### TITLE OF UNIT: Foundations for Multiplication, Division, Addition, and Subtraction COURSE OR GRADE :3

EXPERVIEW OF UNIT:       ESSENTIAL QUESTIONS         tudents will use properties of multiplication, and subtraction to solve       Can the order of the factors be reversed in a multiplication problem? If so, is this always true?         util step problems and look for arithmetic patterns.       Can the order of the numbers be reversed in a multiplication problem? If so, is this always true?         • Can the order of the numbers be reversed in a division problem? If so, is this always true?       • Can the order of the numbers be reversed in a division problem? If so, is this always true why not?         • What multiplication facts could you use to solve division sentences?       • How can multiplication strategies help you determine the reasonableness of an answer?         • How can multiplication strategies help you determine the reasonableness of an answer?       • What numeric patterns do you see?         TANDARDS: Common Core Math Standards - Grade level domains K-5       Number and Not Operations and Operations Measurement and Data Geometry of Mageoratin Thinking on Operations are the stategically with a materia and request multiplication and the relationship with the problems and ording the mathematical Practices grades K-12         1.       Make sense of problems and ording the mathematical Practices grades K-12       1.       Make sense of problems and ording the mathematical matematical mathematical mathematical mathematica		DATE PRESEN	ITED:	DATE DUE:	L	ENGTH OF TIME: Several w	reeks
STANDARDS: Common Core Math Standards – Grade level domains K-5 Counting and Cardinality CC       Operations and Algebraic Thinking OA Algebraic Thinking OA Poerations in Base Ten NET       Member and Operations – Fractions NF       Measurement and Data MD       Geometry 6 MD	DVERV tudents livision, nulti ste	<b>TEW OF UNIT:</b> addition, and subtrop problems and loo	of multiplication, action to solve k for arithmetic pattern	<ul> <li>Can the true?</li> <li>Can the Why one what is the true?</li> <li>What is the true what is the true</li></ul>	E e order of the factors be r why not? multiplication facts coul an multiplication strate <u>c</u> strategies help you dete numeric patterns do you	SSENTIAL QUESTIONS reversed in a multiplication be reversed in a division prob d you use to solve division set gies help you solve other facts rmine the reasonableness of a see?	oroblem? If so, is this always lem? If so, is this always true: ntences? s? an answer?
<ul> <li>STANDARDS: Mathematical Practices grades K-12</li> <li>Make sense of problems and presevere in solving them</li> <li>Solving them</li> <li>Model with mathematics *</li> <li>Description of others mathematics *</li> <li>Model with mathematics *</li> <li>Model with mathematics *</li> <li>Model with mathematics *</li> <li>Model with mathematics *</li> <li>Multiply and divide within 100. 3.0A.7</li> <li>Represent and solve problems involving multiplication and division. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5</li> </ul>	TAND	ARDS: Common Counting and Cardinality CC	n Core Math Standa Operations and Algebraic Thinking OA	rds – Grade level Number and Operations in Base NBT	domains K-5 Number and Ten Operations – Fract NF	Measurement and Data ions MD	Geometry G
<ul> <li>Make sense of problems and persevere in solving them</li> <li>Make sense of problems and persevere in solving them</li> <li>Reason abstractly and quantitatively</li> <li>Model with mathematics *</li> <li>Attend to precision</li> <li>Applied Learning Standards:</li> <li>problem solving</li> <li>communication</li> <li>critical thinking</li> <li>research</li> <li>research</li> <li>reflection/ evaluation</li> </ul>							
<ul> <li>Make sense of problems and persevere in solving them</li> <li>Reason abstractly and quantitatively</li> <li>Model with mathematics *</li> <li>Model with mathematics *</li> <li>Model with number of the precision</li> <li>Attend to process regularity in repeated reasoning</li> <li>Attend to process regularity and quantitatively</li> <li>Attend to process of multiplication and the relationship between multiplication and division. 3.0A.5.6</li> <li>Multiply and divide within 100. 3.0A.5.6</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.5.6</li> <li>Solve problems of Student Learning (High School only):</li> </ul>	TAND	ARDS: Mathema	atical Practices grad	les K-12			
<ul> <li>OCUS_MATHEMATICS STANDARDS:</li> <li>Understand properties of multiplication and the relationship between multiplication and division. 3.0A.5,6</li> <li>Multiply and divide within 100. 3.0A.7</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.0A.9</li> <li>Applied Learning Standards:         problem solving communication critical thinking research reflection/ evaluation</li> <li>Expectations for Student Learning (High School only):</li> </ul>	1. 2.	Make sense of problems and persevere in solving them Reason abstractly and quantitatively	<ol> <li>Construct viable arguments and critique the reasoning of others</li> <li>Model with mathematics ★</li> </ol>	<ol> <li>Use appropriat tools strategically</li> <li>Attend to precision</li> </ol>	te 7. Look for and make use of structure	<ol> <li>Look for and express regularity in repeated reasoning</li> </ol>	
<ul> <li>Understand properties of multiplication and the relationship between multiplication and division. 3.OA.5, 6</li> <li>Multiply and divide within 100. 3.OA.7</li> <li>Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.OA.9</li> <li>Applied Learning Standards: communication critical thinking research reflection/ evaluation</li> <li>Expectations for Student Learning (High School only):</li> </ul>	OCUS	MATHEMATICS	STANDARDS:				
Applied Learning Standards:       reflection/ evaluation         problem solving       communication       critical thinking       research       reflection/ evaluation         Expectations for Student Learning (High School only):       thinking       thinking       thinking       thinking	<ul> <li>Un</li> <li>bet</li> <li>Mu</li> </ul>	derstand properties ween multiplicatior Iltiply and divide wit	of multiplication and th a and division. <mark>3.0A.5, (</mark> thin 100. <mark>3.0A.7</mark>	ne relationship	<ul> <li>Represent and s division 3.0A.3</li> <li>Solve problems explain patterns</li> </ul>	olve problems involving mult involving the four operations in arithmetic. <mark>3.0A.9</mark>	iplication and , and identify and
Expectations for Student Learning (High School only):		Applied Learni problem solving	ing Standards: communicatio	on crit	tical thinking	research r	eflection/ evaluation
	E	xpectations for S	tudent Learning (Hig	gh School only):	-		

At the end of this unit students will be able to solve two step word problems involving all four operations.

#### **PRIOR KNOWLEDGE:**

**ENDURING UNDERSTANDING:** 

- Students can use known multiplication facts to determine the unknown fact in a multiplication or division problem.
- In Grade 2, students found the total number of objects using rectangular arrays, such as a 5 x 5, and wrote equations to represent the sum. This is called unitizing, and it requires students to count groups, not just objects. They see the whole as a number of groups of a number of objects. This strategy is a foundation for multiplication in that students should make a connection between repeated addition and multiplication.

#### STUDENT OBJECTIVES, SKILLS and/or NEW KNOWLEDGE:

- Using arrays, pictures or equal groups, students will solve multiplication and division word problems.
- Understand the properties of multiplication ( commutative, associative, distributive) helps us become efficient and flexible problem solvers.
- Students solve multiplication problems with missing factors

- Know from memory all products and quotients of one digit numbers
- Students will study patterns and relationships of multiplication facts and relate it to division.
- Students observe addition and multiplication tables to find patterns and explain how those patterns exist

SUGO	GESTED PROBLEMS:	
TANDARD	WEBSITE	ADDITIONAL
		INFO (B, A)
3.0A.3	http://www.illustrativemathematics.org/illustrations/344	Basic
	http://www.illustrativemathematics.org/illustrations/262	Basic
	http://www.illustrativemathematics.org/illustrations/365	Advanced
	http://www.khanacademy.org/math/arithmetic/multiplication-	Advanced
	division/delightful division/e/arithmetic word problems 2	
	http://www.k-5mathteachingresources.com/support-files/building-arrays.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/number-story-arrays-set1.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/x5x10wordproblems.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/3rd-gd-multiplication-word-problems.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/equalrowsinamarchingband.pdf	Advanced
	http://www.k-5mathteachingresources.com/support-files/sharingmarbles.pdf	Advanced
3.0A.5	http://www.khanacademy.org/math/arithmetic/order-of-	Basic
	operations/arithmetic properties/e/properties of numbers 1	
	http://www.k-5mathteachingresources.com/support-files/Split-a-Factor.pdf	Advanced
	http://www.k-5mathteachingresources.com/support-files/Decompose-a-Factor.pdf	Advanced
3.OA.6	http://www.khanacademy.org/math/arithmetic/factors-	Advanced
	multiples/divisibility_and_factors/e/divisibility_intuition	
	http://www.khanacademy.org/math/arithmetic/multiplication-division/long_division/e/division_1.5	Basic
	http://www.k-5mathteachingresources.com/support-files/division-as-unknown-factor.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/multiplicationdivisionstories3oa6.pdf	Advanced
3.OA.7	http://www.k-5mathteachingresources.com/support-files/x2-to-x5-arrays.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/multiplicationnumberwheel.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/divisionriddlesdoc.pdf	Advanced
	http://www.k-5mathteachingresources.com/support-files/division-spin.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/theproductis3oa7.pdf	Advanced
	http://www.k-5mathteachingresources.com/support-files/theansweris3oa7.pdf	Advanced
3.OA.8	http://www.illustrativemathematics.org/illustrations/13	Basic
	http://www.illustrativemathematics.org/illustrations/1301	Advanced
	http://www.k-5mathteachingresources.com/support-files/3rdgrademultistepproblems.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/twostepwordproblemssetset2.pdf	Advanced
3.OA.9	http://www.illustrativemathematics.org/illustrations/954	Advanced
	http://www.illustrativemathematics.org/illustrations/953	Basic
	http://www.k-5mathteachingresources.com/support-files/oddandevensums.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/oddandevenproducts.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/rollarule.pdf	Basic
	http://www.k-5mathteachingresources.com/support-files/roll-a-rule-two-step.pdf	Advanced
	http://www.k-5mathteachingresources.com/support-files/twostepnumberpatterns3.oa9.pdf	Basic

## ACTIVITIES, PRODUCTS, PERFORMANCE, and ASSESSMENTS: see curriculum introduction

Application to real world
problems

- 6. Graphic organizers
- 7. Graphing
- Creating charts/collecting 8. Interviews
  - 9. Journals
  - 10. KWL charts
     11. Mathematical Practices
  - 11. Mathematica 12. Modeling ★
- Conferencing Exhibits
  - 13.

- 14. Problem/Performance
- based/common tasks15. Real-life applications
- involving graphing 16. Represent numbers
- 17. Rubrics/checklists
  - (mathematical practice, modeling)
- 18. Technology
- 19. Summarizing and notetaking
- 20. Tests and quizzes
- 21. Writing genres Arguments/ opinion Informative
- OA.3 solve multiplication and division word problems using strategies to find unknown numbers

**Oral presentations** 

- OA.5 show an understanding of multiplication and division properties
- OA.6 solve division sentences with an unknown number

1.

2.

3.

4.

5.

data

Collaboration -

interpersonal

- OA.7 use the relationship of multiplication and division to solve problems fluently
- OA.9 look for and explain patterns in arithmetic

### HIGHER ORDER THINKING SKILLS: Web's Depth of Knowledge 2 – 4 or Bloom's Taxonomy

#### Web's Depth of Knowledge

- skill/conceptual understanding
- strategic reasoning
- extended reasoning

#### Bloom's Taxonomy

• Newmark Learning Common Core Math Grade 3,

- apply
- analyze
- synthesize/create

• p.p. 61-65 (3.OA.3)

• p.p. 36-40 (3.OA.5)

• p.p. 56-60 (3.OA.7)

• 41-45 (3.OA.9)

• p.p. 51-55, 66-70 (3.OA.6)

• evaluate

### ADDITIONAL RESOURCES: see curriculum for specifics

- enVisionMath,
  - Topics 5,6, 7,8 (3.OA.3)
  - Topic 8, 6-6 (3.OA.5)
  - Topics 7 & 8 (3.OA.6)
  - Topic 8 (3.OA.7)
  - Topics embedded throughout
  - Topics 2-1, 2-2, 5 and 6 (3.OA.9)
- VOCABULARY OA
  - Array
  - Missing factor
  - Associative property
  - Commutative property
  - Distributive property
  - Identity property
  - Part
  - Whole
  - Zero property
  - Factors

- Divisors
- Dividends
- Quotients
- Doubling
- Multiples
- Square numbers
- Skip counting
- Addend
- Diagonal
- Doubles

- Even
- Factor
  - Horizontal
- Multiple
- Odd
- Patterns
- Product
- Sum
- Vertical

# LESSON PLAN for UNIT \_\_\_\_\_

### LESSONS

- Lesson # 1 Summary:
- Lesson #2 Summary:
- Lesson #3 Summary:

OBJECTIVES for LESSON # \_\_\_\_\_

- Materials/Resources:
- Procedures:
  - Lead –in
  - Step by step
  - Closure
- Instructional strategies: see curriculum introduction
- Assessments: see curriculum introduction
   o Formative
  - Summative