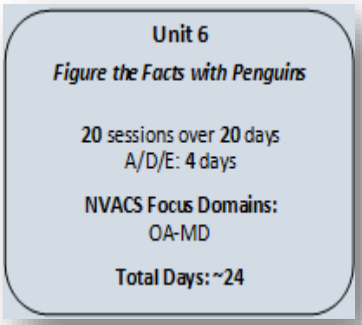
First Grade Unit 6: Figure the Facts with Penguins



1st Grade Curriculum Pacing Framework: Balanced Calendar

Big Conceptual Idea: K-5 Progression on Counting and Cardinality and Operations and Algebraic Thinking (pp. 1-7, 12-17), K-5 Progression on Number and Operations in Base Ten (pp. 1-4, 6-7), K-6 Progression on Measurement and Data (Measurement Part) (pp. 1-4, 8-11)

Read the Bridges Unit Overview/Introduction for Unit 6 pp. i-vi. Also, read each Module Overview for the current week's sessions, and the current Session Summary along with details for the teaching of each session as you work through Unit 6. These Introduction/Overview/Summary sections provide focus, clarity, vocabulary, definitions, and examples for the "big mathematical ideas and understandings" critical to 1st Grade. This information will support your professional decision-making within the Sessions and Modules as needed.

Mathematical Background: Read Bridges Unit 6 Overview pages (pp. i-vi)	Essential Questions for teacher consideration: How will I support students' development of addition and subtraction to fluency with facts from 0-10 and to flexibly with use of robust strategies for problem solving facts to 20? How will I support students' broader and deeper understandings of operations so they can see and use the relationship between addition and subtraction within a given context to solve a problem? How will I extend this problem solving to writing equations with unknowns in any position, encouraging the use of context to determine and confirm the problem?

Instructional note:

> "If you learn something deeply, the synaptic activity will create lasting connections in your brain, forming structural pathways, but if you visit an idea only once or in a superficial way, the synaptic connections can "wash away" like pathways made in the sand." (Boaler, 2016, p. 1)

The big mathematical idea for Unit 6 picks up where Unit 4 left off in OA and NBT Standards using the Number Rack and Double-Flap Dot Cards. The work continues to support fluency development (flexibly, efficiency, accuracy, and appropriateness) by extending reasoning strategies used with numbers within 10 to solve basic number combinations within 20. Students develop a broader understanding of addition and subtraction operations by applying strategies to word problems of all types. They use the number rack as a tool to make sense of problems that involve unknowns in all positions. Understanding of numbers and the relationship between the operations of addition and subtraction support the big idea of part-part-whole relationships.

Table 1: Addition and subtraction situations

	Result Unknown	Change Unknown	Start Unknown
Add To	A bunnies sat on the grass. B more bunnies hopped there. How many bunnies are on the grass now? $A + B = \square$	A bunnies were sitting on the grass. Some more bunnies hopped there. Then there were C bunnies. How many bunnies hopped over to the first A bunnies? $A + \square = C$	Some bunnies were sitting on the grass. B more bunnies hopped there. Then there were C bunnies. How many bunnies were on the grass before? $\square + B = C$
Take From	C apples were on the table. I ate B apples. How many apples are on the table now? $C - B = \square$	C apples were on the table. I ate some apples. Then there were A apples. How many apples did I eat? $C - \square = A$	Some apples were on the table. I ate B apples. Then there were A apples. How many apples were on the table before? $\square - B = A$
	Total Unknown	**Both Addends Unknown[1]**	**Addend Unknown[2]**
Put Together /Take Apart	A red apples and B green apples are on the table. How many apples are on the table? $A + B = \square$	Grandma has C flowers. How many can she put in her red vase and how many in her blue vase? $C = \square + \square$	C apples are on the table. A are red and the rest are green. How many apples are green? $A + \square = C$ $C - A = \square$
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	*"How many more?" version.* Lucy has A apples. Julie has C apples. How many more apples does Julie have than Lucy? *"How many fewer?" version.* Lucy has A apples. Julie has C apples. How many fewer apples does Lucy have than Julie? $A + \square = C$ $C - A = \square$	*"More" version suggests operation.* Julie has B more apples than Lucy. Lucy has A apples. How many apples does Julie have? *"Fewer" version suggests wrong operation.* Lucy has B fewer apples than Julie. Lucy has A apples. How many apples does Julie have? $A + B = \square$	*"Fewer" version suggests operation.* Lucy has B fewer apples than Julie. Julie has C apples. How many apples does Lucy have? *"More" suggests wrong operation.* Julie has B more apples than Lucy. Julie has C apples. How many apples does Lucy have? $C - B = \square$ $\square + B = C$

In *Table 1. Common addition and subtraction situations* of the *Nevada Academic Content Standards* (NVACS), twelve different problem types appropriate for first grade development are defined (2010, p.88). "This classification of problem types is based on years of research on how children think about addition and subtraction" (Carpenter, Fennema, Loef Franke, Levi, & Empson, 2015, p. 13). Note that the "add to result unknown" in top left box of the table is the most accessible problem type for students as they can directly model the action in the problem. The problem types in the table increase in complexity from left to right and from top to bottom, intentionally designed to support student's early learning. "In each grade, the situations, representations, and methods are calibrated to be coherent and to foster growth from one grade to the next." (Progressions for the Common Core State Standards in Mathematics - K, Counting and Cardinality; K-5, Operations and Algebraic Thinking p. 6 - Table 1, above. The same document showing this coherent progression for addition and subtraction by grade level is found in Table 2: Addition and subtraction

situations by grade level, p.9). Working with all problem types, representing all situations with equations, and solving for unknowns in all situations lays foundations for extending arithmetic to negative rational numbers and algebra.

First Grade students extend their understandings into solving addition and subtraction problems within 20, representing and solving for unknowns in any location for all problem types, and moving into compare problem situations. Context is always critical in solving story problems, especially as students engage in compare problems in first grade. Compare problems allow for multiple representations and can be stated as either a "more" or a "less" statement. Within the language of comparison, "…students need experience hearing and saying a separate sentence for each of the two parts in order to comprehend and say the one-sentence form." Comparison problems also require students to conceptualize and construct a representation of a part of the problem situation (the difference) that is not physically present in the problem. "Extensive experience with a variety of contexts is needed to master these linguistic and situational complexities." (Progressions for the Common Core State Standards in Mathematics - K, Counting and Cardinality; K-5, Operations and Algebraic Thinking, p.12). Teachers can easily differentiate all problem types by changing the number quantities within the problems or the problem contexts. Security in the more difficult Compare Problems is not expected until the end of 2nd Grade.

Students use a variety of strategies for solving different problem types - direct modeling the actions and relations in the problem, using a counting strategy, or using a derived number fact. When direct modeling the actions, students physically represent all three quantities in a problem and the action or relationship involving those quantities before counting the resulting set. Using a counting strategy, students will abstract one number, typically by holding a number in their head or conserving it, and work from there. Using a derived fact students use a familiar fact or strategy to help them problem solve an unknown fact. "All of the strategies described come naturally to young children. Children do not have to be taught that a specific strategy goes with a particular type of problem. With opportunity and encouragement, children construct for themselves strategies that model the action or relationship in a problem. Similarly, they do not have to be shown how to count on or be explicitly taught specific Derived Facts. In an environment that encourages children to use procedures that are meaningful to them, they will construct these strategies" (Carpenter et al., 2015, p. 4).

"In all mathematical problem solving what matters is the explanation a student gives to relate a representation to a context, and not the representation separated from its context." (Progressions for the Common Core State Standards in Mathematics - K, Counting and Cardinality; K-5, Operations and Algebraic Thinking, p.13). It is important to watch how students solve problems and explain their thinking using the context of the problem, and not just follow a procedure of identified steps. To promote classroom collaboration and rigor, select students to share their thinking and strategy use in a staircase of complexity model by choosing a student who used *direct modeling* to share first, then select someone who used a *counting strategy* next, then a student who may have used a *derived fact or recall* to share last. This creates an equal opportunity for all students to access the thinking of others. When another student shares a strategy and others on the cusp of that level of thinking are encouraged to attempt that strategy next time, challenge and rigor come into play. Rigorous instruction is happens when students are provided the appropriate scaffolding through discussion and strategy sharing, and allowed multiple entry points for engaging in the problem.

Key-word strategies for problem solving are not recommended. Such strategies are ineffective in dealing with the complexity of problem situations and discourage children from using meaning when thinking about problem solving. In the article, "13 Rules That Expire" (Bush and Dougherty, 2014; click hyperlink to access the complimentary article from NCTM) describes challenges that occur when keywords lead students to "grab" the numbers from the problem, performing a computation without attending to the meaning of the entire problem. The *NVACS* recommends the development of the above thinking strategies and problem solving mindsets rather than the direct teaching of rote methods for problem solving. Fluency using the standard algorithms for addition and subtraction is not expected by the *NVACS* until the end of 4th grade. "Use of the standard algorithms can be viewed as the culmination of a long progression of reasoning about quantities, the base-ten system, and the properties of operations." (Progressions for the Common Core State Standards in Mathematics – K-5, Number and Operations in Base Ten, p.3).

Also incorporated in *Unit 6* is Geometrical Measurement with direct comparisons, indirect comparisons, and ordering objects by length. This includes the understanding of transitivity defined in the *Progressions for the Common Core State Standards in Mathematics – K-6 – Measurement and Data (Measurement Part) (*p. 8), "If A is longer that B and B is longer than C, then A must be longer than C as well." See the *K-6 Progression on Measurement and Data (Measurement Part)* link above for information and clarifications on the use of standard and nonstandard units of measure for emergent learners. "Emphasizing nonstandard units too early may defeat the purpose it is intended to achieve. Early use of many nonstandard units may actually interfere with students' development of basic measurement concepts required to understand the need for standard units. In contrast, using manipulative standard units, or even standard rulers, is less demanding and appears to be a more interesting and meaningful real-world activity for young students.... Instead, students might learn to measure correctly with standard units, and even learn to use rulers, before they can successfully use nonstandard units and understand relationships between different units of measurement" (K-6 Progression on Measurement and Data (Measurement Part) p. 9). Students in this Unit are performing direct comparisons, connecting a number to

length, and comparing the results of direct measurements to indirect measurements. These measurement opportunities develop reasoning and logic and extend to equality and inequality statements.

Throughout the school year, in October and January, *Number Corner* provided other opportunities for students to engage in computation through word problems. These are powerful connections to point out to students during *Unit 6* instruction.

On-going enrichment:
Continue noting the *Skills Across the Grade Level* chart in the Introduction section (Unit 6 p. v). Please note that many OA Standards are expected to be secure by the end of this *Unit* (see table p. v). This is important information for those day-to-day professional instructional decisions you have to make within each session as to what discussions or activities to extend or cut short or emphasize or skip or, etc. Expect all students to engage in the math.

Continue to consider "Support" and "Challenge" options within each *Session*, and "Game Variations", "Differentiate", and "English-Language Learners" ideas in *Work Places*.

Essential Academic Vocabulary Use these words consistently during instruction.			
New Academic Vocabulary: (first time explicitly taught) *indicates Word Resource Cards are available in the Bridges materials	Review Academic Vocabulary: (Vocabulary from Number Corner or previous units)		
Count on*	*Add**	*Double ten-frame*	*More than*
Foot*	*Addition*	*Equal**	*Pattern**
Join	*Add nine fact*	*Equation**	*Separate*
Missing addend	*Add ten fact*	*Even number**	*Shorter than*
Whole*	*Closest to*	*Fact family**	*Story problem*
	Combination	*False*	*Subtract**
	Combine	*Greater than**	*Subtraction*
	*Compare**	*Height**	*Sum or Total**
	*Difference**	*Inch**	*Triangle**
	Double	*Join*	*True*
	Doubles fact	*Less than**	*Ten frame*
	Doubles plus or minus one fact	*Make ten fact*	*Taller than*
		measure	*Unknown Number*

Additional terminology that students might need support with: *chart, strategy, take-away, minus, observation, plus, pair, partner*

*Collaborative Team Conversations (CTC)

Consider using ***one*** of the following as part of the formative assessment process at the lesson level to **collect student work** to analyze for <u>evidence of mathematical understanding</u>:

Guiding question:
"What strategies and tools are students using to solve addition and subtraction problem to 20?"
"What evidence shows understanding and use of landmark numbers such as 5, 10, or some known quantity in problem solving?"
"What evidence is observed to demonstrate fluent understanding of 5 and/or 10?"
"How do students show they are making sense of the problems?"
"If needed, what intensification interactions will support the use of a variety of strategies and tools to support problem solving for combinations to 20?"

Lesson	Evidence	Look for
U6M2S5 *Combinations & Stories Checkpoint* TG p. 32	*Combinations & Stories Checkpoint* observation and student record sheet (TG U6M2S5 pp. T12-T13) *Combinations & Stories Checkpoint Scoring Guide* (AG Bridges Unit Assessments pp. 63-65)	Focus CTC around conceptual understandings of the big idea and strategies used: • using strategies for adding and subtracting within 20 (subitizing, counting strategies, derived facts, known combinations, recall) • using tools for problem solving combinations within 20 (number rack, fingers, number line, manipulatives, frames, drawings, equations, numeric representations) • sense making (joining sets, separating sets, comparing sets, solving for missing parts) *-continues on next page-*

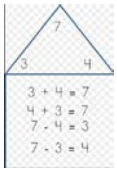
		• working with combination within 10 with flexibility, accuracy, efficiency, and appropriateness
U6M3S5 *U6 Assessment #5* TG pp. 25-29	*U6 Assessment #5* observation and student record sheet (TG U6M3S5 pp. T11-T12) *U6 Assessment #5 Scoring Guide* (AG Bridges Unit Assessments pp. 68-70)	Focus CTC around conceptual understandings of the big idea and strategies used: • sense making (joining sets, separating sets, putting together and taking apart sets, comparing sets, solving for missing parts) • using strategies for adding and subtracting within 20 (subitizing, counting strategies, derived facts, known combinations, recall) • using tools for problem solving combinations within 20 (number rack, fingers, number line, manipulatives, frames, drawings, equations, numeric representations) • working with combination within 10 with flexibility, accuracy, efficiency, and appropriateness

Learning Cycle Assessments (summative)	*U6 Assessment #1, 2, 3, 4* U6M3S5 TG pp. 25-29, T9-T10; AG Bridges Unit Assessments pp. 66-67	Use *U6 Assessment Scoring Guide #1, 2, 3, 4* AG Bridges Unit Assessments p. 70

Standards listed in **bold** indicate a focus of the lesson.

NVACS (Content and Practices)	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Module 1- Session 1: Penguins on Ledges		
1.OA.1 1.OA.5 1.OA.6 1.NBT.2 MP.2 MP.7	Access Prior Learning: • Kindergarten students solved addition and subtraction word problems, within 10, by using objects or drawings to represent the problem. • Unit 4 Module 4 set the stage for this work. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using 5 and 10 as landmark number • counting on • solving for the unknown – result unknown • writing equations	Guiding Question: • What do you notice about the penguins? • How is a picture the same as an equation? Instructional Notes: • Send home the *Family Letter* found here. • This teacher tool by Visnos, suggested on the Bridges Educator site, animates penguins on icebergs. Use the round sliding toggles at the bottom to select the number of penguins on each iceberg. • Read the *Math Practices in Action* in the margin (p. 5). • These are "add to, result unknown" problem type which are the easiest problem type for students. Students may use various strategies to problem solve these problems such as: **direct modeling** using their number rack - counting out 10 by 1s, then sliding and counting another 2, or starting over from 1 and counting all 12 beads by 1s; **counting strategies** - sliding over 10 beads without counting individual beads and count on saying "11, 12."; or the anchor of 10 as a **landmark number** and easily add 2 mentally. Enrichment: • See Step 10 (p. 6). Child Watching: • Identify students who are direct modeling with cubes or number racks. Challenge students to conserve numbers by holding a number in their head and count on.
Module 1- Session 2: Penguin Huddles & Penguin Pals		
1.OA.1 1.OA.5 1.OA.6 1.OA.7 1.OA.8 1.NBT.2 MP.2 MP.7	Access Prior Learning: • Kindergarten students solved addition and subtraction word problems, within 10, by using objects or drawings to represent the problem. • Unit 4 Module 4 set the stage for this work.	Guiding Questions: • How do you figure out what the story is asking? • How do you figure out which part is missing? • How is a picture the same as an equation? Instructional Notes: • The first problem is an "add to change unknown" problem type, which is more difficult than the previous lesson. • Introduce the new "count on" vocabulary card as well as discuss "missing addend" (no card). Enrichment: • See Step 11 (p. 11). *-continues on next page-*

	Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • making sense of addition story problems within 20 • using 10 as a landmark number • solving for the unknown within 20 – change unknown	Child Watching: • Many students may need to directly model this problem type since it is more difficult. Students using a number rack may count out 10 on the top, and then add by 1s to the bottom until they get to 14. Then students go back and count the four on the bottom they added to find the missing addend. 10 + ___ = 14. • Identify students using the counting on strategy, conserving the first number in their head and counting up until they arrive at the result. • Some students might mentally derive the fact without using manipulatives or counting strategies. • Support students who are directly modeling problems consistently toward trying other more efficient strategies they see modeled by other students.
Module 1- Session 3: Penguin Egg Doubles		
1.OA.6 1.NBT.1 MP.2 MP.7 MP.8	Access Prior Learning: • Kindergarten students represented addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. • Connect to Session 1 & 2 and experiences counting by 2s. Developing the Big Idea and key Strategic Behaviors: • understanding number structure • using doubles	Guiding Questions: • What patterns do you see? • What do you know about doubles? Instructional Notes: • Read the *Math Practices in Action* in the margin (p. 17). • This lesson will support repeated reasoning abilities and the transition into using doubles as a reasoning strategy for fluency development. Enrichment: • Using two dice will increase the number to double, leading to sums beyond 20. Child Watching: • Watch for students who struggle and encourage the use of just one die.
Module 1- Session 4: Nine Fish, Ten Fish		
1.OA.1 1.OA.6 MP.4 MP.5 MP.7	Access Prior Learning: • Kindergarten students solved addition and subtraction word problems, by using objects or drawings to represent the problem. • Connect to previous sessions. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using 10 as a landmark number • using 9 + or - 1	Guiding Question: • How can you use the number rack to model stories and solve problems? Instructional Notes: • See the *Work Place Sentence Frames* for Unit 6 here. • These strategy posters for addition might be useful to support students in using +10 and +9 facts. • Read the *About This Session* in the margin (p. 20). Child Watching: • Identify students who are having difficulty using the add 10 or add 9 strategy while playing Spin to Win Bingo. Use *Work Place Guide* for suggestions to support (p. T8). • Take notes on which students are counting by 1s and which students are counting on to inform tomorrow's lesson.
Module 1- Session 5: Fishing for Subtraction Strategies		
1.OA.1 1.OA.4 1.OA.6 MP.2 MP.5 MP.8	Access Prior Learning: • Kindergarten students solved addition and subtraction word problems, by using objects or drawings to represent the problem. • Connect to previous sessions. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • making sense of subtraction story problems within 20 – taking from and finding the difference	Guiding Questions: • What do you know about subtraction? • How many strategies do you know to solve story problems? Instructional Notes • Read the *About This Session* in the margin (p. 26). • In step 3, the introductory problem is a "take from, result unknown" problem type. In step 7, a "compare, difference unknown" problem type is posed which is more challenging. "Comparison problems involve comparing two quantities. The third quantity in these problems does not actually exist but is the difference between the two amounts" (Van de Walle et al., 2014, p. 129). "The challenge in comparison problems comes from the fact that two quantities are being described using language that can be complex for children. Fewer, less than, more, bigger, and greater than are the terms typically used to describe the relationships in comparison problems" (Van de Walle et al., 2014, p. 131). • For the "count up" strategy suggested on p. T13 the student makes a set of objects for each quantity, matches and counts up the remaining set, or the student models 9 and counts up (without the larger model) to 12 and determines 12 is 3 more than 9. *-continues on next page-*

		• Step 16, Problem 1 is another "compare, difference unknown" problem type. In this problem type there is no physical action to model or act out. Students must determine the relationship between the quantities and compare the two sets. A common direct modeling strategy is matching objects from one set to the other set until one set finished. The number of unmatched objects indicates how many more are in the larger set. • Relating subtraction problems to a related addition problem supports the understanding of part/whole relationships. Enrichment: • The nature of these problem types is enriching and students can try more than one strategy on each problem. Child Watching: • Identify students struggling with the comparison problem types and scaffold with manipulatives, perhaps using cubes as well as the number rack. • Connect the comparison situation with a story that is more familiar in context than penguins and fish. Sharing cookies with a sibling or friend might be a more relatable context.
Module 2- Session 1: Double-Flap Dot Cards Ten to Twenty		
1.OA.1 1.OA.3 1.OA.4 1.OA.6 1.OA.8 MP.2 MP.7 MP.8	Access Prior Learning: • Kindergarten students solved addition and subtraction word problems, and added and subtracted within 10 by using objects or drawings to represent the problem. • Kindergarten students decomposed numbers less than or equal to 10 into pairs in more than one way. • Connect to the dot cards in Unit 2 Module 2 Session 1. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using relationship between addition and subtraction • using combinations within 20 • writing addition and subtraction equations	Guiding Questions: • What patterns do you notice? • What kind of equations can you make with the combinations of dots? Instructional Note: • Consider relating a number "fact family" to their own families being made up of different parts but the total the parts remain the same no matter what configuration they are put in. No other parts can be included.  Enrichment: • Challenge students to create story problems that are more complex, like a change unknown, start unknown, or comparison problem. Child Watching: • Identify students who confuse the subtrahend and the minuend in their subtraction equation, although students do not need to use these terms yet. • Check for understanding of the written equations for both addition and subtraction. Determine if students can explain the parts of the equation - which number represents the total, which represents the parts, and what each symbol means.
Module 2- Session 2: Double-Flap Penguin Picture Cards		
1.OA.1 1.OA.3 1.OA.4 1.OA.6 1.OA.8 MP.2 MP.7 MP.8	Access Prior Learning: • Kindergarten students solved addition and subtraction problems within 10 by using objects or drawings to represent the problem and decomposed numbers less than or equal to 10 into pairs in more than one way. • Connect to the dot cards in Unit 2 Module 2 Session 1. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using relationship between addition and subtraction • using combinations within 20 • generating story problems and matching equations	Guiding Question: • How do you know the missing part? Instructional Notes: • Read the About This Session in the margin (p. 12). • Read the Math Practices in Action (p. 15). • Encourage students consider various strategies when thinking about the combinations for the Double-Flap Penguin Picture Cards, such as: doubles plus or minus one facts, add ten facts, or add nine facts. Enrichment: • Challenge students to create story problems that are more complex, like a change unknown, start unknown, or comparison. Child Watching: • Identify students still counting all or counting up from the quantity that is less on the Double-Flap cards. Refer to the addition strategy posters and ask students to identify what type of fact they worked on and model how to use the more efficient strategy to add the quantities.

Module 2- Session 3: Penguins Marching Two by Two		
1.OA.1 1.OA.2 1.OA.6 MP.2 MP.7 MP.8	Access Prior Learning: • Connect to doubles in Module 1 Session 3. Developing the Big Idea and key Strategic Behaviors: • understanding number structure • using doubles	Guiding Questions: • What do you know about doubles? • How can you change a double so it is not a double any longer? Instructional Notes: • Read the *About This Session* in the margin (p. 18). • Keep the focus of this session on the idea of doubles + 1 or - 1. The understanding of "even and odd" is a 2nd grade standard. "Near doubles are also called the "Doubles Plus One" or "Doubles Minus One" facts and include all combinations in which one addend is one more or one less that the other. This strategy uses a known fact to derive an unknown fact. Double the smaller number and add 1 or double the largest number and subtract 1. Be sure children solidly know the doubles before you focus on this strategy" (Van de Walle et al., 2014, p. 163). • If students do not know doubles, encourage them to use whatever strategies they know to solve the problems. "The reality is there is no one "best" strategy for any fact. For example, 7+8 could be solved using Up Over 10 or near-doubles. The more you emphasize choice, the more children will be able to find strategies that work for them, which will lead to fluency" (Van de Walle et al., 2014, p. 165). Up and Over 10 strategy refers to children using a known facts that equal 10 and then adding the rest of the number onto 10 (for example, 6+8, student recognizes 8+2 is 10, then add on the remaining 4). (Van de Walle et al., 2014, p. 161). Enrichment: • Challenge students to solve the problems using multiple strategies. Child Watching: • Identify students who have difficulty solving double facts and support with using other strategies while noting they need extra time to work on doubles in a meaningful way. Children often discover the pattern of doubles and the mathematical idea that when a number is doubled it is joining two equal groups. These doubles become anchors for other facts. The goal is that students will later use doubles to derive other facts.
Module 2- Session 4: Addition Facts Flash		
1.OA.6 1.NBT.2b 1.MP.2 1.MP.4 1.MP.7	Access Prior Learning: • Kindergarten students solved addition and subtraction problems within 10 by using objects or drawings to represent the problem. • Kindergarten students decomposed numbers less than or equal to 10 into pairs in more than one way. • Connect to all previous class strategies. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using strategies for problem solving – doubles, doubles +1 or -1, make 10, add 10, add 9 • operating with fluency	Guiding Questions: • How does knowing your doubles help you to solve problems quickly? • How many strategies do you know to help you solve problems? Instructional Notes: • Read the *About This Session* in the margin (p. 24). • Create time for students to discuss the selection and use of accurate, efficient, flexible and appropriate strategies for any given context or set of numbers. Enrichment: • See the *Work Place Game Variations* (p. T9). Child Watching: • Identify students struggling to choose appropriate and efficient strategies for specific problems. • Identify students still functioning with counting strategies instead of using derived facts.
Module 2- Session 5: Pick Two to Make Twenty		
1.OA.1 1.OA.6 MP.1 MP.2 MP.3	Access Prior Learning: • Kindergarten students decomposed numbers less than or equal to 10 into pairs in more than one way. • Connect to previous sessions that have developed strategies for computation.	Guiding Question: • How many ways do you know to make 20? Instructional Notes: • Read the *About This Session* in the margin (p. 30). • Read the *Math Practices in Action* in the margin (p. 31). • The assessment binder under the *Bridges Unit Assessment* tab provides the scoring guide for this checkpoint (p. 65). *-continues on next page-*

	Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • using combinations to 20 • finding the difference to 20	Child Watching: • Identify students struggling to select two numbers that will be closest to 20. Adjust for a target to 10 if needed. • Observe student strategy selection for combining numbers. • Use the *Scoring Guide* (p. 65) to assess students and inform your instruction.
Module 3- Session 1: Penguin Problems: Joining		
1.OA.1 1.OA.2 1.OA.6 1.OA.8 MP.1 MP.3 MP.7	Access Prior Learning: • Kindergarten students worked predominantly with "add to, result unknown," "take from, result unknown," "put together/take apart, total unknown," and "put together/take apart, addend unknown" problem types. • Connect to Unit 3 work on commutativity and associativity. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • solving addition story problems within 20 • solving for unknowns in all positions • writing equations • using addition strategies – doubles, doubles +1 or -1, add 10s, add 9s • understanding the commutative and associative properties for addition	Guiding Question: • What is adding all about? Instructional Notes: • A *Common addition and subtraction situations* table can be located in the NVACS, 2010, p.88. • Students may be using various strategies for problem solving: direct modeling by drawing or counting out 9 & 5; counting strategy by not representing the 9 or 5 at all, but just counting up; or using a derived fact by thinking 9 is close to 10+5=15, so it is one less than 15. Consider allowing student to solve the problem however they would like, observe the strategy used, then draw from the strategies seen around the room to have students model their strategies, including the derived fact strategy using the number rack which is suggested in the materials. • If needed, consider changing the numbers for any of the problems and continue working with the problem types until students show understanding. • The third problem offered is an "add to, start unknown" problem type which is not a standard expectation for 1st grade. Use this problem for exposure or challenge only. Enrichment: • See Step 11 or change the numbers in the problem and provide another opportunity (p. 7). Child Watching: • Identify student strategies being used. • Identify students applying the commutative and associative properties.
Module 3- Session 2: Penguin Problems: Separating		
1.OA.1 1.OA.4 1.OA.6 1.OA.8 MP.1 MP.3 MP.7	Access Prior Learning: • Kindergarten students worked predominantly with "add to, result unknown," "take from, result unknown," "put together/take apart, total unknown," and "put together/take apart, addend unknown" problem types. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • solving subtraction story problems within 20 • solving for unknowns in all positions • writing equations	Guiding Questions: • What do you know about taking things away from a group? • Where do you do it your everyday life? Instructional Notes: • A *Common addition and subtraction situations* table can be located in the NVACS, 2010, p.88. • Students may be using various strategies for problem solving: direct modeling by drawing or counting out 12, removing 3, and then counting the 9 remaining; a counting strategy by not representing the 12 at all, but just counting back 11, 10, 9, or similarly counting up from 9; or a derived fact by thinking 12- 2 is 10, and one less is 9. Again, consider allowing student to solve the problem whichever way they would like, observe the strategy used, then draw from the strategies seen around the room to have students model their strategies, including the derived fact strategy using the number rack which is suggested in the materials. If many students struggle with the first problem, consider changing the numbers and engage students in another "take from, result unknown" problem. • The third problem offered is a "take from, start unknown" problem type, which is not a standard expectation for 1st grade. Use this problem for exposure or challenge only. • Be cautious about trying to turn strategies into a procedure by coaching "when you see this box empty you just need to add, even though there is a subtraction sign." Allowing students to solve problems in their own way and listening to each other's strategies will result in more success for this hard work of making sense of the problem and understanding the operations. Enrichment: • If students can solve problems easily by recalling facts, challenge them by changing the numbers in the problem. Also, see Step 11 (p. 13). The rigor of the start unknown problem types is built into the standards. *-continues on next page-*

		Child Watching: • Observe for student strategies. Are students direct modeling? Are students using a counting strategy? Are students using a derived fact? Select students to share in that order.
Module 3- Session 3: Counting Penguin Feathers		
1.OA.1 1.OA.6 1.OA.7 1.OA.8 MP.1 MP.2 MP.3	Access Prior Learning: • Kindergarten students worked predominantly with "add to, result unknown," "take from, result unknown," "put together/take apart, total unknown," and "put together/take apart, addend unknown" problem types. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • solving put together/take apart story problems within 20 - • solving for unknown total and addend • writing equations	Guiding Questions: • What do we know about putting things together and taking thing apart? • How many different ways can you find to take apart a group of things or put a group of thing together? • Where do you use both in your everyday life? Instructional Notes: • Read *About this Session* in the margin, (p. 16). • A *Common addition and subtraction situations* table can be located in the NVACS, 2010, p.88. • Consider just posing the chart, setting the stage for the work, and sending students off to come up with as many combinations as they can, rather than keeping them in a whole group. Reconvene and share out your selected group's strategy. • In making the combinations, students who are direct modeling might need to use black and white cubes and manipulate them to create their combinations. Some students will not care what color the cubes are. Other students might be able to see the patterns in the chart. If we start with 1+9, then switch one over to the other color it will be 2+8, then 3+7. Do not force students to see this, yet be looking for students who might be discovering this repeated reasoning. Choose these students to share as the last share of the day. Enrichment: • See Step 12 (p. 18). Child Watching: • Observe for student strategies. Are students direct modeling? Are students using a counting strategy? Are students using a derived fact? Select students to share in that order.
Module 3- Session 4: Comparing Penguins		
1.OA.1 1.OA.6 1.OA.8 MP.1 MP.2 MP.3	Access Prior Learning: • Kindergarten students worked predominantly with "add to, result unknown," "take from, result unknown," "put together/take apart, total unknown," and "put together/take apart, addend unknown" problem types. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships • solving compare story problems within 20 - • solving for unknown differences • writing equations	Guiding Questions: • What are some things that you compare? • How do you compare something with something else? Instructional Notes: • A *Common addition and subtraction situations* table can be located in the NVACS, 2010, p.88. • Compare problems are difficult to directly model, so they are difficult problems for younger learners Students cannot rely on the words alone in the problem to guide them. They have to use internal knowledge to know they must compare, and they must understand what compare means. Enrichment: • Consider posing the problem and having students work through it in small groups, rather than using your number rack to illustrate each. Child Watching: • Observe for student strategies. Who is trying to Direct Model? What strategies are students using to compare? Are students making one to one matches and seeing what is left? Are students using a counting up strategy?
Module 3- Session 5: Unit 6 Assessment		
1.OA.1 1.OA.6 1.OA.7 1.OA.8 MP.1	Access Prior Learning: • Kindergarten students worked predominantly with "add to, result unknown," "take from, result unknown," "put together/take apart, total unknown," and "put together/take apart, addend unknown" problem types. Developing the Big Idea and key Strategic Behaviors: • understanding part/whole relationships	Instructional Notes: • The *Assessment Guide* under the *Bridges Unit Assessments* tab provides the scoring guide for the *Unit 6 Assessment* (p. 70). • Standards 1.OA.1, 1.OA.4, 1.OA.6, 1.OA.7, 1.OA.8 are targeted for mastery according to the *Grade 1 Assessment Map* in the assessment binder under the *Assessment Overview* tab (pp. 13-15). • Problems in number 5 of the assessment are "take from, change unknown", "put together/take apart, addend unknown", and "compare, difference unknown" problems. If students are not successful with solving these during the assessment, consider giving them a few add to, result unknown and add to, change unknown problems just to formatively assess where they are able to be successful. • A portion of the assessment assessing addition and subtraction facts is a "gentle timed" test. Read the note on page 28 of the lesson for more descriptions. Research shows that timed tests create anxiety (Boaler, 2015). The intention of the 3-minute marker on this assessment is to support the goal of students coming to an answer using a reasoning strategy within 3 seconds. *-continues on next page-*

	• solving all types of story problems within 20 • solving for unknown in all positions • writing equations	• The goal of the assessment is for teachers to identify how students are developing in fluency and to notice what strategies they are using. Consider replacing that part of the assessment with the assessment tool created for APTT fluency assessment. It can be found on the Family Game resources section of the WCSD Curriculum and Instruction website. Child Watching: • See *Assessment Binder*, *Bridges Unit Assessment* tab, p. 61 for information on which students you should be concerned about at this time of year.
Module 4- Session 1: Emperor Penguins		
1.NBT.1 1.NBT.3 1.NBT.4 1.MD.2 MP.1 MP.3 MP.4	Access Prior Learning: • Kindergarten students worked with describing and comparing measurable attributes of objects such as length and weight. • Kindergarten students also directly compared two objects with a measurable attribute in common to see which object had "more of" or "less of" the attribute and described the difference. • Connect to measurement in U4M4. Developing the Big Idea and key Strategic Behaviors: • comparing measurements • determining difference • understanding part/whole relationships • writing inequality statement	Guiding Question: • What do you find out when you compare? Instructional Notes: • Inches and feet are standard measures and not addressed in the standards until 2nd grade. The expectation for this work is the application of using what students have learned about number lines and reinforcing that turned vertically, they can also be used as a measuring tool. • Using string to observe length is a great way to maintain the linear measurement attribute. It also supports students in constructing understanding of transitivity, which is important when direct comparison cannot be used. "In situations when direct comparison is not possible or convenient, they should be able to use indirect comparison and explanations that draw on transitivity" (K-6 Progression on Measurement and Data, 2011, p. 8). • Consider permanently posting the penguins' strings next to the labeled measuring strip. This will support students who need a concrete model, allowing them to connect the concrete string to the abstract label on the measuring strip, and support further direct comparisons. Child Watching: • Identify strategies students use in determining the difference. Are students counting up from the smallest number? Are students counting back from the largest number? Are students counting by 10s off the decade (16, 26, 36)?
Module 4- Session 2: Little Blue Penguins		
1.NBT.1 1.NBT.3 1.MD.1 1.MD.2 MP.2 MP.4	Access Prior Learning: • Kindergarten students worked with describing and comparing measurable attributes of objects such as length and weight. • Kindergarten students also directly compared two objects with a measurable attribute in common to see which object had "more of" or "less of" the attribute and described the difference. • Connect to measurement in U4M4. Developing the Big Idea and key Strategic Behaviors: • comparing measurements • determining difference • understanding part/whole relationships • writing inequality statements • ordering 3 numbers	Guiding Questions: • What does it mean to put objects in order? • How can you use height measurements to order objects? Instructional Notes: • Read the *About This Session* in the margin (p. 10). • Consider posting a student's height measuring strip (created in Unit 4, Module 4, Session 1) next to the class measuring strip displaying all penguin string lengths. Use the student's height measuring strip to compare with penguins' strings to place in height order. Consider labeling the comparisons on sticky notes, using written words and mathematical notation. This provides students another opportunity to engage with 1.MD.1, ordering three objects by length. Enrichment: • Students can explore measuring other objects. Child Watching: • Identify students struggling with the use of the vocabulary - shorter than, taller than, more than, greater than, less than. Use them interchangeably.

Module 4- Session 3: Me & the Penguins Again		
1.NBT.1 1.NBT.3 1.NBT.4 1.MD.1 1.MD.2 MP.1 MP.2	Access Prior Learning: • Kindergarten students worked with describing and comparing measurable attributes of objects such as length and weight. • Kindergarten students also directly compared two objects with a measurable attribute in common to see which object had "more of" or "less of" the attribute and described the difference. • Connect to measurement in U4M4 and previous day's work. Developing the Big Idea and key Strategic Behaviors: • comparing measurements • solving for the difference • writing inequality statement • understanding part/whole relationships • using data	Guiding Question: • How can you see comparisons on a data sheet? Instructional Notes: • Students will likely use a counting up or counting down strategy to find the difference between their height and the emperor penguin, as the difference will be minimal and the numbers close together. The little blue penguin portion of the lesson provides opportunity to look for counting strategies. Watch for students who operate on 10s and 1s separately by counting up to a decade number then counting by 10s or by counting by 10s or off the decade. • Consider allowing students the opportunity to solve these questions using whatever tools and strategies they choose. Students might use cubes to make lengths for themselves and the penguins, and then compare their cube trains. The cubes are not exactly an inch long, so 45 cubes will not equal 45 inches. If students discover this, take the opportunity to discuss the importance of equal length units when comparing. • Student Book page 48 & 49 (problems 1, 2, and 3 only) can be used as an assessment of 1.MD.1. Enrichment: • See second bullet above. Child Watching: • Common misconceptions for measurement might be students who do not keep the length of string to be measured straight, or students who do not line the beginning of their string up with the beginning of their measuring tool. Both lead to inaccurate measurements.
Module 4- Session 4: Penguin Pairs		
Supports 1.OA 1.NBT MP.7 MP.8	Access Prior Learning: • Connect to counting by 2s previously and the patterns of 5s and 10s. Developing the Big Idea and key Strategic Behaviors: • counting by 2s • understanding and using number structure • understanding and using relationships between numbers	Guiding Questions: • What patterns can you see in numbers? • How can patterns help you make predictions? Instructional Notes: • The next two lessons provide opportunity for the teacher to work with any student who might need more support based on the *Unit 6 Assessment*. • Read *Math Practices in Action* in the margin (p. 21). • This lesson sets the stage for tomorrow's lesson. • This lesson is for exposure only. Determining whether a group of objects has an odd or even number of members is a 2nd grade standard. Enrichment: • See Step 8 (p. 22).
Session 5: Counting by Twos with Penguin Pairs		
1.NBT.1 MP.7 MP.8	Access Prior Learning: • Connect to counting by 2s previously and the patterns of 5s and 10s. Developing the Big Idea and key Strategic Behaviors: • counting by 2s • understanding and using number structure • understanding and using relationships between numbers	Guiding Questions: • What patterns can you see in numbers? • How can patterns help you make predictions? Instructional Notes: • This lesson provides opportunity for the teacher to work with any students who might need more support based on the *Unit 6 Assessment*. • This lesson is for exposure only. Determining whether a group of objects has an odd or even number of members is a 2nd grade standard. Enrichment: • See Step 4 (p. 25).

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