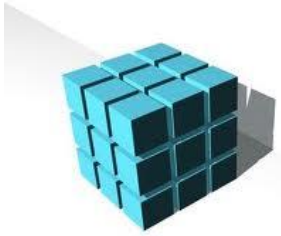


Unit 1: Whole Number Place Value & Operations; Volume

Unit 2: Understanding Multiplication & Division of Fractions

5th Grade

Big Rocks for 2014-2015

Understanding the Standards

Scoring to the Standards

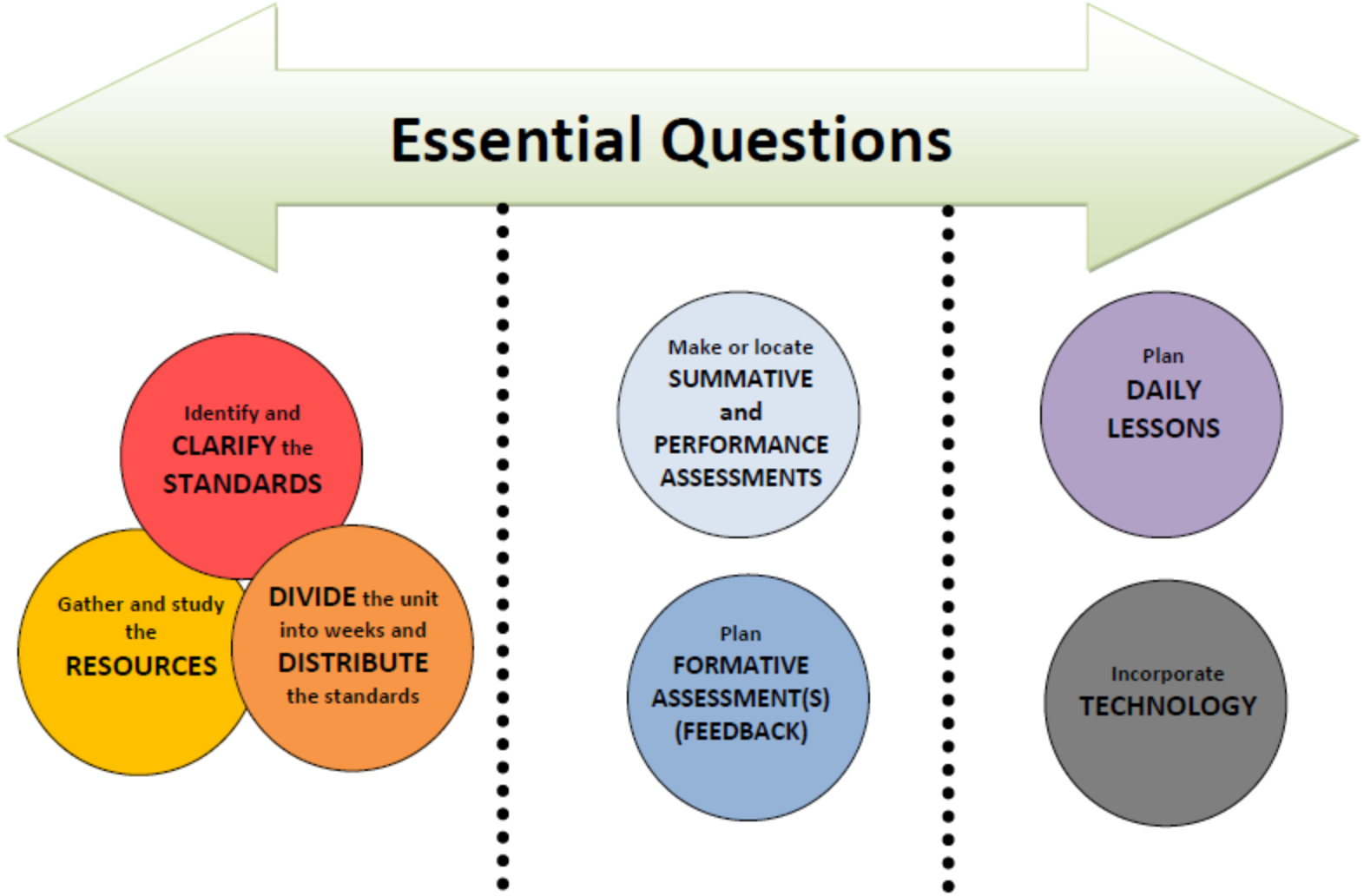
Vocabulary

GANAG/CGI & ECM

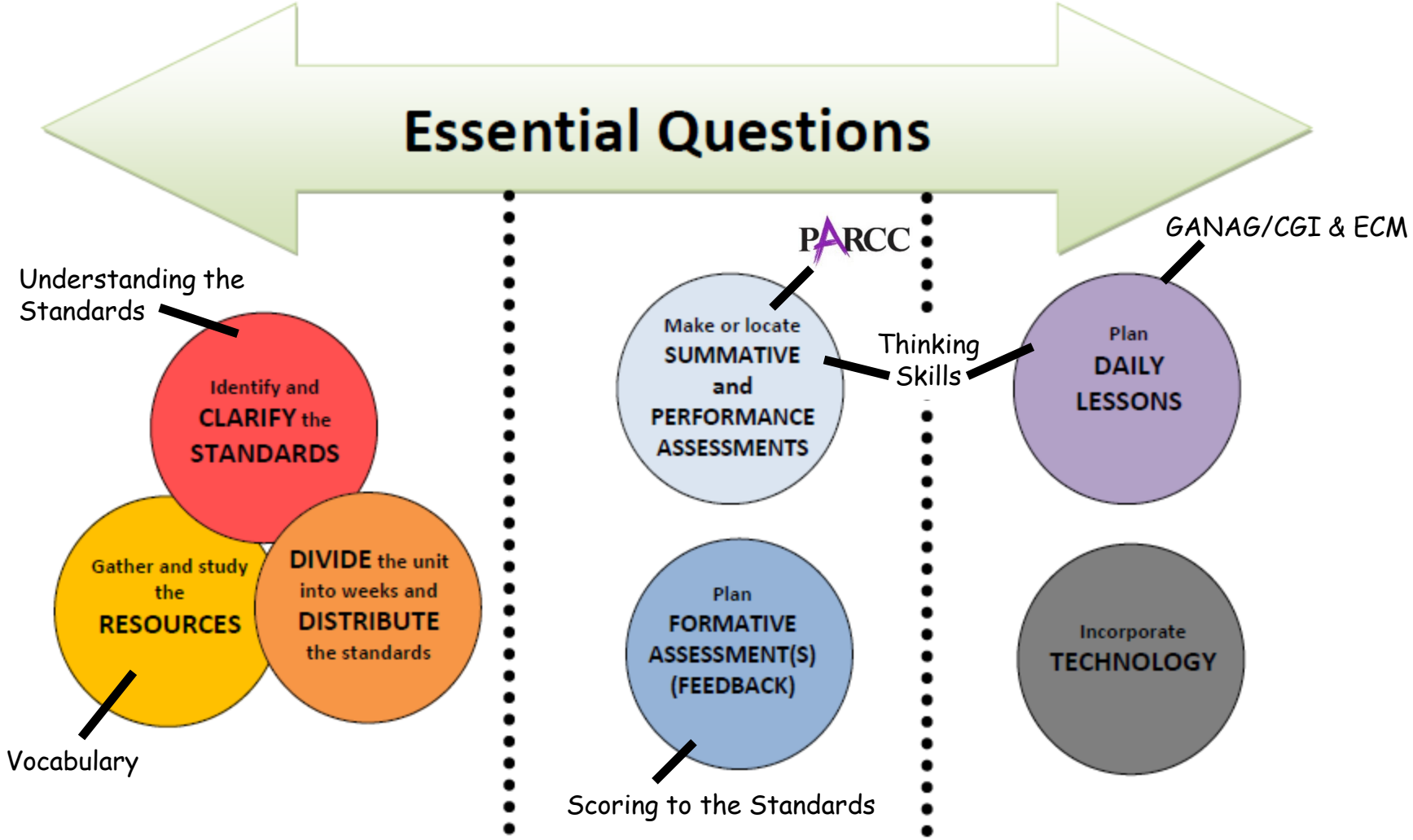
Thinking Skills

PARCC

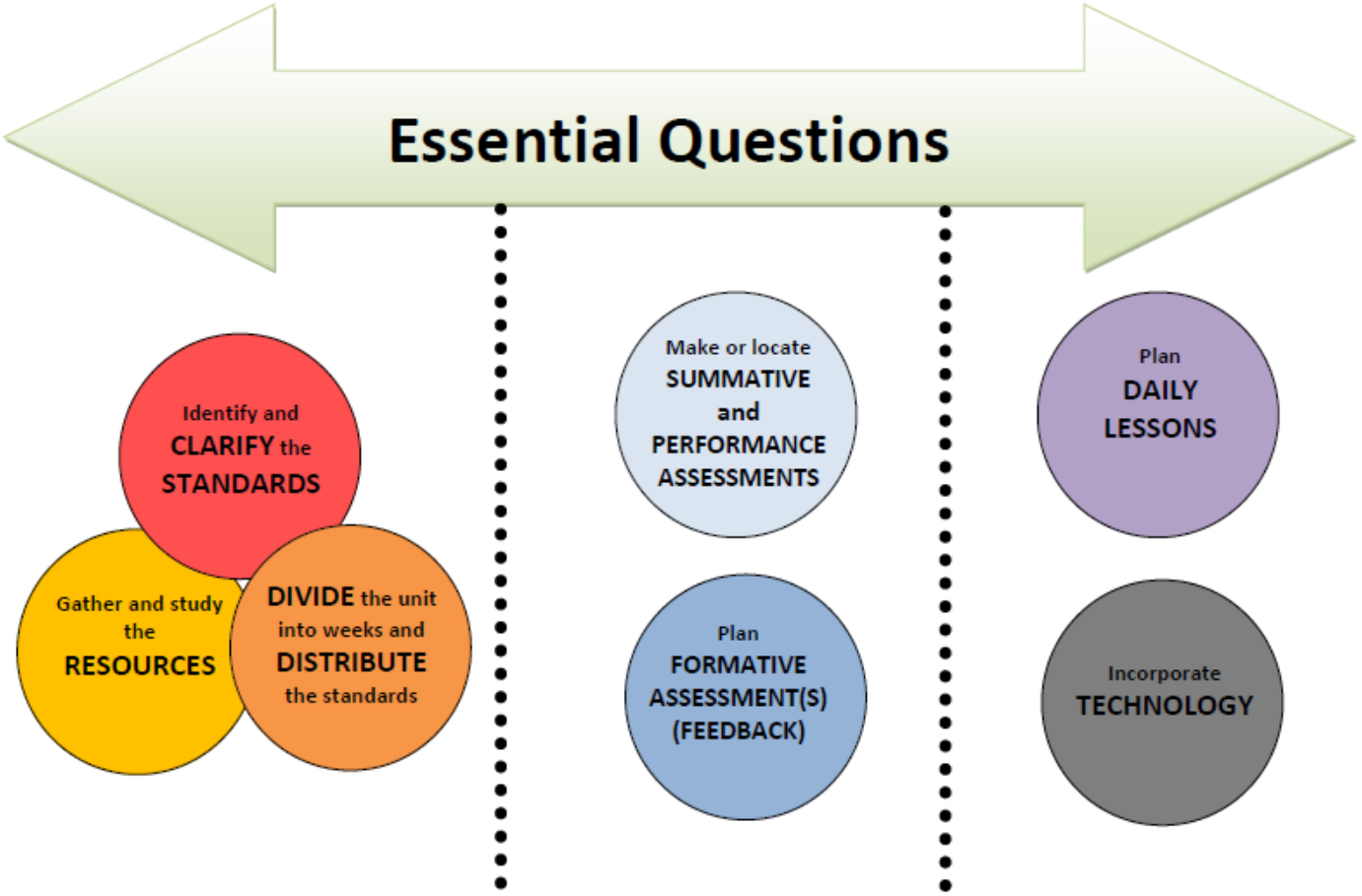
Backward Unit Planning 1.0



Backward Unit Planning 1.0



Backward Unit Planning 1.0



The next 3 slides are for use at the beginning of the presentation on August 13.

BIG 4

- Well Articulated Curriculum
- Plan for Instruction
- Varied Assessment
- Standards-based Feedback

Teaching Closet

The Big Four

- Well Articulated Curriculum
- Plan for Instruction
- Varied Assessment
- Standards-based Feedback

Common Core Standards
ELD Standards
Arkansas Curriculum Frameworks
Curriculum Documents

GANAG
Lesson Plan Book
SIOP
C.G.I./ECM
Smartboard
Co-teaching
Kagan Cooperative Learning

MAP
DIBELS
DRA
CRT/NRT Tests
Formative/Summative Assessment
Scoring Guides
Performance Assessments

Progress Report
Daily scores & grade book
Student Conferences
Report Card
Parent/Teacher Conferences

The BIG FOUR

Well Articulated Curriculum

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

Plan for Instruction

Gather and study the **RESOURCES**

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

Plan **DAILY LESSONS**

Incorporate **TECHNOLOGY**

Varied Assessment

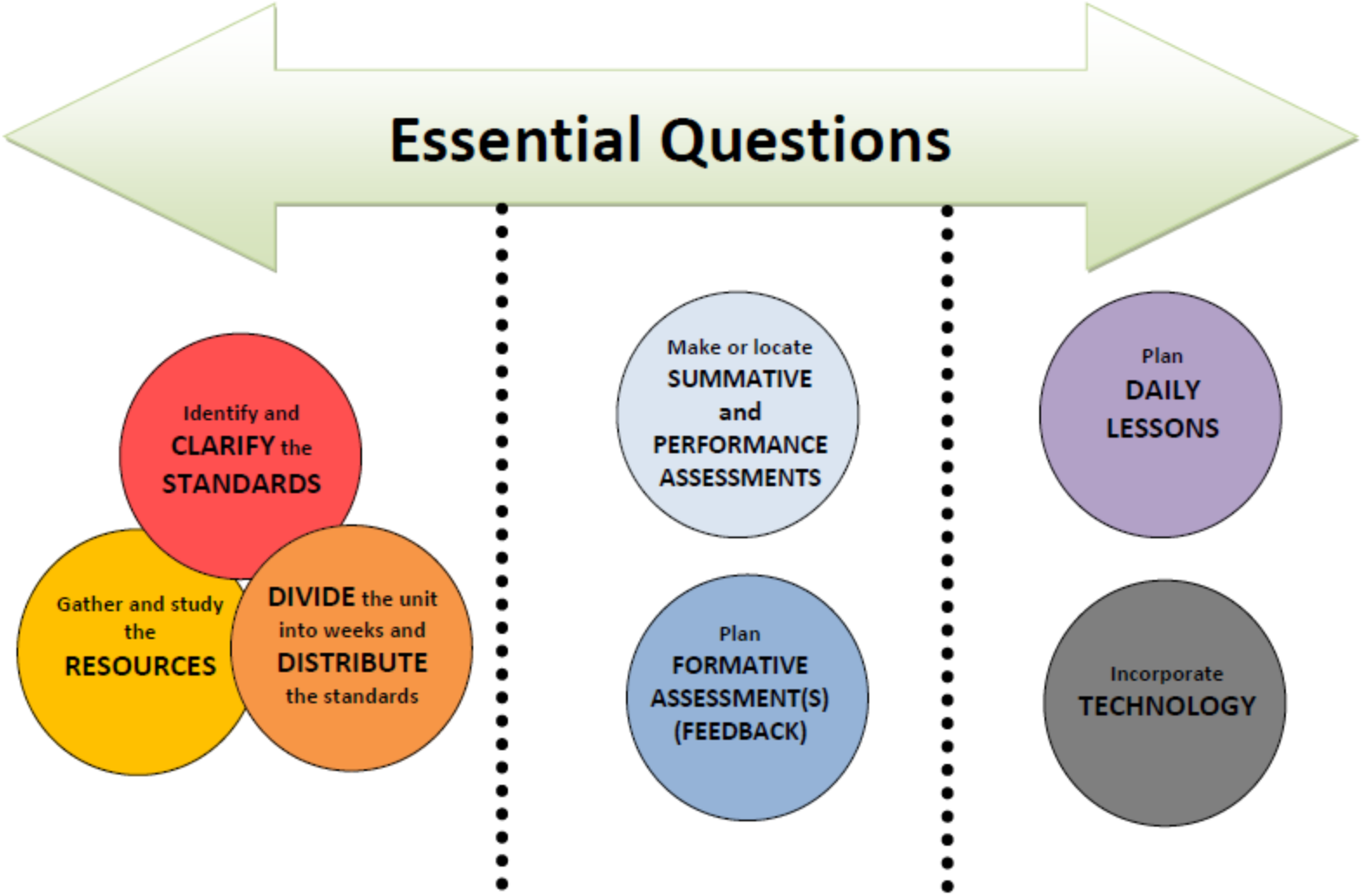
Locate or make **SUMMATIVE** and **PERFORMANCE ASSESSMENTS**

Standards-based Feedback

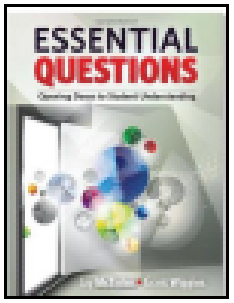
Plan **FORMATIVE ASSESSMENT(S)**

(FEEDBACK)

Backward Unit Planning 1.0



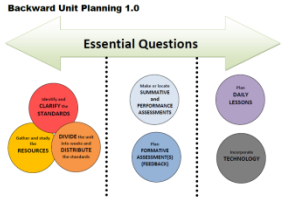
7 Defining Characteristics



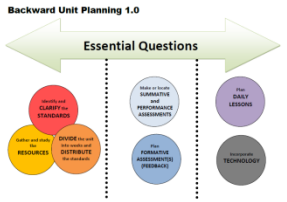
A good essential question:

1. Is *open-ended*; that is, it typically will not have a single, final, and correct answer.
2. Is *thought-provoking* and *intellectually engaging,* often sparking discussion and debate.
3. Calls for *higher-order thinking* such as analysis, inference, evaluation, prediction. It cannot be effectively answered by recall alone.
4. Points toward *important, transferable ideas* within (and sometimes across) disciplines.
5. Raises *additional questions* and sparks further inquiry.
6. Requires *support* and *justification*, not just an answer.
7. *Recurs* over time; that is, the questions can and should be revisited again and again.

Mathematical Practices



1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.



R.P.S. Common Core Math Curriculum | 5th Grade

Unit 1 – Whole Number Place Value & Operations; Volume 3 W

Students will build on their work from Fourth grade using various strategies based on place value to multiply and divide m… numbers. Students will only be scored on four digits by one digit in first quarter. They will continue to use these diff… area model, base ten model, array, etc.) throughout the year to solidify their understanding until the standard… fourth quarter. Students will experience finding volume of rectangular prisms and understand concept… finding volume will develop from these experiences.

Essential Questions:

How are place value patterns repeated in numbers?

How can place value help me multiply and divide?

How do I solve real-world problems involving volume?

Number and Operations in Ba…	
Understand the place value system.	
5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 tim… represents in the place to its right and 1/10 of what it represents in the place to its …
5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by po… and explain patterns in the placement of the decimal point when a decimal is multiplied or divi… by a power of 10. Use whole-number exponents to denote powers of 10.
Perform operations with multi-digit whole numbers and with decimals to hundredths.	
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
	Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.
Measurement and Data	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
	a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
	b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
	a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
	b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
	c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
Operations and Algebraic Thinking	
Write and interpret numerical expressions.	
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

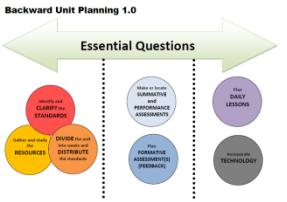
Rogers Public Schools | Revised 5-14-13

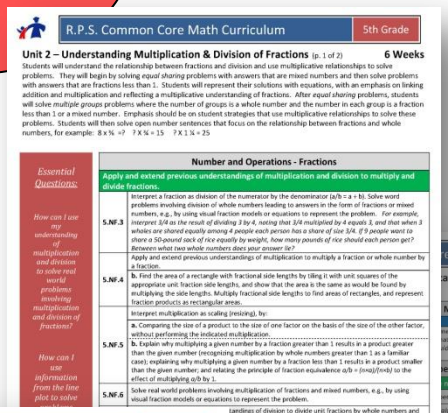
Essential Questions

1. ***How are place value patterns repeated in numbers?***
2. ***How can place value help me multiply and divide?***
3. ***How do I solve real-world problems involving volume?***

Clarifying Documents

Identify and CLARIFY the STANDARDS

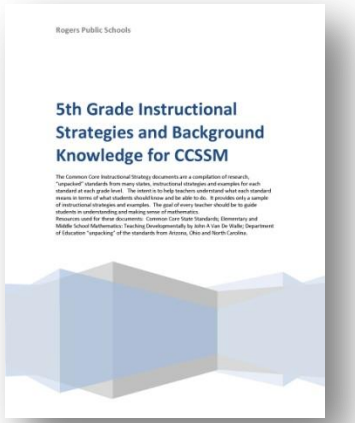



R.P.S. Common Core Math Curriculum — 5th Grade

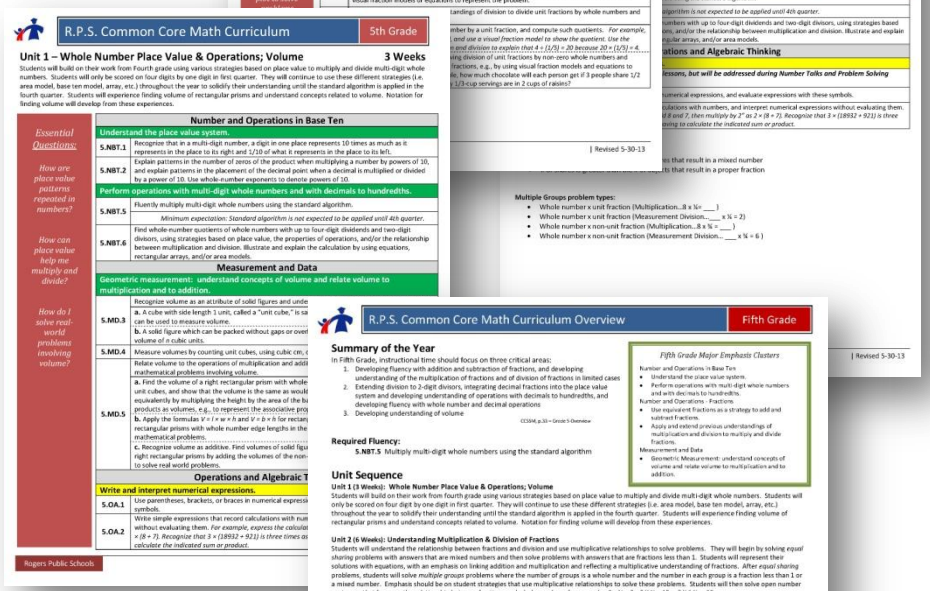
Unit 2 – Understanding Multiplication & Division of Fractions (p. 1 of 2) — 6 Weeks

Number and Operations - Fractions

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.


Rogers Public Schools

5th Grade Instructional Strategies and Background Knowledge for CCSSM


R.P.S. Common Core Math Curriculum — 5th Grade

Unit 1 – Whole Number Place Value & Operations; Volume — 3 Weeks

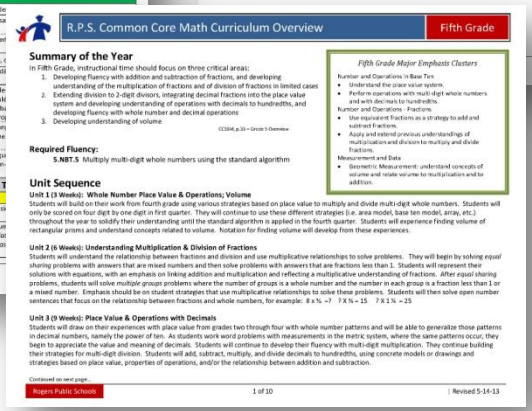
Number and Operations in Base Ten

Understand the place value system.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

Measurement and Data

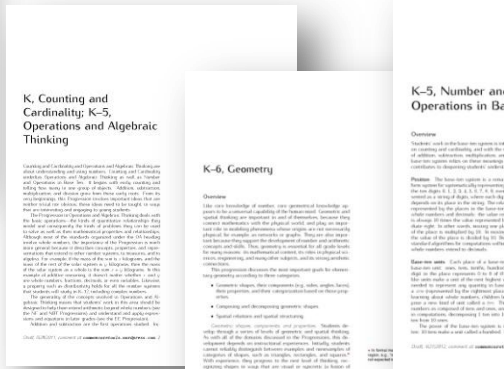
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.


R.P.S. Common Core Math Curriculum Overview — Fifth Grade

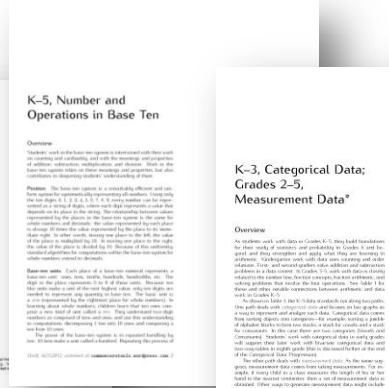
Summary of the Year

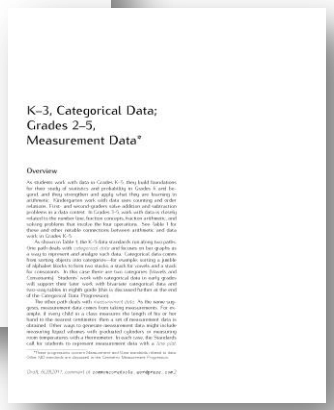
Fifth Grade Major Emphasis Clusters

Unit Sequence


K, Counting and Cardinality; K–5, Operations and Algebraic Thinking

K–6, Geometry


K–5, Number and Operations in Base Ten


K–3, Categorical Data; Grades 2–5, Measurement Data*

Progression Documents

R.P.S. Common Core Math Curriculum — 5th Grade

Unit 1 – Whole Number Place Value & Operations; Volume — 3 Weeks

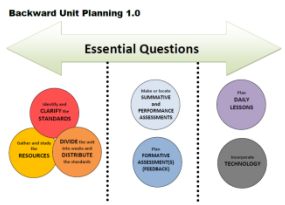
Students will build on their work from Fourth grade using various strategies based on place value to multiply and divide multi-digit whole numbers. Students will only be scored on four digits by one digit in first quarter. They will continue to use these different strategies (i.e. area model, base ten model, array, etc.) throughout the year to solidify their understanding until the standard algorithm is applied in the fourth quarter. Students will experience finding volume of rectangular prisms and understand concepts related to volume. Notation for finding volume will develop from these experiences.

Essential Questions:

How are place value patterns repeated in

Number and Operations in Base Ten	
Understand the place value system.	
5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and
Perform oper	
	Flue

Identify and CLARIFY the STANDARDS



Fifth Grade: Whole Number Place Value and Operations: Volume (Unit 1: 3 Weeks)

Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?

Common Core State Standards	Understand the place value system. 5.NBT.1 Depth opportunity: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	Understand the place value system. 5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. *Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.*	Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.6 Depth opportunity: Find whole-number quotients of whole numbers with up to four-digit dividends and two-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
Week 1:	x	x	X fluency	
Week 2:			X fluency	X
Week 3:			X fluency	
Goal Statements				
Notes	MP2,7 Whole numbers only...not decimal		fluency...push strategies	MP1,5 4 digit by 1 digit Use efficient strategies to push base 10

Fifth Grade: Whole Number Place Value and Operations: Volume (Unit 1: 3 Weeks)

Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?

Common Core State Standards	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (a) A cube with side length 1 unit, called a "unit cube," or unit to have "one cubic unit" of volume, and can be used to measure volume.	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (b) A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (a) Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (c) Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts,	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (c) Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts,	Write and interp numerical expressions. 5.OA.1 Use parent brackets, or braces i numerical expressions evaluate expressions these symbols.
Week 1:								
Week 2:								
Week 3:	X	X	X	X	X	X	X	
Goal Statements								
Notes	MP 7	MP 7	MP 7	MP 5,7	MP 5,7	MP 2,5	MP 7	

Page 1 Page 2 Page 3

of idence	PB	EO	Evidence Statement Text	Clarifications	MP		Level 4: Stong Command	Level 3: Moderate Command	Level 2: Pa
BT.5-1	x		Multiply multi-digit numbers using the standard algorithm.	i)Tasks do not explicitly assess fluency. ii) The given factors are such as to require an efficient/standard algorithm (e.g., 726-48). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 725 - 40). iii) Tasks do not have a context. iv) For purposes of assessment, the possibilities are 2-digit x 3-digit.		Multiply with Whole Numbers 5.NBT.5-1 5.Int.1 5.Int.2 5.NBT.Int.1	Solves multi-step unscaffolded word problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.	Solves two-step unscaffolded word problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.	Solves two-step scaffolded word problems involving multiplication of a three-digit by a one-digit whole number.	Solves one-problems in multiplicatic
.Int.1		x	Solve one-step word problems involving multiplying multi-digit whole numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 726 × 4871). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 × 400). ii) For purposes of assessment, the possibilities are3-digit × 4-digit.	1, 7				
.Int.2		x	Solve word problems involving three two-digit numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 76 × 48 × 39). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 50 × 20 ×15).	1, 7				
NBT.6		x	Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.	i) Tasks do not require students to illustrate or explain. ii) Tasks involve 3- or 4-digit dividends and one- or two-digit divisors.	1, 5	Quotients and Dividends 5.NBT.6 5.NBT.Int.1	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and one-digit divisors which are multiples of ten using strategies based on place value, the properties of operations and/or the relationship between multiplication and	Divides wh up to three- and one-dig which are n using strate place value, of operation relationship multiplicatic

Sheet1 (2) Sheet1 Sheet2

Mathematical Practices Look-fors

MP.7: Look for and make use of structure. (how numbers and shapes are organized)

The Math Task:	The Student:	The Teacher:
• Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation	• Recognizes that quantities can be represented in different ways • Uses properties of operations to make sense of problems • Recognizes how numbers and shapes are organized • Looks for patterns and structures in the number system • Justify strategy for basic facts • Uses models to prove equations • Recognize how symbols help represent relationships and can be applied to new situations	• Gives students time to discus connections • Brings students back to the rule or properties being used • Helps students look for patterns and structures in th number system • Helps make connections between the structure used, equation, student thinking, a content standard • Helps make connections to r world

(from: Implementing Standards-Based Mathematics Instruction, Stein, Smith Henningsen & Silver, 1998)

MP #8: Look for and express regularity in repeated reasoning. (number pattern)

The Math Task:	The Student:	The Teacher:
• Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification	• Notices number patterns • Notices if calculations are repeated • Applies more efficient computation strategies using number patterns • Looks both for general methods and for shortcuts	• Encourages students to connect task to prior concept taught • Helps make connections between pattern, equation, student thinking, and conten standard

R.P.S. Common Core Math Curriculum — 5th Grade

Unit 1 – Whole Number Place Value & Operations; Volume — 3 Weeks

Students will build on their work from Fourth grade using various strategies based on place value to multiply and divide multi-digit whole numbers. Students will only be scored on four digits by one digit in first quarter. They will continue to use these different strategies (i.e. area model, base ten model, array, etc.) throughout the year to solidify their understanding until the standard algorithm is applied in the fourth quarter. Students will experience finding volume of rectangular prisms and understand concepts related to volume. Notation for finding volume will develop from these experiences.

Essential Questions:

How are place value patterns repeated in numbers?

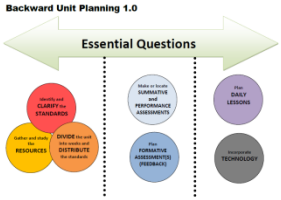
How can place value help me multiply and divide?

How do I solve real-world problems involving volume?

Number and Operations in Base Ten	
Understand the place value system.	
5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
Perform operations with multi-digit whole numbers and with decimals to hundredths.	
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
	Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.
Measurement and Data	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
	a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
	b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
	a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
	b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
	c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
Operations and Algebraic Thinking	
Write and interpret numerical expressions.	
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

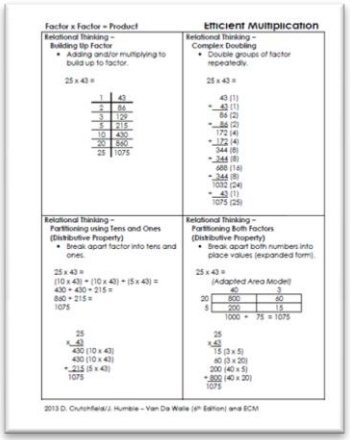
Rogers Public Schools | Revised 5-14-13

Identify and CLARIFY the STANDARDS

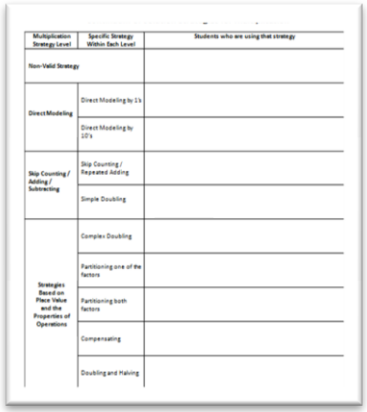


Whole numbers only …not decimals this quarter

Focus on strategies based on place value /fluent by 4th quarter



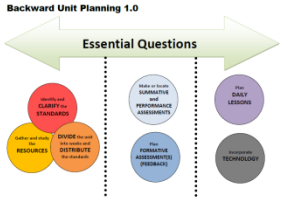
4th grade develops ideas for area and perimeter. Volume is the focus for 5th grade.
Students need to develop the ideas of volume using models and equations



This can be brought out during # talks and posing of problems. In this unit you would pose multiplication and measurement division problems with multiples of 10 in each group.

Build order of operations through discussions (connecting strategies to notation)

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



A	B	C	D	E	F	G	H	I	J	K	L	M
Fifth Grade: Whole Number Place Value and Operations; Volume (Unit 1: 3 Weeks)					Fifth Grade: Whole Number Place Value and Operations; Volume (Unit 1: 3 Weeks)							
Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?					Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?							
Common Core State Standards	**Understand the place value system. 5.NBT.1 Depth opportunity** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	**Understand the place value system. 5.NBT.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	**Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.5** Fluently multiply multi-digit whole numbers using the standard algorithm. *Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.*	**Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.6 Depth opportunity** Find whole-number quotients of whole numbers with up to four-digit dividends and two-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	Common Core State Standards	**Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **(a)** A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	**Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **(b)** A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	**Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.4** Measure volumes by counting unit cubes, us cubic cm, cub cubic ft, and improvised u	**Geometric measurement: understand concepts of volume and relate volume multiplication and addition. 5.MD.5 Depth opportunity** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **(a)** Find the volume of a right rectangular prism with whole- equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as	**volume to multiplication and addition. 5.MD.5 Depth opportunity** Relate volume to the operations of the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of	**addition. 5.MD.5 Depth opportunity** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **(c)** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts,	brackets, or braces in numerical expressions, evaluate expressions w these symbols.
Week 1:	x	x	X fluency		Week 1:							# talks
Week 2:			X fluency	X	Week 2:							# talks
Week 3:			X fluency		Week 3:	X	X	X	X	X	X	# talks
Goal Statements					Goal Statements							
Notes	MP2,7 Whole numbers only_not decimal		fluency_push strategies	MP1,5 4 digit by 1 digit Use efficient strategies to push base 10	Notes	MP 7	MP 7	MP 7				group

Page 1 Page 2 Page 3

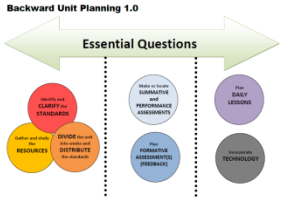
5.0A.1 AND 2 Are imbedded in # talks

In-depth standards

Mathematical practices are match with standards on how they will be assessed in PARCC and how it lends itself to that standard

Clustering of standards that are taught and assessed for coherence

Identify and CLARIFY the STANDARDS



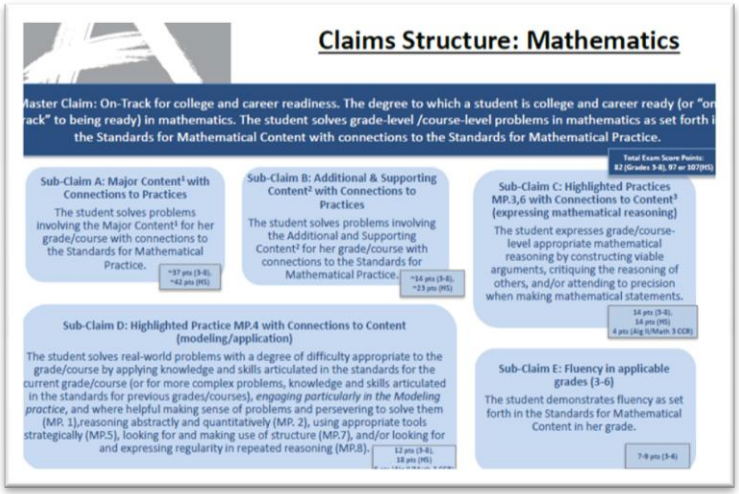
[PARCC Blueprints and Specs]

[PARCC Performance Level Descriptors]

of Evidence	PBA	EOY	Evidence Statement Text	Clarifications	MP		Level 5 : Distinguished	Level 4: Stong Command	Level 3: Moderate	Level 2: Pa
NBT.5-1	x		Multiply multi-digit algorithm.	...plicitly assess fluency. ii) The given factors are such as to require an efficient/standard algorithm (e.g., 726-48). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 725 - 40). iii) Tasks do not have a context. iv) For purposes of assessment, the possibilities are 2-digit x 3-digit.		Multiply with Whole Numbers 5.NBT.5-1 5.Int.1 5.Int.2 5.NBT.Int.1	Solves ... unscaffolded word problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.	... problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. **Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.**	... problems involving multiplication **of a three-digit by a one-digit whole number.**	Solves one-... problems in... multiplicatio...
5.Int.1		x	Solve one-step word problems involving multiplying multi-digit whole numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 726 × 4871). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 × 400). ii) For purposes of assessment, the possibilities are3-digit × 4-digit.	1, 7					
5.Int.2		x	Solve word problems involving three two-digit	i) The given factors are such as to require an efficient/standard algorithm (e.g., 76 × 48 × 39). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 50 × 20 ×15).	1, 7					
			...of whole numbers with up to four-digit dividends and two-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.	i) Tasks do not require students to illustrate or explain. ii) Tasks involve 3- or 4-digit dividends and one- or two-digit divisors.	1, 5	**Quotients and Dividends** 5.NBT.6 5.NBT.Int.1	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and	Divides whole numbers up to four-digit dividends and **two-digit** divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and	Divides whole numbers up to **four-digit** dividends and one-digit divisors which are multiples of ten using strategies based on place value, the properties of operations and/or the relationship between	Divides wh... up to three-... and one-dig... which are n... using strate... place value... of operatior... relationshig...

Major, Supporting, and Additional Standards

In-depth Standards



Fifth Grade: Whole Number Place Value and Operations; Volume (Unit 1: 3 Weeks)

Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?

Common Core State Standards	Understand the place value system. 5.NBT.1 Depth opportunity Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	Understand the place value system. 5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. *Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.*	Perform operations with multi-digit whole numbers and with decimals to hundredths. 5.NBT.6 Depth opportunity Find whole-number quotients of whole numbers with up to four-digit dividends and two-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
Week 1:	X	X		
Week 2:			X fluency	
Week 3:			X fluency	X
Goal Statements			X fluency	
Notes	MP2,7 Whole numbers only_not decimal		fluency_push strategies	MP1,5 4 digit by 1 digit Use efficient strategies to push base 10

Page 1

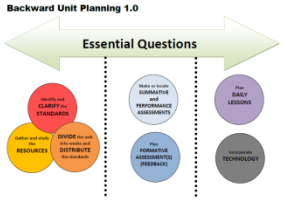
Fifth Grade: Whole Number Place Value and Operations; Volume (Unit 1: 3 Weeks)

Essential Questions: How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?

Common Core State Standards	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (a) A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (b) A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (a) Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (b) Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of	Geometric measurement: understand concepts of volume and relate volume to multiplication and addition. 5.MD.5 Depth opportunity Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (c) Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts,	Write and interpret numerical expressions. 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, evaluate expressions w these symbols.
Week 1:							
Week 2:							
Week 3:	X	X	X	X	X	X	
Goal Statements							
Notes	MP 7	MP 7	MP 7	MP 5,7	MP 5,7	MP 2,5	MP 7 Para multiplication and Measurement Division with multiplier of 10 in each group

Page 2

Page 3



Identify and CLARIFY the STANDARDS

Statement of Evidence	PBA	EOY	Evidence Statement Text	Clarifications	MP		Level 5 : Distinguished Command	Level 4: Stong Command	Level 3: Moderate Command	Level 2: Partial
5.NBT.5-1	x		Multiply multi-digit numbers using the standard algorithm.	i)Tasks do not explicitly assess fluency. II) The given factors are such as to require an efficient/standard algorithm (e.g., 726-48). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 725 - 40). iii) Tasks do not have a context. iv) For purposes of assessment, the possibilities are 2-digit x 3-digit.		**Multiply with Whole Numbers** 5.NBT.5-1 5.Int.1 5.Int.2 5.NBT.Int.1	Solves **multi-step** unscaffolded word problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.	Solves two-step **unscaffolded** word problems involving multiplication and multiplies three-digit by **two-digit** whole numbers using the standard algorithm. **Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.**	Solves two-step scaffolded word problems involving multiplication **of a three-digit by a one-digit whole number.**	Solves one-step problems involv multiplication.
5.Int.1		x	Solve one-step word problems involving multiplying multi-digit whole numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 726 × 4871). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 × 400). ii) For purposes of assessment, the possibilities are3-digit × 4-digit.	1, 7					
5.Int.2		x	Solve word problems involving three two-digit numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 76 × 48 × 39). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 50 × 20 ×15).	1, 7					
5.NBT.6		x	**Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.**	i) Tasks do not require students to illustrate or explain. ii) Tasks involve 3- or 4-digit dividends and one- or two-digit divisors.	1, 5	**Quotients and Dividends** 5.NBT.6 5.NBT.Int.1	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and **two-digit** divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to **four-digit** dividends and one-digit divisors which are multiples of ten using strategies based on place value, the properties of operations and/or the relationship between multiplication and	Divides whole up to three-digit and one-digit di which are multi using strategies place value, the of operations ar relationship bet multiplication ar

Mathematical Practices Look-fors

MP.7: Look for and make use of structure.
[how numbers and shapes are organized]

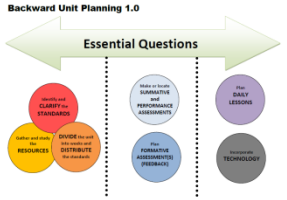
The Math Task:	The Student:	The Teacher:
• Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation	• Recognizes that quantities can be represented in different ways • Uses properties of operations to make sense of problems • Recognizes how numbers and shapes are organized • Looks for patterns and structures in the number system • Justify strategy for basic facts • Uses models to prove equations • Recognize how symbols help represent relationships and can be applied to new situations	• Gives students time to discuss connections • Brings students back to the rule or properties being used • Helps students look for patterns and structures in the number system • Helps make connections between the structure used, equation, student thinking, and content standard • Helps make connections to real world

[from- Implementing Standards-Based Mathematics Instruction. Stein, Smith Henningsen & Silver, 1998]

MP #8: Look for and express regularity in repeated reasoning.
[number pattern]

The Math Task:	The Student:	The Teacher:
• Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation	• Notices number patterns • Notices if calculations are repeated • Applies more efficient computation strategies using number patterns • Looks both for general methods and for shortcuts	• Encourages students to connect task to prior concepts taught • Helps make connections between pattern, equation, student thinking, and content standard

New Learning Unit 1

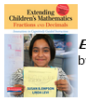


Week	Standards	Structure/Resource
1	5.NBT.1 A digit in one place represents 10 times as much… 5.NBT.2 Explain patterns in number of zeros when multiplying by powers of 10 5.NBT.5 Fluent multiply multi digit numbers pushing strategies 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions	Push strategies using base 10 (multiplication) ECM problems (# in each group is a multiple of 10) Number Talks and problem discussion Look online at unit resources and choose those related to the standards being taught each week.
2	5.NBT.1 A digit in one place represents 10 times as much… 5.NBT.2 Explain patterns in number of zeros when multiplying by powers of 10 5.NBT.6 Find whole number quotients 4 digit by 1 digit 5.OA.1 Use parentheses, brackets, or brace 5.OA.2 Write simple expressions	Push strategies using Base 10 (measurement division) ECM measurement division problems (number in each group is a multiple of 10) Number Talks and problem discussion Look online at unit resources and choose those related to the standards being taught each week.
3	5.MD.3 Cubic Units 5.MD.4 Counting Cubic Units 5.MD.5 Connecting packing to the formula 5.OA.1 Tie to 5.MD.5 Through use of properties of operations 5.OA.2 Tie to 5.MD.5 through use of properties of operations	Look online at unit resources and choose those related to the standards being taught each week. https://grade5commoncoremath.wikispaces.hcpss.org/Grade+5+Home http://www.engageny.org/resource/grade-5-mathematics

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

Exemplars Resources - Unit 1
Technology Resources
Games and Activities
Literature Connections
Number Talks for Unit 1
Assessments

Lesson Resources



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

Student Recording Sheets for problems
The following documents are student recording sheets for problems presented in Chapter 7. "Multiplication and Measurement Division problems with larger numbers can engage students in thinking about base-ten number concepts beyond two-digit numbers." p.152 (5.NBT.1, 5.NBT.2)
Mr. Jones (p. 152)
Crystal Clear Water Company (p. 152)
Photospot Mega-Servers (p. 152)
Habitat for Humanity (p. 152)
National Debt (p. 153)

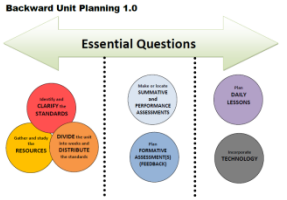
The Box Factory
This Contexts for Learning Mathematics unit focuses on deepening and extending students' understanding of multiplication and the extension of student's understanding of two-dimensional rectangular arrays to three dimensional arrays within rectangular prisms. Students work with these big ideas: properties of multiplication; dimensions of length and width can be used to produce a sq unit of area for rectangles; dimensions of length, width, and height can be used to produce a cubic unit of measurement; surface area of rectangular solids increase as the measures of the 3-Dimensions diverge. 10 lessons (5.MD.3, 5.MD.4, 5.MD.5)

Lessons, Tasks, and Investigations The following lessons were written by the *Georgia Department of Education* and correspond with the standards in this unit. Some lessons may require additional days.

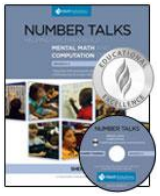
Powers of Ten and Exponents
Patterns R Us Part 1
Power-ful Exponents

Multiplication and Division
Multiplication Three in a Row
Division Four in a Row
Patterns R Us Part 2

Area and Volume
Differentiating Area and Volume
How Many Ways
Exploring with Boxes



Gather and study the RESOURCES



Parents | Students | Staff

Home | District | K-5 Curriculum | 6-8 Curriculum | 9-12 Curriculum | Calendar | Assessment | PD | Employment | Links

Intranet » K-5 Curriculum » 5th Grade Curriculum » Math » Curricular and Instructional Resources » Whole Number Place Value & Operations; Volume

Whole Number Place Value & Operations; Volume
Planning Options
Lesson Resources
Technology Resources
Games and Activities
Literature Connections
Number Talks for Unit 1
Assessments
Understanding Multiplication & Division of Fractions

Whole Number Place Value & Operations; Volume

3 weeks

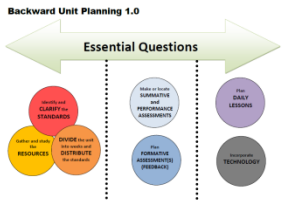
Students will build on their work from Fourth grade using various strategies based on place value to multiply and divide multi-digit whole numbers. Students will only be scored on four digits by one digit in first quarter. They will continue to use these different strategies (i.e. area model, base ten model, array, etc.) throughout the year to solidify their understanding until the standard algorithm is applied in the fourth quarter. Students will experience finding volume of rectangular prisms and understand concepts related to volume. Notation for finding volume will develop from these experiences.

Essential Questions

How are place value patterns repeated in numbers?

How can place value help me multiply and divide?

How do I solve real world problems involving volume?



5th Math, Unit1 (3 weeks) Whole Number Place Value & Operations; Volume

Unit 1: Instructional Strategies and Background Knowledge for 5th Grade Math CCSS

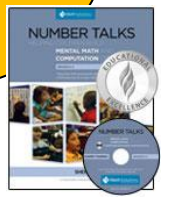
Students will build on their work from Fourth grade **using various strategies based on place value to multiply and divide multi-digit whole numbers**. Students will only be scored on **four digits by one digit** in first quarter. They will continue to use these different strategies (i.e. area model, base ten model, array, etc.) throughout the year to solidify their understanding until the standard algorithm is applied in the fourth quarter. Students will **experience finding volume** of rectangular prisms and understand concepts related to volume. Notation for finding volume will develop from these experiences.

How are place value patterns repeated in numbers? How can place value help me multiply and divide? How do I solve real-world problems involving volume?

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday
# Talks that push fluency	During # talks you will want to use the area model , rectangular arrays and base 10 models, # talks . You will also want to focus on the power of 10. You will want students to use the notation of finding volume **5.NBT.5** Use area model rectangular arrays, and base 10 models **5.OA.1 5.OA2** Resource Guide for using *Number Talks* in Unit 1 Supplemental Number Talks for Unit 1 Number Talks Resources for 3rd-5th Grades				
Standards/MP	**5NBT1 (2,7),** 5NBT2 (2,7), 5NBT5 (F), 5OA1 (7), 5OA2 (7)				
Goal and Task:	I use my understanding of place value understanding to solve problems. I see patterns when I multiplying by multiples of 10.				
Lesson *4-digit by 1-digit multiplication problems with multiples of 10 in each group. *Build order of operation through discussion and Minds on Math	(4 x 100) (25 X 100) (258 x 100)	(8 x 1000) (26 X 1000) (478 X 1000)	(36,000 x 10) (30,450 x 10) (14,560 X 100)	Foldable for exponents 100 x 100 1000 x 1000 $10^3 \times 10^5$ $10^2 \times 10^4$ $3 \times 10^3 \bigcirc 4 \times 10^2$ $4 \times 10^4 \bigcirc 7 \times 10^5$	9×10^3 720×10^4 4025×10^3 $10^4 = 40000$
Fluency/ Assessment	**5.NBT.5** Make the Largest Product Make the Smallest Product **5.NBT.2** Multiplying a Whole Number by a Power of 10 Dividing a Whole Number by a Power of 10 **Assessment of learning**				

Gather and study the

RESOURCES



Assessment Tasks

External Measures

State Tests

District Tests

Classroom
Assessment Tasks

FORMATIVE
Provides instructive feedback about progress intended for improvement

- **observation**
- **assignments & quizzes**
- **student self- assessment**

SUMMATIVE
Provides summary of achievement at a point in time

- **performance tasks**
- **tests for comprehension and thinking**
- **end of unit tests**

Evaluating Student Performance

Grading & Record Keeping
for Improvement

Grade Books

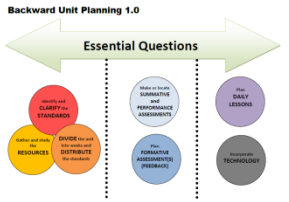
Reporting

Report Cards
Progress Reports

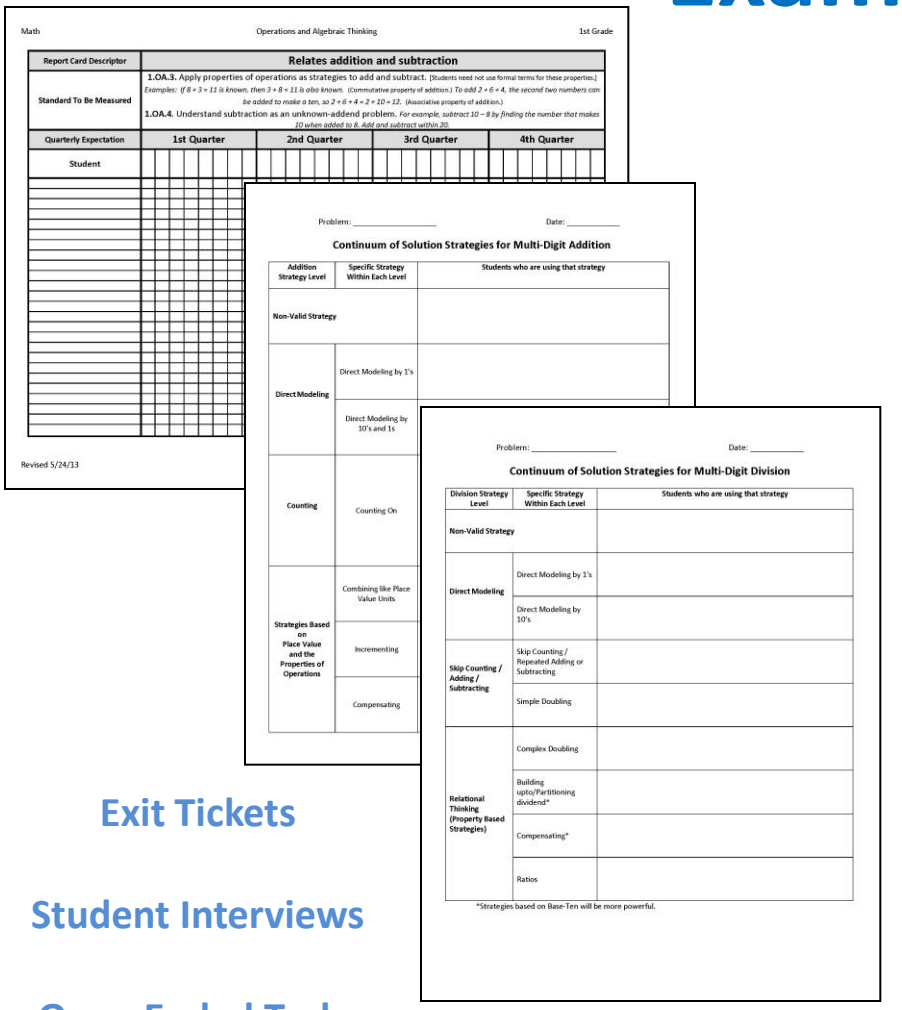
One Teacher at a Time (Pollock, 2007)

Formative Assessment *is used during the learning process. It's purpose is to inform the teacher and the students how well the learning is going.*

- Anne R. Reeves



Examples:



Math — Operations and Algebraic Thinking — 1st Grade

Report Card Descriptor	Relates addition and subtraction
Standard To Be Measured	**1.OA.3.** Apply properties of operations as strategies to add and subtract. (Students need not use formal terms for these properties.) *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* **1.OA.4.** Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.*

Quarterly Expectation	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Student				

Revised 5/24/13

Problem: _____ Date: _____

Continuum of Solution Strategies for Multi-Digit Addition

Addition Strategy Level	Specific Strategy Within Each Level	Students who are using that strategy
Non-Valid Strategy		
Direct Modeling	Direct Modeling by 1's	
	Direct Modeling by 10's and 1s	
Counting	Counting On	
Strategies Based on Place Value and the Properties of Operations	Combining like Place Value Units	
	Incrementing	
	Compensating	

Problem: _____ Date: _____

Continuum of Solution Strategies for Multi-Digit Division

Division Strategy Level	Specific Strategy Within Each Level	Students who are using that strategy
Non-Valid Strategy		
Direct Modeling	Direct Modeling by 1's	
	Direct Modeling by 10's	
Skip Counting / Adding / Subtracting	Skip Counting / Repeated Adding or Subtracting	
	Simple Doubling	
Relational Thinking (Property Based Strategies)	Complex Doubling	
	Building upto/Partitioning dividend*	
	Compensating*	
	Ratios	

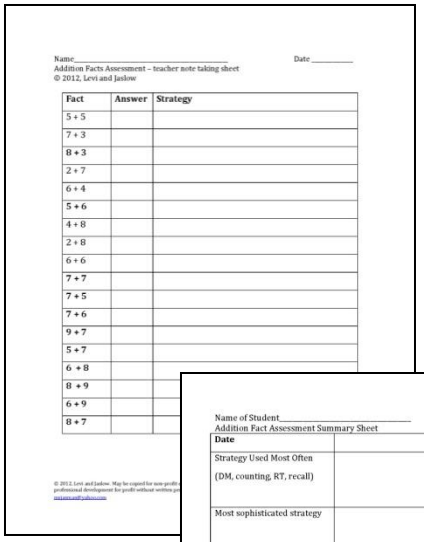
*Strategies based on Base-Ten will be more powerful.

Exit Tickets

Student Interviews

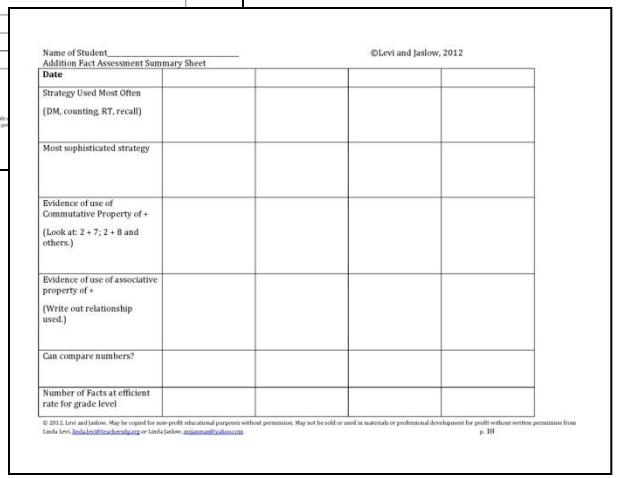
Open Ended Tasks

Fact Fluency Interviews/Assessment



Name_____ Date _____
Addition Facts Assessment – teacher note taking sheet
© 2012, Levi and Jaslow

Fact	Answer	Strategy
5 + 5		
7 + 3		
8 + 3		
2 + 7		
6 + 4		
5 + 6		
4 + 8		
2 + 8		
6 + 6		
7 + 7		
7 + 5		
7 + 6		
9 + 7		
5 + 7		
6 + 8		
8 + 9		
6 + 9		
8 + 7		



Name of Student_____ ©Levi and Jaslow, 2012
Addition Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, counting, RT, recall)				
Most sophisticated strategy				
Evidence of use of Commutative Property of + (Look at: 2 + 7; 2 + 8 and others.)				
Evidence of use of associative property of + (Write out relationship used.)				
Can compare numbers?				
Number of Facts at efficient rate for grade level				

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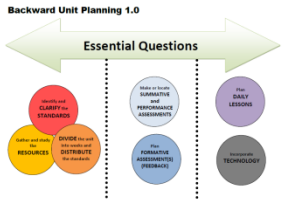
Plan FORMATIVE ASSESSMENT(S)

Summative Assessment *are*



Examples:

Plan Summative Assessment(S)

Fifth Grade: Whole Number Place Value and Operations; Volume (Unit 1: 3 weeks)

1. The following equations involve different quantities and use different operations, yet produce the same result. Show and explain why this is true.

$413 \times 10^2 = 4130$ $4{,}130{,}000 \div 10^2 = 4130$

2. Solve the equation below

a. $432 \div 7 =$_____

Explain how estimation will help check the reas

a. $432 \div 7 =$_____

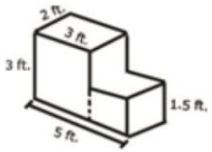
Fifth Grade: Whole Number Place Value and Operations; Vo

3.

a. A rectangular container that has a length of 30 cm, a width of 20
Calculate the volume and label in cubic units.

b. The rectangular container from Part A is filled with water to a de
additional 6.5 liters of water is poured into the container, some
liters of water overflow the container? Use words, pictures, and
answer. **(Remember 1 cm³ = 1 mL)**

4. Calculate the volume and label in cubic units. Write and explain you



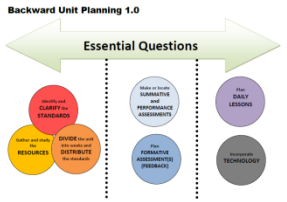
A Progression Toward Mastery

Assessment Task Item and Standards Assessed	STEP 1 Little evidence of reasoning without a correct answer. (1 Point)	STEP 2 Evidence of some reasoning without a correct answer. (2 Points)	STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)	STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)
1 5.NBT.1 5.NBT.2	The student is unable to provide a correct response.	The student attempts but is not able to accurately show or explain reasoning fully.	The student correctly shows but does not show full reasoning, or explains reasoning fully. Work may not match explanation	The student correctly: • Shows movement of digits. • Explains movement of units to the left for multiplication and movement of units to the right for division.
2 5.NBT.1 5.NBT.2 5.NBT.6	The student is unable to solve and estimate either the dividend or the divisor to a one-digit fact.	The student solves and estimates the dividend and divisor, but not to a one-digit fact.	The student correctly solves and estimates to a one-digit fact for either Part (a) or Part (b).	The student correctly solves and estimates both Part (a) and Part (b) to a one-digit fact. estimate a. $420 \div 70 = 6$ b. $1200 \div 600 = 2$ Solve a. and b.
3 A & B 5.MD.3 5.MD.5	The student is unable to find the volume of the water that has overflowed and is unable to explain the reasoning used.	The student finds the volume of the water that has overflowed, but is unable to explain the reasoning used.	The student makes a calculation error in finding the volume of the water that has overflowed, but is able to clearly explain the reasoning used.	The student finds the volume of the water that has overflowed to be 1.1 L and uses words, numbers, and pictures to clearly explain the reasoning used.
4 5.MD.4 5.MD.5	The student is unable to find the volume and write the equation	The student can to find the volume but and not write the equation	The student makes a calculation error in finding the volume, but is able to write the equation	The student finds the volume and writes the correct equation

Exit Tickets

Student Interviews

Open Ended Tasks



R.P.S. Common Core Math Curriculum | 5th Grade

Unit 2 – Understanding Multiplication & Division of Fractions (p. 1 of 2) **6 W**

Students will understand the relationship between fractions and division and use multiplicative relationships to
problems. They will begin by solving *equal sharing* problems with answers that are mixed numbers and
with answers that are fractions less than 1. Students will represent their solutions with equations
addition and multiplication and reflecting a multiplicative understanding of fractions. After
will solve *multiple groups* problems where the number of groups is a whole number a
less than 1 or a mixed number. Emphasis should be on student strategies that use multip
problems. Students will then solve open number sentences that focus on the relationship betw
numbers, for example: 8 x ¾ =? ? X ¾ = 15 ? X 1 ¼ = 25

Essential Questions:

How can I use my understanding of multiplication and division to solve real world problems involving multiplication and division of fractions?

How can I use information from the line plot to solve problems involving operations with fractions?

Number and Operations - Fractions	
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	
5.NF.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
	b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
5.NF.5	Interpret multiplication as scaling (resizing), by:
	a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
	b. Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n×a)/(n×b)* to the effect of multiplying *a/b* by 1.
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
	b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*
	c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Rogers Public Schools | Revised 5-30-13

Essential Questions

1. ***How can I use my understanding of multiplication and division to solve real world problems involving multiplication and division of fractions?***

2. ***How can I use information from the line plot to solve problems involving operations with fractions?***

R.P.S. Common Core Math Curriculum — 5th Grade

Unit 2 – Understanding Multiplication & Division of Fractions (p. 1 of 2) — 6 Weeks

Students will understand the relationship between fractions and division and use multiplicative relationships to solve problems. They will begin by solving *equal sharing* problems with answers that are mixed numbers and then solve problems with answers that are fractions less than 1. Students will represent their solutions with equations, with an emphasis on linking addition and multiplication and reflecting a multiplicative understanding of fractions. After *equal sharing* problems, students will solve *multiple groups* problems where the number of groups is a whole number and the number in each group is a fraction less than 1 or a mixed number. Emphasis should be on student strategies that use multiplicative relationships to solve these problems. Students will then solve open number sentences that focus on the relationship between fractions and whole numbers, for example: 8 x ¾ = ? ? X ¾ = 15 ? X 1 ¾ = 25

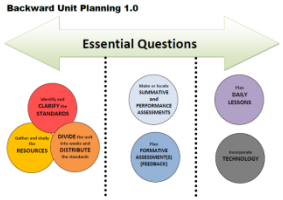
Essential Questions:

How can I use my understanding of multiplication and division to solve real world problems involving multiplication and division of fractions?

How can I use information from the line plot to solve problems involving operations with fractions?

Number and Operations - Fractions	
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	
5.NF.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
	a. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
5.NF.5	Interpret multiplication as scaling (resizing), by:
	a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
	b. Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
	a. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*
	c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Identify and CLARIFY the STANDARDS



Pose equal sharing problems .
Equal Sharing problem types:
# of objects is greater than the # of shares that result in a mixed number
# of shares is greater than the # of objects that result in a proper fraction

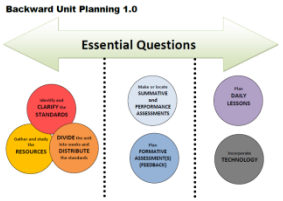
Finding area using fractions

Scaling-this is during the entire unit…part of discussions when checking for reasonableness of answers

Whole Number x Fraction
Whole Number ÷ Fraction
May involve area
Multiple Groups problem types:
Whole number x unit fraction (Multiplication…8 x ¼= ___)
Whole number x unit fraction (Measurement Division…___ x ¼ = 2)
Whole number x non-unit fraction (Multiplication…8 x ¾ = ___)
Whole number x non-unit fraction (Measurement Division… ___ x ¾ = 6)

R.P.S. Common Core Math Curriculum — 5th Grade

Unit 2 – Understanding Multiplication & Division of Fractions (p. 2 of 2)



Identify and CLARIFY the STANDARDS

Measurement and Data	
Represent and interpret data.	
5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*
Number and Operations in Base Ten	
Perform operations with multi-digit whole numbers and with decimals to hundredths.	
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
	Minimum expectation: Standard algorithm is not expected to be applied until 4th quarter.
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.
Operations and Algebraic Thinking	
Write and interpret numerical expressions.	
These standards will not be taught in isolated lessons, but will be addressed during Number Talks and Problem Solving discussion and notation.	
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Denominators are limited to ½,1/4,1/8

Posing of math problems/ approach during number talks and equal sharing problems

5.NBT.6 in this quarter is 4 digit X 1 digit

This can be brought out during # talks and posing of problems. In this unit you would pose equal sharing and multiple group problems.

Build order of operations through discussions (connecting strategies to notation)

Equal Sharing problem types:

- # of objects is greater than the # of shares that result in a mixed number
- # of shares is greater than the # of objects that result in a proper fraction

Multiple Groups problem types:

- Whole number x unit fraction (Multiplication…8 x ¼= ___)
- Whole number x unit fraction (Measurement Division…___ x ¼ = 2)
- Whole number x non-unit fraction (Multiplication…8 x ¾ = ___)
- Whole number x non-unit fraction (Measurement Division… ___ x ¾ = 6)

Fifth Grade: Understanding Multiplication and Division of Fractions (Unit 2: 6 Weeks)

Essential Questions: How can I use my understanding of multiplication and division to solve real world problems involving multiplication and division of fractions?

Common Core State Standards	**Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.3 (1)** Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). **(2)** Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	**Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.4 Depth opportunity** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **(b)** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.5** Interpret multiplication as scaling (resizing), by: **(a)** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	**Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.5** Interpret multiplication as scaling (resizing), by: **(b)** Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a)/(n×b) to the effect of multiplying a/b by 1.	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.6 (1) Solve real world problems involving multiplication of fractions and (2) mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	**Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **(b)** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.7 Apply and previous understandings of divide unit fractions by wh numbers and whole numb fractions. (c) Solve real wo problems involving divisio fractions by non-zero whol and division of whole num fractions, e.g., by using vis models and equations to r the problem. *For example, chocolate will each person people share 1/2 lb of choc equally? How many 1/3-c are in 2 cups of raisins?*
Week 4:	X Equal Sharing problems		X	X			
Week 5:	**X Equal Sharing problems**		X	X			
Week 6:		X	X	X	X	X	X
Week 7:		X	X	X	X	X	X
Week 8:	**X Equal Sharing problems**	X	X	X	X	X	X
Week 9:			X	X			
Goal Statements							
Notes	**MP 2 -5.NF.3 (1) Interpret** **MP 1,4,5 -5.NF.3 (2) Solve**	**MP2,5** **Area**	**MP 7,8** **Part of discussion when checking for reasonableness of answer**		**MP1,4,5 -5.NF.5-1** **MP1,2,5 -5.NF.5-2** **whole number X fraction** **whole number divided by fraction**	**MP 5,7** **whole number X fraction** **whole number divided by fraction** **May involve area**	**MP 2,5,7**

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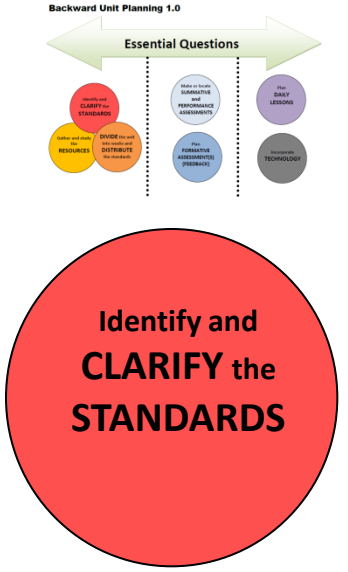
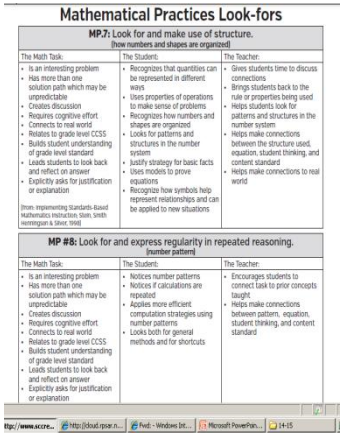
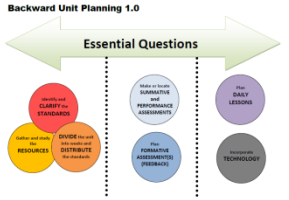


Statement of Evidence	PBA	EOY	Evidence Statement Text	Clarifications	MP		Level 5 : Distinguished Command	Level 4: Stong Command	Level 3: Moderate Command	Level 2: Partial
5.NBT.5-1	x		Multiply multi-digit numbers using the standard algorithm.	i)Tasks do not explicitly assess fluency. II) The given factors are such as to require an efficient/standard algorithm (e.g., 726-48). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 725 - 40). iii) Tasks do not have a context. iv) For purposes of assessment, the possibilities are 2-digit x 3-digit.		**Multiply with Whole Numbers** 5.NBT.5-1 5.Int.1 5.Int.2 5.NBT.Int.1	Solves **multi-step** unscaffolded word problems involving multiplication and multiplies three-digit by two-digit whole numbers using the standard algorithm. Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.	Solves two-step **unscaffolded** word problems involving multiplication and multiplies three-digit by **two-digit** whole numbers using the standard algorithm. **Performs exact and approximate multiplications and divisions by mentally applying place value strategies when appropriate.**	Solves two-step scaffolded word problems involving multiplication **of a three-digit by a one-digit whole number.**	Solves one-step problems involv multiplication.
5.Int.1		x	Solve one-step word problems involving multiplying multi-digit whole numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 726 × 4871). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 × 400). ii) For purposes of assessment, the possibilities are3-digit × 4-digit.	1, 7					
5.Int.2		x	Solve word problems involving three two-digit numbers.	i) The given factors are such as to require an efficient/standard algorithm (e.g., 76 × 48 × 39). Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 50 × 20 ×15).	1, 7					
5.NBT.6		x	**Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.**	i) Tasks do not require students to illustrate or explain. ii) Tasks involve 3- or 4-digit dividends and one- or two-digit divisors.	1, 5	**Quotients and Dividends** 5.NBT.6 5.NBT.Int.1	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and **two-digit** divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to **four-digit** dividends and one-digit divisors which are multiples of ten using strategies based on place value, the properties of operations and/or the relationship between multiplication and	Divides whole up to three-digit and one-digit di which are multi using strategies place value, the of operations ar relationship bet multiplication ar



New Learning Unit 2

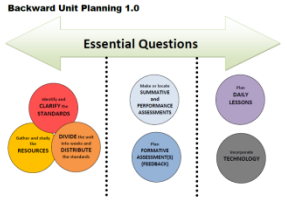
Week	Standards	Structure/Resource
1	5.NF.3 5.NF.5A During discussion 5.NF.5B During discussion 5.NBT.6 *(4 digit X 1 digit)* 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions (push strategies using base 10 division)	Pose equal sharing problems Whole number divided by whole number = whole number Whole number divided by whole number= mixed number Whole number divided by whole number=fraction
2	5.NF.3 5.NF.5A During discussion 5.NF.5B During discussion 5.NBT.6 *(4 digit X 1 digit)* 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions (push strategies using base 10 division)	Pose equal sharing problems Whole number divided by whole number = whole number Whole number divided by whole number = mixed number Whole number divided by whole number = fraction
3	5.NF.4 5.NF.6 5.NF.7 5.NF.5A During discussion 5.NF.5B During discussion 5.NBT.5 5.NBT.6 *(4 digit X 1 digit)* 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions (push strategies using base 10 division)	Multiple group problems Whole number x fraction Fluency 4 digit divided by 1 digit (number talks)



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

Layer in Continuous Standards

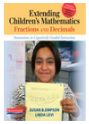
Week	Standards	Structure/Resource
4	5.NF.4 5.NF.6 (*4 digit X 1 digit)* 5.NF.7 5.NF.5A During discussion 5.NF.5B During discussion 5.NBT.5 5.NBT.6 *(4 digit X 1 digit)* 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions (push strategies using base 10 division)	Multiple group problems Whole number x fraction Fluency 4 digit divided by 1 digit (number talks)
5	5.NF.3 5.NF.4 5.NF.6 (*4 digit X 1 digit)* 5.NF.7 5.NF.5.A During discussion 5.NF.5.B During discussion 5.NBT.6 *(4 digit X 1 digit)* 5.OA.1 Use parentheses, brackets, or braces 5.OA.2 Write simple expressions (push strategies using base 10 division)	Look online at unit resources and choose those related to the standards being taught each week. https://grade5commoncoremath.wikispaces.hcpss.org/Grade+1+Home http://www.engageny.org/resource/grade-5-mathematics
6	5.MD.2 5.NF.5.A 5.NF.5.B	Denominators 1/8, ½, ¼ Look online at unit resources and choose those related to the standards being taught each week. https://grade5commoncoremath.wikispaces.hcpss.org/Grade+1+Home http://www.engageny.org/resource/grade-5-mathematics



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

Assessments
Number Talks for Unit 2
Planning Options

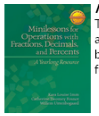
Lesson Resources



Extending Children's Mathematics: Fractions and Decimals
by Susan B. Empson and Linda Levi
This book is referenced throughout the unit and school year to guide your instruction with fractions. The authors share how a student's understanding of whole-number operations can be extended to fractions and decimals. Full of examples and student work, it provides rich understanding and insight to problem solving with fractions. Page xxiv provides correlation between this book and the CCSS.
Guide for Using Extending Children's Mathematics

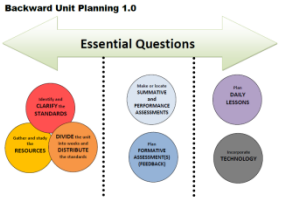
Instructional Progression of Fraction and Decimal Operations

Field Trips and Fundraisers: Introducing Fractions
This Contexts for Learning Mathematics unit introduces fractions and fair sharing through a series of investigations set in context of the fair sharing of submarine sandwiches on a field trip. Students work with these big ideas: fractions are relations - the size or amount of the whole matters; fractions may represent division with a quotient less than one; with unit fractions, the greater the denominator, the smaller the piece is; pieces don't have to be congruent to be equivalent; and for equivalence, the ratio must be kept constant. 10 days of lesssons (5.NF.3, 5.NF.4)



Minilessons for Operations with Fractions, Decimals, & Percents
This book contains minilessons that you can choose from as you consider the needs of your students and can be used through out the school year. These are more guided and explicit and were designed to be used at the start of your math instr
further details regarding the miniless

Contextual Problem Solving Situations In the tas
with fractions through contextual situations that will h
in a "suggested" instructional sequence that begins wit
strong intuitive understanding. Most students can dra
siblings or friends to help them solve these problems.
meaningful to students.



Gather and study the RESOURCES

Rogers Public Schools

Parents | Students | Staff

Home | District | K-5 Curriculum | 6-8 Curriculum | 9-12 Curriculum | Calendar | Assessment | PD | Employment | Links

Whole Number Place Value & Operations; Volume
Understanding Multiplication & Division of Fractions
Lesson Resources
Games and Activities
Assessments
Number Talks for Unit 2
Planning Options

Intranet » K-5 Curriculum » 5th Grade Curriculum » Math » Curricular and Instructional Resources » Understanding Multiplication & Division of Fractions

Understanding Multiplication & Division of Fractions

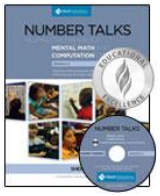
6 weeks

Students will understand the relationship between fractions and division and use multiplicative relationships to solve problems. They will begin by solving equal sharing problems with answers that are mixed numbers and then solve problems with answers that are fractions less than 1. Students will represent their solutions with equations, with an emphasis on linking addition and multiplication and reflecting a multiplicative understanding of fractions. After equal sharing problems, students will solve multiple groups problems where the number of groups is a whole number and the number in each group is a fraction less than 1 or a mixed number. Emphasis should be on student strategies that use multiplicative relationships to solve these problems. Students will then solve open number sentences that focus on the relationship between fractions and whole numbers, for example: 8 x ⅝ =? ? X ¾ = 15 ? X 1 ¼ = 25

Essential Questions

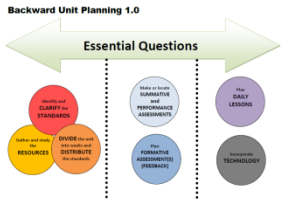
How can I use my understanding of multiplication and division to solve real world problems involving multiplication an division of fractions?

How can I use information from the line plot to solve problems involving operations with fractions?

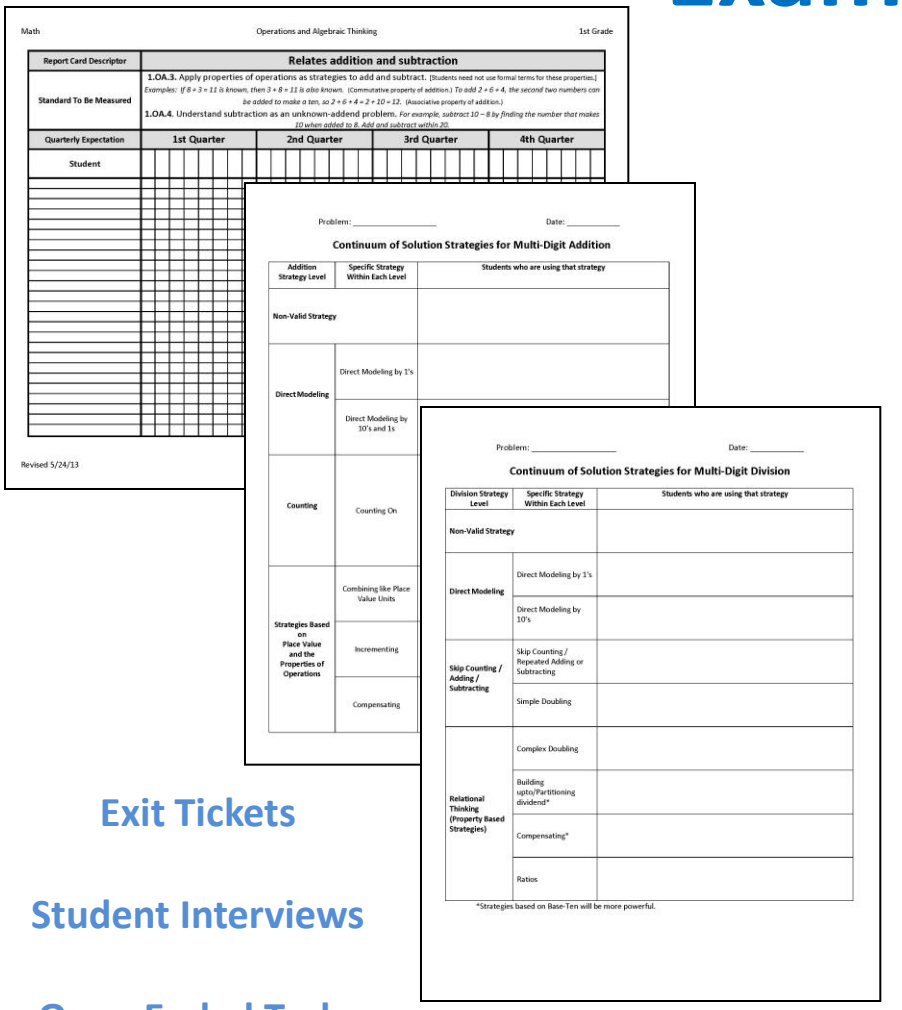


Formative Assessment *is used during the learning process. It's purpose is to inform the teacher and the students how well the learning is going.*

- Anne R. Reeves



Examples:



Math — Operations and Algebraic Thinking — 1st Grade

Report Card Descriptor	Relates addition and subtraction
Standard To Be Measured	**1.OA.3.** Apply properties of operations as strategies to add and subtract. (Students need not use formal terms for these properties.) *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* **1.OA.4.** Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.*

Quarterly Expectation	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Student				

Revised 5/24/13

Problem: _____ Date: _____

Continuum of Solution Strategies for Multi-Digit Addition

Addition Strategy Level	Specific Strategy Within Each Level	Students who are using that strategy
Non-Valid Strategy		
Direct Modeling	Direct Modeling by 1's	
	Direct Modeling by 10's and 1s	
Counting	Counting On	
Strategies Based on Place Value and the Properties of Operations	Combining like Place Value Units	
	Incrementing	
	Compensating	

Problem: _____ Date: _____

Continuum of Solution Strategies for Multi-Digit Division

Division Strategy Level	Specific Strategy Within Each Level	Students who are using that strategy
Non-Valid Strategy		
Direct Modeling	Direct Modeling by 1's	
	Direct Modeling by 10's	
Skip Counting / Adding / Subtracting	Skip Counting / Repeated Adding or Subtracting	
	Simple Doubling	
Relational Thinking (Property Based Strategies)	Complex Doubling	
	Building upto/Partitioning dividend*	
	Compensating*	
	Ratios	

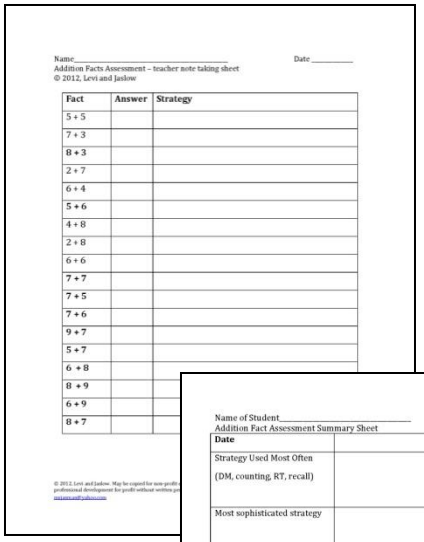
*Strategies based on Base-Ten will be more powerful.

Exit Tickets

Student Interviews

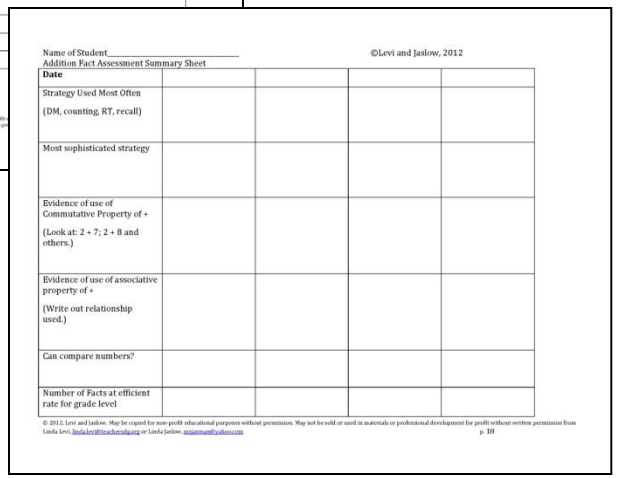
Open Ended Tasks

Fact Fluency Interviews/Assessment



Name_____ Date _____
Addition Facts Assessment – teacher note taking sheet
© 2012, Levi and Jaslow

Fact	Answer	Strategy
5 + 5		
7 + 3		
8 + 3		
2 + 7		
6 + 4		
5 + 6		
4 + 8		
2 + 8		
6 + 6		
7 + 7		
7 + 5		
7 + 6		
9 + 7		
5 + 7		
6 + 8		
8 + 9		
6 + 9		
8 + 7		



Name of Student_____ ©Levi and Jaslow, 2012
Addition Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, counting, RT, recall)				
Most sophisticated strategy				
Evidence of use of Commutative Property of + (Look at: 2 + 7; 2 + 8 and others.)				
Evidence of use of associative property of + (Write out relationship used.)				
Can compare numbers?				
Number of Facts at efficient rate for grade level				

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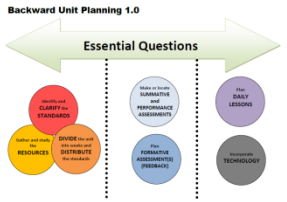
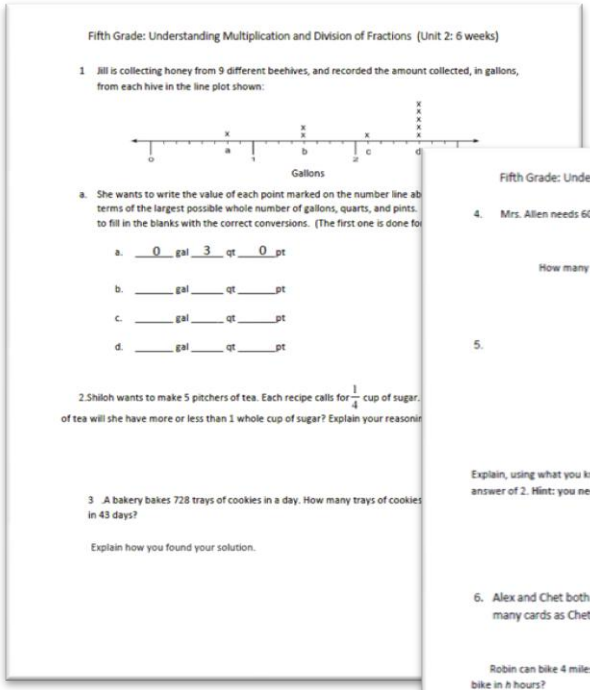
Plan FORMATIVE ASSESSMENT(S)

Summative Assessment *are*



Examples:

Plan Summative Assessment(S)



Fifth Grade: Understanding Multiplication and Division of Fractions (Unit 2: 6 weeks)

1 Jill is collecting honey from 9 different beehives, and recorded the amount collected, in gallons, from each hive in the line plot shown:

Gallons

a. She wants to write the value of each point marked on the number line ab terms of the largest possible whole number of gallons, quarts, and pints. to fill in the blanks with the correct conversions. (The first one is done fo

a. 0 gal 3 qt 0 pt

b. _____ gal _____ qt _____pt

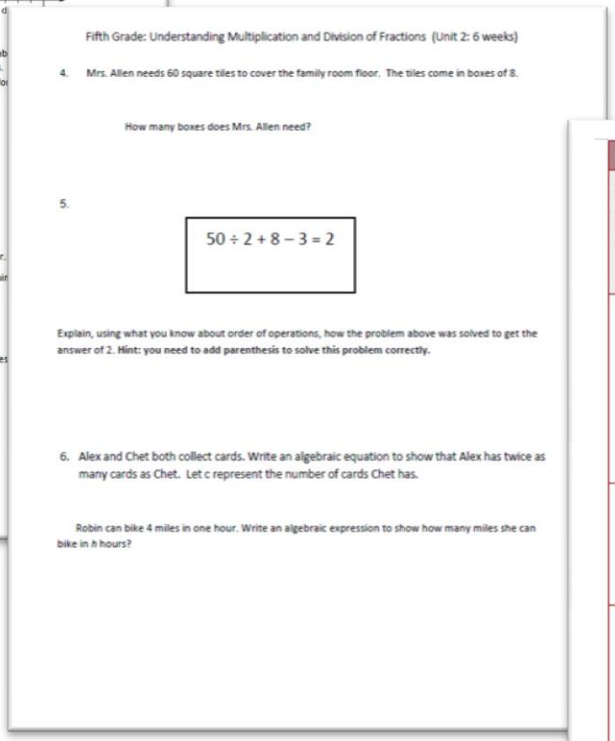
c. _____ gal _____ qt _____pt

d. _____ gal _____ qt _____pt

2.Shiloh wants to make 5 pitchers of tea. Each recipe calls for $\frac{1}{4}$ cup of sugar. of tea will she have more or less than 1 whole cup of sugar? Explain your reasonir

3 .A bakery bakes 728 trays of cookies in a day. How many trays of cookies in 43 days?

Explain how you found your solution.



Fifth Grade: Understanding Multiplication and Division of Fractions (Unit 2: 6 weeks)

4. Mrs. Allen needs 60 square tiles to cover the family room floor. The tiles come in boxes of 8.

How many boxes does Mrs. Allen need?

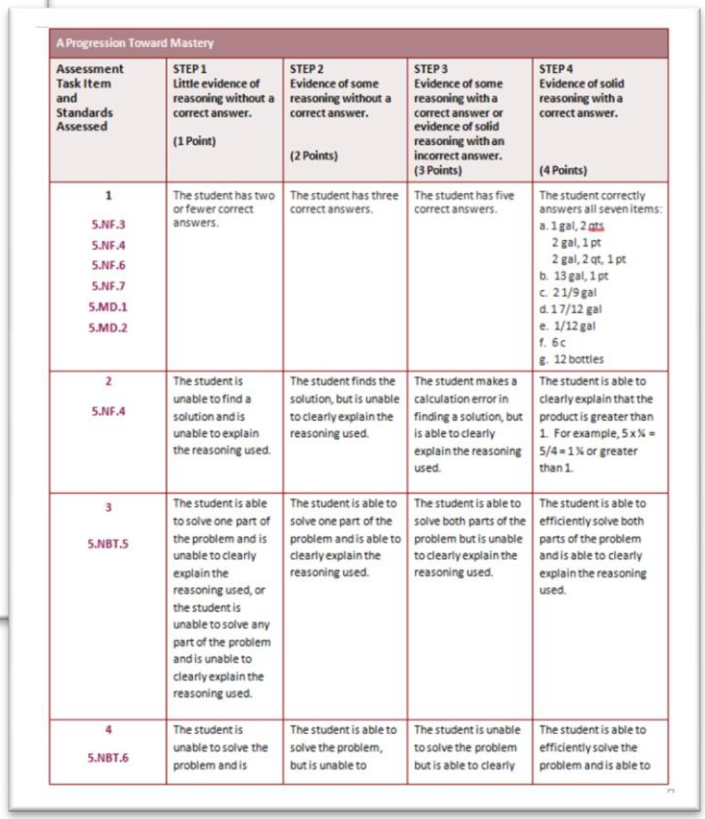
5.

$$50 \div 2 + 8 - 3 = 2$$

Explain, using what you know about order of operations, how the problem above was solved to get the answer of 2. **Hint: you need to add parenthesis to solve this problem correctly.**

6. Alex and Chet both collect cards. Write an algebraic equation to show that Alex has twice as many cards as Chet. Let c represent the number of cards Chet has.

Robin can bike 4 miles in one hour. Write an algebraic expression to show how many miles she can bike in *h* hours?



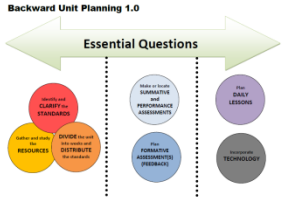
A Progression Toward Mastery

Assessment Task Item and Standards Assessed	STEP 1 Little evidence of reasoning without a correct answer. (1 Point)	STEP 2 Evidence of some reasoning without a correct answer. (2 Points)	STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)	STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)
1 5.NF.3 5.NF.4 5.NF.6 5.NF.7 5.MD.1 5.MD.2	The student has two or fewer correct answers.	The student has three correct answers.	The student has five correct answers.	The student correctly answers all seven items: a. 1 gal, 2 qts 2 gal, 1 pt 2 gal, 2 qt, 1 pt b. 13 gal, 1 pt c. 2 1/9 gal d. 1 7/12 gal e. 1/12 gal f. 6 c g. 12 bottles
2 5.NF.4	The student is unable to find a solution and is unable to explain the reasoning used.	The student finds the solution, but is unable to clearly explain the reasoning used.	The student makes a calculation error in finding a solution, but is able to clearly explain the reasoning used.	The student is able to clearly explain that the product is greater than 1. For example, 5 x ¾ = 5/4 = 1 ¼ or greater than 1.
3 5.NBT.5	The student is able to solve one part of the problem and is unable to clearly explain the reasoning used, or the student is unable to solve any part of the problem and is unable to clearly explain the reasoning used.	The student is able to solve one part of the problem and is able to clearly explain the reasoning used.	The student is able to solve both parts of the problem but is unable to clearly explain the reasoning used.	The student is able to efficiently solve both parts of the problem and is able to clearly explain the reasoning used.
4 5.NBT.6	The student is unable to solve the problem and is	The student is able to solve the problem, but is unable to	The student is unable to solve the problem but is able to clearly	The student is able to efficiently solve the problem and is able to

Exit Tickets

Student Interviews

Open Ended Tasks



Essential Questions

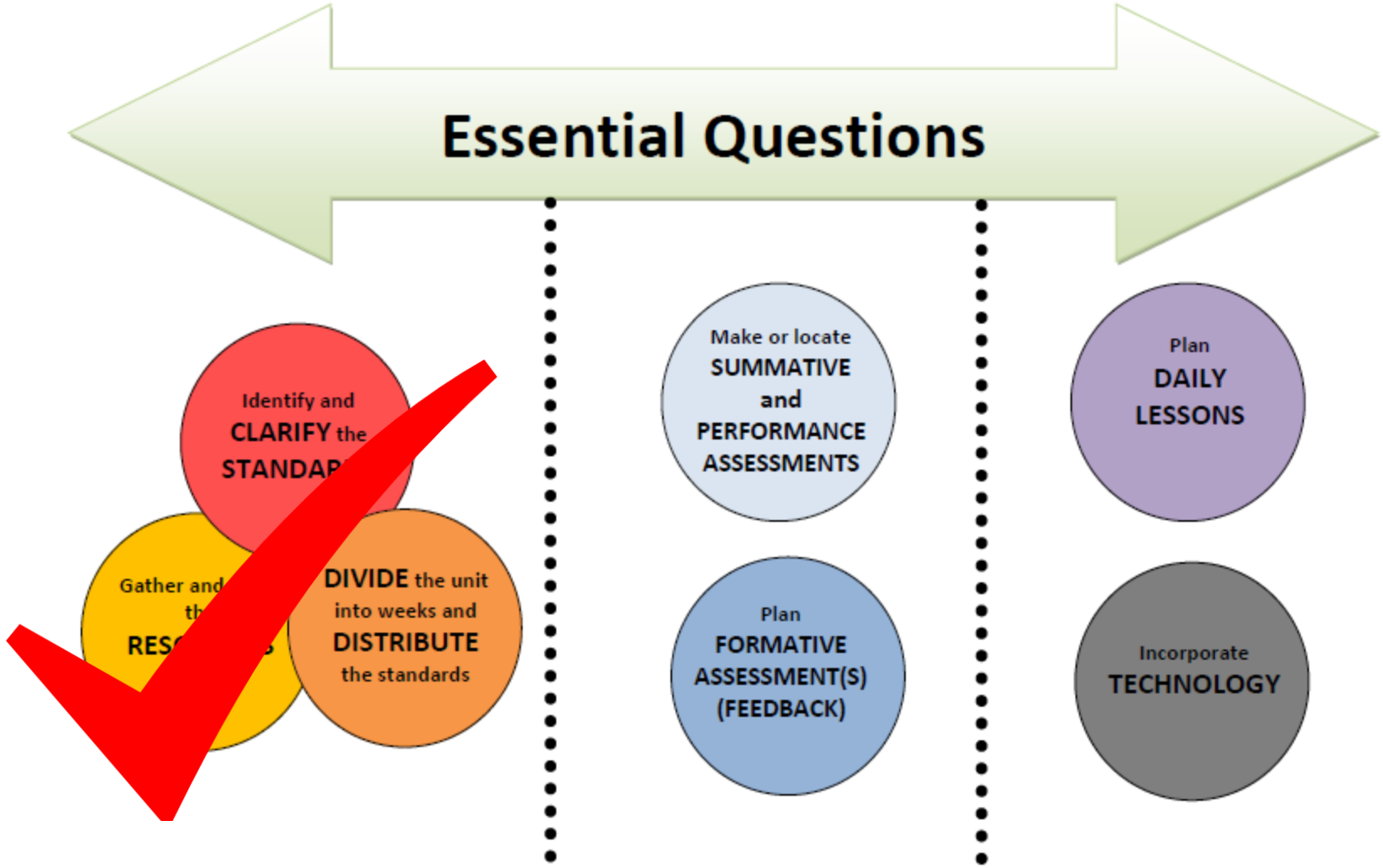
Unit 1

1. *How are place value patterns repeated in numbers?*
2. *How can place value help me multiply and divide?*
3. *How do I solve real-world problems involving volume?*

Unit 2

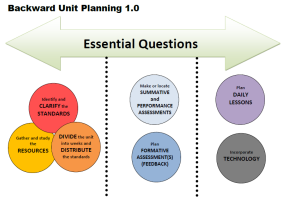
1. *How can I use my understanding of multiplication and division to solve real world problems involving multiplication and division of fractions?*
2. *How can I use information from the line plot to solve problems involving operations with fractions?*

Backward Unit Planning 1.0



Summative Assessment *is designed and administered to "sum up" learning that has taken place during a lesson, a unit, or a course.*

- Anne R. Reeves

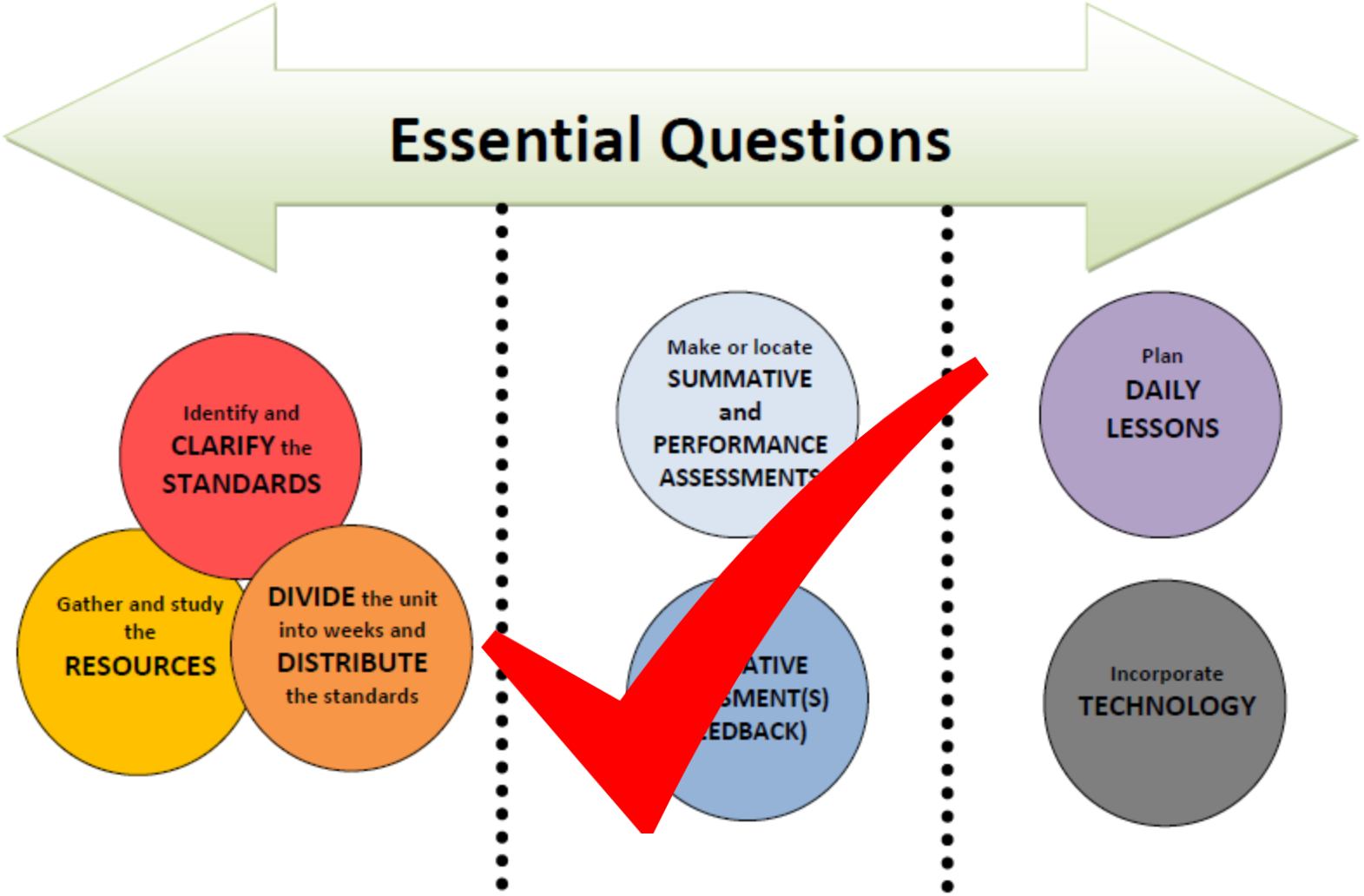


Considerations:

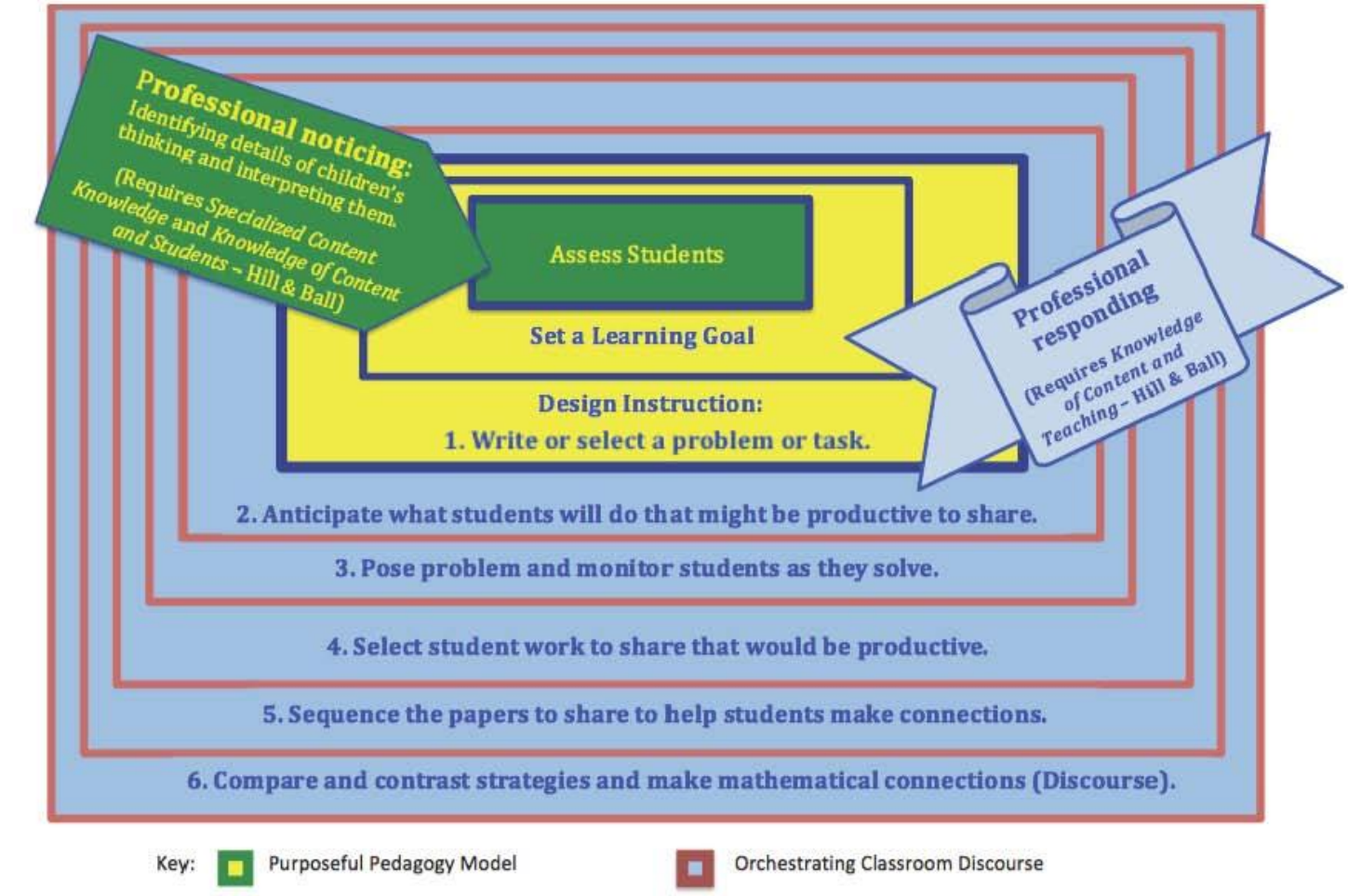
Make and locate SUMMATIVE And PERFORMANCE ASSESSMENTS

1. ***Assess*** **CCSS**
2. ***Address*** **Essential Questions**
3. ***Incorporate Mathematical***
4. PARCC

Backward Unit Planning 1.0



Purposeful Pedagogy in Math



Written by Linda Jaslow in collaboration with Aimee L. Evans

GANAG is a daily lesson structure that allows teachers to plan for student use of research based instructional strategies.

G= goal

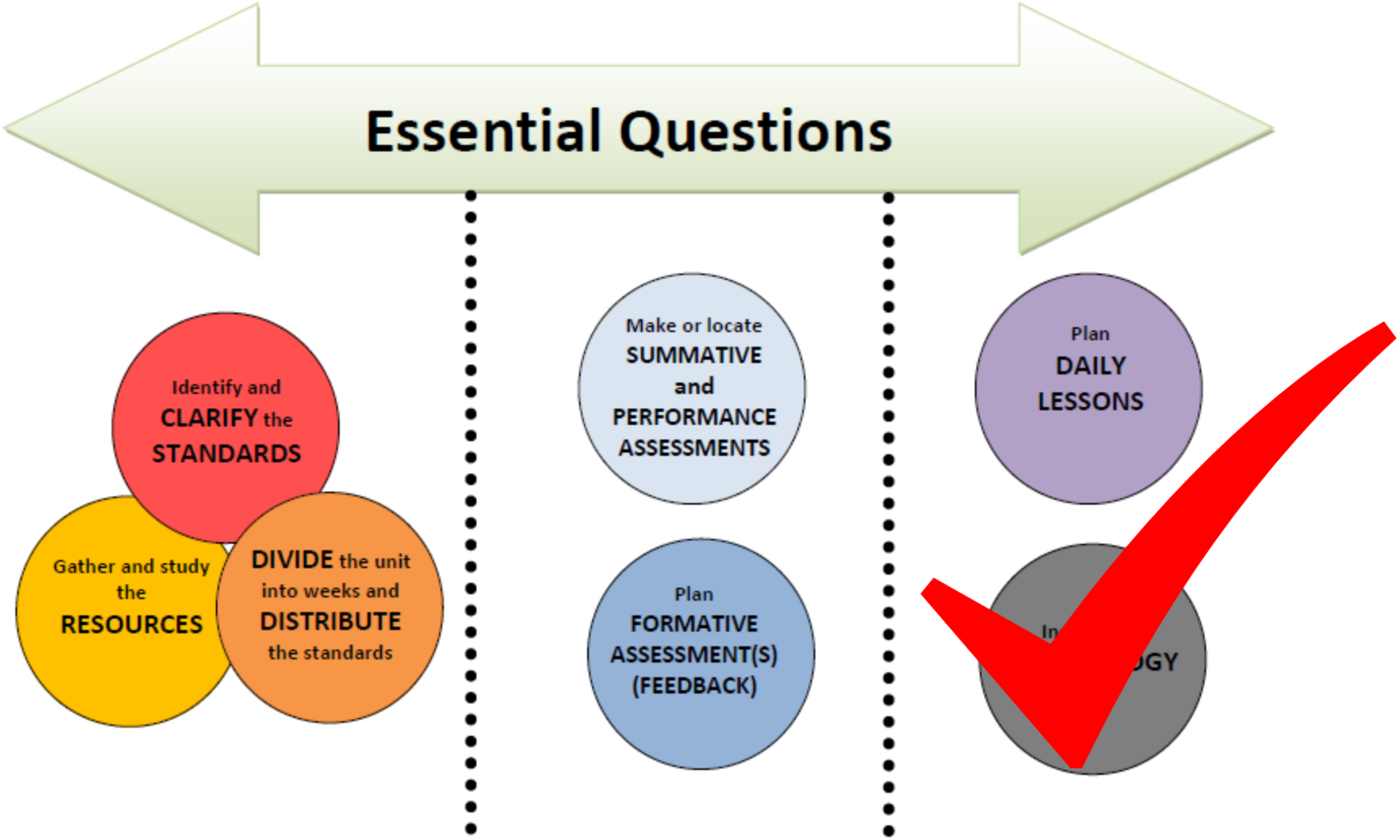
A= access prior knowledge

N= new information

A= application

G= generalize the goal

Backward Unit Planning 1.0



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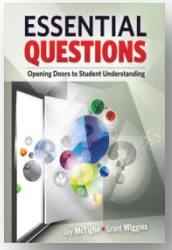
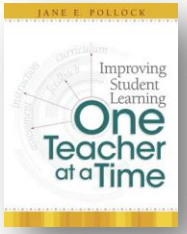
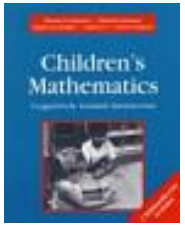


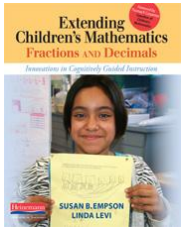
McTighe, J.,& Wiggins, G. (2013). *Essential questions: opening doors to student understanding.* Alexandria, VA: Association for Supervision and Curriculum Development.



Pollock, J. E. (2007). *Improving student learning one teacher at a time.* Alexandria, VA: Association for Supervision and Curriculum Development.



Carpenter, Fennema, Franke, Levi, & Empson (1999). *Children's Mathematics: Cognitively Guided Instruction.* Portsmouth, NH: Heinemann & National Council of Teachers of Mathematics.



Empson, S., & Levi, L. (2011). *Extending Children's Mathematics: Fractions and Decimals.* Portsmouth, NH: Heinemann.