when making diagrams to help.

Illustrate **adding and subtracting fractions and mixed numbers** and **decomposing** using number lines, fraction strips, area models, set models, rulers, etc.

Use number lines, fraction strips, area models, set

Picture books: Piece=Part=Portion Fractions=Decimals=Percents by Scott Gifford If you were a Fraction by Trisha Speed Shaskan Apple Fractions by Jerry Pallotta Polar Bear Math by Ann Whitehead Nagda and Cindy Bickel Working With Fractions by David Adler Fraction Fun by David Adler Teaching Student-Centered Mathematics in Grades 3-5 by John Van de Walle Navigating Through Number and Operations in Grades 3-5 by NCCTM	models, rulers to show multiple addition of unit fractions. Then connect this to multiplication of a fraction by a whole number. 10x10 grids Money Model tenths using dimes and hundredths with pennies Use grid paper to line up decimals to compare Use place value blocks (change the value-flat=1 whole; rod=1 tenth; units=1 hundredth) Number line Meter stick

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Unit 8: Multiplication and Division: Many Packages? How Many Groups? Approximately 18 days	☐ **Q1** ☐ **Q2** ☐ **Q3** ■ **Q4**

Common Core and/or Essential Standards:

4.OA.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 answer using mental computation and estimation strategies including rounding.

4.OA.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.

4.MD.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.

4.NBT.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.

4.NBT.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

Transfer: Students will be able to independently use their learning to…
- solve real world problems using multiplication and division

Possible "I Can" Statements:

I can solve multi-step word problems, represent these problems using equations and assess the reasonableness of my answer by using estimation strategies.

I can multiply multi-digit numbers.

I can use multiplication to help me solve division problems.

I can divide up to four digit dividends and explain my results.

I can make sense of remainders by thinking of the problem's context.

I can multiply using multiples of ten.

using equations, rectangular arrays, and/or area models.

Meaning	
Understandings: Students will understand that . . . • a whole number is a multiple of each of its factors • there is a difference between multiples and factors although they are related • there are a variety of strategies/methods to use when multiplying and dividing	**Essential Question(s):** • **How can situations in your life bring about the use of multiplication and division?** • **Is it important to know a variety of processes to solve multiplication and division?** • **How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply/divide)**

Acquisition	
Students will know: • how to identify and verbalize a quantity being multiplied and which number represents "how many" times to get a specified number. • how to find factors and multiples of whole numbers. • how to use a variety of strategies to multiply whole numbers. • how to illustrate and explain the method/methods used to solve multiplication and division problems.	**Students will be skilled at:** • identifying and verbalizing which quantity is being multiplied • multiplying and dividing • skip counting • finding and identifying patterns when listing factors and multiples • multiplying whole numbers • using various strategies to solve problems • illustrating their reasoning • solving problems in and out of context

Essential Vocabulary:
• Equation, unknown, multiplication, factors, products, rectangular array, mental computation, estimation, rounding, reasonableness, multiples, factor pairs, division, quotient, partial products, area model, base ten blocks, place value, remainder, skip counting, strategies

IT Standards:	IT Strategies:

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.
   4.SI.1.1 Use various types of resources to gather information (including print and online media).
   4.SI.1.2 Use relevant sources of information for an assigned task.
4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
   4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.).
4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.
   4.SE.1.1 Understand the guidelines for responsible use of technology hardware.
   4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing,
	Students will create an advertisement using Microsoft Word or Publisher for the newspaper in order to get students to buy it.

netiquette) when using resources.

Unit Title: Unit 8: Multiplication and Division: Many Packages? How Many Groups? **Grade: 4th**
Subject: Math

STAGE 2 Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
A whole number is a multiple of each of its factors. There is a difference between multiples and factors although they are related. Multiples can be related to skip counting. There are a variety of strategies/methods to use when multiplying and dividing. **Essential Questions:** How can situations in your life bring about the use of multiplication and division? Is it important to know a variety of processes to solve multiplication and division? How can you save time? (multiply vs. repeated addition, using most effective strategy to multiply, reason for knowing primes/composite numbers and how that can help)	**Creating:** Can the student create new product or point of view?	assemble, construct, create, design, develop, formulate & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from enVisions/Investigations & other sources) Teacher Observation Anecdotal Notes	<u>School Newspaper</u> Your class has agreed to publish a 26 page school-wide newspaper for each of the 740 students (or use the number of students at your school). Both sides of the paper will be printed to help save money. A package of 50 sheets of special newsprint paper costs $1.00. • Find the cost of publishing the newspaper if you can make the copies at school for no additional cost other than purchasing the paper. Explain how you know. • How many extra copies of the newspaper could you make using the paper that you purchased? How do you know? • If the school decided to charge $20 for the use of the copy machine, how would this change your answers? • Your class decided to sell the newspapers to students. They will be sold at a cost of $0.25. Since you are not sure that every student will buy one, you
	Evaluating: Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
	Analyzing: Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
	Applying: Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
	Understanding: Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
	Remembering: Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		

			are printing enough newspapers for every student. Will you make enough money to cover the cost of the paper if only _____ (pick a number) students purchase one? Explain your thinking.
			• If each of the teachers in your school also wanted a copy of the newspaper, show how that would change your results.
			• Create an advertisement using Microsoft Word or Publisher for the newspaper in order to get students to buy it.
			(From Common Core Georgia Performance Standards Framework)

Stage 3

Approximate number of days spent on unit: 18 days
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

Resources:	Strategies:
Investigations Units:	Arrays
Unit 8 How Many Packages? How Many Groups?	Area Models
Sessions 1.1-1.5; 2.1-2.5; 3.1-3.6	Fact Families to show relationship between division and multiplication
enVision Lessons to supplement Investigations as needed:	Flashcards
(Remember these lessons are a starting point and may not cover all the standards in a cluster.)	Timed Tests (fluency)
	Skip Counting
5-1, 5-2, 5-3, 5-4, 5-5, 6-1, 6-3, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 8-1, 8-2, 8-3, 8-4, 18-3	Rhymes 'n Times
	Wrap Ups
Web Resources:	Use manipulatives to show arrays.
Factor Trail Game (Illuminations)	
http://illuminations.nctm.org/LessonDetail.aspx?id=L719	Build arrays for equations to show the Commutative Property of Multiplication.
Factor Findings (lesson from Illuminations)	
http://illuminations.nctm.org/LessonDetail.aspx?id=L872	
The Product Game (lesson from Illuminations exploring products, factors and multiples and the relationship between them)	Give students a problem solving method to help them figure out how to solve word problems.
http://illuminations.nctm.org/LessonDetail.aspx?id=U100	
Chairs Around the Table (pattern lesson from Illuminations	"Count Around the Room"—give students a rule such as count by 15's.
http://illuminations.nctm.org/LessonDetail.aspx?id=L627	
Patterns That Grow (number and shape pattern unit from Illuminations	
http://illuminations.nctm.org/LessonDetail.aspx?id=U103	
http://mathstory.com/mathlessons/arrayrace.htm	
(short lesson and game for building arrays, writing equations and solving for a product)	
www.k-5mathteachingresources.com	
(has a collection of resources for each area taught)	

(interactive pattern games)

enVision eTools
Promethean Planet flipcharts

Picture books:
The Doorbell Rang by Pat Hutchins (division basics)
Anno's Magic Seeds by Mitsumasa Anno (pattern)
Anno's Mysterious Multiplying Jar by Masaichiro and Mitsumasa Anno (multiplication)
A Remainder of One by Elinor J. Pinczes
The Great Divide: A Mathematical Marathon by Dayle Ann Dodds
Amanda Bean's Amazing Dream by Cindy Neuschwander (multiplication)
The Grapes of Math by Greg Tang
If you were a Set by Marcie Aboff
If you were a Divided-By Sign by Trisha Speed Shaskan
If you were a Times Sign by Trisha Speed Shaskan
Minnie's Diner A Multiplying Menu by Dayle Ann Dodds
Divide and Ride by Stuart J. Murphy
One Hundred Hungry Ants by Elinor J. Pinczes
The Best of Times by Greg Tang
Equal Shmequal by Virginia Knoll

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Number and Operations in Grades 3-5 by NCCTM

Alexander County Schools 2012-2013

Unit: **Measurement, Data and Geometry** **4th Grade**	☐ **Q1** ☐ **Q2** ☐ **Q3** ■ **Q4**

Common Core and/or Essential Standards:

4.MD.1 Know relative sizes of measurement units within one system of units including 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. *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 forfeet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

4.MD.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.

4.MD.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.*

4.MD.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.*

4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.

4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Transfer: Students will be able to independently use their learning to…

- apply knowledge of measurement in everyday life skills and real world problem solving
- describe, analyze, compare and classify two-dimensional shapes to deepen their understanding of the properties of two dimensional objects and use them to solve problems involving symmetry in real world situations

Possible "I Can" Statements:

I can express measurements in larger and smaller terms and record equivalents in a table.

I can use the four operations to solve word problems and represent measurement in diagrams.

I can apply the area and perimeter formulas for rectangles in the real world.

I can make a line plot to display data in fractions and solve problems involving addition and subtraction of fractions.

I can draw and identify points, lines, line segments, rays, angles and parallel and perpendicular lines.

I can classify figures based on parallel and perpendicular lines and angles.

I can recognize and draw lines of symmetry!

I can recognize angles as shapes formed where two rays share an endpoint.

4.MD.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. **4.G.1** Draw points, lines, line segments, rays, angles, (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **4.G.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 **4.G.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.	I can use a protractor to measure and sketch angles! I can solve addition and subtraction problems to find unknown angles!

Meaning

Understandings: Students will understand that… • larger units can be subdivided into equivalent units (partition) • the same unit can be repeated to determine the measure (iteration) • there is a relationship between the size of a unit and the number of units needed (compensatory principle) • everyday objects have a variety of attributes and can be measured in many ways • you can express measurements from a larger unit in terms of a smaller unit • number line diagrams that feature a measurement scale can represent measurement quantities (ex. ruler, volume measure on the side of a container, timetable showing hours, line plot, etc.) • a formula can be used to calculate area and perimeter • points and lines, line segments, angles, perpendicular, and parallel lines can come together and make 2-D figures • 2-D figures can be classified using different characteristics such as parallel and perpendicular lines or angle measurement • 2 lines are parallel if they never intersect and are equidistant	**Essential Question(s):** • **How do measurements solve real world problems?** • **When do you use area and perimeter in your everyday life?** • **How do points, lines, line segments, rays, angles, and perpendicular/parallel lines fit into the world around me?** • **Why would you need to classify shapes?** • **Where do you see symmetry in your environment?** • **When would you use an angle measurement in real life?** • **Why are precise measurements important?** • **When would decomposing angles be used in the real world?**

• 2 lines are perpendicular if they intersect in right angles (90 degrees)
• objects can be sorted based on parallelism, perpendicularity and angle types
• there are different types of right triangles
• regular and non-regular polygons can be symmetrical and non-symmetrical
• angles are connected to circular measurement (360 degrees)
• an angle is a series of "one-degree turns"
• unknown angle measures can be found by decomposing an angle into smaller parts

Acquisition

Students will know:	**Students will be skilled at:**
• units of measurement and their relative size within one system of units (km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec)	• measuring objects accurately
• the relationships between units of measure	• recording measurement equivalents in a two-column table
• how to use the four operations to solve word problems involving various forms of measurement	• converting units of measure within the same system
• the formulas for area and perimeter and why they work	• solving multi-step word problems involving measurement with distances, intervals of time, liquid volumes, masses of objects, money, simple fractions and/or decimals
• line plots can be used to record measurement data	• using various diagrams to record and determine correct measurement quantities (line plot)
• the different ways to classify 2-dimensional figures	• calculating area and perimeter of rectangles using the correct formula
• how to recognize lines of symmetry	• communicating their understanding of why the formulas work
• angle measurement is additive	• measuring objects to an eighth, fourth and half of an inch
• how to identify parallel and perpendicular lines	• making a line plot
• real world problems can be solved with angles	• interpreting line plot data
• how to use benchmark angle measurements to determine an estimated angle measure to classify an angle (90 degrees, 180 degrees, 45 degrees, etc)	• drawing and identifying points, lines, line segments, rays, angles, perpendicular, and parallel lines.
• how to use a diagram to write an equation using a symbol to form an addition or subtraction problem to find an unknown angle measurement.	• identifying points, lines, line segments, rays, angles, perpendicular, and parallel lines in 2-dimensional figures.
	• classifying 2-D figures
	• recognizing right angles
	• sorting objects based on criteria
	• drawing lines of symmetry
	• recognizing lines of symmetry
	• measuring angles with a protractor
	• sketching a specific measured angle
	• adding and subtracting angle measurements

Essential vocabulary:

measurement units (metric and customary), measurement categories (volume, mass, length, etc), unit conversions, operations (addition, subtraction, multiplication, division, number line, diagram, money, fraction, decimal, area, perimeter, formula, square unit, linear unit, measure, metric, customary, relative size, liquid volume, distance, kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in), foot (ft), yard (yd), mile (mi), ounce (oz), pound (lb), cup (c), pint (pt), quart (qt), gallon (gal), time, hour, minute, second, equivalent, line plot, length, polygon (regular an non-regular), rhombus, rectangle, square, triangle (right, isosceles, equilateral, scalene), quadrilateral, pentagon, hexagon, trapezoid, point, line, line segment, ray, angle, perpendicular line, parallel line, two-dimensional figure, acute angle, obtuse angle, right angle, equidistant, symmetry, end point, angle measurement, reference to a circle, degrees, degrees of a circle, protractor, decompose, part/whole, classify shapes/ figures, vertex/vertices, line of symmetry, symmetric figures

IT Standards:	IT Strategies:
4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes. 　4.SI.1.1 Use various types of resources to gather information (including print and online media). 　4.SI.1.2 Use relevant sources of information for an assigned task. 　4.SI.1.2 Use reliable sources of information. **4.IN.1 Apply appropriate strategies when reading for enjoyment and for information.** 　4.IN.1.1 Implement appropriate reading strategies when reading for information. **4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.** 　4.TT.1.1Use a variety of technology tools to gather data and information (e.g., Web-based resources, e-books, online communication tools, etc.). 　4.TT.1.2 Use a variety of technology tools to organize data and information (e.g., word processor, graphic organizer, audio and visual recording, online collaboration tools, etc.). 　4.TT.1.3 Use technology tools to present data and information (multimedia, audio and visual recording, online collaboration tools, etc.). **4.RP.1 Apply a research process as part of collaborative research.** 　4.RP.1.1 Implement a research process by collaborating effectively with other students. **4.SE.1 Understand issues related to the safe, ethical, and responsible use of information and technology resources.** 　4.SE.1.1 Understand the guidelines for responsible use of technology hardware. 　4.SE.1.2 Understand ethical behavior (copyright, not plagiarizing, netiquette) when using resources. 　4.SE.1.3 Understand internet safety precautions (personal information, passwords, etc.).	Students will research information on North Carolina to use in the brochure created as part of the summative assessment. Students will choose a program to complete the brochure for summative assessment; for example: Storybook Weaver; PowerPoint; Word; Publisher. Students will use different technology tools to help with their summative assessment project.

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
Larger units can be subdivided into equivalent units (partition). The same unit can be repeated to determine the measure (iteration). There is a relationship between the size of a unit and the number of units needed (compensatory principle). Everyday objects have a variety of attributes and can be measured in many ways. You can express measurements from a larger unit in terms of a smaller unit. Number line diagrams that feature a measurement scale can represent measurement quantities (ex. ruler, volume measure on the side of a container, timetable showing hours, line plot, etc.). A formula can be used to calculate area and perimeter. Points and lines, line segments, angles, perpendicular, and parallel lines can come together and make 2-D figures. 2-D figures can be classified using different characteristics such as parallel and perpendicular lines or angle measurement. 2 lines are parallel if they never intersect and are equidistant. 2 lines are perpendicular if they	**Creating**: can the student create new product or point of view?	assemble, construct, create, design, develop, formulate, write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from enVisions & other sources) Teacher Observation Anecdotal Notes Measure objects accurately in customary and metric Use right tools to measure objects Convert units of measure within the same system Calculate area and perimeter using formulas and be able to explain why the formula works Solve multi-step word problems related to measurement Produce a 2-column table to show conversions from larger to smaller units and to show equivalent measurements	**Students are to design an apartment (the futures channel) or a zoo with specifications. (For Area and Perimeter)** **Students will design a brochure about objects in North Carolina. (one side of brochure in metric and one side in customary)** 1) height of tallest lighthouse in North Carolina 2) weight or mass of sweet potatoes grown in a year in North Carolina 3) daily average capacity of milk produced by the dairy cow in North Carolina 4) car travel time from Murphy, NC to Manteo, NC at 60 mph 5) Find the value of the name "North Carolina" if the value of a consonant is $0.73 and a vowel is $0.54. Display this amount 3 different ways. **Investigations Unit can be used to assess line plot using fractions of a unit. Teacher choice performance activity.** Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.) **Student Created Scavenger Hunt (small group)** 1) Students will be placed in small groups. 2) They will choose a symbol to mark their objects. (example: star, circle, etc.) 3) Students will find the following
	Evaluating: can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value, evaluate		
	Analyzing: can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.		
	Applying: can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.		
	Understanding: can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase		
	Remembering: can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce state		

| | | | in and around school:
(Choose 10 out of 20) |

intersect in right angles (90 degrees).

Objects can be sorted based on parallelism, perpendicularity and angle types.

There are different types of right triangles.

Regular and non-regular polygons can be symmetrical and non-symmetrical.

Angles are connected to circular measurement (360 degrees).

An angle is a series of "one-degree turns".

Unknown angle measures can be found by decomposing an angle into smaller parts.

Essential Questions:

How do measurements solve real world problems?

When do you use area and perimeter in your everyday life?

How do points, lines, line segments, rays, angles, and perpendicular/parallel lines fit into the world around me?

Why would you need to classify shapes?

Where do you see symmetry in your environment?

When would you use an angle measurement in real life?

Why are precise measurements

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in and around school:
(Choose 10 out of 20)

- Parallel
- Perpendicular
- Line Segment
- Point
- Right Angle
- Acute Angle
- Obtuse Angle
- Right Triangle
- Intersecting Lines
- Line of Symmetry
- Congruent Figures
- Similar Figures
- Rhombus
- Trapezoid
- Square
- Rectangle
- Pentagon
- Hexagon
- Octagon
- Parallelogram

4) Students will write a clue to find their first object. At the object they will place their symbol to mark the object. They will place their next clue for their next object. **Clues must include how to find the object and a description of the geometry term they are finding.**

5) After students mark their hunt, another group will complete the scavenger hunt.

*Teacher will decide how students will record what they found (for example-flip camera; draw what they found next to the clue, etc.).

Additional assessment as needed (Unit Test; enVision Exam View Test Generator, ClassScape, etc.)

important?

When would decomposing angles be used in the real world?

Approximate number of days spent on unit: Approximately 6 weeks

W – Where are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self **E**valuate and reflect on learning?
T – How will we **T**ailor learning to varied needs, interests, styles?
O – How will we **O**rganize and sequence the learning?

Resources:

Investigations Unit:
Unit 4 (Size, Shape, and Symmetry)
    Investigation 1: Linear Measurement **Session 1.1-1.5**
Unit 7 (Moving Between Solids and Silhouettes)
    Investigation 3: Understanding Volume (only) **Sessions 3.5A**
& Session 3.5 B only
Unit 4 Size, Shape, and Symmetry
    Investigation 2: Polygons of Many Types **Sessions 2.1-2.5**
    Investigation 3: Measuring Angles **Sessions 3.1-3.4a**
    Investigation 4: Finding Area **Sessions 4.1, 4.2 & 4.5 only**

Ideas with Food (2 lessons from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?ID=U78
Oil Oil Everywhere (Lesson on Area from Illuminations
http://illuminations.nctm.org/LessonDetail.aspx?id=L862
Four Square Galore (lesson on Area from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=L860
How Long? How Tall? How Wide? How Deep? (lesson for measurement; goes along with the book How Big is a Foot?)
http://illuminations.nctm.org/LessonDetail.aspx?id=L635
Junior Architects (designing a club house has some geometry concepts from Illuminations)
http://illuminations.nctm.org/LessonDetail.aspx?id=U172
http://www.uen.org/3-6interactives/math.shtml#fractions
(interactive measurement activities)
http://nrich.maths.org/6923
(Growing Rectangles-area)
http://nrich.maths.org/2663
(Fence It-perimeter)

Measurement Strategies:

Gallon Man-poster that can be purchased and students can make to help with gallons, pints, quarts and cups

"Pound Cake"-poster that can be purchased to help with ounces and pounds

"Yard Plant"-poster that can be purchased to help with yards and feet

Containers for Measuring

Scales and Weights

Use diagrams to help solve word problems.

Have students measure the length of the room with one-inch tiles, one foot rulers and with yardsticks. Do the same activity with centimeters and meters.

Area Tiles

"Mrs. Burke's Area and Perimeter

http://www.jmathpage.com/JIMSMeasurementpage.html
(various measurement activities)
www.k-5mathteachingresources.com
(has a collection of resources for each area taught)
http://www.geogebra.org/cms/
(free mathematics software)
http://www.uen.org/Lessonplan/preview.cgi?LPid=11235
(lesson to identify and describe attributes of two-dimensional geometric shapes)
www.k-5mathteachingresources.com
(word problems with multiplicative comparison)
http://illuminations.nctm.org/LessonDetail.aspx?ID=L270
(polygon capture game)
http://nrich.maths.org/1840
(lines of symmetry)
http://www.innovationslearning.co.uk/subjects/maths/activities/year3/symmetry/shape_game.asp
(symmetry)
http://www.ixl.com/math/grade-4
(measuring angles)
http://www.mathsisfun.com/angles.html
(information about angles)
http://www.mathopenref.com/
(reference tool)

enVision eTools
Promethean Planet flipcharts

Picture books:
How Big is a Foot? By Rolf Myller
Jim and the Beanstalk by Raymond Briggs
About Time: A First Look at Time and Clocks by Bruce Koscielniak
Racing Around by Stuart J. Murphy (perimeter)
Bigger, Better, Best! by Stuart J. Murphy (area)
Area (My Path to Math) Math concepts Made Easy
Spaghetti and Meatballs for All! A Mathematical Story by Marilyn Burns (area and perimeter)
Game Time! by Stuart J. Murphy (time)
If you were a Quart or a Liter by Marcie Aboff
Inchworm and a Half by Elinor J. Pinczes
Polly's Pen by Stuart J. Murphy (metric)
Measuring Penny by Loreen Leedy
Millions to Measure by David M. Schwartz
Sir Cumference and the Isle of Immeter by Cindy Neuschwander

Geometry Strategies:
Pretzel sticks
Toothpicks and Marshmallows
Licorice
Pattern Blocks
Geo Boards
Clocks

Body Symbols for line, point and ray

Build geometric shapes with toothpicks and marshmallows

Build geometric shapes with straws and pipe cleaners
"Spaghetti Drop"—give students dry spaghetti. Have them drop on floor and find all the geometric terms they can.

Examine and label the components of a circle

Recognize angles formed when rays are drawn for the center of the circle
Measure angles with a variety of degrees

Using protractors, students draw an angle with missing measure and trade drawing. Partner finds the missing angle measure.

Grandfather Tang's Story by Ann Tompert
The Greedy Triangle by Marilyn Burns
Line, Segments, Rays, and Angles (My Path to Math) Math Concepts Made Simple
Polygons (My Path to Math) Math Concepts Made Simple
Hamster Champs by Stuart J. Murphy (angles)
If you were a Triangle by Marcie Aboff
If you were a Quadrilateral by Molly Blaisdell
If you were a Polygon by Marcie Aboff
Sir Cumference and the Great Knight of Angleland by Cindy Neuschwander
Sir Cumference and the First Round Table by Cindy Neuschwander

enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
16-1, 16-2, 16-3, 16-4, 16-5, 16-6, 16-7, 16-8, 16-9, 16-12, 11-4, 12-6, 13-7, 14-1, 14-2, 14-6
enVision Lessons: (Remember these lessons are a starting point and may not cover all the standards in a cluster.)
9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 19-4, 19-5

enVision eTools
Promethean Planet flipcharts

Teaching Student-Centered Mathematics by John Van de Walle
Navigating Through Measurement in Grades 3-5 by NCCTM

Alexander County Schools 2013 - 2014

Unit 9: Penny Jars and Plant Growth Approximately 8 days	☐ **Q1** ☐ **Q2** ☐ **Q3** ■ **Q4**

Common Core and/or Essential Standards: **4.OA.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.	Transfer: Students will be able to independently use their learning to . . . • Create and extend a numerical or shape pattern from a given rule. • Generate a rule based on a given numerical or shape pattern. • Recognize whether a pattern is a repeating pattern or a growing pattern. • Find unknown values in patterns by identifying a rule or using one that is given. • Identify and justify features of a pattern that are not related to the rule itself (Example: 1, 3, 9, 27, 81, 243 Rule: Multiply by 3; Additional Features: All numbers are odd). See Unpacking Document for additional examples.

Meaning	
Understandings: Students will understand that . . . ▪ Number and shape patterns follow a given rule ▪ Patterns often contain other features not related to the rule ▪ Patterns and rules are related ▪ Patterns can either repeat or grow	Essential Question(s): • Why is it important to recognize and generate patterns in everyday life?

Acquisition	
Students will know: • How to generate a pattern that follows a given rule. • How to identify and explain additional patterns or behaviors that go beyond the given rule.	Students will be skilled at: • Identifying rules and features from numerical and shape patterns that may or may not be explicit in the rule • Generating a numerical or shape pattern from a given rule

Essential Vocabulary: Pattern (number or shape), pattern rule number pattern	
IT Standards: **4.TT.1** Use technology tools and skills to reinforce classroom concepts and activities. **4.SE.1** Understand issues related to the safe, ethical, and responsible use of information and technology resources.	IT Strategies: Students will use google chrome to make a powerpoint slide. Each individual slide will be put together into a class powerpoint.

Unit Title: Penny Jars and Plant Growth Unit 9   **Grade: 4th**   **Subject: Math**

STAGE 2

Understandings:	Revised Blooms		Formative Assessments (Evidences)	Summative Assessment
- Number and shape patterns follow a given rule - Patterns often contain other features not related to the rule - Patterns and rules are related - Patterns can either repeat or grow **Essential Questions:** Why is it important to recognize and generate patterns in everyday life?	**Creating:** Can the student create new product or point of view?	assemble, construct, create, design, develop, formulate & write.	Oral Assessments Quizzes (teacher made & textbook) Skill Worksheets Flip Charts Active Votes Active Expressions Exit Cards Math Stations (from envisions/Investigations & other sources) Teacher Observation Anecdotal Notes Take pictures of student work of different pattern situations used in Session 2.1.	**http://www.insidemathematics.org/problems-of-the-month/pom-tritriangles.pdf** Teacher may choose which level they would need for each student. This project asks students to use algebraic thinking to solve problems involving patterns, sequences, generalizations, and linear and non-linear functions. This project may be extended by having them develop their own pattern with both shapes and numbers, including writing questions about their pattern. Students can then make their pattern on a powerpoint slide using Google Chrome to develop a class pattern powerpoint. Then students could complete other students' pattern questions.
	Evaluating: Can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value & evaluate		
	Analyzing: Can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question & test.		
	Applying: Can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use & write.		
	Understanding: Can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate & paraphrase		
	Remembering: Can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce & state		

Stage 3

Approximate number of days spent on unit: 8 days
W – **W**here are we going? **W**hy? **W**hat is expected?
H – How will we **H**ook and **H**old students?
E – How will we **E**quip students to **E**xplore and **E**xperience?
R – How will we help students **R**ethink, **R**ehearse, **R**evise, and **R**efine?
E – How will student self -**E**valuate and reflect on learning?
T – How will we **T**ailor learning to vary needs, interests, and styles?
O – How will we **O**rganize and sequence the learning?

Resources:	Strategies:
Investigations Unit 9: Penny Jars and Plant Growth only Session 2.1-2.8	Anno's Magic Seeds Activity (in dropbox)
Growing Pattern Activities:	Square Numbers Activity (in dropbox)
http://www.mathwire.com/problemsolving/4firtree.pdf	Triangular Numbers Activity (in dropbox)
http://www.mathwire.com/problemsolving/4hexagondragons.pdf	From PBS Teachers: Snake Patterns –s-s-s: Students will use given rules to generate several
http://www.mathwire.com/algebra/tableschairs.pdf	stages of a pattern and will be able to predict the outcome for any stage.
Pattern Word Problems:	
http://www.mathwire.com/problemsolving/3favoriteshells.pdf	http://www.pbs.org/teachers/mathline/lessonplans/atmp/snake/snake_procedure.shtm
http://www.mathwire.com/problemsolving/4marathontraining.pdf	
Literature Connections:	In order for students to be successful later in the formal study of algebra, their algebraic thinking needs to be developed. Understanding patterns is fundamental to algebraic thinking. Students have experience in identifying arithmetic patterns, especially those included in addition and multiplication tables. Contexts familiar to students are helpful in developing students' algebraic thinking.
Two of Everything	
One Grain of Rice	
The Kings Chessboard	
Bats on Parade	

Guess My Function Game: http://mathwire.com/games/guessmyrulegame.pdf From PBS Teachers: Snake Patterns –s-s-s: Students will use given rules to generate several stages of a pattern and will be able to predict the outcome for any stage. http://www.pbs.org/teachers/mathline/lessonplans/atmp/snake/snake_procedure.shtm **nctm.org (Illuminations)** *Patterns that Grow – Growing Patterns.* **Students use numbers to make growing patterns. They create, analyze, and describe growing patterns and then record them. They also analyze a special growing pattern called Pascal's triangle.** nctm.org (Illuminations): *Patterns that Grow – Exploring Other Number Patterns*. Students analyze numeric patterns, including Fibonacci numbers. They also describe numeric patterns and then record them in table form. **nctm.org (Illuminations):** *Patterns that Grow – Looking Back and Moving Forward***. In this final lesson of the unit, students use logical thinking to create, identify, extend, and translate patterns. They make patterns with numbers and shapes and explore patterns in a variety of mathematical contexts.**	Students should generate numerical or geometric patterns that follow a given rule. They should look for relationships in the patterns and be able to describe and make generalizations. As students generate numeric patterns for rules, they should be able to —undo the pattern to determine if the rule works with all of the numbers generated. For example, given the rule, —Add 4 starting with the number 1, the pattern 1, 5, 9, 13, 17, … is generated. In analyzing the pattern, students need to determine how to get from one term to the next term. Teachers can ask students, —How is a number in the sequence related to the one that came before it?, and —If they started at the end of the pattern, will this relationship be the same? Students can use this type of questioning in analyzing numbers patterns to determine the rule. Students should also determine if there are other relationships in the patterns. In the numeric Pattern generated above, students should observe that the numbers are all odd numbers.