

Title of Unit	Operations and Algebraic Thinking: addition and subtraction	Grade Level	K
Curriculum Area	Math	Time Frame	
Developed By	Brennan		
Storyline	Count the things that Danny sees and add them together. Danny sees two red flowers and two blue flowers. How many flowers does Danny see?		
Identify Desired Results (Stage 1)			
Content Standards			
K.OA.A.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical
<p>Skill Statements:</p> <ul style="list-style-type: none"> -Represent and solve problems involving addition. -Understand and apply properties of operations and the relationship between addition and subtraction. -Work with addition equations. 		How do you determine the total number of two groups?	How can addition numbers sentences be used to show the parts and the whole?
Related Misconceptions			
Children will see 1 and 1 and say "eleven". They will count inaccurately. In joining stories children need to realize that parts disappear once they are combined to make a larger group.			
Knowledge Students will know...		Skills Students will be able to...	

Color discrimination How to sort into groups One to one correspondence for counting	I can act out number stories that involve joining two groups.
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Assessment Evidence (Stage 2)

Performance Task Description	
Goal	I can act out number stories that involve joining two groups.
Role	
Audience	
Situation	
Product/Performance	Portfolio which includes a representation of mastery (artifact) of the standard.
Standards	K.OA.A.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Other Evidence	
ability to count and add two die/ ability to count and add two groups of counters/ability to count a group of ten, remove a part and report remainder	

Learning Plan (Stage 3)

Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore addition and subtraction operations and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete an activity applying topic to real life situation.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of integers to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Addition Analyze and demonstrate the different mathematical properties. Independent practice utilizing properties of Addition and Subtraction Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment

	Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learning Adaptation of Content Leveled homework and practices
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 1) Opening 2) Direct Instruction 3) Guided Practice 4) Extension activities, Opportunity for Re-teaching 5) Check for Understanding 6) Closure

From: Wiggins, Grant and J. Mc Tighe. (1998). *Understanding by Design*, Association for Supervision and Curriculum Development
 ISBN # 0-87120-313-8 (ppk)

Title of Unit	Operations and Algebraic Thinking Represent and solve problems involving addition	Grade Level	1st Grade
Curriculum Area	Math	Time Frame	
Developed By	Brennan		
Storyline	We often tell children that addition means “put together”. Other story lines are “combine two groups”, “add on to a group”.		
Identify Desired Results (Stage 1)			
Content Standards			
1.OA.1, Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. 1.OA.3 Apply properties of operations as strategies to add and subtract 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.7, Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example which of the following equations are true and which are false? $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.
 1.OA.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 + ? = 11$, $5 = _ - 3$, $6 + 6 = _$.

Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical
<p>Skill Statements:</p> <ul style="list-style-type: none"> -Represent and solve problems involving addition. -Understand and apply properties of operations and the relationship between addition and subtraction. -Work with addition equations. 		How do you determine the total number of two groups?	How can addition numbers sentences be used to show the parts and the whole?
Related Misconceptions			
The order of the numbers will not change the sum. The arrangement of objects will not change the total.			
Knowledge Students will know...		Skills Students will be able to...	
How to write numbers How to count on Properties of addition Rules of addition and subtraction		I can match each property with an example and tell why. I can solve a multi-step problem using the properties of addition. I can add using the rules.	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will model and solve problem adding two groups of different colored objects accurately at the 80% level.		
Role			
Audience			
Situation			
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.		
Standards	1.OA.1, Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and		

comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Other Evidence

Learning Plan (Stage 3)

Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore addition and subtraction operations and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore addition within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of addition to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Addition Analyze and demonstrate the different mathematical properties. Independent practice utilizing properties of Addition Practice in small group stations
How will you cause students to reflect and rethink ? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learning

	Adaptation of Content Leveled homework and practices
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 7) Opening 8) Direct Instruction 9) Guided Practice 10) Extension activities, Opportunity for Re-teaching 11) Check for Understanding 12) Closure

Title of Unit	Operations and Algebraic Thinking: Understanding Addition and Subtraction	Grade Level	2 nd Grade
Curriculum Area	Math	Time Frame	
Developed By	Kriesch		
Storyline	Students are encouraged to think addition as joining, combining two groups, and adding onto a group instead of as "putting together". Subtraction builds on knowledge gained from addition and students are encouraged to think of it as separating or comparing groups.		
Identify Desired Results (Stage 1)			
Content Standards			
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical

<p>There are multiple ways to interpret and use addition and subtraction and these operations are related to each other.</p> <p>Math operations, such as addition and subtraction can be applied to solve problems.</p>		<p>How are addition and subtraction related to each other?</p> <p>How can addition and subtraction be used to solve problems?</p>	<p>How can addition and subtraction be understood in terms of joining parts to a whole, or separating parts from a whole?</p> <p>Which situations require the use of addition and which situations involve the use of subtraction?</p>
Related Misconceptions			
<p>Students may be unsure of which order to write the numbers in a subtraction sentence. Ensure that they know to subtract the lesser number from the greater number.</p>			
Knowledge Students will know...		Skills Students will be able to...	
<p>Addition involves joining parts to make a whole and addition number sentences can be used to show joining parts of a whole.</p> <p>Subtraction involves separating parts from the whole or comparing parts of the whole. Subtraction sentences can be used to show separating the parts from the whole.</p>		<p>Write addition sentences to solve stories about joining parts to a whole.</p> <p>Write subtraction sentences to solve stories about comparing groups.</p> <p>Write subtraction sentences to solve stories about separating parts of the whole.</p>	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will write addition and subtraction sentences to solve stories about joining parts, comparing parts and separating parts of the whole.		
Role			
Audience			
Situation			
Product/Performance	Portfolio with one artifact demonstrating knowledge of the overarching understanding and mastery of addition sentences and one artifact demonstrating the same for subtraction sentences.		
Standards			
Other Evidence			

Learning Plan (Stage 3)

Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore addition and subtraction operations and how these relate to real-life situations. For example, 7 brown puppies and 12 black puppies are playing in a park. How many more black puppies are there than brown puppies? Can you use cubes to find the answer?
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore addition within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	<p>Create your own visual representation of addition as joining parts to the whole and subtraction as separating parts from the whole to display in the classroom</p> <p>Visit computer lab and explore numerical operations within community</p> <p>Create Math Word Wall (Vocabulary)</p> <p>Demonstrate mastery with hands on Lab: Properties of Operations- Addition and Subtraction</p> <p>Analyze and demonstrate the different mathematical properties.</p> <p>Independent practice utilizing properties of Addition and Subtraction</p> <p>Practice in small group stations</p>
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	<p>Station Work</p> <p>Entrance/Exit Slip</p> <p>Journaling</p> <p>Enrichment activities for students who demonstrate mastery</p> <p>Remediation activities for students who require additional support</p> <p>Bell-Ringer, Warm-Up</p>
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	<p>Performance assessment based on observation</p> <p>Exit/Entrance Slip</p> <p>Self-assessment</p> <p>Formative assessment</p> <p>Student Self-Reflection</p> <p>Partner and Group Work</p> <p>Journaling</p> <p>Vocabulary Log</p> <p>Note-Taking</p> <p>Portfolio entries to demonstrate knowledge of each skill statement</p>
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	<p>Differentiation:</p> <p>Modeling</p> <p>Guided Practice</p> <p>Independent Practice</p> <p>Small Group Instruction</p> <p>Whole class direct instruction</p> <p>Links to background and past learning</p> <p>Adaptation of Content</p>

	Leveled homework and practices
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 13) Opening 14) Direct Instruction 15) Guided Practice 16) Extension activities, Opportunity for Re-teaching 17) Check for Understanding 18) Closure

Title of Unit	Operations and Algebraic Thinking: The Number System- Operations	Grade Level	3rd Grade
Curriculum Area	Math	Time Frame	
Developed By	Lawrence		
Storyline	Real-world problems involving joining, part-part-whole or comparison can be solved using multiplication.		

Identify Desired Results (Stage 1)

Content Standards

CCSS.Math.Content.3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical
Skill Statements: Represent and solve problems involving multiplication of whole numbers. Understand and apply properties of operations of multiplication. Work with multiplication equations.	How do the properties of multiplication relate to real-world problems?	How can you use multiplication to solve problems? Why do we multiply to solve the problem?
Related Misconceptions		

The order of numbers does not change the product. The arrangement of the objects will not change the product.			
Knowledge Students will know...		Skills Students will be able to...	
Distribute Place Value How to write numbers How to count on Properties of Multiplication Rules		I can represent and solve problems using multiplication. I can apply the properties of multiplication. I can solve with multiplication equations.	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will select correct operation given real-life situation and solve problem accurately at the 80% level.		
Role			
Audience			
Situation			
Product/Performance	Students will represent multiplication situations using manipulatives.		
Standards	CCSS.Math.Content.3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.		
Other Evidence			
Learning Plan (Stage 3)			
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore multiplication using place-value blocks and how these relate to real-life situations. Visual Learning Bridge		
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore multiplication within their community.		
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of integers to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Addition and Subtraction Analyze and demonstrate the different mathematical properties. Independent practice utilizing properties of Addition and Subtraction Practice in small group stations		
How will you cause students to reflect and rethink ? How will you guide them in rehearsing,	Station Work Entrance/Exit Slip		

revising, and refining their work?	Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learnings Adaptation of Content Leveled activities and Homework
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 19) Opening 20) Direct Instruction 21) Guided Practice 22) Extension activities, Opportunity for Re-teaching 23) Check for Understanding 24) Closure

Title of Unit	Operations and Algebraic Thinking Represent and solve problems involving multiplication	Grade Level	4th Grade
Curriculum Area	Math	Time Frame	
Developed By	Brennan		
Storyline	Using patterns is a way to understand by mathematics. Students will break apart numbers using place value and the parts to find products.		

Identify Desired Results (Stage 1)

Content Standards

4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
 4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical
Skill Statements: -Represent and solve problems involving multiplication. -Understand and apply properties of operations and the relationship between addition and multiplication. -Work with multiplication equations.	How can you break apart calculations into simpler ones, to solve equations?	How do you use basic facts and place value patterns to find products when one factor is 10 or 100?
Related Misconceptions		
You should not break the numbers into smaller parts. The arrangement of objects will change the total.		
Knowledge	Skills	
Students will know...	Students will be able to...	
How to write numbers How to count on Properties of addition Properties of multiplication Rules of addition Rules of multiplication	I can round break numbers by place value in order to find products. I can use patterns to understand mathematics. I can multiply by adding groups together.	

Assessment Evidence (Stage 2)

Performance Task Description

Goal	Students will model and solve problems multiplying two groups of objects accurately at the 80% level.
Role	

Audience	
Situation	
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.
Standards	4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. 4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
Other Evidence	
Learning Plan (Stage 3)	
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore multiplication operations and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore multiplication within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of multiplication to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Multiplication Analyze and demonstrate the different mathematical properties. Independent practice utilizing properties of Multiplication Practice in small group stations
How will you cause students to reflect and rethink ? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement	Differentiation: Modeling

and effectiveness of ALL students, without compromising the goals of the unit?	Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learning Adaptation of Content Leveled Activities and Homework
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 25) Opening 26) Direct Instruction 27) Guided Practice 28) Extension activities, Opportunity for Re-teaching 29) Check for Understanding 30) Closure

Title of Unit	Operations and Algebraic Thinking: Adding and Subtracting Whole Numbers and Decimals	Grade Level	5th Grade
Curriculum Area	Math	Time Frame	
Developed By	Kriesch		
Storyline	Students will learn how to use simple algorithms in both mental math and paper and pencil math to transform more complex calculations into simpler ones.		
Identify Desired Results (Stage 1)			
Content Standards			
6.5.12 Solve problems and number sentences involving addition, subtraction, multiplication, and division using whole numbers.			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical

<p>Doing addition and subtraction calculations mentally involve changing the numbers so the calculation is easy to do mentally.</p> <p>Multi-digit number calculations can be broken into simpler calculations by using place values starting with the ones, then the tens, and so on.</p> <p>Adding or subtracting multi-digit decimals is similar to adding or subtracting multi-digit whole numbers.</p>	<p>How can a multi-digit addition or subtraction problem be simplified to be able to do the math mentally?</p> <p>How can place values help in solving multi-digit addition and subtraction problems?</p>	<p>How is adding or subtracting multi-digit decimals similar to multi-digit whole numbers?</p>
Related Misconceptions		
<p>Students can sometimes make mistakes in calculations because they are not lining digits up correctly. A simple solution is to have them use quarter inch grid paper to write out the problems with a number in each square.</p>		
<p>Knowledge Students will know...</p>	<p>Skills Students will be able to...</p>	
<p>the following vocabulary:</p> <ul style="list-style-type: none"> - difference - sum - commutative property - associative property - compensation - rounding - compatible numbers 	<ul style="list-style-type: none"> - round numbers in order to more easily perform mental math for addition and subtraction - break numbers into place values to more easily add or subtract multi-digit whole numbers - use the place value method to solve addition and subtraction problems involving multi-digit decimals 	
Assessment Evidence (Stage 2)		
Performance Task Description		
Goal	<p>Students will be able to round numbers in order to more easily perform mental math for addition and subtraction. Students will be able to break numbers into place values to more easily add or subtract multi-digit whole numbers. Students will be able to use the place value method to solve addition and subtraction problems involving multi-digit decimals</p>	
Role		
Audience		
Situation		

Product/Performance	Portfolio which includes 1 artifact representing mastery of each objective above.
Standards	6.5.12 Solve problems and number sentences involving addition, subtraction, multiplication, and division using whole numbers.
Other Evidence	
Learning Plan (Stage 3)	
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will attempt to solve multi-digit addition and subtraction problems that relate to real-life situations using mental math.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to attempt a solution to the mental math problem and explain the procedure they applied.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of multi-digit addition or subtraction problems to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Multi-digit addition and subtraction Independent practice utilizing multi-digit addition and subtraction Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction

	Whole class direct instruction Links to background and past learning Adaptation of Content Leveled Activities and Homework
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 31) Opening 32) Direct Instruction 33) Guided Practice 34) Extension activities, Opportunity for Re-teaching 35) Check for Understanding 36) Closure

Title of Unit	The Number System-Multiply and divide fractions	Grade Level	6 th Grade
Curriculum Area	Math	Time Frame	3 weeks
Developed By	Dave Smith		
Storyline	Building knowledge of multiplying and dividing fractions and apply to real world contexts.		
Identify Desired Results (Stage 1)			
Content Standards			
6.NS1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical

<p>Skill Statements:</p> <p>T1.6.NS1 Calculate the sum, difference, and product of fractions and mixed numbers with like and unlike denominators</p> <p>6.NS1 Illustrate quotients of fractions</p> <p>6.NS1 Compute quotients of fractions using an algorithm</p>	<p>How do you use the multiplying and dividing fractions in your daily life?</p>	<p>How would use visual model or diagram to show what dividing fractions means and find the answer</p>
Related Misconceptions		
Students will have mastery of multiplying and dividing integers.		
<p>Knowledge Students will know...</p>	<p>Skills Students will be able to...</p>	
<p>Properties of multiplying and dividing integers Rules of multiplying and dividing fractions Visual fraction models Define factors Like denominators Unlike denominators</p>	<p>I can match each property with an example and tell why. I can solve a multi-step problem using the properties of Multiplying and dividing fractions. I can define and list multiples of a number. I can find the LCD and GCF.</p>	
Assessment Evidence (Stage 2)		
Performance Task Description		
Goal	Students will apply multiplying and dividing fractions to real-life situations and solve problem accurately at the 80% level.	
Role		
Audience		
Situation		
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.	
Standards	6.NS1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions	
Other Evidence		

Learning Plan (Stage 3)

Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore multiplying and dividing fractions and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore fractions within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of multiplying and dividing fractions in the classroom Visit computer lab and explore multiplying and dividing fractions within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of multiplying and dividing fractions Analyze and demonstrate the different multiplying and dividing properties. Independent practice utilizing properties of multiplying and dividing fractions Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learnings Adaptation of Content

How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 37) Opening 38) Direct Instruction 39) Guided Practice 40) Extension activities, Opportunity for Re-teaching 41) Check for Understanding 42) Closure
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Title of Unit	Operations and Algebraic Thinking: The Number System- Operations	Grade Level	7 th Grade
Curriculum Area	Math	Time Frame	
Developed By	Lawrence		
Storyline	Building knowledge of integers to apply to real world contexts.		

Identify Desired Results (Stage 1)

Content Standards

7.NS1d Apply properties of operations as strategies to add and subtract rational numbers

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical
Skill Statements: 7.NS1d Define and identify the properties of addition and subtraction of rational numbers 7.NS1d Apply properties of addition and subtraction as strategies to add and subtract rational numbers 7.NS1d Solve problems using the rules for adding and subtracting signed numbers	How do you use the properties of operations in your daily life?	How would you know whether or not to add or subtract given specific situations within your community? How do I solve multi-step problems using the properties of addition and subtraction? How do I use addition and subtraction to solve real-life problems?

Related Misconceptions			
Students will have mastery of subtraction of negative numbers on a number line.			
Knowledge Students will know...		Skills Students will be able to...	
Properties of addition and subtraction Rules of addition and subtraction Negative Numbers Positive Numbers Number Line additive inverse commutative zero property associative Rational Numbers		I can match each property with an example and tell why. I can solve a multi-step problem using the properties of addition and subtraction. I can add and subtract using the rules.	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will select correct operation given real-life situation and solve problem accurately at the 80% level.		
Role			
Audience			
Situation			
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.		
Standards	7.NS1d Apply properties of operations as strategies to add and subtract rational numbers		
Other Evidence			
Learning Plan (Stage 3)			
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore addition and subtraction operations and how these relate to real-life situations.		
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore integers within their community.		
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of integers to display in the classroom Visit computer lab and explore numerical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Properties of Operations- Addition and Subtraction		

	Analyze and demonstrate the different mathematical properties. Independent practice utilizing properties of Addition and Subtraction Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learnings Adaptation of Content
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 43) Opening 44) Direct Instruction 45) Guided Practice 46) Extension activities, Opportunity for Re-teaching 47) Check for Understanding 48) Closure

Title of Unit	The Number System- Rational & Irrational Numbers	Grade Level	8 th Grade
Curriculum Area	Math	Time Frame	3-4 weeks
Developed By	Dave Smith		

Storyline	Know the difference between rational and irrational numbers to gain a deeper understanding of the real number system.	
Identify Desired Results (Stage 1)		
Content Standards		
8.NS1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.		
Understandings		Essential Questions
Overarching Understanding	Overarching	Topical
<p>Skill Statements:</p> <p>8.NS1 Recognize that every number has a decimal expansion</p> <p>8.NS1 Recognize that for rational numbers the decimal expansion repeats eventually</p> <p>8.NS1 Convert a decimal expansion which repeats eventually into a rational number</p>	<p>How would you recognize - verbalize and use within an example given, and provide an example?</p> <p>Be able to synonym terms - terminating decimals, repeating decimals</p>	<p>How would you be able to identify a repeating decimal (rational) from a Non-repeating decimal (irrational)</p>
Related Misconceptions		
Students will have mastery of TI calculator fraction function.		
Knowledge Students will know...	Skills Students will be able to...	
Know that there are numbers that are not rational, and approximate them by rational number.	<p>I can write any rational number as an exact decimal or any irrational number as an approximate decimal.</p> <p>I can identify a rational number by a decimal.</p> <p>I can change a repeating decimal to a fraction.</p>	
Assessment Evidence (Stage 2)		

Performance Task Description	
Goal	Students will identify rational and irrational numbers given real-life situation and solve problem accurately at the 80% level.
Role	
Audience	
Situation	
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.
Standards	8.NS1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number
Other Evidence	
Learning Plan (Stage 3)	
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore rational and irrational numbers and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore rational/irrational numbers within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of rational/irrational numbers to display in the classroom Visit computer lab and explore converting repeating decimals to fractions within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: rational/irrational numbers Analyze and demonstrate decimal expansion. Independent practice utilizing properties of rational and irrational numbers Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log

	Note-Taking Portfolio entries to demonstrate knowledge of each skill statement
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learnings Adaptation of Content
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 49) Opening 50) Direct Instruction 51) Guided Practice 52) Extension activities, Opportunity for Re-teaching 53) Check for Understanding 54) Closure

Title of Unit	The Number System- Rational Exponents	Grade Level	Algebra 1
Curriculum Area	Math	Time Frame	1 week
Developed By	Dave Smith		
Storyline	Building knowledge of rational exponents to real world contexts.		
Identify Desired Results (Stage 1)			
Content Standards			
A.NRN2 Rewrite expressions involving radicals and rational exponents using the properties of exponents			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical

Skill Statements: A.NRN2 Rewrite expressions involving radicals as rational exponents using the properties of exponents A.NRN2 Rewrite expressions involving rational exponents as radicals using the properties of exponents		How do you use the rational exponents in your daily life?	How would you know when to use negative exponents when setting-up a fraction?
Related Misconceptions			
Students will have mastery of fractions.			
Knowledge Students will know...		Skills Students will be able to...	
Radical notation Rewrite radical expressions		I can rewrite expressions involving fractional exponents as radicals.	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will use radical expressions given real-life situation and solve problem accurately at the 80% level.		
Role			
Audience			
Situation			
Product/Performance	Portfolio which includes 1 artifact representing mastery of each cluster standard.		
Standards	A.NRN2 Rewrite expressions involving radicals and rational exponents using the properties of exponents		
Other Evidence			
Learning Plan (Stage 3)			
Where are your students headed? Where have	Using hook activity, students will explore radical expressions and how these relate to real-life		

<p>they been? How will you make sure the students know where they are going?</p>	<p>situations.</p>
<p>How will you hook students at the beginning of the unit?</p>	<p>Students will complete activity in small groups to explore integers within their community.</p>
<p>What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?</p>	<p>Create your own visual representation of radical expressions to display in the classroom Visit computer lab and explore radical operations within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Rewrite of radical expression Analyze and demonstrate the different radical properties. Independent practice utilizing properties of radical expressions Practice in small group stations</p>
<p>How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?</p>	<p>Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up</p>
<p>How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?</p>	<p>Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement</p>
<p>How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?</p>	<p>Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learnings Adaptation of Content</p>
<p>How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?</p>	<p>Lesson Components 55) Opening 56) Direct Instruction 57) Guided Practice 58) Extension activities, Opportunity for Re-teaching 59) Check for Understanding 60) Closure</p>

Title of Unit	Operations and Algebraic Thinking: The Number System- Operations	Grade Level	11 th Grade
Curriculum Area	Algebra 2	Time Frame	
Developed By	Lawrence		
Storyline	<p>Extend understanding of the real number system.</p> <p>Apply the properties of the real number system to complex numbers.</p>		
Identify Desired Results (Stage 1)			
Content Standards			
<p>Perform arithmetic operations with complex numbers.</p> <p>A2.NCN1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real</p>			
Understandings		Essential Questions	
Overarching Understanding		Overarching	Topical
<p>Skill Statements:</p> <p>A2.NCN1 Recognize there is a complex number</p> <p>A2.NCN1 Recognize every complex number as the form $a + bi$ with a and b as real numbers</p>		<p>How does my understanding of the complex number system apply to real-life situations?</p>	<p>How will I know when to apply the i theorem when solving a real-life problem?</p> <p>How will I utilize the form $a + bi$ equations when solving problems using the complex number system?</p>
Related Misconceptions			

Students will have mastery of square roots, rational and irrational numbers.			
Knowledge Students will know...		Skills Students will be able to...	
Complex Numbers Square roots Negative Squares		I can recognize that there is a complex number. I can recognize that every complex number as the form $a + bi$ with a and b as real numbers.	
Assessment Evidence (Stage 2)			
Performance Task Description			
Goal	Students will utilize the complex number system given a real-life situation and solve problem accurately at the 80% level.		
Role			
Audience			
Situation			
Product/Performance	Summative Assessment		
Standards	A2.NCN1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real		
Other Evidence			
Summative			
Learning Plan (Stage 3)			
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore the complex number system and how these relate to real-life situations.		
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore the complex number system within their community. Background knowledge and/or re-teaching activity to ensure skill foundation		
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of the complex number system to display in the classroom Visit computer lab and explore the complex number system within community Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Complex Number System Analyze and demonstrate the different mathematical properties related to the Complex Number System. Independent practice Practice in small group stations		
How will you cause students to reflect and	Station Work		

rethink? How will you guide them in rehearsing, revising, and refining their work?	Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement Summative Assessment
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction Whole class direct instruction Links to background and past learning's Adaptation of Content
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 61) Opening 62) Direct Instruction 63) Guided Practice 64) Extension activities, Opportunity for Re-teaching 65) Check for Understanding 66) Closure

Title of Unit	Operations and Algebraic Thinking: The Number System- Operations	Grade Level	12 th Grade
Curriculum Area	4 th Year Course	Time Frame	
Developed By	Lawrence		
Storyline	Students will gain a deeper understanding of the laws of complex numbers.		
Identify Desired Results (Stage 1)			

Content Standards		
4th.NCN3 Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers		
Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical
Skill Statements: 4th.NCN3 Find the conjugate of a complex number 4th.NCN3 Calculate the moduli 4th.NCN3 Apply the conjugate to calculate the quotient of complex numbers	When given a complex number system, how would I determine the conjugate to find the moduli and quotient? What connection can I make between a related field of interest and the complex number system?	What process would I use to conjugate a complex number? How would I calculate the moduli in terms of a specific problem? How would I apply the conjugate to calculate the quotient of complex numbers?
Related Misconceptions		
Students will have background knowledge of the complex number system including identifying when to use "i" within context of a problem.		
Knowledge	Skills	
Students will know...	Students will be able to...	
Complex Number Moduli (Modulus) Conjugate Quotient	I can calculate the moduli I can find the conjugate of a complex number I can apply the conjugate to calculate the quotient of complex numbers	
Assessment Evidence (Stage 2)		
Performance Task Description		
Goal	Given various mathematical opportunities, students will apply the conjugate of a complex number to calculate the quotient independently with at least 80% accuracy.	
Role		
Audience		
Situation		

Product/Performance Standards	Summative Assessment 4th.NCN3 Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers
Other Evidence	
State Mandated Exams: PSAE	
Learning Plan (Stage 3)	
Where are your students headed? Where have they been? How will you make sure the students know where they are going?	Using hook activity, students will explore the complex number system and how these relate to real-life situations.
How will you hook students at the beginning of the unit?	Students will complete activity in small groups to explore the complex number system within their community.
What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?	Create your own visual representation of the complex number system to display in the classroom Technology based activity to explore the complex number system Create Math Word Wall (Vocabulary) Demonstrate mastery with hands on Lab: Complex Number System Analyze and demonstrate the laws of the complex number system Independent practice utilizing the laws of the complex number system Practice in small group stations
How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?	Station Work Entrance/Exit Slip Journaling Enrichment activities for students who demonstrate mastery Remediation activities for students who require additional support Bell-Ringer, Warm-Up
How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?	Performance assessment based on observation Exit/Entrance Slip Self-assessment Formative assessment Student Self-Reflection Partner and Group Work Journaling Vocabulary Log Note-Taking Portfolio entries to demonstrate knowledge of each skill statement Summative Assessment
How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?	Differentiation: Modeling Guided Practice Independent Practice Small Group Instruction

	Whole class direct instruction Links to background and past learning's Adaptation of Content
How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?	Lesson Components 67) Opening 68) Direct Instruction 69) Guided Practice 70) Extension activities, Opportunity for Re-teaching 71) Check for Understanding 72) Closure