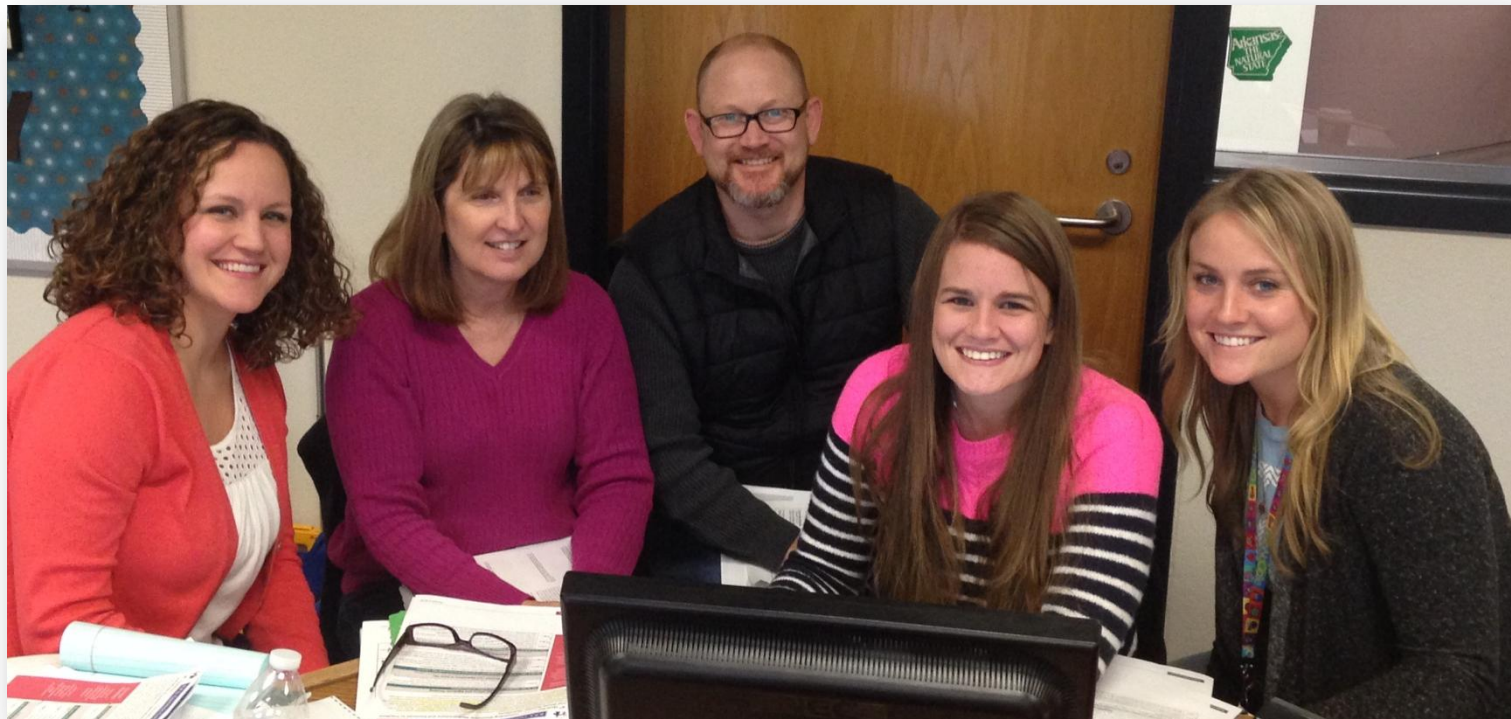# Connecting Geometric Measurement & Decimals to Fractions and Whole Number Operations
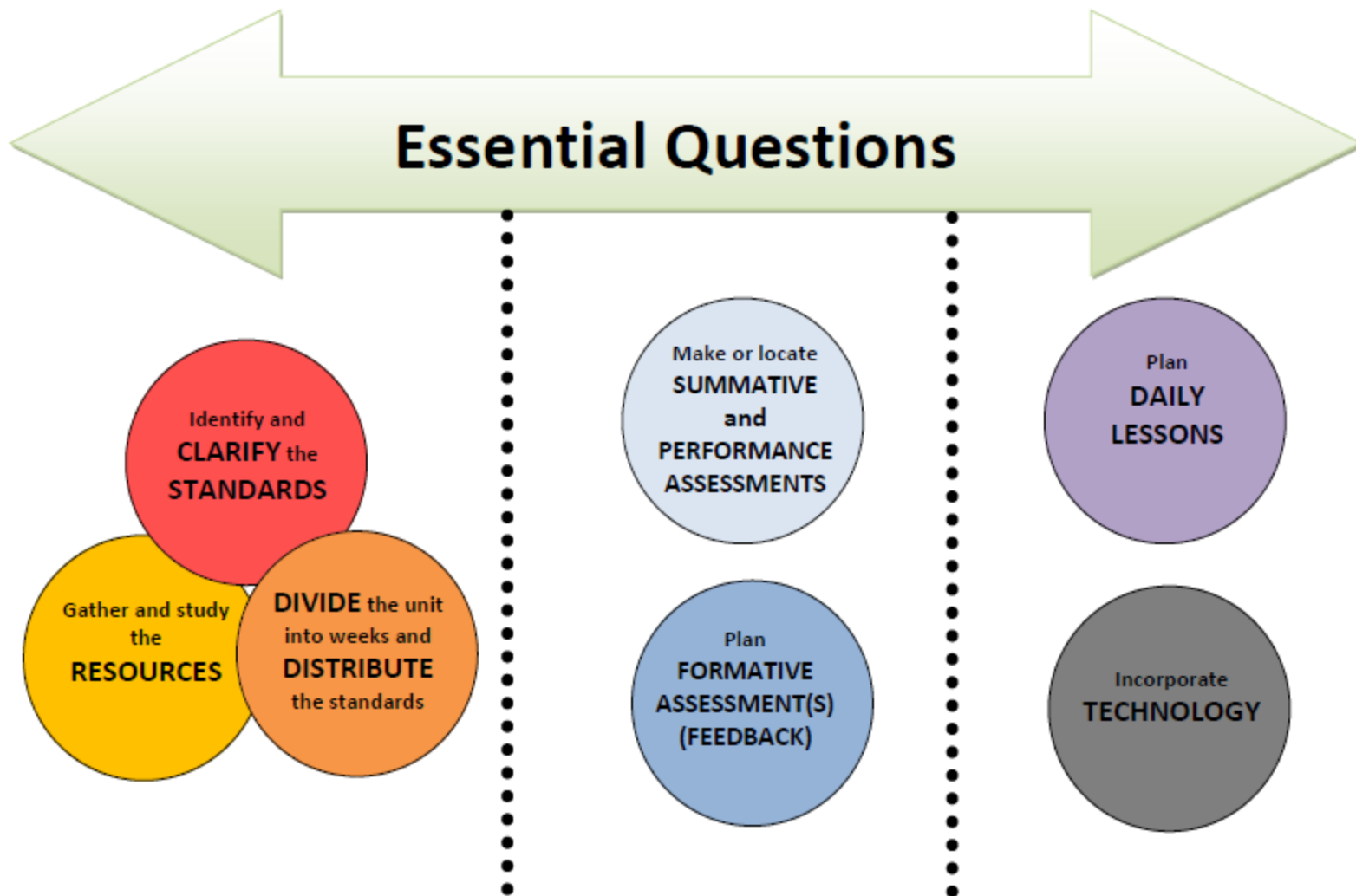

Unit Planning Team:

Rea Smith (RG), Deborah Hales (RJ), Wes Faith (JM),
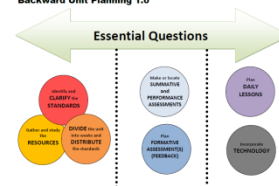
Rachel Watterson (ES), Megan Fawley (GH)

Backward Unit Planning 1.0

Essential Questions

Identify and **CLARIFY** the **STANDARDS**

Gather and study the **RESOURCES**

DIVIDE the unit into weeks and **DISTRIBUTE** the standards

Make or locate **SUMMATIVE** and **PERFORMANCE ASSESSMENTS**

Plan **FORMATIVE ASSESSMENT(S) (FEEDBACK)**

Plan **DAILY LESSONS**

Incorporate **TECHNOLOGY**

Essential Questions

R.P.S. Common Core Math Curriculum — 4th Grade

4th Quarter (p. 1 of 2) — Connecting Geometric Measurement and Decimals to Fractions and Whole Number Operations

Students have solidified efficient, generalizable methods and strategies for solving multi-digit addition, subtraction, multiplication, and division problems rooted in place value understanding and properties of operations. By the end of the year, 4th graders are expected to have an efficient/standard algorithm for solving multi-digit addition and subtraction problems. Students will extend their understanding of whole number place value and fractions to decimal notation to the hundredths place. They will use this understanding to compare decimals and add two decimal fractions (with denominators 10 and 100). Students will also use their understanding of fractions to explore the geometric concepts of and measurement of angles using shapes and lines. Contexts that support the major work of this quarter include solving whole number multi-step word problems, as well as real-world scenarios that involve decimal notation and measurement.

Essential Questions:

How can I extend my understanding of place value and fractions to decimal notation?

How can I connect what I know about fractions to help me explore angle measurement?

Operations and Algebraic Thinking	
Use the four operations with whole numbers to solve problems.	
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 answers using mental computation and estimation strategies including rounding.
Number and Operations in Base Ten *(expectations in this domain are limited to whole numbers less than or equal to 1,000,000)*	
Use place value understanding and properties of operations to perform multi-digit arithmetic.	
4.NBT.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
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.
Number and Operations - Fractions *(expectations in this domain are limited to fractions with denominators 2,3,4,5,6,8,10,12, and 100)*	
Understand decimal notation for fractions, and compare decimal fractions.	
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. For 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. For 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.

The ★ represents a new standard this unit.

Rogers Public Schools | Revised 5-14-13

How can I extend my understanding of place value and fractions to decimal notation?

How can I connect what I know about fractions to help me explore angle measurement?

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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 answers using mental computation and estimation strategies including rounding.

Number and Operations in Base Ten
(expectations in this domain are limited to whole numbers less than or equal to 1,000,000)

Use place value understanding and properties of operations to perform multi-digit arithmetic.

4.NBT.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
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.
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Number and Operations - Fractions
(expectations in this domain are limited to fractions with denominators 2,3,4,5,6,8,10,12, and 100)

Understand decimal notation for fractions, and compare decimal fractions.

| 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 100.4 *For 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. *For 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.

The ★ represents a new standard this unit.

Backward Unit Planning 1.0
Essential Questions
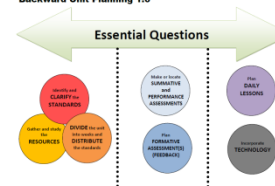
Identify and CLARIFY the STANDARDS

Clarifications

4.NF.6 and 4.NF.7	Make the connection to fractions – decimals are just a new way to notate what we already know about fractions Ex: 0.3 = 3/10 Use this opportunity to attend to precision (SMP 6) when reading decimals – reading 0.3 as "three tenths" (rather than "zero point three") will help students see the connection to fractions.
4.NF.1 and 4.NF.2	These standards are not in the pacing for this quarter, however we wanted to reiterate their importance because they often occur in discussions when working with fractions

Measurement and Data

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

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.

Quarterly Expectation: Problems posed should involve measurement quantities with fractions and decimals.

Geometric measurement: understand concepts of angle and measure angles.

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

Geometry

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

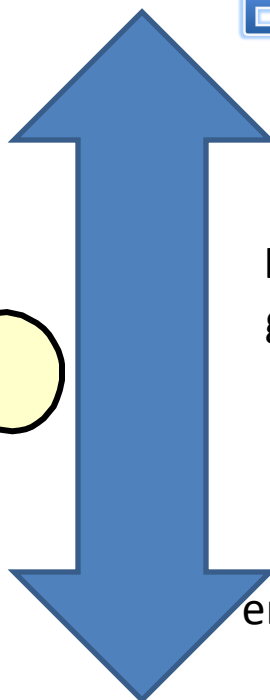| ★ 4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
★ 4.G.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of 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.

Identify and CLARIFY the STANDARDS
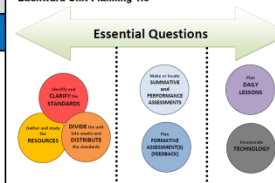
Clarifications

4.MD.5 4.MD.6 4.MD.7	Angle measure connects nicely to fractions if you discuss them as part of a turn (as the standards show)

The ★ represents a new standard this unit.
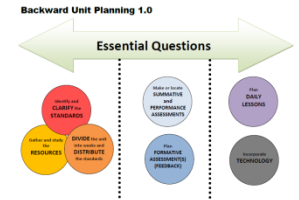
Emphasis on understanding decimals will be valuable!

5th Grade spends the majority of the year focusing on solidifying base 10 understanding (including decimals) and operations with fractions and decimals.

Vertical Exploration

Where are they going?

How does the work in your grade level extend into the grade level above?

What do you need to emphasize this quarter to ensure they are ready for the next grade level?
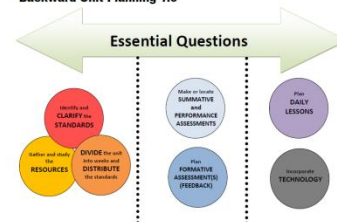
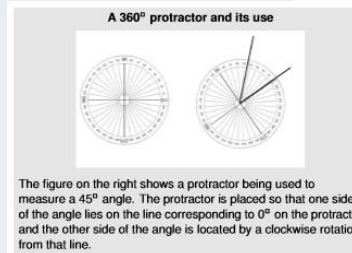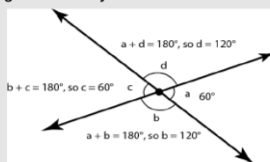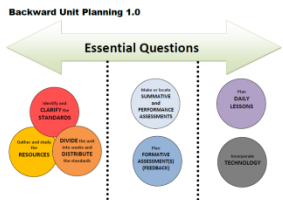| Week	Standards	Explanation/Clarification
1	**Focus** **4.NF.5/4.NF.6/4.NF.7** **Connection** **4.MD.2** **Continuous** **4.OA.3** **4.NBT.4/4.NBT.5/4.NBT.6**	Help students make the connection that decimals are just a new way to notate what you already know about fractions. ECM book—Chapter 7(pg. 148) "Understanding Decimals" 1-2 days focus on continuous standards
2	**Focus** **4.MD.5/4.G.1** **4.NF.5/4.NF.6/4.NF.7** **Connection** **4.MD.2** **Continuous** **4.OA.3** **4.NBT.4/4.NBT.5/4.NBT.6**	4.MD.5 - KEY WORD: Turn (We want kids to see angles as a turn (part of a circle) As students work on angles, we will be naturally be naming important geometric terms (4.G.1) 1-2 days focus on decimals from last week **A 360º protractor and its use** The figure on the right shows a protractor being used to measure a 45º angle. The protractor is placed so that one side of the angle lies on the line corresponding to 0º on the protractor and the other side of the angle is located by a clockwise rotation from that line.
3	**Focus** **4.MD.5/4.MD.7/4.G.1** **4.NF.5/4.NF.6/4.NF.7** **Connection** **4.MD.2** **Continuous** **4.OA.3** **4.NBT.4/4.NBT.5/4.NBT.6**	Using 4.MD.5., make connections about what they know about whole number decomposing to angle decomposing (4.MD.7) Example: 45 + n = 90 *Draw a circle, and split it into 4ths. If I turn a quarter turn, how many degrees did I turn? What if I turned half of a fourth? What degree is that? Rachel made a 140 degree turn. If she needed to turn 180 degrees, how many more degrees will she need to turn? *1-2 days focus on decimals from week 1 **Working with Unit Angles** This article provides instructional support to developing students' understanding of unit angles. 1-2 days focus on decimals

Backward Unit Planning 1.0

Essential Questions

Identify and CLARIFY the STANDARDS · Gather and study the RESOURCES · DIVIDE the unit into weeks and DISTRIBUTE the standards · Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS · Plan FORMATIVE ASSESSMENT(S) (FEEDBACK) · Plan DAILY LESSONS · Incorporate TECHNOLOGY

DIVIDE the unit into weeks and **DISTRIBUTE** the standards

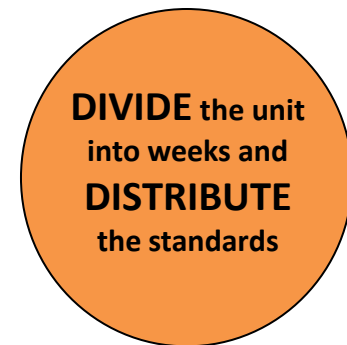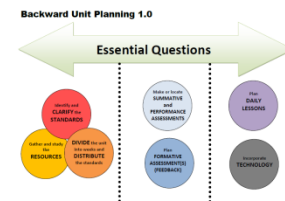| Week	Standards	Explanation/Clarification
4	**Focus** **4.MD.6**/**4.MD.7**/**4.G.1** **4.NF.5**/**4.NF.6**/**4.NF.7** **Connection** **4.MD.2** **4.MD.5** **Continuous** **4.OA.3** **4.NBT.4**/**4.NBT.5**/**4.NBT.6**	*Estimate what an angle that is 160 degrees would look like. How many more degrees would you need to go get to a full turn (What is the reflex angle)? What would 47 degrees look like? Bring the vocabulary (points, lines, line segments, rays, angles-right, acute, obtuse) into discussion. *1-2 days focus on decimals **An angle** | name	measurement
---	---
right angle	90°
straight angle	180°
acute angle	between 0 and 90°
obtuse angle	between 90° and 180°
reflex angle	between 180° and 360°	 **Angles created by the intersection of two lines** a + d = 180°, so d = 120° b + c = 180°, so c = 60° c d a 60° a + b = 180°, so b = 120° When two lines intersect, they form four angles. If the measurement of one is known (e.g., angle *a* is 60°), the measurement of the other three can be determined.
5	**Focus** **4.G.2** **4.NF.5**/**4.NF.6**/**4.NF.7** **Connection** **4.MD.2** **4.MD.5**/**4.MD.6**/**4.MD.7** **Continuous** **4.OA.3** **4.NBT.4**/**4.NBT.5**/**4.NBT.6**	**A Look at Triangles** In this lesson, students will classify triangles based on their properties. This lesson format can also be used when discussing squares and other rectangles. (4.G.2) *Identify the properties of types of triangles (Right, Isosceles, scalene) in order to cross classify. For example: naming a shape as a right isosceles triangle. See progression document (Geometry K-6) page 15. *1-2 days focus on decimals (if time)

Backward Unit Planning 1.0

Essential Questions

DIVIDE the unit into weeks and **DISTRIBUTE** the standards

Week	Standards	Explanation/Clarification
6	**Focus** 4.G.2/4.G.3 4.NF.5/4.NF.6/4.NF.7 **Connection** 4.MD.2 4.MD.5/4.MD.6/4.MD.7 **Continuous** 4.OA.3 4.NBT.4/4.NBT.5/4.NBT.6	**Decoding ABC Symmetry**- Introduction lesson on symmetry (4.G.3) *give one half a figure and the line of symmetry and accurately draw the other half (4.G.3) *1-2 days on decimal ideas *1-2 days on whole number multiplication/division multi-step problem
7	End of the geometry section. Reteach any standard students are still struggling with as noted by formative assessments. Geometry Town (culminating task)	

Week	Standards	Explanation/Clarification
8	**Focus** 4.NF.5/4.NF.6/4.NF.7 **Connection** 4.MD.2 **Continuous** 4.OA.3 4.NBT.4/4.NBT.5/4.NBT.6	As you come to the end of the year, please begin to consider the standards that would best prepare your students for the beginning of 5th grade. -Any multi digit multiplication or division multi-step problems. -bring in 4.MD.2 (distance, time, money, liquid volume, etc.) though problems relating to decimals and fractions.
9	**Focus** 4.NF.5/4.NF.6/4.NF.7 **Connection** 4.MD.2 **Continuous** 4.OA.3 4.NBT.4/4.NBT.5/4.NBT.6	Continue to consider the standards that would best prepare your students for the beginning of 5th grade. -Any multi digit multiplication or division multi-step problems. -bring in 4.MD.2 (distance, time, money, liquid volume, etc.) though problems relating to decimals and fractions.

DIVIDE the unit into weeks and **DISTRIBUTE** the standards

Gather and study the RESOURCES

Backward Unit Planning 1.0

Essential Questions

Intranet
Rogers Public Schools

500 W. Walnut St., Rogers, AR 72756
479-636-3910

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Intranet ▸ K-5 Curriculum ▸ 4th Grade Curriculum ▸ Math ▸ Curricular and Instructional Resources ▸ U4: Connecting Geometric Measurement & Decimals to Fractions and Whole Number Operations ▸ Lesson Resources

Planning Options
Lesson Resources
Technology Resources
Games and Activities
Literature Connections
Number Talks for Unit 4
Teacher Created Resources for Unit 4
Assessments

Lesson Resources

Connecting Geometric Measurement and Decimals to Fractions and Whole Number Operations
4.OA.3, 4.NBT.4-6, 4.NF.5-7, 4.MD.2, 4.MD.5-7, 4.G.1-3

Area and Perimeter Problems (4.MD.3, 4.NBT.5, 4.NBT.6)

Compare-Additive Problems (4.NF.7, 4.NF.5)

Multiplication and Division Problem Situations (4.NBT.5, NBT.6)
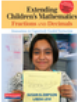
Multi-Step Word Problems (4.OA.3, 4.NBT.5, 4.NBT.6)

Multi-Step Word Problems (4.OA.3)

Adding and Subtracting Multi-Digit Numbers - Word Problems (4.NBT.4)

Minilessons for Extending Multiplication and Division This book contains minilessons that you can choose from as you consider the needs of your students and can be used throughout the year. These are more guided and explicit and were designed to be used at the start of your math instruction - lasting 10 to 15 minutes. See the overview (p.5-11) for further details.

Extending Children's Mathematics: Fractions and Decimals by Susan B. Empson and Linda Levi

Equal Groups/Sharing Problems
Chapter 1 p.3-28
Problems to Pose p.29-31
Instructional Guidelines for Equal Group Problems p.32-35

Multiple Groups Problems
Chapter 3 p.48-64
Problems to Pose p.65-68
Instructional Guidelines for Multiple Group Problems p.69-71

Understanding Decimals
Chapter 7 p.148-170
Problems to Pose p.171-173
Instructional Guidelines for Equal Group Problems p.174-177

Operations on Fractions and Decimals
Chapter 8 p.178-208
Problems to Pose p.209-216
Instructional Guidelines for Equal Group Problems p.217-222

Resource Guide for Using *Extending Children's Mathematics* in Unit 4
Foundational Problems from ECM Book p.171-172
Animal at the Zoo (from ECM Book p.154)

Lessons, Tasks and Investigations The following lessons were written by the *Georgia Department of Education* and correspond with the standards in this unit.
Geometric Measurement: Concepts of Angle and Measure Angles (4.MD.5,6,7)
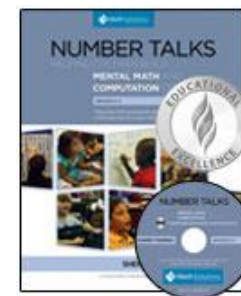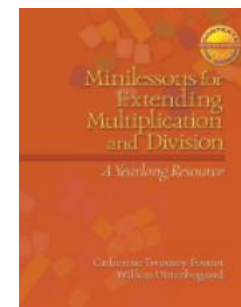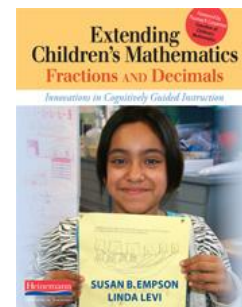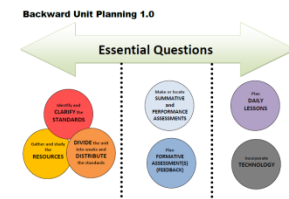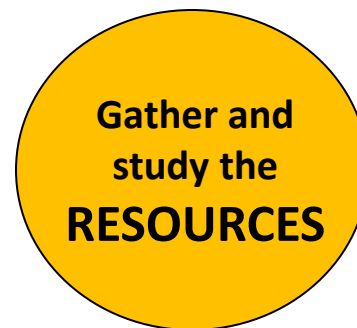Which Wedge is Right?
Angle Tangle
Build an Angle Ruler
Guess My Angle
Turn, Turn, Turn
Summing It Up
Angles of Set Squares (culminating task)
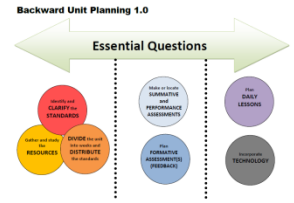
Essential Question 1

How can I extend my understanding of place value and fractions to decimal notation?

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

[4th Grade Decimals Assessment from OCSD](#)

[Using Place Value](#) (4.NF.7)

[4th Grade Decimals Assessment](#)

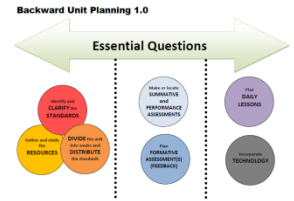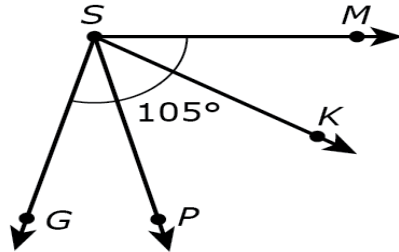# Options for Assessment – available online for Unit 3

Essential Question 2

How can I connect what I know about fractions to help me explore angle measurement?

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Two figures are shown. In Figure 1, the measure of angle *MSG* is 105°.

Figure 1

S — M
105°
K
G — P

Part A

Drag and drop numbers and symbols into the blanks to complete an equation that can be used to find the value of *y*. Each symbol may be used more than once or not at all.

Drag and drop the numbers and symbols into the correct order.

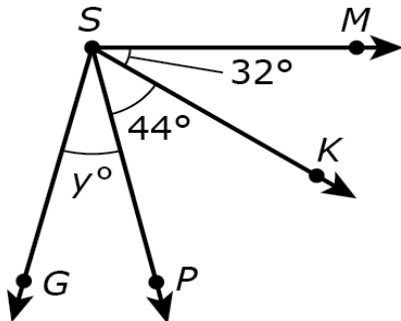| y | + | − | × | ÷ | 105 | 32 | 44 |

[ ] [ ] [ ] [ ] [ ] = 105

Part B

What is the value of *y* ?

Enter your answer in the box.

[ ]

The measures of angle *MSK*, angle *KSP*, and angle *PSG* are shown in Figure 2. The measure of angle *MSG* is still 105°.

Figure 2

S — M
32°
44°
K
y°
G — P

Part A

Drag and drop numbers and symbols into the blanks to complete an equation that can be used to find the value of *y*. Each symbol may be used more than once or not at all.

Drag and drop the numbers and symbols into the correct order.

| y | + | − | × | ÷ | 105 | 32 | 44 |

[ ] [ ] [ ] [ ] [ ] = 105

Part B

What is the value of *y* ?

Enter your answer in the box.

[ ]

LESSONS AND RESOURCES ARE AVAILABLE ONLINE.

Plan **DAILY LESSONS**

Incorporate **TECHNOLOGY**

Teacher Created Resources pages!!!

RESOURCES

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Elementary Curriculum Specialist
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