Addition & Subtraction Fact Strategy Book

Wichita Public Schools
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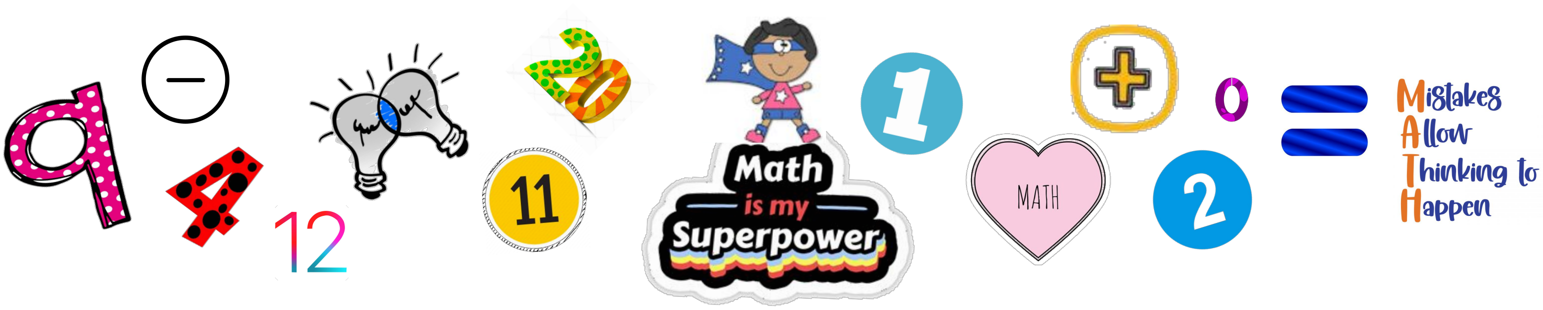
Introduction, Research, Best Practices, & Connections



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Effective Mathematics Teaching Practices

1. Establish mathematics goals to focus learning	Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.
2. Implement tasks that promote reasoning and problem solving	Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allows multiple entry points and varied solution strategies.
3. Use and connect mathematical representations	Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.
4. Facilitate meaningful mathematical discourse	Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
5. Pose purposeful questions	Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sensemaking about important mathematical ideas and relationships.
6. Build procedural fluency from conceptual understanding	Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.
7. Support productive struggle in learning mathematics	Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.
8. Elicit and use evidence of student thinking	Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

National Council of Teachers of Mathematics. (2014). Principles to actions: Ensuring mathematical success for all. Reston, VA: Author.

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www.nctm.org/principlestoactions

Summary of Standards for Mathematical Practice	Questions to Develop Mathematical Thinking
1. Make sense of problems and persevere in solving them • Interpret and make meaning of the problem looking for starting points. Analyze what is given to explain to themselves the meaning of the problem. • Plan a solution pathway instead of jumping to a solution. • Can monitor their progress and change the approach if necessary. • See relationships between various representations. • Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another. • Continually ask themselves, "Does this make sense?" • Can understand various approaches to solutions.	• How would you describe the problem in your own words? • How would you describe what you are trying to find? • What do you notice about...? • What information is given in the problem? • Describe the relationship between the quantities. • Describe what you have already tried. What might you change? • Talk me through the steps you've used to this point. • What steps in the process are you most confident about? • What are some other strategies you might try? • What are some other problems that are similar to this one? • How might you use one of your previous problems to help you begin? • How else might you organize...represent...show...? How might this be helpful?
2. Reason abstractly and quantitatively • Make sense of quantities and their relationships. • Are able to decontextualize (represent a situation symbolically and manipulate the symbols) and contextualize (make meaning of the symbols in a problem) quantitative relationships. • Understand the meaning of quantities and are flexible in the use of operations and their properties. • Create a logical representation of the problem. • Attends to the meaning of quantities, not just how to compute them.	• What do the numbers used in the problem represent? • What is the relationship of the quantities? • How is _______ related to ________? • What is the relationship between ______and ______? • What does_______mean to you? (e.g. symbol, quantity,diagram) • What properties might we use to find a solution? • How did you decide in this task that you needed to use...? • Could we have used another operation or property to solve this task? Why or why not?
3. Construct viable arguments and critique the reasoning of others • Analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments. • Justify conclusions with mathematical ideas. • Listen to the arguments of others and ask useful questions to determine if an argument makes sense. • Ask clarifying questions or suggest ideas to improve/revise the argument. • Compare two arguments and determine correct or flawed logic.	• What mathematical evidence would support your solution? • How can we be sure that...? / How could you prove that...? • Will it still work if...? • What were you considering when...? • How did you decide to try that strategy? • How did you test whether your approach worked? • How did you decide what the problem was asking you to find? (What was unknown?) • Did you try a method that did not work? Why didn't it work? Would it ever work? Why or why not? • What is the same and what is different about...? • How could you demonstrate a counter-example?
4. Model with mathematics • Understand this is a way to reason quantitatively and abstractly (able to decontextualize and contextualize). • Apply the math they know to solve problems in everyday life. • Are able to simplify a complex problem and identify important quantities to look at relationships. • Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation. • Reflect on whether the results make sense, possibly improving/revising the model. • Ask themselves, "How can I represent this mathematically?"	• What number model could you construct to represent the problem? • What are some ways to represent the quantities? • What's an equation or expression that matches the diagram..., number line..., chart..., table...? • Where did you see one of the quantities in the task in your equation or expression? • Would it help to create a diagram, graph, table...? • What are some ways to visually represent...? • What formula might apply in this situation? TOC

Summary of Standards for Mathematical Practice	Questions to Develop Mathematical Thinking
5. Use appropriate tools strategically • Use available tools recognizing the strengths and limitations of each. • Use estimation and other mathematical knowledge to detect possible errors. • Identify relevant external mathematical resources to pose and solve problems. • Use technological tools to deepen their understanding of mathematics.	• What mathematical tools could we use to visualize and represent the situation? • What information do you have? • What do you know that is not stated in the problem? • What approach are you considering trying first? • What estimate did you make for the solution? • In this situation would it be helpful to use...a graph..., number line..., ruler..., diagram..., calculator..., manipulative? • Why was it helpful to use...? • What can using a ______ show us that _____may not? • In what situations might it be more informative or helpful to use...?
6. Attend to precision • Communicate precisely with others and try to use clear mathematical language when discussing their reasoning. • Understand meanings of symbols used in mathematics and can label quantities appropriately. • Express numerical answers with a degree of precision appropriate for the problem context. • Calculate efficiently and accurately.	• What mathematical terms apply in this situation? • How did you know your solution was reasonable? • Explain how you might show that your solution answers the problem. • Is there a more efficient strategy? • How are you showing the meaning of the quantities? • What symbols or mathematical notations are important in this problem? • What mathematical language..., definitions..., properties can you use to explain...? • How could you test your solution to see if it answers the problem?
7. Look for and make use of structure • Apply general mathematical rules to specific situations. • Look for the overall structure and patterns in mathematics. • See complicated things as single objects or as being composed of several objects.	• What observations do you make about...? • What do you notice when...? • What parts of the problem might you eliminate..., simplify...? • What patterns do you find in...? • How do you know if something is a pattern? • What ideas that we have learned before were useful in solving this problem? • What are some other problems that are similar to this one? • How does this relate to...? • In what ways does this problem connect to other mathematical concepts?
8. Look for and express regularity in repeated reasoning • See repeated calculations and look for generalizations and shortcuts. • See the overall process of the problem and still attend to the details. • Understand the broader application of patterns and see the structure in similar situations. • Continually evaluate the reasonableness of their intermediate results.	• Will the same strategy work in other situations? • Is this always true, sometimes true or never true? • How would we prove that...? • What do you notice about...? • What is happening in this situation? • What would happen if...? • Is there a mathematical rule for...? • What predictions or generalizations can this pattern support? • What mathematical consistencies do you notice?

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Introduction & Research Connections

What is fluency? Why do we need to adapt the way we instruct and practice addition and subtraction?

Fluency is not synonymous with speed or memorization of facts. "Procedural fluency is a critical component of mathematical proficiency. Procedural fluency is the ability to apply procedures **accurately**, **efficiently**, and **flexibly**; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more **appropriate** to apply than another. To develop procedural fluency, students need **experience** in integrating concepts and procedures and building on familiar procedures as they create their own informal strategies and procedures. Students need opportunities to **justify** both informal strategies and commonly used procedures mathematically, to **support and justify** their choices of appropriate procedures, and to strengthen their understanding and skill through distributed practice" (NCTM, 2014).

Procedural fluency is more than memorizing facts or procedures, and it is more than understanding and being able to use one procedure for a given situation. Procedural fluency builds on a **foundation of conceptual understanding**, strategic reasoning, and problem solving (NGA Center & CCSSO, 2010; NCTM, 2000, 2014). Research suggests that once students have memorized and practiced procedures that they do not understand, they have less motivation to understand their meaning or the reasoning behind them (Hiebert, 1999). Therefore, the development of students' conceptual understanding of procedures should precede and coincide with procedural instruction. Although conceptual knowledge is an essential foundation, procedural knowledge is important in its own right. All students need to have a **deep and flexible knowledge of a variety of procedures**, along with an **ability to make critical judgments about which procedures or strategies are appropriate** for use in particular situations (NRC, 2001, 2005, 2012; Star, 2005).

Effective teaching practices provide experiences that help students to connect procedures with the underlying concepts and provide students with opportunities to **rehearse or practice strategies** and to **justify** their procedures. Practice should be **brief, engaging, purposeful, and distributed** (Rohrer, 2009). Too much practice too soon can be ineffective or lead to math anxiety (Isaacs & Carroll, 1999). Analyzing students' procedures often reveals insights and misunderstandings that help teachers in planning next steps in instruction (NCTM 2014)."

Fluency: Simply Fast and Accurate? I Think Not! **- Linda Gojak (NCTM Past-President) – from *NCTM Summing It Up*, Nov. 1, 2012**

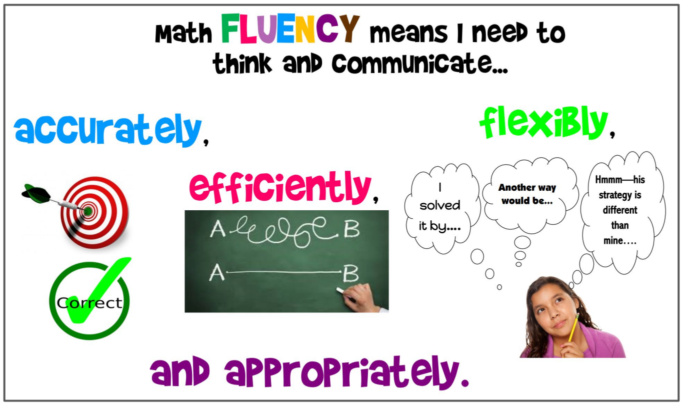
"Our students enter school with the misconception that the goal in math is to do it fast and get it right.

- Do we promote that thinking in our teaching without realizing it?
- Do we praise students who get the right answer quickly?
- Do we become impatient with students who need a little more time to think?

As we strive for a balance between conceptual understanding and procedural skill with mathematical practices, we must remember that there is a very strong link between the two. Our planning, our instruction, and our assessments must build on and value that connection. Fluency entails so much more than being fast and accurate!"

What is Fluency?

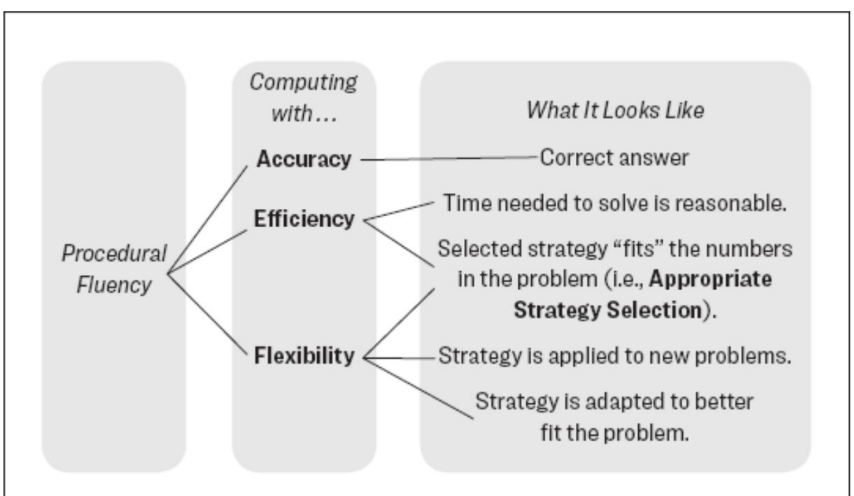
Adapted from Randall Charles, Heineman Blog, King/Bay-Williams & Gojak



- **Accuracy:** the ability to produce mathematically precise answers
- **Efficiency:** the ability to produce answers relatively quickly and easily "using strategic thinking to carry out a computation without being hindered by many unnecessary or confusing steps in the solution process" (Gojak, 2012)
- **Appropriateness:** the ability to select and apply a strategy/strategies that is/are appropriate for solving the problem
- **Flexibility:** the ability to think about a problem in more than one way (multiple strategies) and to adapt or adjust thinking if necessary

"Applying strategies is different than applying algorithms" (Kling & Bay-Williams 2019).

Figure 1.1. What Procedural Fluency Is and What It Looks Like



The four components (**bolded**) are interrelated. Appropriate strategy selection is required for efficiency and flexibility.

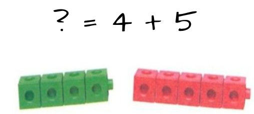
Gina Kling & Jennifer Bay-Williams (2019) Math Fact Fluency: The Five Fundamentals

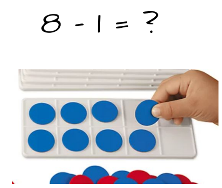
What are the 3 phases of learning?

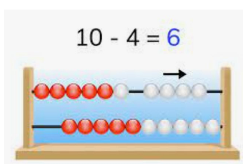
Adapted from Randall Charles, Heineman Blog, King/Bay-Williams & O'Connell/SanGiovanni

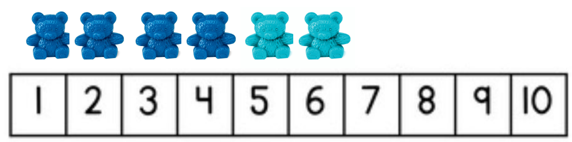
1

The first phase is **<u>concept learning or understanding</u>**. Here, the goal is for students to understand the meaning of addition and subtraction, as well as the reciprocal nature of these operations. In this phase, children focus on actions (i.e. putting sets together or taking them apart, using models that support 5 and 10, etc.) Students should be provided many hands-on opportunities to demonstrate a deep understanding of addition and subtraction. Meaningful practice is usually accomplished with tools (SMP 5, EMTP 3), models (SMP 4, EMTP 3), and purposeful discourse (SMP 3, EMTP 4). Conceptual understanding is the foundation to the other two phases and complex mathematics in later grades. "Students with greater conceptual knowledge are more likely to use sophisticated strategies and retrieve facts accurately (Heinemann Blog)."









Effective Math Teaching Practice 6:

Build procedural fluency from conceptual understanding

Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems. (*Principles to Action*, NCTM, 2014)

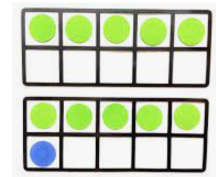
What are the 3 phases of learning?

Adapted from Randall Charles, Heineman Blog, King/Bay-Williams & O'Connell/SanGiovanni

2

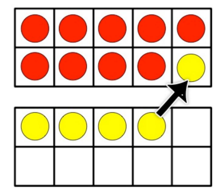
An important instructional bridge that is often neglected between concept learning and "know from memory" is the second phase, **fact strategies**. There are two goals in this phase. First, students need to recognize and explain there are clusters of addition and subtraction facts that relate in certain ways. Second, students label their thinking and manipulative-based work with specific strategies (i.e. Doubles - 1). The activities in this book are designed to assist with this phase. If you have students that are not ready, you will need to address the first phase of concept learning. "Effective teachers attend explicitly and directly to the important conceptual issues students are more likely to encounter. They help students develop important conceptual understandings. Research is clear that effective strategies include counting strategies, conceptual subitizing, and break-apart-to-make-ten" (Heinemann Blog).

5 + 6 = ?



Strategy:
Doubles + 1

9 + 4 = ?



9 + 4 = 10 + 3

Strategy:
Make a 10

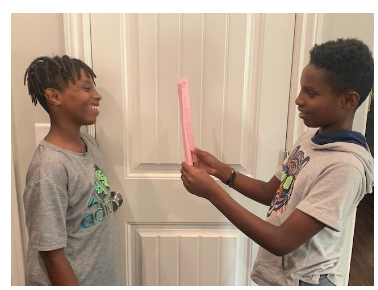
> "When students only learn a single procedure, regardless of how quickly and accurately they can implement it, they are denied the opportunity to develop procedural fluency. Strategy selection, adaptation, and transference are critical to both procedural fluency and mathematical proficiency and must be a significant part of students' experiences with the operations right from the beginning, with learning basic facts" (Kling & Bay-Williams 2019).

Strategy:
Combinations of 10

16 - 8 = ? "I know the Doubles strategy 8 + 8 = 16 so 16 - 8 has to equal 8."

3

The third phase is **know from memory** (automatically recall facts). Here the goal is for students to master sums and differences so they can recall them efficiently, accurately, and retain them over time. Students who have deep conceptual understanding and can apply multiple strategies are more likely to be able to recall addition and subtraction facts than students who simply memorize facts. In this phase, students should:



- Have engaging practice opportunities that provide immediate feedback (i.e. peer work like Partner Practice Pages so to avoid stating or writing sums or differences incorrectly over and over)
- Not participate in timed tests as they do not measure or provide effective practice for fluency
- Occasionally explain which strategy or strategies are appropriate to help solve the problems
- Set goals (short-term &/or long-term)
- Celebrate growth :o) !!!

> Students need and deserve intentional and effective practice with ALL 3 phases. Please do not jump to Phase 3 too quickly! If Phases 1 and 2 are done well, Phase 3 will naturally fall into place and the learning will stick!

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We Now Know More

Teaching Student-Centered Mathematics - Van de walle, Bay-Williams, Lovin & Karp

"Some textbooks and teachers move from presenting concepts of addition and subtraction straight to memorization of facts, feeling that developing strategies is not essential to learning facts (Baroody, Bajwa, & Eiland, 2009). This "passage storage view" (the idea that children can just store the facts when they are practiced extensively) means that children have 100 separate addition facts for the various combinations of 0 through 9 that must be memorized and practiced frequently. They may even have to memorize subtraction separately, bringing the total to over 200! There is strong evidence that this method simply does not work."

"When students count on their fingers or make marks in the margins they have not mastered their facts because they have not developed efficient methods of producing a fact answer based on number relationships and reasoning. Drilling inefficient methods does not produce mastery!

Over many years, research supports the notion that basic fact mastery is dependent on the development of reasoning strategies. These reasoning strategies are essential to fact development.

Guided invention is an effective, research-informed method for developing fact mastery. Teachers should design sequenced tasks and problems that will promote students' invention of effective strategies. Then, students need to clearly articulate these strategies and share them with peers. This sharing is often best carried out in think-alouds, in which student talk through the decisions they made and share counterexamples."

Mastering the Basic Math Facts in Addition and Subtraction: Strategies, Activities & Interventions to Move Students Beyond Memorization - O'Connell & SanGiovanni

"In the past, much of mathematics was taught in a drill and practice style. Students were simply asked to memorize their math facts, often without much attention to conceptual understanding. Through worksheets filled with single-digit computations or lengthy flash card sessions, students were asked to memorize addition and subtraction facts. Our goal in today's math classrooms has shifted from memorizing facts and procedures to increase understanding of math skills and concepts. We want our students to be able to do mathematics, but we also want them to understand the math they are doing."

"The ability to recall items is enhanced when understanding is connected to the task. Memorizing a chain of nonsensical words (e.g., sat chair red girls a in little the) is more difficult than memorizing a sentence in which the words have meaning (e.g., A little girl sat in the red chair.). Asking students to memorize dozens of number facts can be discouraging and confusing when students view them simply as pairs of numbers. The understanding that 7 + 4 represents the combined total of those two quantities, and that the sum is clearly close to 10 *(e.g., Combinations of 10)*, aids our ability to recall the sum."

Planning, Teaching, and Assessing Culturally and Linguistically Diverse Children
Planning, Teaching, and Assessing Children with Exceptionalities
From *Teaching Student-Centered Mathematics 2nd Edition Vol. 1* - VandeWalle, Lovin, Karp & Bay-Williams

See the text: Chapter 5 (p. 54) and Chapter 6 (p. 70)

Limitations & Risks of Timed Mathematics Tests

Jennifer Bay-Williams & Gina Kling

"Timed tests offer little insight about how flexible students are in their use of strategies or even which strategies a student selects. And evidence suggests that efficiency and accuracy may actually be negatively influenced by timed testing. A study of nearly 300 first graders found a negative correlation between timed testing and fact retrieval and number sense (Henry and Brown 2008). Children who were frequently exposed to timed testing demonstrated lower progress toward knowing facts from memory than their counterparts who had not experienced as many timed tests. In fact, growing evidence suggests that timed testing has a negative impact on students" (Boaler 2012, Henry and Brown 2008, Ramirez et al. 2013).

Teaching Children Mathematics **- Van de Wall et al., April 2014, pp 488 – 497**

"In a recent study of 150 first and second graders, researchers measured students' levels of math anxiety, finding that children as young as first grade experienced it and that levels of math anxiety did not correlate with grade level, reading level, or parental income (Ramirez et al. 2013). Other researchers analyzed brain-imaging data from forty-six seven- to nine-year-old children while they worked on addition and subtraction problems and found that those students who "felt panicky" about math had increased activity in brain regions associated with fear. When those areas were active, decreased activity took place in the brain regions that are involved in problem solving" (Young, Wu, and Menon 2012).

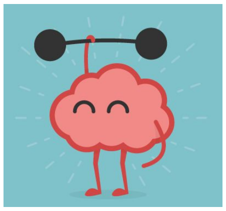
Research Suggests that Timed Tests Cause Math Anxiety **- Jo Boaler, 2014**

"Evidence strongly suggests that timed tests cause the early onset of math anxiety for students across the achievement range. Given the extent of math anxiety, math failure, and innumeracy in the United States (Boaler 2009), such evidence is important for us all to consider."

"Occuring in students from an early age, math anxiety and its effects are exacerbated over time, leading to low achievement, math avoidance, and negative experiences of math throughout life (Ramirez et al. 2013; Young, Wu, and Menon 2012). Educators have witnessed the impact of math anxiety for decades, but only in recent years have timed math tests been shown to be one cause of the early onset of math anxiety. Indeed, researchers now know that students experience stress on timed tests that they do not experience when working on the same math questions in untimed conditions" (Engle 2002).

Time Test Limitations When Compared to KCCRS/USD 259 Proficiency Scales

For Wichita Public Schools, proficiency scales are the bedrock for planning, instruction, meaningful practice, learning checks, feedback, and grading. Timed computation tests do <u>not</u> fully align with Level 3 proficiency with addition and subtraction fluency. WPS students are expected to demonstrate all the components of fluency (accuracy, efficiency, flexibility and appropriateness - which includes explaining strategies to apply and why/how they work). Therefore, learning checks should include opportunities for students to defend this thinking. Teachers are encouraged to collect this data unobtrusively as students are engaged in partner activities (ask students to name, explain, and defend appropriate strategies).



Some Big Ideas (Adapted from O'Connell & SanGiovanni)

- Our number system is a **base-ten system**:
    - ten is a benchmark and friendly number,
    - numbers can be represented as separate objects or a group of 10 objects, and
    - adding 10 to a single-digit number will add one place value.

- **Addition** is a
    - joining/combining,
    - adding to and/or,
    - part-part-whole process.

- **Adding 1** to a quantity is the same as counting 1 more number or counting forward in our **counting** process.

- **Subtraction** is a
    - separation (taking away) or
    - comparison process.

- **Subtracting 1** from a quantity is the same as counting 1 less or counting backwards in our **counting** process.

- Addition and subtraction are **inverse processes**.

- **Zero Property of Addition/Identity Property of Addition:** Zero added to (or subtracted from) any number will result in a sum (or difference) of the original number.

- **Commutative Property:** Changing the order of the addends does not change the sum.

- **Associative Property:** Changing the grouping of addends does not change the sum.

Meaningful & Effective Practice & Growth

(Adapted from Van de Walle, O'Connell/SanGiovanni, Bay-Williams/Kling, Boaler, & Sutton)

1. Have clarity of the state standards (targets on the scales) and set high expectations for all students

2. Provide engaging practice opportunities OFTEN

    - Manipulatives, tools, games, drawing/writing, music, and connections to strategies increase knowledge and engagement.
    - Meaningful practice will strengthen strategies and make them increasingly automatic.

3. Expect student discourse and strategy retrieval

    - Student discourse is critical to developing conceptual understanding of the operations, deep understanding of the strategies, and Standard for Mathematical Practice 3 (construct viable arguments and critique the reasoning of others).
    - When students are involved in an exercise that is designed to practice a particular strategy, it is likely they will use that strategy. Organize the students' practice problems according to a selected strategy.
    - Student discourse also includes immediate feedback (i.e., Partner Practice Pages).

4. Provide individualized practice (strategy practice and know from memory)

    - Often strategies are introduced to the whole class. Different students will bring different number tools to the task and will develop strategies at different rates. Once students are ready for practice and moving to the 'know from memory stage," opportunities will likely need to be individualized or practiced in small groups. A large number of practice activities (strategy lessons games and Partner Practice Pages) will be needed to support differentiation.

5. Enhance by conducting Number Talks

    - As students are learning addition and subtraction fact strategies, conduct Number Talks that allow for application of those strategies. The Number Talks routine can be RICH and fruitful in multiple ways!

6. Avoid inefficient practice and assessments

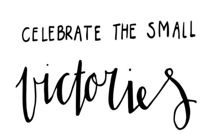
    - Worksheets and timed tests do not fully measure fluency, often cause boredom, and can lead to math anxiety.

7. Offer review opportunities

    - As students learn 2-3 new strategies, offer activities that review these strategies, where students select strategies and explain why they are efficient and appropriate.

8. Share the learning targets often and set goals using them

    - Ideally, the teacher and students should set and monitor goals (student ownership)

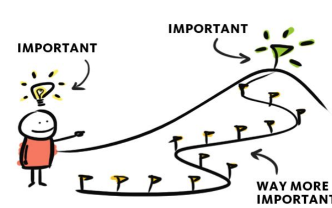


9. Collect data unobtrusively

    - While students are doing partner activities or engaging in a Number Talk, unobtrusively collect data on a few students, being sure to ask questions that align to the target on the scale (explaining strategies, etc.).

10. Expect, inspect, and respect mistakes

    and celebrate growth!



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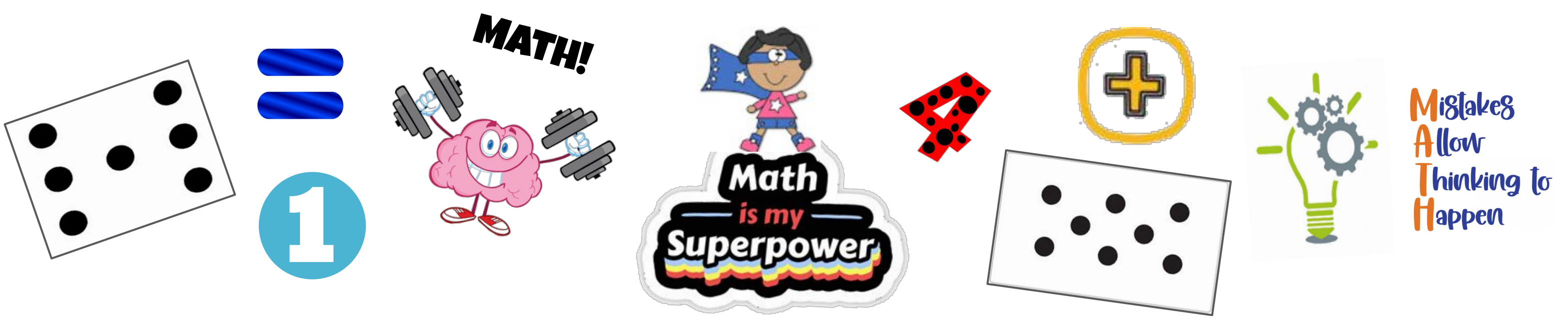
Foundational Numeration Skills



Foundational Numeration Skills

Students should not be made to work on their facts if they are still struggling with basic, foundational number sense skills. For those students that consistently count on their fingers or must always "count all" in order to find a correct answer to a simple addition or subtraction problem, the teacher will want to focus on increasing their skill of subitization. Students must be proficient with perceptual and conceptual subitizing before they can be expected to master the fluency levels that are necessary with the basic facts.

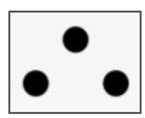
Two Types of Subitizing

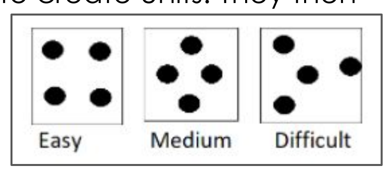
(From *Subitizing: What is it? Why teach it?* - Doug Clements)

Perceptual Subitizing

"Perceptual subitizing is closest to the original definition of subitizing: recognizing a number without using other mathematical processes. For example, children might "see 3" without using any learned mathematical knowledge. Perceptual subitizing may involve mechanisms similar to those used by animals. Two-year-old children show this ability clearly (Gelman and Gallistel 1978).

Perceptual subitizing also plays an even *more* primitive role, one that most of us do not even think about because we take it for granted. This role is making units, or single "things," to count. This ability seems obvious to us. However, "cutting out" pieces of experience, keeping them separate, and coordinating them with number words is no small task for young children. Even when they count their fingers, for example, they have to mentally "cut out" one part of the hand from the next to create units. They then have to connect each of these units with one, and only one, number word."

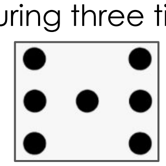


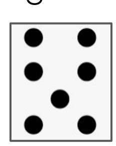


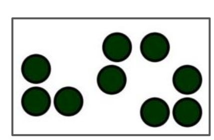
Conceptual Subitizing

"But how is it that people see an eight-dot domino and just "know" the total number? They are using the second type of subitizing. Conceptual subitizing plays an advanced-organizing role. People who "just know" the domino's number recognize the number pattern as a composite of parts and as a whole. They see each side of the domino as composed of four individual dots and as "one four." They see the domino as composed of two groups of four and as "one eight." These people are capable of viewing number and number patterns as units of units (Steffe and Cobb 1988).

Spatial patterns, such as those on dominoes, are just one kind. Other patterns are temporal and kinesthetic, including finger patterns, rhythmic, and spatial-auditory patterns. Creating and using these patterns through conceptual subitizing help children develop abstract number and arithmetic strategies (Steffe and Cobb 1988). For example, children use temporal patterns when counting on: "I knew there were three more, so I just said, 'Nine . . . ten, eleven, twelve,' rhythmically gesturing three times, one "beat" with each. They use finger patterns to figure out addition problems. Children who cannot subitize conceptually are handicapped in learning such arithmetic processes. Children who can may subitize only small numbers at first. Such actions, however, can be stepping-stones to constructing more sophisticated procedures with larger numbers."







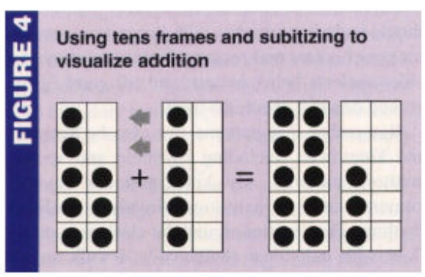
Conceptual Subitizing and Arithmetic

"The spatial arrangement of sets influences how difficult they are to subitize. Children usually find rectangular arrangements easiest, followed by linear, circular, and scrambled arrangements (Beckwith and Restle 1966; Wang, Resnick, and Boozer 1971). This progression holds true for students from the primary grades to college.

Finally, textbooks often present sets that discourage subitizing. Their pictures combine many inhibiting factors, including complex embedding, different units with poor form (e.g., birds that were not simple in design as opposed to squares), lack of symmetry, and irregular arrangements (Carper 1942; Dawson 1953). Such complexity hinders conceptual subitizing, increases errors, and encourages simple one-by-one counting.

We want to use conceptual subitizing to develop ideas about addition and subtraction. It provides an early basis for addition, as students "see the addends and the sum as in 'two olives and two olives make four olives' " (Fuson 1992, 248). A benefit of subitizing activities is that different arrangements suggest different views of that number.

Children can use familiar spatial patterns to develop conceptual subitizing of arithmetic. For example, students can use tens frames to visualize addition combinations (fig. 4). Such pattern recognition can assist students with mental handicaps and learning disabilities as they learn to recognize the five- and ten-frame configuration for each number. "These arrangements ... help a student first to recognize the number and use the model in calculating sums. It is this image of the number that stays with the student and becomes significant" (Flexer 1989)."



Subitizing (Quick Looks Routine) is an expectation at PreK and kindergarten. See the proficiency scales supporting this critical skill.

Required Computational Fluencies & Fact Strategies

KCCRS Required Computational Fluencies

	K – 2 grade band	3 – 5 grade band
	Conceptual Understandings that lead to fluency: · Addition and Subtraction (concepts, skills, problem solving) · Place Value	Conceptual Understandings that lead to fluency: · Multiplication and Division of Whole Numbers and Fractions (concepts, skills, problem solving)

Wichita Public Schools have math proficiency scales for the required computational fluency standards. See the scales for specifics on student proficiency.

Required Computational/ Procedural Fluency	**Kindergarten** CC: K.OA.5 WPS: (!)OA.5A & (!)OA.5B Fluently add/subtract within 5	**1st grade** CC: 1.OA.6 WPS: (!)OA.6B Fluently add/subtract within 10	**2nd grade** CC:L 2.OA.2 WPS:(!)OA.2A Fluently add/subtract within 20 CC: 2.NBT.5 WPS: (!)NBT.5A & (!)NBT.5B Fluently add/subtract within 100	**3rd grade** CC: 3.OA.7 WPS: (!)OA.7 Fluently multiply/divide within 100 CC: 3.NBT.2 WPS: (!)NBT.2 Fluently add/subtract within 1000	**4th grade** CC: 4.NBT.4 WPS: (!)NBT.4 Fluently add/subtract within 1,000,000	**5th grade** CC: 5.NBT.5 WPS: (!)NBT.5 Fluently multi-digit multiplication

Addition/Subtraction Fact Strategies

**Fluency expectations: Kindergarten within 5, 1st within 10, and 2nd within 20.

Bold **X** = primary strategy/focus   Unbold x = secondary strategy (review or introduced but may not be mastered due to number range)

Strategy	K	1	2	Strategy Description	Van de Walle
Counting On or Back **One-more-than/ Two-more-than One-less-than/ Two-less/than**	**X**	**X**	x	Used when adding or subtracting 1 or 2 to a given number. By mid-1st grade, students should apply a different strategy than Counting On/Back for numbers greater than 2.	1st Ed. V 1 p. 99-100 2nd Ed. V. 1 p. 158-159 1st Ed. V. 2 p. 79-80 2nd Ed. V. 2 p. 132
Facts with 0/ Zero	**X**	**X**	x	Used when one of the addends is 0 – especially helpful with application/story problems.	1st Ed. V. 1 p. 100 2nd Ed. V.1 p. 159-160 1st Ed. V. 2 p. 79-80
Doubles	x	**X**	**X**	Adding two of the same number together, such as 2 + 2 or 8 + 8. When subtracting, students apply this strategy reciprocally (14 - 7 = ? Apply understanding of 7 + 7).	1st Ed. V. 1 p. 101 2nd Ed. V. 1 p. 162 1st Ed. V. 2 p. 80-81 2nd ed. V. 2 p. 134-135
Doubles +/- 1		**X**	**X**	Finding a double hidden in the fact where one addend is one more or one less than the other addend. Students should demonstrate clear understanding of decomposition with manipulatives and models for this strategy.	1st Ed. V. 1 p 101-102 2nd Ed. V. 1 p. 163 1st Ed. V. 2 p. 80-81 2nd ed. V. 2 p. 134-135
Combinations of 10	**X**	**X**	**X**	Grouping the numbers to find expressions that would equal 10, such at 2 + 8, 9 + 1, 3 + 7. When subtracting, students apply this strategy reciprocally (10 - 4 = ? Apply Combination of 10 strategy by asking oneself, "*4 + ? equals 10?*" 4 + 6 = 10)	1st Ed. V. 1 p 106 1st Ed.V. 2 p. 83
Add & Subtract 10			**X**	In an addition problem, one addend is 0-10 while the other addend is 10. In a subtraction problem, the minuend is 10-20, while the subtrahend is 10. Some of the problems might be written inversely (sum or difference is 10).	
Make a 10		x	**X**	Use with addend of 8 or 9. Decompose one addend to make a 10 then add on the rest. Students should demonstrate clear understanding of decomposition with manipulatives and models for this strategy.	1st Ed. V. 1 p. 102-103 2nd Ed. V. 1 p. 160-162 1st Ed.V. 2 p. 81-82 2nd ed. V. 2 p. 133-134
Doubles + 2 **Two-Apart Facts**		x	**X**	Finding a double hidden in the fact where one addend is two more than the other. For instance, 3 + 5 is a double 3 then 2 more. Students should demonstrate clear understanding of decomposition with manipulatives and models for this strategy.	1st Ed. V. 1 p. 105 1st Ed.V. 2 p. 83
+/- 9 **Add 10 and take 1 away Subtract 10 then add 1**		x	**X**	When an addend is 9, then just add 10 and take 1 away. When 9 is the subtrahend, subtract 10 then add 1.	
Other					
Other					

Subtraction Fact Strategies

Strategy	Subtraction Description	Van de Walle
Think Addition	Using the known addition fact to solve the subtraction problem. For example, 13 - 5, think "What goes with 5 to make 13?"	1st Ed. V. 1 p 106-107 2nd Ed. V. 1 p. 164 1st Ed. V. 2 p. 84-85 2nd Ed. V. 2 p. 135-136
Related Equations/Fact Families	Think of the fact family to recall the missing number. A fact family has 8 equations.	1st Ed. I. 1 p. 110-111 1st Ed. V. 2 p. 86-87 2nd Ed. V.2 p. 137
Back Down Through Ten	Working backward with 10 as a "bridge". For example, 15 - 6 = ? Take 5 away from 15 to get to ten. Then take one more away, leaving 9. Students should demonstrate clear understanding of decomposition with manipulatives and models for this strategy.	1st Ed. VI. 1 p. 109 1st ed. V. 2 p. 85-86

Making Meaning for Operations & Word Problem Information

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Making Meaning for Operations

Structures for Addition and Subtraction Problems

This section is provided for teachers in order to help students develop operation sense to connect different meanings of addition and subtraction to each other. This will enable students to effectively use these operations in real-world settings. These problem structures are not intended for students, but will help you as the teacher in formulating and assigning addition and subtraction tasks.

Math Activity: Modeling Word Problems

1. Model each of the following five problems with cubes or other counters. After you have acted out the problems with a concrete model, write an arithmetic sentence for each one.

    a. Kris has 8 candies. She eats 3 of them. How many does she have left?

    b. Kris has 8 candies and Marcus has 3 candies. How many more candies does Kris have?

    c. Kris has 3 dollars. She wants to buy something that costs 8 dollars. How many more dollars does she need?

    d. Yesterday Kris had 8 balloons. Some of them burst last evening. Today she has 3 left. How many balloons burst?

    e. Yesterday Kris had some balloons. Today Marcus gave her 3 more balloons. Now she has 8 altogether. How many balloons did she have yesterday?

2. How are these five problems <u>alike</u>? How are they <u>different</u>?

3. What <u>connections</u> do you see between the five problems and the information presented on the chart, <u>*Common Addition and Subtraction Situations*</u>? How does this learning impact your <u>lesson planning decisions</u>?

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Making Meaning for Operations

Common Addition and Subtraction Situations (pg 88 in CCSS)

Shading taken from OA progression

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Taken from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	Total Unknown	**Addend Unknown**	**Both Addends Unknown**[1]
Put Together/ Take Apart[2]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare[3]	(“How many more?” version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? (“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

Blue shading indicates the four Kindergarten problem subtypes. Students in grades 1 and 2 work with all subtypes and variants (blue and green). Yellow indicates problems that are the difficult four problem subtypes or variants that students in Grade 1 work with, but do not need to master until Grade 2.

[1] These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.

[2] Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

[3] For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

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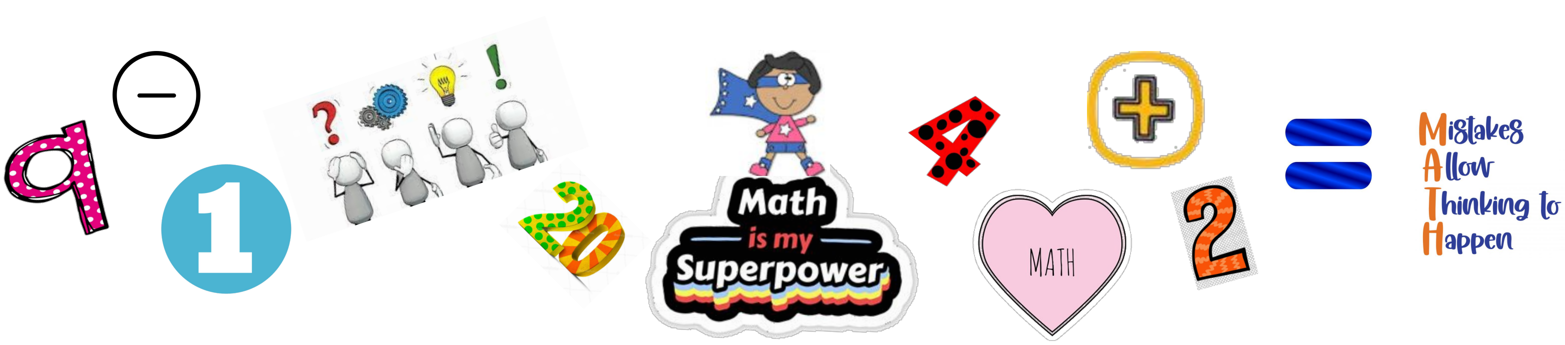
Addition & Subtraction Fact Strategy Assessments & Recording Sheets



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Addition/Subtraction Fact Strategies Assessment - Directions E2

Materials:

Addition & Subtraction Fact Strategy Assessment Student Page (check grade level)

Addition & Subtraction Fact Strategy Assessment Student Page KEY (check grade level)

Individual Student Data Sheet (hard copy or electronic copy - check grade level)

Post-it notes

Pencils

Information and Directions:

1. Choose 1-3 students to assess. Keeping the group very small will help with the data collection process.

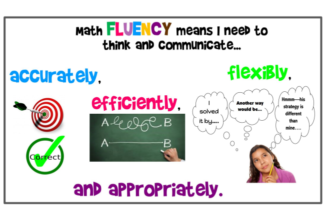
2. Students cover some of their boxes with post-it notes. Let them know that you will tell them which post-it notes to remove to solve and explain their strategies. By having students solve different boxes at the same time will help keep them from copying oral responses.

3. Take notes on the Individual Student Data Sheet on ***HOW* the student is solving the problems in the box**. See the suggested abbreviations in the far left hand column or create your own recording system (be sure to keep it consistent - especially if sharing students within the grade).

4. As a student completes the problems in a box, **ask him/her to explain a strategy that works well with that set**. Part of fluency is the ability to **defend** efficient and appropriate strategies to solve addition **AND** subtraction problems - not just addition. See additional details on the Individual Student Data Sheet (text at the top).

5. Keep the Individual Student Data Sheet for additional learning checks after opportunities to practice the strategies have taken place.

6. Ideally, the teacher and student should use this assessment information to set goals.



Be sure STUDENTS apply the definition of fluency (vocabulary precision – **SMP 6**) as they practice the strategies and set goals.

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Addition Fact Strategies Assessment - Analysis

E3

1. The student age is broken apart so that the different boxes focus on strategies that are appropriate for those particular equations:

K (Boxes 1-4 and 6) & 1st

- Box #1 – Counting On or Back (+1/-1; +2/-2)
- Box #2 – Counting On (order/Commutative Property)
- Box #3 – Zero
- Box #4 – Doubles
- Box #5 – Doubles + 1/-1 (Near Doubles)
- Box #6 – Combinations of Ten
- Box #7 – Make a 10
- Box #8 – Doubles + 2

2nd - 5th

- Box #1 – Counting On or Back (+1/-1; +2/-2)
- Box #2 – Counting On (order/Commutative Property)
- Box #3 – Zero
- Box #4 – Doubles
- Box #5 – Doubles + 1/-1 (Near Doubles)
- Box #6 – Combinations of Ten
- Box #7 - Add 10
- Box #8 – Make a 10
- Box #9 – Doubles + 2
- Optional: +9/-9

**If wanting to check other strategies, have the student flip the paper over and ask them to write the equations you would like to check.

2. After grading the papers and revisiting the information you wrote about the strategies they <u>**applied and explained**</u>, determine if:

- conceptual understanding/foundations of addition and subtraction is lacking and needed first
- conceptual understanding is in place, but the student is unaware of strategies - strategy instruction needs to take place and/or precise vocabulary is lacking
- the student does have strategy knowledge, but additional practice is needed and/or precise vocabulary is lacking
- the student has vast knowledge of strategies - ready to move to "know from memory" (PPPs)

**On the Individual Student Data Sheet, color coding the boxes or marking the boxes with a symbol may help with this analysis process.

3. If possible, meet with your grade level team to decide:

- what (phase of learning and which strategies) and who (students)

core intervention

Addition and Subtraction fact fluency is part of

- core,
- core and intervention or
- intervention.

It just depends on the grades and scales.

Remember… fast and accurate $\neq$ fluency

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Student's Name ______________________________ Date ______________________________

Kindergarten - Addition and Subtraction Fact Strategy Assessment - Student Page

Use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. Students should be prepared to explain their strategies.

1

3 + 1 = _____

2 + 3 = _____

1 + 4 = _____

3 + 2 = _____

5 - 1 = _____

3 - 2 = _____

4 - 1 = _____

5 - 2 = _____

2

2 + 3 = _____

3 + 2 = _____

1 + 2 = _____

2 + 1 = _____

4 + 1 = _____

1 + 4 = _____

3

1 + 0 = _____

0 + 4 = _____

2 + 0 = _____

0 + 0 = _____

3 - 0 = _____

5 - 0 = _____

2 - 0 = _____

0 - 0 = _____

4

2 + 2 = _____

0 + 0 = _____

1 + 1 = _____

2 - 1 = _____

4 - 2 = _____

6

7 + 3 = _____	10 - 6 = _____	10 - 3 = _____
4 + 6 = _____	8 + 2 = _____	10 - 9 = _____
10 - 2 = _____	1 + 9 = _____	10 + 0 = _____

KEY

Kindergarten - Addition and Subtraction Fact Strategy Assessment - Student Page KEY

Have the student use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. If assessing 2 or 3 students, have them pull off the post-its in a different order. Be sure to choose both addition and subtraction problems when asking students to explain their strategies.

1	2	3	4
Counting On/Up & Back/Down	Counting On/Up & Back/Down - Specifically the *Commutative Property*	*Zero or The Identity Property of Zero*	*Doubles*
3 + 1 = **4**	2 + 3 = **5**	1 + 0 = **1**	2 + 2 = **4**
2 + 3 = **5**	3 + 2 = **5**	0 + 4 = **4**	0 + 0 = **0**
1 + 4 = **5**	1 + 2 = **3**	2 + 0 = **2**	1 + 1 = **2**
3 + 2 = **5**	2 + 1 = **3**	0 + 0 = **0**	2 - 1 = **1**
5 - 1 = **4**	4 + 1 = **5**	3 - 0 = **3**	4 - 2 = **2**
3 - 2 = **1**	1 + 4 = **5**	5 - 0 = **5**	
4 - 1 = **3**		2 - 0 = **2**	
5 - 2 = **3**		0 - 0 = **0**	

6

7 + 3 = **10**	10 - 6 = **4**	10 - 3 = **7**
4 + 6 = **10**	8 + 2 = **10**	10 - 9 = **1**
10 - 2 = **2**	1 + 9 = **10**	10 + 0 = **10**

TOC

Student's Name ______________________________ Date ______________________________ **E5**

K/1st Grade - Addition and Subtraction Fact Strategy Assessment - Student Page

Use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. Students should be prepared to explain their strategies.

1	2	3	4
8 + 1 = _____	1 + 6 = _____	9 + 0 = _____	3 + 3 = _____
7 - 1 = _____	2 + 8 = _____	0 + 4 = _____	8 - 4 = _____
5 - 1 = _____	1 + 5 = _____	5 - 0 = _____	2 + 2 = _____
3 + 2 = _____	6 + 1 = _____	7 + 0 = _____	5 + 5 = _____
3 - 2 = _____	7 + 2 = _____	1 - 0 = _____	6 - 3 = _____
6 + 1 = _____	2 + 7 = _____	0 + 8 = _____	4 + 4 = _____
8 - 2 = _____	5 + 1 = _____	0 - 0 = _____	4 - 2 = _____
5 + 2 = _____	8 + 2 = _____	6 - 0 = _____	10 - 5 = _____

5	6	7 Teacher see note on key	8
5 + 4 = _____	7 + 3 = _____	9 + 5 = _____	3 + 5 = _____
2 + 3 = _____	4 + 6 = _____	8 + 4 = _____	4 + 6 = _____
9 - 5 = _____	10 - 2 = _____	9 + 6 = _____	2 + 4 = _____
7 - 3 = _____	1 + 9 = _____	8 + 3 = _____	5 + 3 = _____
4 + 3 = _____	10 - 6 = _____	5 + 8 = _____	4 + 6 = _____
9 - 4 = _____	10 - 3 = _____	9 + 8 = _____	4 + 2 = _____
3 + 4 = _____	8 + 2 = _____	7 + 9 = _____	6 + 4 = _____
7 - 4 = _____	10 - 9 = _____	8 + 6 = _____	3 + 5 = _____

KEY

1st Grade - Addition and Subtraction Fact Strategy Assessment - Student Page KEY

Have the student use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. If assessing 2 or 3 students, have them pull off the post-its in a different order. Be sure to choose both addition and subtraction problems when asking students to explain their strategies.

All but Box 7 are within 10. Box 7 needs to work with numbers greater than 10 to successfully apply this strategy.

1 Counting On/Up & Back/Down (ONLY for +/- 1 or 2, not 3 or greater)

8 + 1 = **9**
7 - 1 = **6**
5 - 1 = **4**
3 + 2 = **5**
3 - 2 = **1**
6 + 1 = **7**
8 - 2 = **6**
5 + 2 = **7**

2 Counting On/Up & Back/Down - Specifically the Commutative Property

1 + 6 = **7**
2 + 8 = **10**
1 + 5 = **6**
6 + 1 = **7**
7 + 2 = **9**
2 + 7 = **9**
5 + 1 = **6**
8 + 2 = **10**

3 Zero or The Identity Property of Zero

9 + 0 = **9**
0 + 4 = **4**
5 - 0 = **5**
7 + 0 = **7**
1 - 0 = **1**
0 + 8 = **8**
0 - 0 = **0**
6 - 0 = **6**

4 Doubles

3 + 3 = **6**
8 - 4 = **4**
2 + 2 = **4**
5 + 5 = **10**
6 - 3 = **3**
4 + 4 = **8**
4 - 2 = **2**
10 - 5 = **5**

5 Doubles +/- 1 or Near Doubles

5 + 4 = **9**
2 + 3 = **5**
9 - 5 = **4**
7 - 3 = **4**
4 + 3 = **7**
9 - 4 = **5**
3 + 4 = **7**
7 - 4 = **3**

6 Combinations of 10

7 + 3 = **10**
4 + 6 = **10**
10 - 2 = **8**
1 + 9 = **10**
10 - 6 = **4**
10 - 3 = **7**
8 + 2 = **10**
10 - 9 = **1**

7 (Will have numbers greater than 10)

Make a 10 - (student should decompose the smaller addend and compensate to make a 10 with the other addend)

9 + 5 = **14**
8 + 4 = **12**
9 + 6 = **15**
8 + 3 = **11**
5 + 8 = **13**
9 + 8 = **17**
7 + 9 = **16**
8 + 6 = **14**

8 Doubles + 2 (student should decompose one addend to identify the double then add on 2)

3 + 5 = **8**
4 + 6 = **10**
2 + 4 = **6**
5 + 3 = **8**
4 + 6 = **10**
4 + 2 = **6**
6 + 4 = **10**
3 + 5 = **8**

TOC

Student's Name ______________________________ Date ______________________________ **E6**

2nd - 5th - Addition and Subtraction Fact Strategy Assessment - Student Page

Use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. Students should be prepared to explain their strategies.

1

8 + 1 = _____
7 - 1 = _____
5 - 1 = _____
3 + 2 = _____
3 - 2 = _____
6 + 1 = _____
8 - 2 = _____
5 + 2 = _____

2

1 + 6 = _____
2 + 8 = _____
1 + 7 = _____
6 + 1 = _____
9 + 2 = _____
7 + 1 = _____
2 + 9 = _____
8 + 2 = _____

3

9 + 0 = _____
0 + 4 = _____
5 - 0 = _____
7 + 0 = _____
1 - 0 = _____
0 + 8 = _____
0 - 0 = _____
6 - 0 = _____

4

6 + 6 = _____
8 - 4 = _____
2 + 2 = _____
9 + 9 = _____
14 - 7 = _____
5 + 5 = _____
8 + 8 = _____
18 - 9 = _____

5

5 + 6 = _____	7 + 8 = _____	17 - 8 = _____	7 + 6 = _____
9 - 5 = _____	4 + 3 = _____	8 + 9 = _____	11 - 6 = _____

6

7 + 3 = _____
4 + 6 = _____
10 - 2 = _____
1 + 9 = _____
10 - 6 = _____
10 - 3 = _____
8 + 2 = _____
10 - 9 = _____

7

10 + 5 = _____
17 - 10 = _____
19 - 10 = _____
2 + 10 = _____
8 + 10 = _____
16 - 6 = _____
14 - 4 = _____
10 + 9 = _____

8

9 + 5 = _____
8 + 4 = _____
9 + 6 = _____
8 + 3 = _____
5 + 8 = _____
9 + 8 = _____
7 + 9 = _____
8 + 6 = _____

9

6 + 8 = _____
9 + 7 = _____
2 + 4 = _____
5 + 3 = _____
8 + 6 = _____
7 + 5 = _____
6 + 4 = _____
3 + 5 = _____

KEY

2nd - 5th - Addition and Subtraction Fact Strategy Assessment - Student Page KEY

Have the student use post-it notes to cover the boxes. The teacher will direct which post-it to remove and solve. If assessing 2 or 3 students, have them pull off the post-its in a different order. Be sure to choose both addition and subtraction problems when asking students to explain their strategies.

1 — *Counting On/Up & Back/Down* (ONLY for +/- 1 or 2, not 3 or greater)

8 + 1 = 9
7 - 1 = 6
5 - 1 = 4
3 + 2 = 5
3 - 2 = 1
6 + 1 = 7
8 - 2 = 6
5 + 2 = 7

2 — Counting On/Up & Back/Down - Specifically the *Commutative Property*

1 + 6 = 7
2 + 8 = 10
1 + 7 = 8
6 + 1 = 7
9 + 2 = 11
7 + 1 = 8
2 + 9 = 11
8 + 2 = 10

3 — *Zero or The Identity Property of Zero*

9 + 0 = 9
0 + 4 = 4
5 - 0 = 5
7 + 0 = 7
1 - 0 = 1
0 + 8 = 8
0 - 0 = 0
6 - 0 = 6

4 — *Doubles*

6 + 6 = 12
8 - 4 = 4
2 + 2 = 4
9 + 9 = 18
14 - 7 = 7
5 + 5 = 10
8 + 8 = 16
18 - 9 = 9

5 — *Doubles +/- 1 or Near Doubles*

5 + 6 = 11	7 + 8 = 15	17 - 8 = 9	7 + 6 = 13
9 - 5 = 4	4 + 3 = 7	8 + 9 = 17	11 - 6 = 5

6 — *Combinations of 10*

7 + 3 = 10
4 + 6 = 10
10 - 2 = 8
1 + 9 = 10
10 - 6 = 4
10 - 3 = 7
8 + 2 = 10
10 - 9 = 1

7 — *Add 10*

10 + 5 = 15
17 - 10 = 7
19 - 10 = 9
2 + 10 = 12
8 + 10 = 18
16 - 6 = 10
14 - 4 = 10
10 + 9 = 19

8 — *Make a 10* - (student should decompose the smaller addend and compensate to make a 10 with the other addend)

9 + 5 = 14
8 + 4 = 12
9 + 6 = 15
8 + 3 = 11
5 + 8 = 13
9 + 8 = 17
7 + 9 = 16
8 + 6 = 14

9 — *Doubles + 2* (student should decompose the larger addend to identify the double then add on 2)

6 + 8 = 14
9 + 7 = 16
2 + 4 = 6
5 + 3 = 8
8 + 6 = 14
7 + 5 = 12
6 + 4 = 10
3 + 5 = 8

TOC

Kindergarten Addition & Subtraction Fact Strategies - Individual Student Data Sheet

Student Solving Strategies & Properties

Students will fluently (accurately, efficiently, flexibly and appropriately)
* add within 5 and explain strategies (OA.5A)
* subtract within 5 and explain strategies (OA.5)

Remember, in kindergarten this standard has been split into two targets.

E7

NS+ or NS- = ***did or did not name the strategy (not required for kinder, but helpful)***

ES+ or ES- = ***did or did not apply and explain how the strategy works for addition and subtraction (if applicable to subtraction)***

V+ or V- = ***did or did not use precise vocabulary***

CP = ***explained the Commutative Property***

IPZ = ***explained the Identity Property of Zero***

R+&- = ***explained the relationship between addition & subtraction - including fact families***

F = ***using fingers or manipulatives***

H = ***bobbing head to count/looking up and counting in head***

T = ***too much or extended time***

CA = ***counting all***

NA+ or NA- = ***correct or incorrect numerical answer(s)***

S- = ***attempted to apply an inappropriate strategy***

RPPP = **used precise vocabulary to explain how the strategy works for addition and subtraction; however student needs practice with retrieving the answers more fluently - student is ready for Partner Practice Pages (PPPs) with THIS strategy**

☺ F = **student is FULLY FLUENT with THIS strategy- wrote accurate answers quickly with no counting, appropriate strategy(ies) was/were explained in detail for <u>BOTH</u> addition and subtraction, and precise vocabulary was used**

This assessment is to check to see which strategies the student can **easily name, apply <u>and</u> explain** and which strategies need further instruction/practice. There is a student sheet that accompanies this sheet. When asking to explain strategies applied, be sure to choose **both addition and subtraction problems**. <u>At the end</u>, if students do not mention a particular strategy (i.e. *Counting Back*), choose a problem that aligns to it. Tell the student the name of the strategy and ask her/him if s/he can explain how it works with that problem.
Each time this assessment is administered, add the date in the second column. If assessing more than one student at a time (no more than 3 students in a small group), have the students cover some of the boxes with post-it notes. Have the students remove post-it notes in a different order to encourage independent thinking and reasoning.

The teacher is not required to use the key system on the left. Any recording system can be used as long as it is consistent (see next page). The recording system should include: a level of accuracy, fact strategy/property application (naming/explanation/justification) and precise vocabulary usage. This way the teacher can use the data to make instructional decisions. Narrative notes will also be helpful.

Student's Name						
Date(s) of Learning Checks	**<u>Box 1</u>** Counting On & Back +1/-1, +2/-2	**<u>Box 2</u>** Counting On +1, +2 Commutative Property	**<u>Box 3</u>** Zero Identity Property of Zero	**<u>Box 4</u>** Doubles	**<u>Box 6</u>** Combinations of 10 (**Not technically part of the fluency standard, but it is a standard/ target on another scale.)	**<u>Other</u>**

Once the assessment has been completed, the teacher should mark the boxes that are proficient (see ☺F above) and ones that are not to help put a focus on instruction (i.e. color code boxes, put a symbol, etc.). Instruction should move through three phases: conceptual understanding (multiple hands-on and vocabulary rich opportunities), strategy instruction (students practice, practice, practice - including explaining how the strategies work), then know from memory with partner work that allows for immediate feedback (use PPPs and limit worksheets).

<u>TOC</u>

Kindergarten Addition & Subtraction Fact Strategies - Individual Student Data Sheet

Student Solving Strategies & Properties Teacher Created Key

Students will fluently (accurately, efficiently, and flexibly)
* add within 5 and explain strategies (OA.5A)
* subtract within 5 and explain strategies (OA.5B)

Remember, in kindergarten this standard has been split into two targets.

This assessment is to check to see which strategies the student can **easily name, apply <u>and</u> explain** and which strategies need further instruction/practice. There is a student sheet that accompanies this sheet. When asking to explain strategies applied, be sure to choose **both addition and subtraction problems**. <u>At the end</u>, if students do not mention a particular strategy (i.e. *Counting Back*), choose a problem that aligns to it. Tell the student the name of the strategy and ask her/him if s/he can explain how it works with that problem.
Each time this assessment is administered, add the date in the second column. If assessing more than one student at a time (no more than 3 students in a small group), have the students cover some of the boxes with post-it notes. Have the students remove post-it notes in a different order to encourage independent thinking and reasoning.

Any recording system can be used as long as it is consistent. The recording system/key should include: a level of accuracy, fact strategy/property application (explanation/justification of strategies) and precise vocabulary usage. This way the teacher can use the data to make instructional decisions. Narrative notes will also be helpful.

Student's Name						
Date(s) of Learning Checks	**<u>Box 1</u>** **Counting On & Back +1/-1, +2/-2**	**<u>Box 2</u>** **Counting On +1, +2 Commutative Property**	**<u>Box 3</u>** **Zero Identity Property of Zero**	**<u>Box 4</u>** **Doubles**	**<u>Box 6</u>** **Combinations of 10 (**Not technically part of the fluency standard, but it is a standard/ target on another scale.)**	**<u>Other</u>**

Once the assessment has been completed, the teacher should mark the boxes that are proficient and ones that are not to help put a focus on instruction (i.e. color code boxes, put a symbol, etc.). Instruction should move through three phases: conceptual understanding (multiple hands-on and vocabulary rich opportunities), strategy instruction (students practice, practice, practice - including explaining how the strategies work), then know from memory with partner work that allows for immediate feedback (use PPPs and limit worksheets).

TOC

1st - 5th Addition & Subtraction Fact Strategies - Individual Student Data Sheet

Student Solving Strategies & Properties

Students will fluently (accurately, efficiently, flexibly, and appropriately) add and subtract by naming, using/applying, and explaining/defending strategies
* 1st (OA.6B): within 10
* 2nd(OA.2): within 20

E8

This assessment is to check to see which strategies the student can **easily name, apply, and explain** and which strategies need further instruction/practice. There is a student sheet that accompanies this sheet.
When asking to explain strategies applied, be sure to choose both addition and subtraction problems.
At the end, if students do not mention a particular strategy (i.e. *Doubles Plus or Minus 1*), choose a problem that aligns to it. Tell the student the name of the strategy and ask her/him if s/he can explain how it works with that problem.
Each time this assessment is administered, add the date in the second column.
If assessing more than one student at a time (no more than 3 students in a small group), have the students cover some of the boxes with post-it notes. Have the students remove post-it notes in a different order to encourage independent thinking and reasoning.

The teacher is not required to use the key system on the left. Any recording system/key can be used as long as it is consistent (see next page). The recording system should include: a level of accuracy, fact strategy/property application (naming/explanation/justification) and precise vocabulary usage. This way the teacher can use the data to make instructional decisions. Narrative notes will also be helpful.

NS+ or NS- = did or did not name the strategy

ES+ or ES- = did or did not apply and explain how the strategy works for addition and subtraction (if applicable to subtraction)

V+ or V- = did or did not use precise vocabulary

CP = explained the Commutative Property

IPZ = explained the Identity Property of Zero

R+&- = explained the relationship between addition & subtraction - including fact families

F = using fingers or manipulatives

H = bobbing head to count/looking up and counting in head

T = too much or extended time

CA = counting all

NA+ or NA- = correct or incorrect numerical answer(s)

S- = attempted to apply an inappropriate strategy

Student's Name										
Date(s) of Learning Checks	**Box 1** Counting On & Back +1/-1, +2/-2	**Box 2** Counting On +1, +2 Commut. Property	**Box 3** Zero Identity Property of Zero	**Box 4** Doubles	**Box 5** Doubles +1/-1 Near Doubles	**Box 6** Comb. of 10	**Box 7** Add 10	**Box 8** Make a 10 (decomposition of one addend & compensate to make a ten with the other addend)	**Box 9** Doubles + 2 (decomp. one addend to identify the double, then add on 2)	**Other** (including +9, +4 and subtraction strategies: Think Addition, Fact Families, Build Up Through Ten, Back Down Through Ten, etc.)

RPPP = used precise vocabulary to explain how the strategy works for addition and subtraction; however student needs practice with retrieving the answers more fluently - student is ready for Partner Practice Pages (PPPs) with THIS strategy

☺F = student is FULLY FLUENT with THIS strategy:
**** wrote accurate answers quickly with no counting,***
**** appropriate strategy(ies) was/were explained in detail for BOTH addition and subtraction,***
**** and precise vocabulary was used***

Once the assessment has been completed, the teacher should mark the boxes that are proficient (see ☺F above) and ones that are not to help put a focus on instruction (i.e. color code boxes, put a symbol, etc.). Instruction should move through three phases: conceptual understanding (multiple hands-on and vocabulary rich opportunities), strategy instruction (students practice, practice, practice - including explaining how the strategies work), then know from memory with partner work that allows for immediate feedback (use PPPs and limit worksheets).

1st - 5th Addition & Subtraction Fact Strategies - Individual Student Data Sheet

Student Solving Strategies & Properties Teacher Created Key

Students will fluently (accurately, efficiently, flexibly and appropriately) add and subtract by naming, using/applying, and explaining/defending strategies
* 1st (OA.6B): within 10
* 2nd(OA.2): within 20

This assessment is to check to see which strategies the student can **easily name, apply, <u>and</u> explain** and which strategies need further instruction/practice. There is a student sheet that accompanies this sheet.
When asking to explain strategies applied, be sure to choose both addition and subtraction problems.
<u>At the end</u>, if students do not mention a particular strategy (i.e. *Doubles Plus or Minus 1*), choose a problem that aligns to it. Tell the student the name of the strategy and ask her/him if s/he can explain how it works with that problem.
Each time this assessment is administered, add the date in the second column.
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Any recording system can be used as long as it is consistent. The recording system/key should include: a level of accuracy, fact strategy/property application (naming and explanation/justification of strategies) and precise vocabulary usage. This way the teacher can use the data to make instructional decisions. Narrative notes will also be helpful.

Student's Name

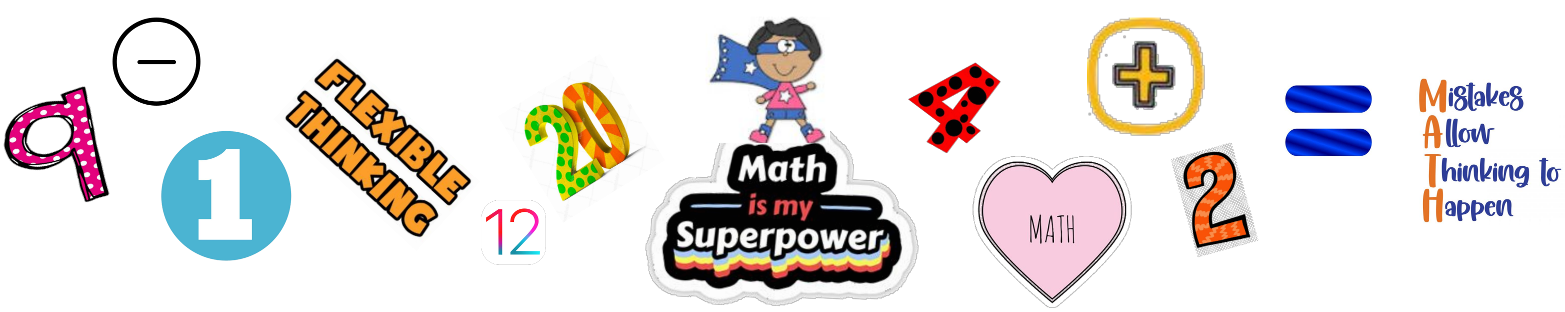
Date(s) of Learning Checks	<u>Box 1</u> Counting On & Back +1/-1, +2/-2	<u>Box 2</u> Counting On +1, +2 Commut. Property	<u>Box 3</u> Zero Identity Property of Zero	<u>Box 4</u> Doubles	<u>Box 5</u> Doubles +1/-1 Near Doubles	<u>Box 6</u> Comb. of 10	<u>Box 7</u> Add 10	<u>Box 8</u> Make a 10 (decomposition of one addend & compensate to make a ten with the other addend)	<u>Box 9</u> Doubles + 2 (decomp. one addend to identify the double, then add on 2)	<u>Other</u> (including +9, +4 and subtraction strategies: Think Addition, Fact Families, Build Up Through Ten, Back Down Through Ten, etc.)

Once the assessment has been completed, the teacher should mark the boxes that are proficient and ones that are not to help put a focus on instruction (i.e. color code boxes, put a symbol, etc.). Instruction should move through three phases: conceptual understanding (multiple hands-on and vocabulary rich opportunities), strategy instruction (students practice, practice, practice - including explaining how the strategies work), then know from memory with partner work that allows for immediate feedback (use PPPs and limit worksheets).

TOC

Fact Strategies

Most of the materials are located after the activity practices pages. Some generic resources (i.e., number bonds, ten frames, etc.) are located in the back of this resource.



Counting On or Back

TOC

Strategy: Counting On or Back	**Application and Teaching the Strategy**
Description: Facts that have addends of 1 or 2	**Materials:** snap cubes or color tiles, white board, dry erase boards/markers/erasers, copy paper (1-2 each if boards are not available), number paths, (optional) block or card, 10 frame cards or PPT, number cards, +1/+2 and/or -1/-2 cards

Application:

Materials for Application: manipulatives, models and/or dry erase boards/markers/erasers

Application:
Let's take a look at a problem and talk about how we might solve it.

Tyrone has 3 pennies in his pocket. He found 1 penny on the sidewalk and picked it up. How many pennies does he now have? *(Students respond and have a few students explain their thinking. They may need to use manipulatives, number line, or symbols.)*

Let's try another one.

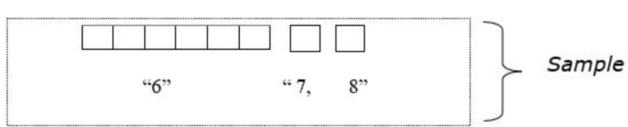
Trisha has 6 pennies in her hand. Her aunt gives her 2 more. How many pennies does she now have? *(Students work with a partner and explain their thinking using manipulatives, pictures, number line, or symbols.)*

Teaching Strategy - Part 1:

Materials for Part 1: snap cubes

"We are going to work on an addition strategy that will help us with facts that have 1 or 2 as an addend. This is called the Counting-On Strategy. We want to learn these facts so we know the answer by keeping track in our minds instead of on our fingers."

**Note: Begin teaching counting-on by using concrete objects, such as snap cubes or color tiles. The student should be able to point to the greater addend, say "6", then count-on,"7, 8" (see picture):



This will need to be modeled numerous times with students. Have students discuss how they know there are "6", then add on 2. The more students get the opportunity to explain their thinking, the stronger they will be with understanding the strategies. It is good to periodically stop and have students share with their shoulder partner or small group of students before discussing it as a whole group.

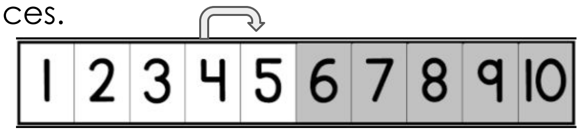
Teaching Strategy - Part 2:

Materials for Part 2: number path, optional: block or card

Sybilla Beckmann (math expert) suggests covering up the greater addend with a card or block so that the students must retain that number in their head before counting on with 1 or 2.

Tools and Models: It is essential to then model this strategy with a <u>number path.</u> A number path is a precursor tool to a number line and should be used in kindergarten or with intervention students in 1st or 2nd who struggle with number sense. Both number paths and number lines are expected in the KCCRS. Start with the greatest addend and count-on 1 or 2 by jumping that number of spaces.

Example: 4 + 1 = 5.



Teaching Strategy - Part 3:

Materials for Part 3: ten frames cards or PPT, white boards/dry erase markers/erasers and/or number cards

After children are comfortable using concrete objects you want to move them to ten frames as soon as possible. Use the Ten Frame Flashcards either under the document camera or in a PowerPoint.

1. You will "flash" the ten frame up for just a second or two and then take it away.
2. Students will mentally count on one more dot and then give the answer.
3. They can write their response on a white board or show you with a number card. You want to make sure that all students are responding quickly.
4. Once you feel all students are comfortable with counting on one more, move to counting on two more.
5. Finally, mix it up. Sometimes ask for 1 more and sometimes 2 more than what is shown on the ten frame.

Teaching Strategy - Part 4:

Materials for Part 4: number cards, +1/+2 or -1/-2 cards

After children are comfortable using concrete objects, ten frames, and the number path, it is time to switch to <u>symbols</u> for practicing counting-on. Here the children need to continue developing the Counting-On strategy by:

1. Identifying the <u>larger addend</u> as the number from which to count-on and retain that number in their head.
2. Saying the number that comes after the larger addend.
3. Counting-on to find the sum.

(For example, with the fact 8 + 2, a student would think, "8…9, 10.")

Teaching Strategy - Part 5:

Materials for Part 5: snap cubes, dry erase boards/markers/erasers or paper/pencils

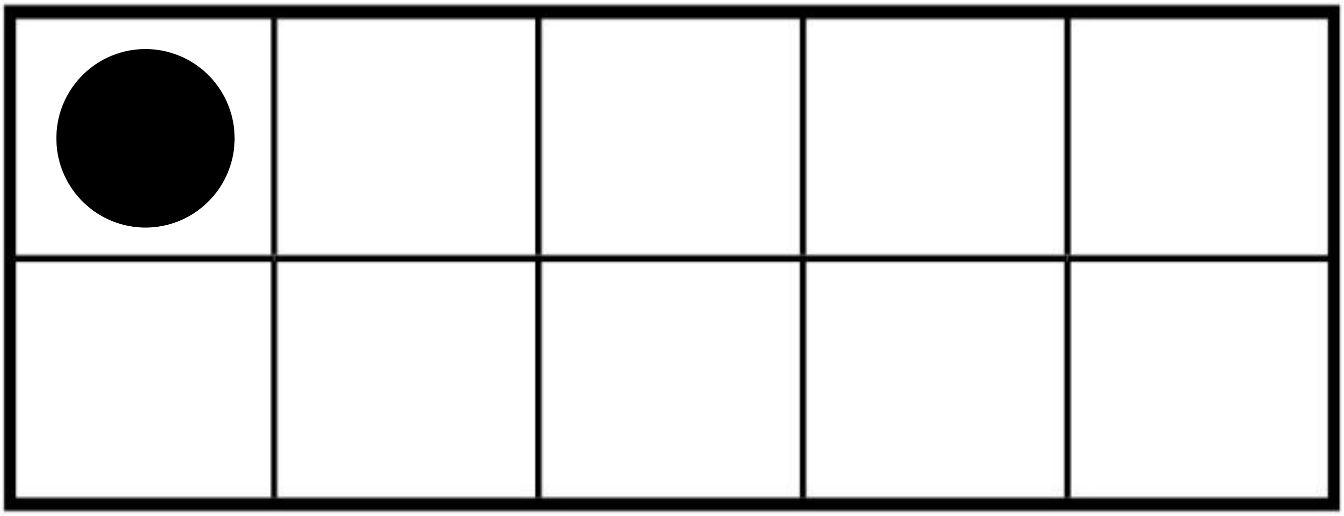
Discovery and Vocabulary: It is also important that students have an understanding of the commutative property. Teachers often use the term "turn around fact" but precise vocabulary should be used (**SMP 6**). An element of discovery oftens help students understand this property.

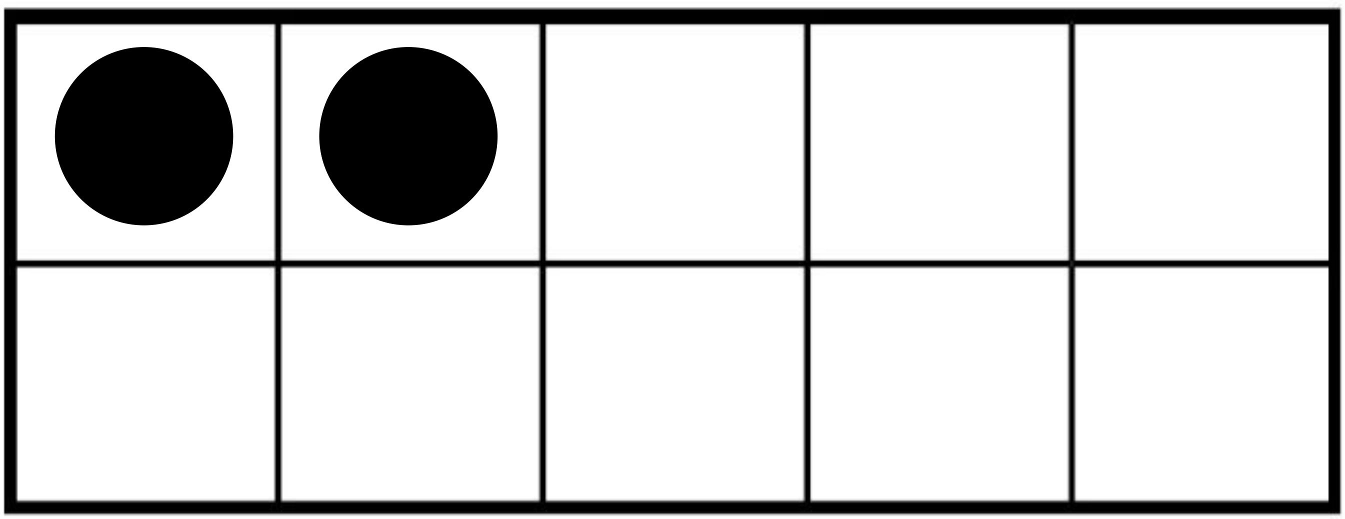
Give students two different colors of snap cubes in one stick. (This provides an excellent visual representation.) For example: 5 green cubes and 2 red cubes [5 + 2]. Have students practice writing the equation: 5 + 2 = 7 Ask the students if there is another way they could write the equation keeping the green cubes together and the red ones together. See if they can discover on their own turning the stick around so that it now shows 2 + 5. Ask them to write that equation. Have them repeat this with two different addends (for example, trade with another table that had 4 + 1). First write the equation with the green cubes on the left. Then see if they can write the equation another way (red cubes on the left). Have a class discussion.

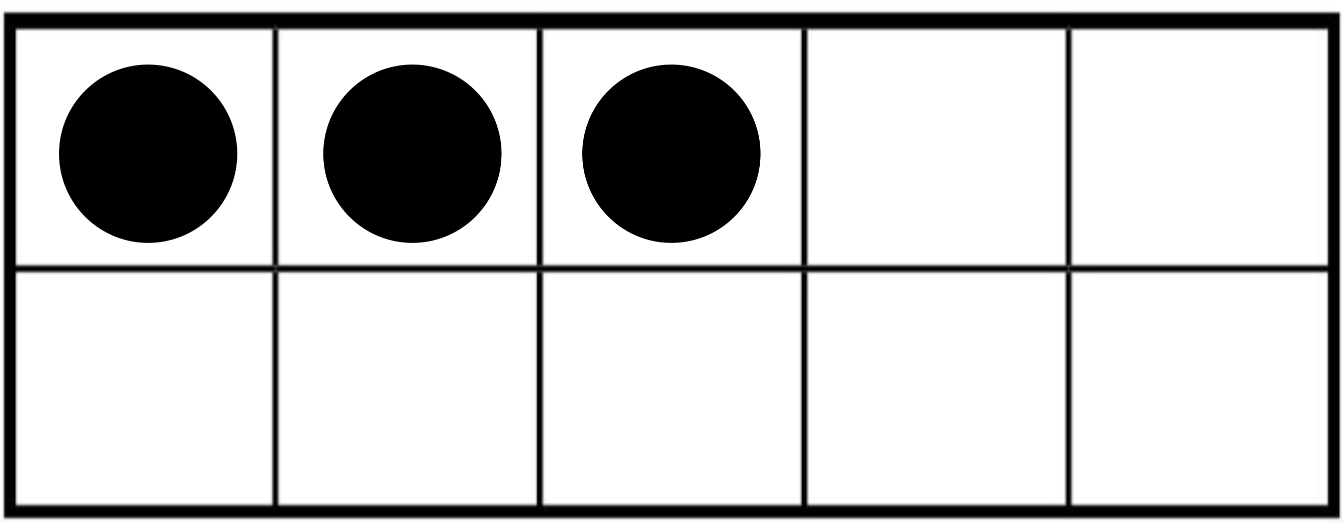
- What are they noticing?
- Are the addends changing? Did the sum change?
- Will this happen every time?
- How do we know?

Then explain their discovery is called the commutative property. We can change the order of the addends and it will not change the sum.

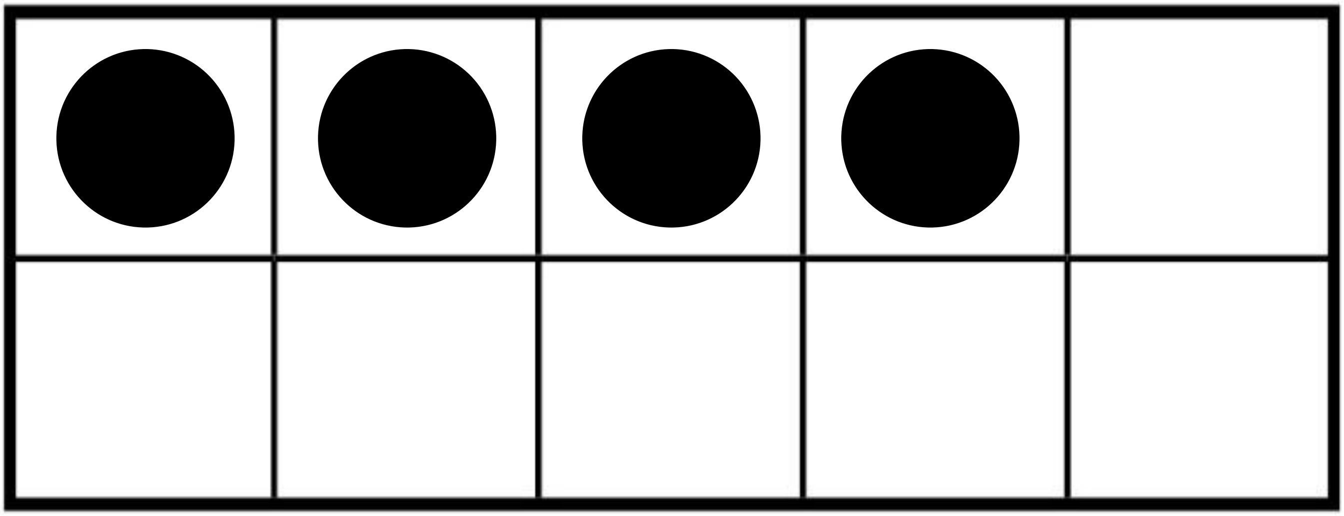
Ten Frame Flashcards

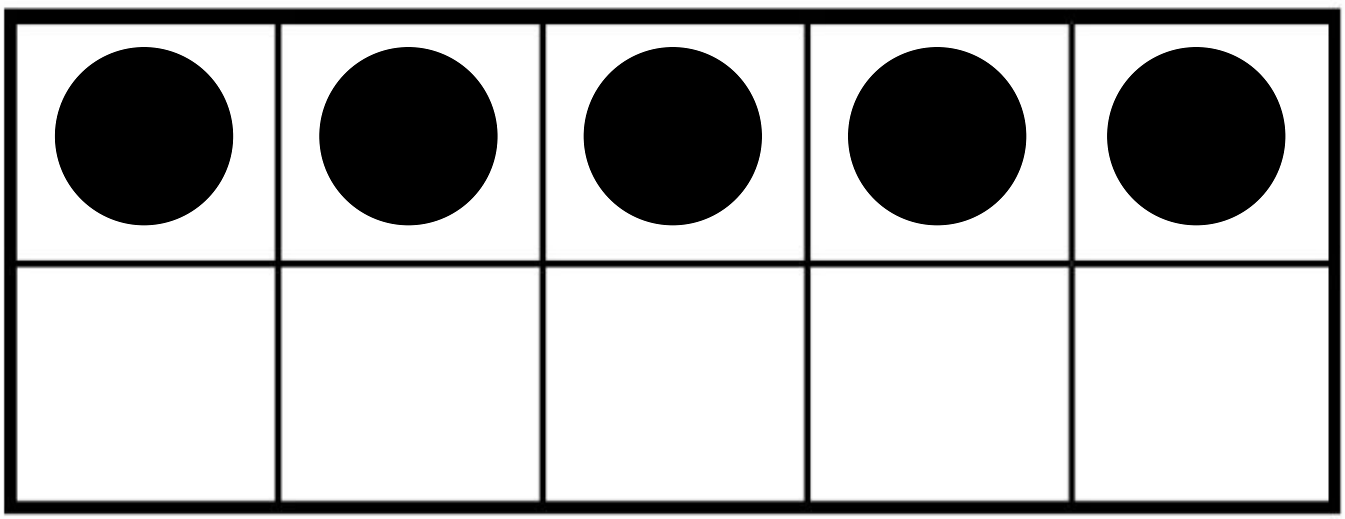


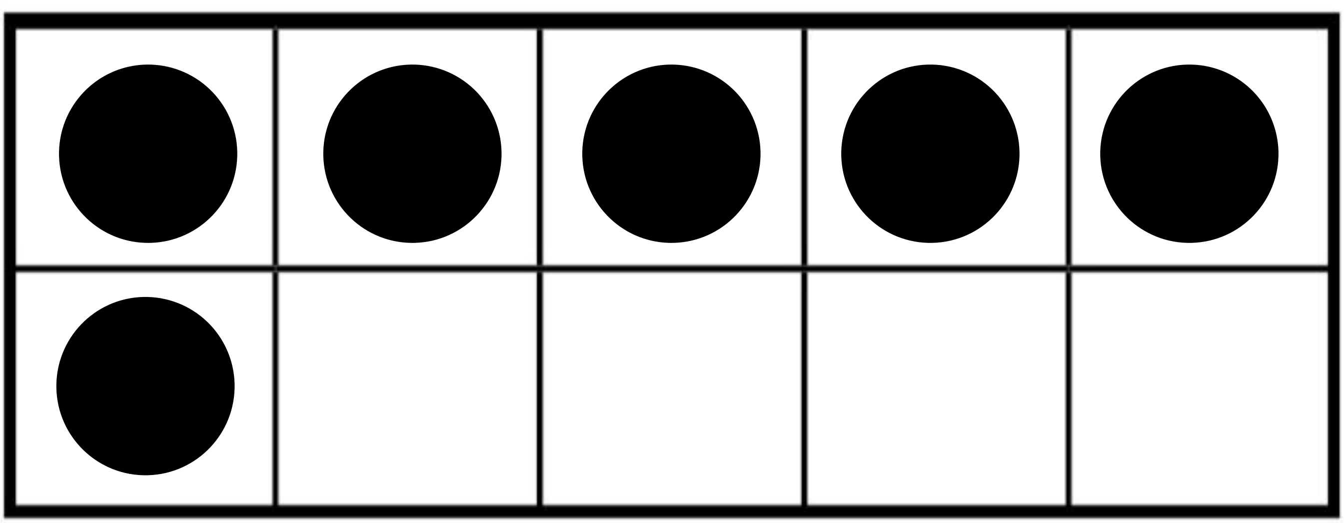




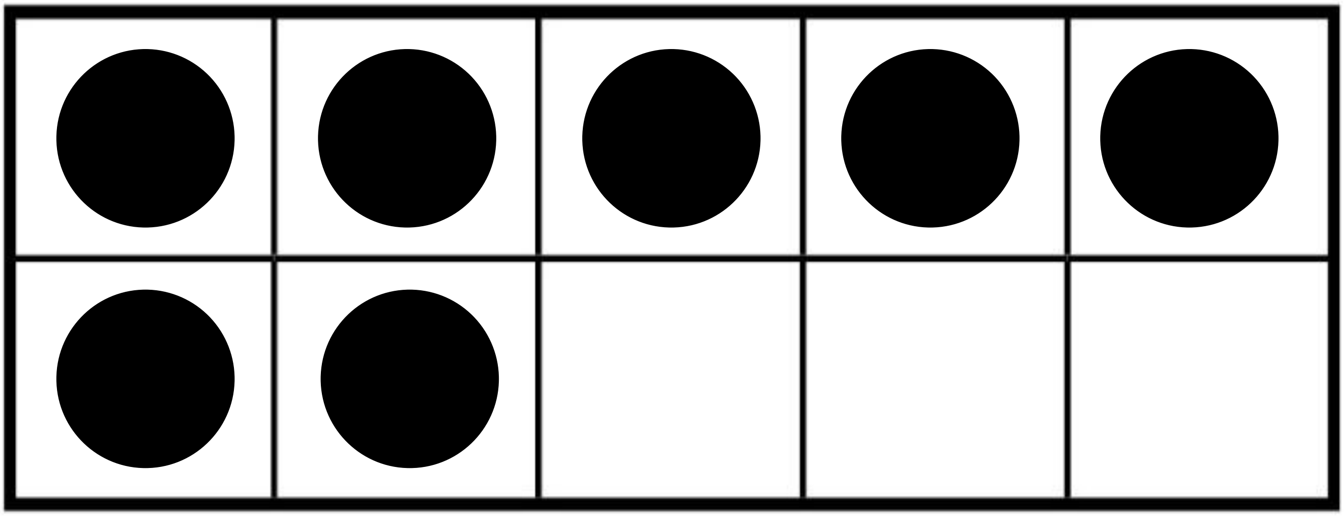
Ten Frame Flashcards

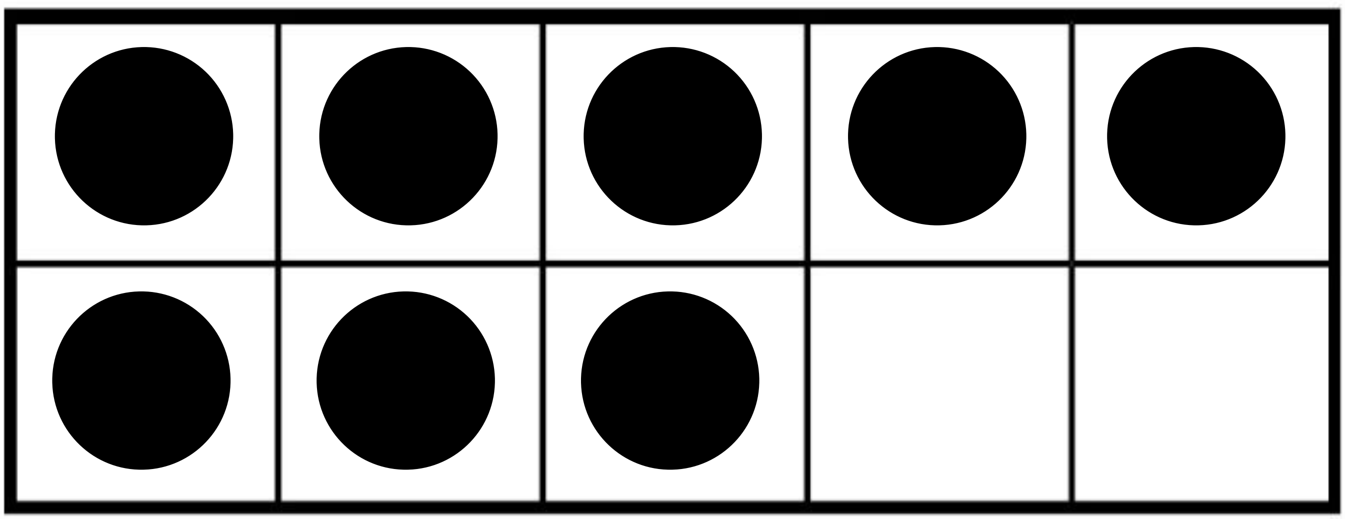


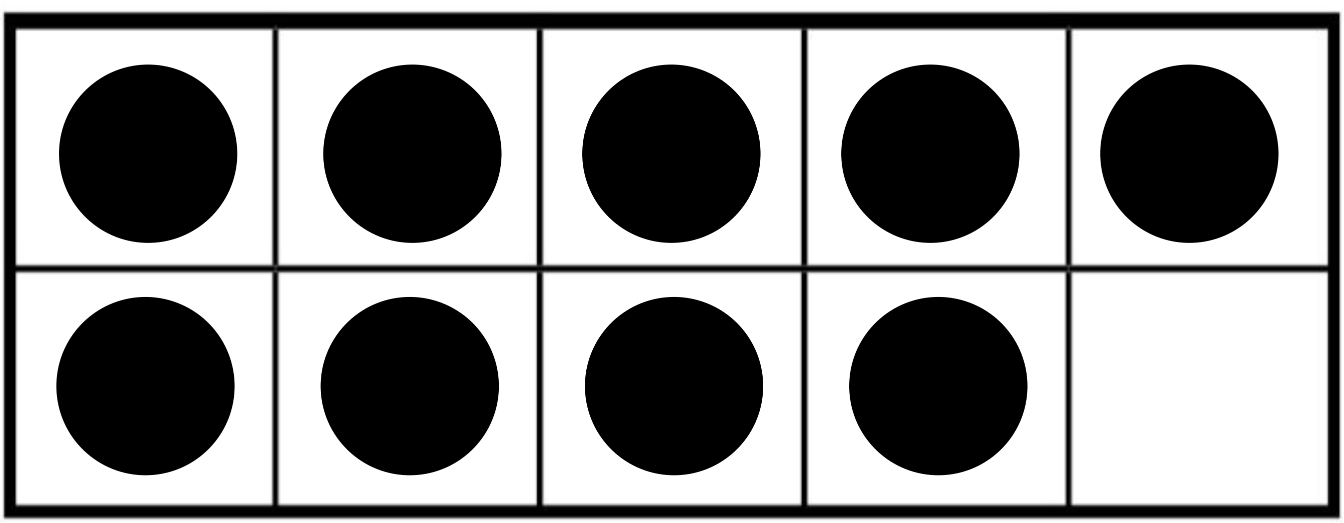




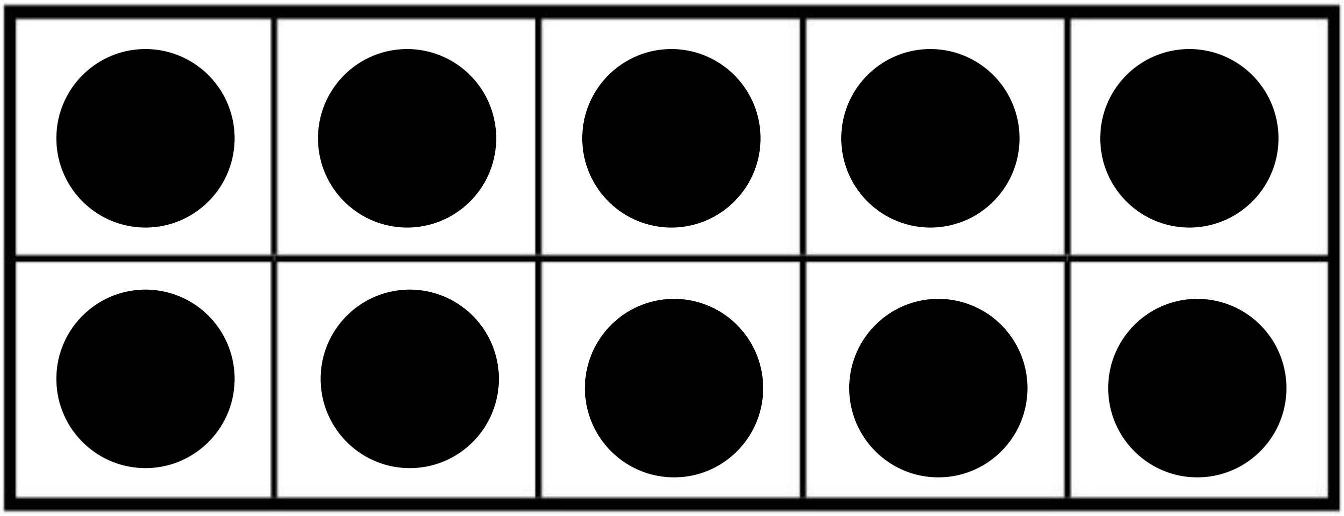
Ten Frame Flashcards

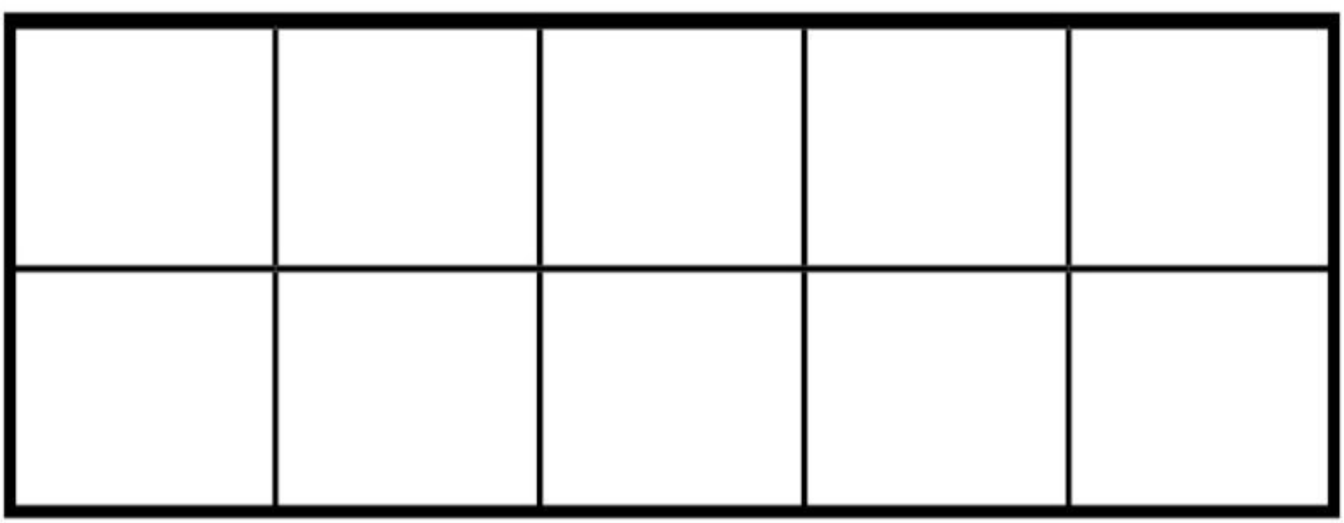






Ten Frame Flashcards

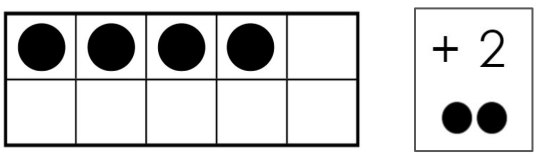




Strategy: Counting On or Back	**Name of Activity: Ten Frame 1 or 2 More** **F2**
Description: Facts that have addends of 1 or 2	**Materials:** ten frame cards, +1 and +2 cards

Opportunity to Practice Counting On Strategy/Directions:

1. Students work in pairs.
2. Put the ten frame cards and +1/+2 cards face down in two different piles.
3. Student A draws a card from the ten frame pile and one from the +1/+2 pile.
4. Student A states the equation and the strategy to Student B:
   For example: "4 + 2 = 6 I used the Counting On Strategy."



5. Student B checks for accuracy.
6. Players switch roles.

Adaptations/Extensions:

Students draw the number of chips and place them on the ten frame flash card to build conceptual understanding.

Students write the equations.

Students use the number and plus sign cards instead of the +1/+2 cards. There is an additional expectation that the students apply the commutative property by changing the cards around. Students follow the same directions as above.
For example: 4 + 2 = 6 and 2 + 4 = 6

Opportunity to Practice Counting Back Strategy/Directions:

To practice counting back 1 or 2, do the activity above with the -1/-2 cards.

Student would use precise vocabulary (Counting Back Strategy, difference, etc.).

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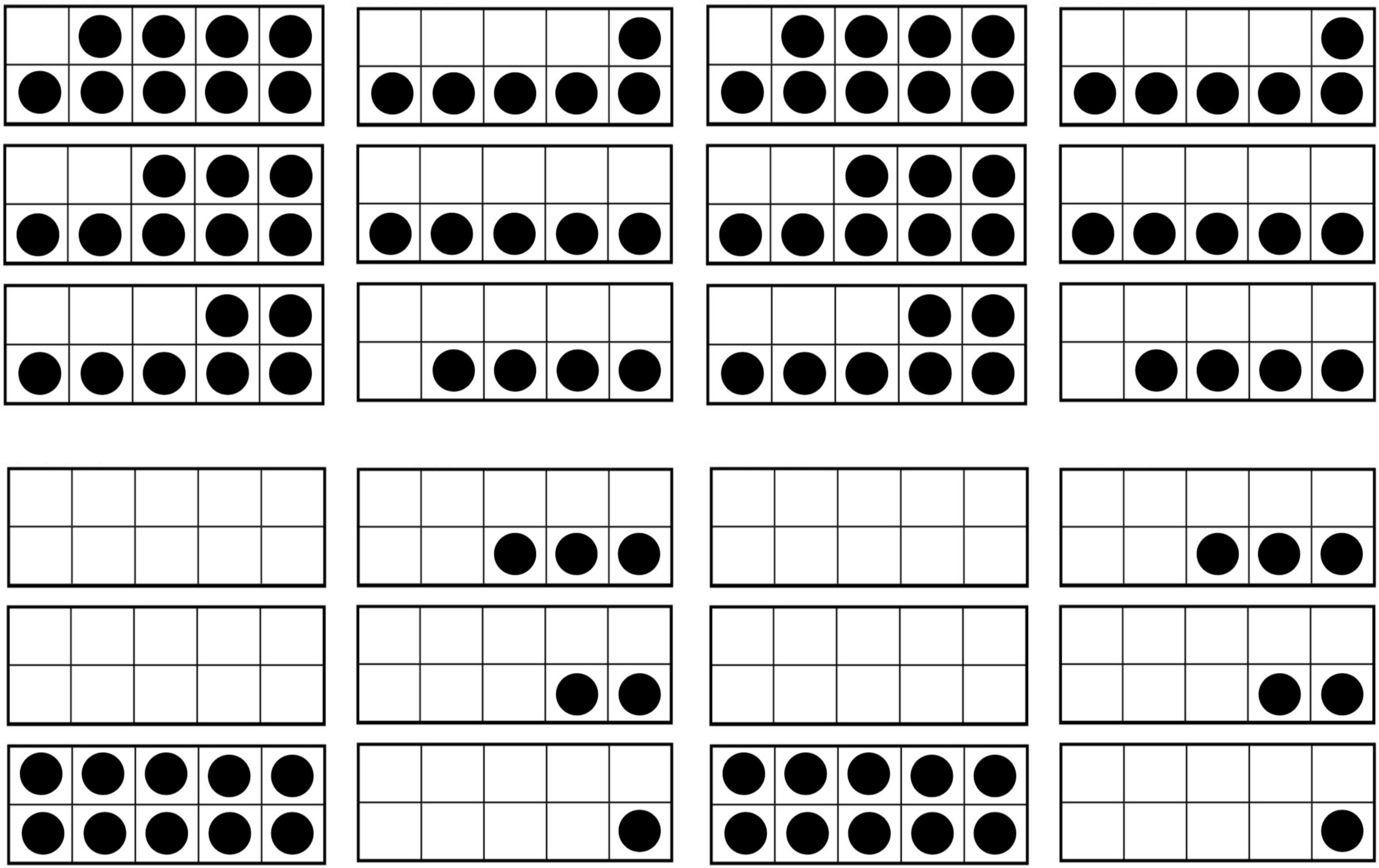
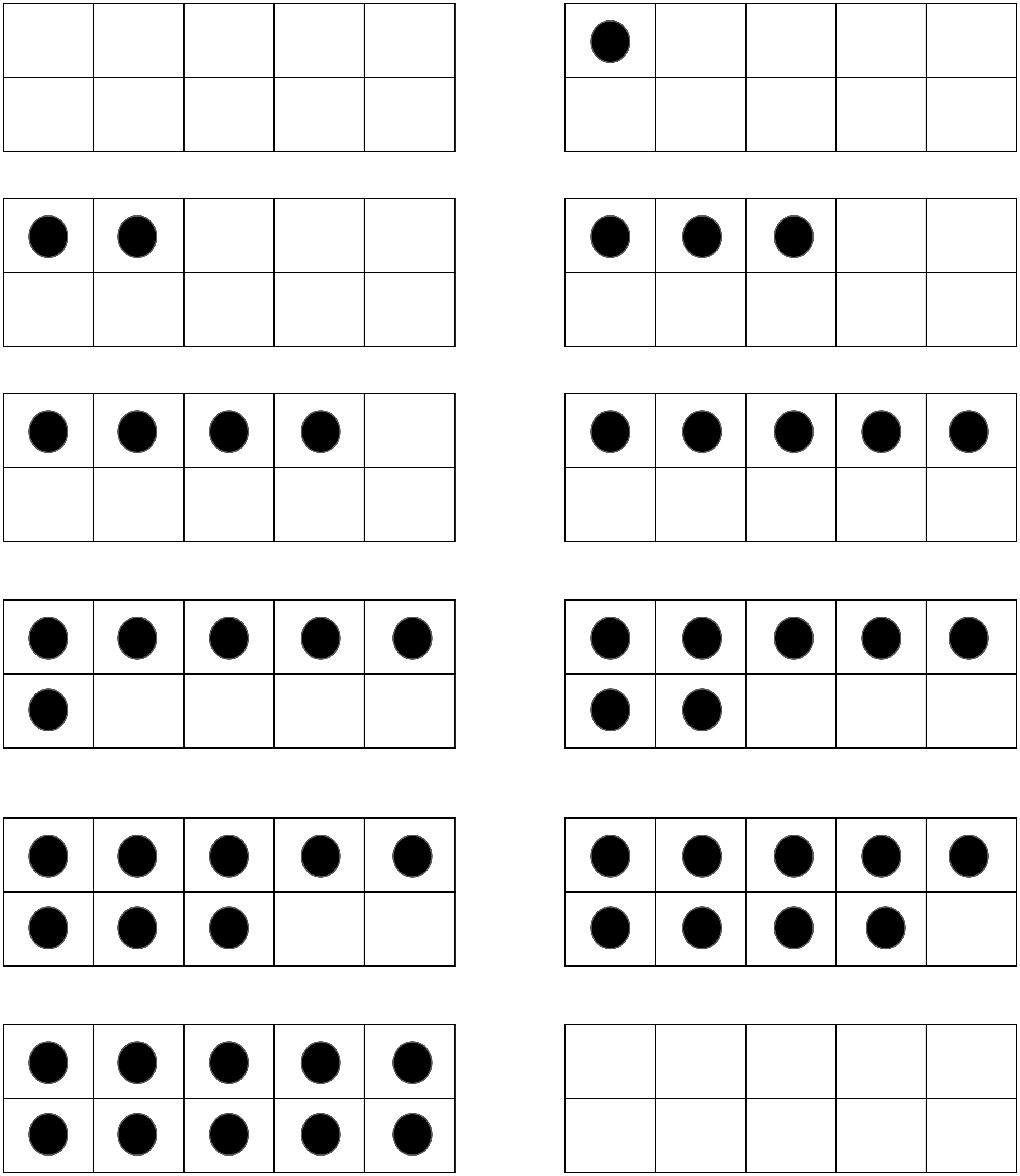
Mini Ten Frame Cards - Set 1



Mini Ten Frame Cards - Set 2



+1/+2 Cards with Dots

+ 1 ●	+ 1 ●	+ 1 ●	+ 1 ●
+ 1 ●	+ 1 ●	+ 1 ●	+ 1 ●
+ 2 ●●	+ 2 ●●	+ 2 ●●	+ 2 ●●
+ 2 ●●	+ 2 ●●	+ 2 ●●	+ 2 ●●

+1/+2 Cards

+ 1	+ 1	+ 1	+ 1
+ 1	+ 1	+ 1	+ 1
+ 2	+ 2	+ 2	+ 2
+ 2	+ 2	+ 2	+ 2

-1/-2 Cards with Dots

- 1 ●	- 1 ●	- 1 ●	- 1 ●
- 1 ●	- 1 ●	- 1 ●	- 1 ●
- 2 ●●	- 2 ●●	- 2 ●●	- 2 ●●
- 2 ●●	- 2 ●●	- 2 ●●	- 2 ●●

-1/-2 Cards

- 1	- 1	- 1	- 1
- 1	- 1	- 1	- 1
- 2	- 2	- 2	- 2
- 2	- 2	- 2	- 2

Number & Plus Sign Cards

1	1	1	1	1
1	1	1	2	2
2	2	2	2	2
2	+	+	=	=

Number & Subtraction Sign Cards

1	1	1	1	1
1	1	1	2	2
2	2	2	2	2
2	–	–	=	=

Strategy: Counting On or Back	**Name of Activity: One More/Two More Board** **F3**
Description: Facts that have addends of 1 or 2	**Materials:** one more and/or two more boards

Opportunity to Practice Counting On Strategy/Directions:

1. Decide which board is being used: +1 or +2 board.
2. Students work in pairs.
3. Students take turns pointing to a number on the board, stating that number and adding on 1 or 2 more (depending on the board being used).
   For example: Student points to 7 and says, "7….8, 9…. 7 plus 2 equals 9. I used the Counting On Strategy." or "7 and 2 more equals 9. I used the Counting On Strategy."

Two More Board

4	9	1	2
6	5	0	7

4. Student B checks for accuracy.
5. Players switch roles.

Adaptations/Extensions:

Students represent the problem with a rekenrek (ideally two pushes for the addends - if need to scaffold, can do two pushes per addend).

Students write the equations.

Opportunity to Practice Counting Back Strategy/Directions:

To practice counting back 1 or 2, do the activity above with the -1/-2 boards.

Student would use precise vocabulary (Counting Back Strategy, difference, etc.).

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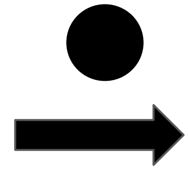
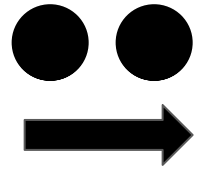
One More Board



4	9	1	2
6	5	0	7
3	8	9	2
4	0	5	6
9	7	3	8

Two More Board

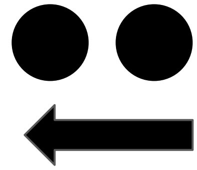


4	9	1	2
6	5	0	7
3	8	9	2
4	0	5	6
9	7	3	8

One Less Board

4	9	1	2
6	5	10	7
3	8	9	2
4	1	5	6
9	7	3	8

Two Less Board



4	9	8	2
6	5	10	7
3	8	2	9
4	10	5	6
9	7	3	8

Strategy: Counting On or Back	**Name of Activity: Grab, Model & Write the Sum** **F4**
Description: Facts that have addends of 1 or 2	**Materials:** two paper bags, two colors of snap cubes, crayons to match the snap cube colors, recording sheet

Opportunity to Practice Counting On Strategy/Directions:

(Teacher can use any two colors of snap cubes.)

1. Put 2 blue snap cubes in one bag. Put up to 8 orange snap cubes in the other bag.
2. Without looking, student A pulls out "some" of the orange snap cubes. Then s/he pulls out 1 or 2 of the blue cubes. The student creates a stick with the snap cubes.

3. The student states, "*I can use the Counting On Strategy. 3 and 1 more equals 4. I'll color my model the same. My sum is 4. I'll write that here.*" Student colors his/her sheet to match the snap cubes and writes the number 4 in the box at the end.

4

4. Student B checks for accuracy.
5. Players switch roles.

Adaptations/Extensions:

Play the same game with the expectation that the student writes the equation.

Students could also demonstrate the commutative property.

Opportunity to Practice Counting Back Strategy/Directions:

Play the game above, except instead of putting 2 cubes in the other bag, put the -1/-2 cards in the bag. The student still grabs "some" out of the bag with the snap cubes (grabbing a minimum of 2 cubes). Then the student takes out 1 card from the other bag.

Student would use precise vocabulary (Counting Back Strategy, difference, etc.).

Strategy: Counting On or Back	**Name of Activity: Racing Bears** **(Adapted from Kling/Bay-Williams)** **F5**
Description: Facts that have addends of 1 or 2	**Materials:** die labeled with +1, +1, +1, +2, +2, +2, die labeled with -1, -1, -1, -2, -2, -2, number path, plastic bears (or any small animal)

Opportunity to Practice Counting On Strategy/Directions:

1. Each student has their own number path or number line and own bear. The students can share a die.
2. If playing the Racing Forward Bears (Counting On), the students start by putting their bears at 0.
3. Student A rolls the die and moves that many spaces on the number line, saying, "0 + 2 = 2."
4. Student B checks for accuracy.
5. Students continue taking turns.
6. The first student to reach 10 wins.

Opportunity to Practice Counting Back Strategy/Directions:

7. Each student has their own number path or number line and own bear. The students can share a die.
8. If playing the Racing Backward Bears (Counting Back), the students start by putting their bears at 10.
9. Student A rolls the die and moves that many spaces on the number line, saying, "10 - 1 = 9."
10. Student B checks for accuracy.
11. Students continue taking turns.
12. The first student to reach 0 wins.

Adaptation:

Create a dice with a mixture of +1, +2 and -1, -2. Have the number line go up to 20, and the students start their bears at 10. Students may run into the challenge of numbers that exceed 20 or are less than zero (negative numbers). Just tell them there are numbers in these ranges, but for the sake of this game, they would just lose a turn. The first person to land back at 10 wins the game.

Play the game above, except instead of putting 2 cubes in the other bag, put the -1/-2 cards in the bag. The student still grabs "some" out of the bag with the snap cubes (grabbing a minimum of 2 cubes). Then the student takes out 1 card from the other bag.

Student would use precise vocabulary (Counting Back Strategy, difference, etc.).

Strategy: Counting On or Back	**Name of Activity: Show What You Know** **F6**
Description: Facts that have addends of 1 or 2	**Materials:** two colors of snap cubes, recording sheet, crayons that match the snap cubes

Opportunity to Practice Counting On Strategy/Directions:

Say to the students:

"I have given you two colors of snap cubes. I want you to build your own snap cube sticks (trains) with any number 1 - 7 and 1 or 2 more.
Here, let me show you.
I'm going to build one that is 5 and 2 more.
I have 5 gray snap cubes and 2 purple ones. Remember… I can ONLY choose 1 or 2 more so I'm okay. I have added on ONLY 2 more. I can use the Counting On Strategy. I can say 5…. 6, 7 or 5 and 2 more equals 7."

"Now I will color my sheet in the same colors to match my stick and I will also write my equation: 5 + 2 = 7."

"Now it is your turn to practice.
I will give you the addends or numbers we are adding together: 4 and 1 more."
(Teacher walks around to make sure the students are putting together 4 and 1 more.)

"Discuss your snap cube stick with your partner. Check your partner's work - are we okay or do we need to adjust? Make sure you are naming the strategy you are using and the sum."

"Go ahead and color your model."

"Let's say the equation aloud together - remember our addends are 4 and 1: 4 + 1 = 5.
That's right - our sum is 5!"

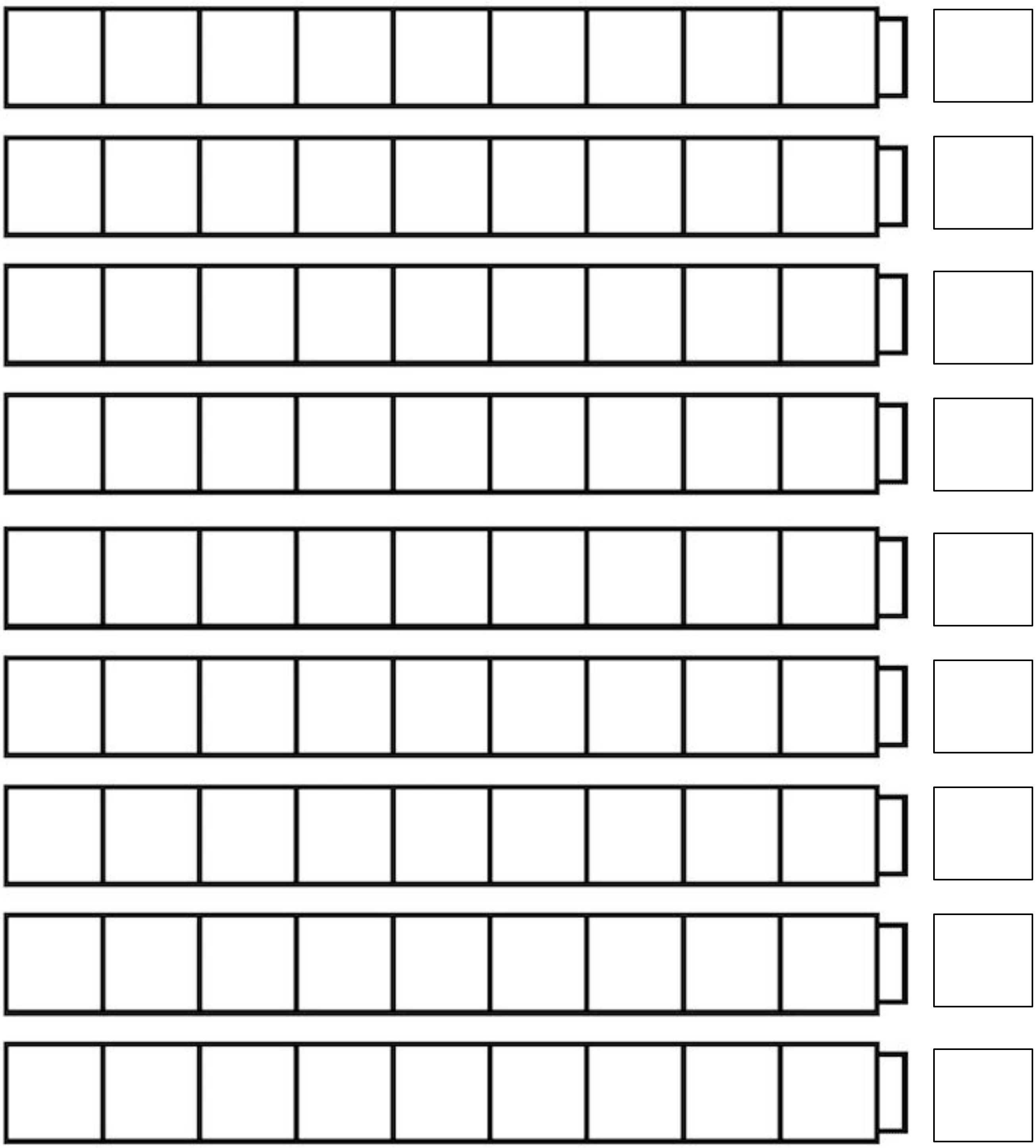
Label your model with that equation.

"Okay - let's review before you choose your own.
Your first addend can be any number between 1 - 7.
Your second addend can ONLY be 1 or 2.
I'll keep walking around to ask you about your thinking and what strategy you are applying to solve these problems. Feel free to turn to your partner and explain the strategy and to say your equation before you color and write."

TOC

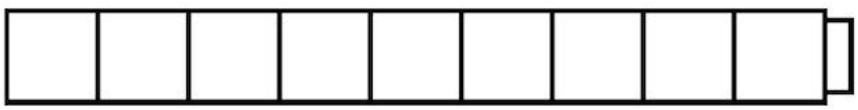
Grab, Model, & Write the Sum Recording Sheet

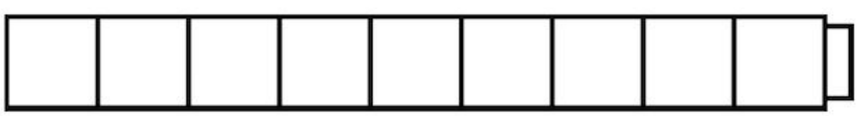
Name ____

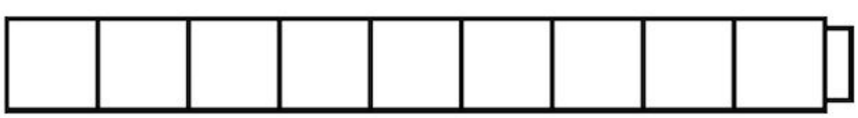


Grab, Model, & Write the Equation(s) Recording Sheet

Name ____

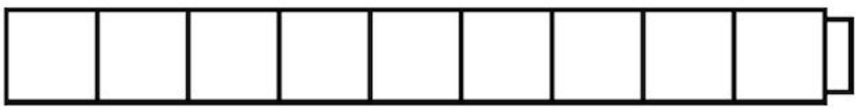


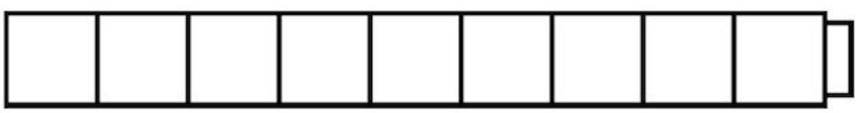


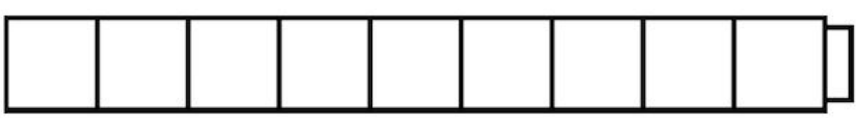


Show What You Know Recording Sheet

Name ______________________________





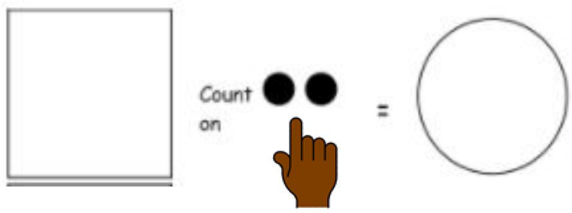


Strategy: Counting On or Back	**Name of Activity: Count Up or Back Contest** **F7**
Description: Facts that have addends of 1 or 2	**Materials:** 1 recording sheet per pair of students, ten-sided die or number cards 0 - 10, blank die with one and two dots colored on it or the dot cards

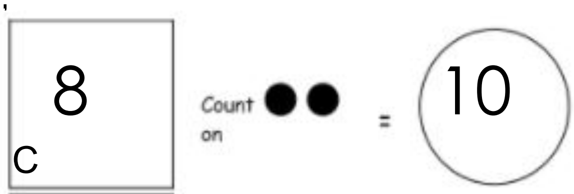
Opportunity to Practice Counting On Strategy/Directions:

Students will either need ten-sided die or number cards 0 - 10. Students will also need a die with 1 and 2 pips (dots) drawn on them or the dot cards.

1. Students work in pairs.
2. The students share one recording sheet.
3. Student A rolls the die (or draw a number card) and rolls the pip dice (or draws a dot card). S/he says, "I can use the Counting On Strategy. I have 8 and 2. 8…. 9, 10. My total or sum is 10. My equation matches this one." The student locates the correct graphic on the page that matches counting on by 2.



4. "I'll fill it to match it. I'll also put my initial in the square it so I can remember this one is mine. 8 + 2 = 10."



5. Now it is Partner B's turn.
6. Students can only fill in the sheet if the correct graphic is available. For example, if the student rolls 2 dots and there is only graphics with 1 dot left on the page, s/he loses their turn.
7. The student with the most filled in at the end wins.

Opportunity to Practice Counting Back Strategy/Directions:

To practice counting back 1 or 2, do the activity above with the Counting Back Contest recording sheet.

TOC

Count Up Contest Recording Sheet

Names ______________________________and ______________________________

Count on ●● =

Count on ● =

Count on ●● =

Count on ●● =

Count on ●● =

Count on ● =

Count on ●● =

Count on ●● =

Count on ● =

Count on ●● =

Count on ●● =

Count on ● =

Count on ●● =

Count on ●● =

Count Back Contest Recording Sheet

Names ______________________________ and ______________________________

Count back =

Count back =

Count back =

Count back =

Count back =

Count back =

Count back =

Count back =

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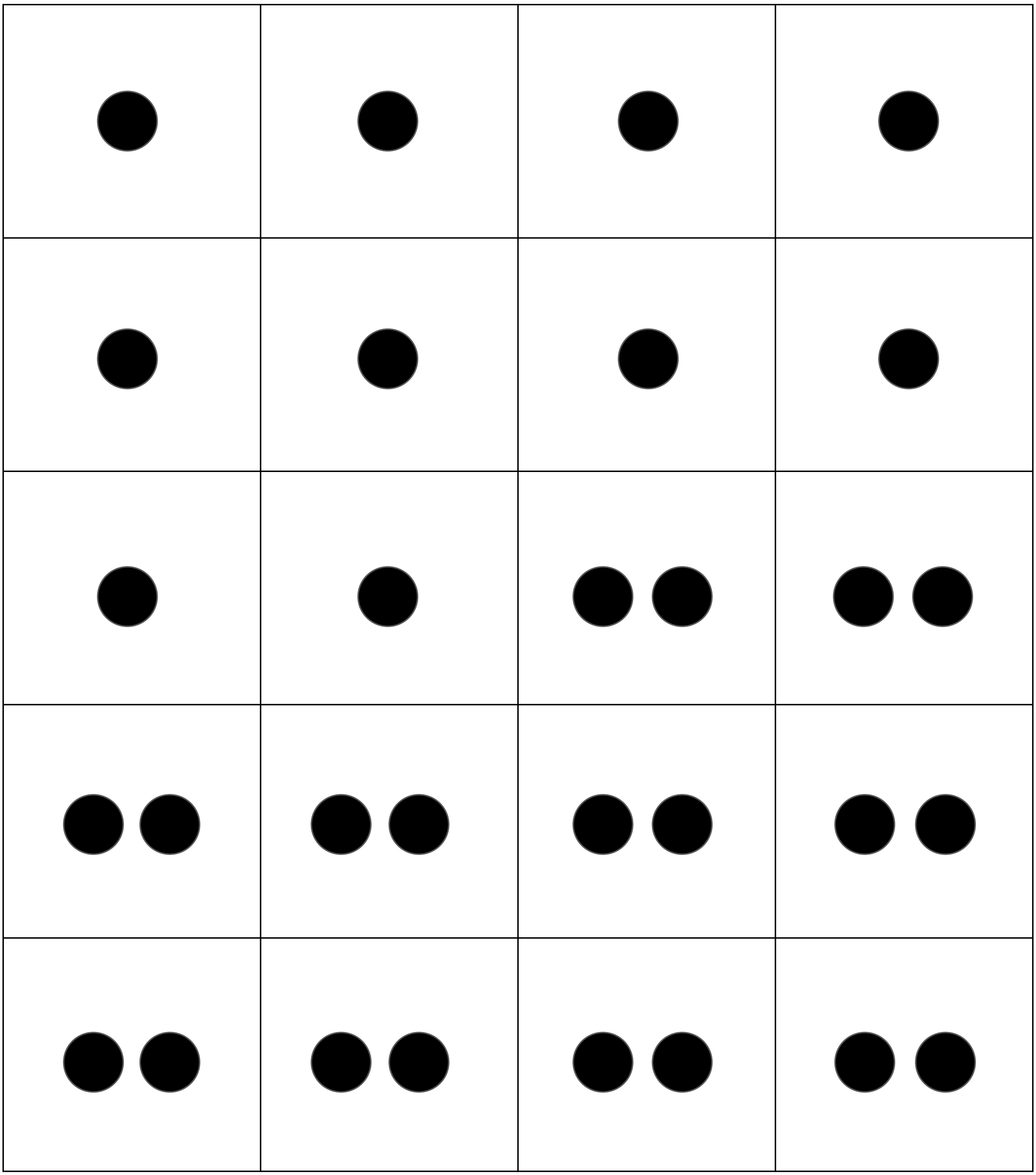
Count back =

Dot Cards - **Use if you do not have blank dice to make into 1 and 2 dot dice for Counting Up Contest**



Strategy: Counting On or Back	**Name of Activity: Squares (up through 10)** **F8**
Description: Facts that have addends of 1 or 2 and/or subtrahends of 1 or 2	**Materials:** this game board per pair of students, tiny clear chips to cover spaces, +/-1 and/or +/-2 cards, number cards up to 10

2	4	8	10	5	0
9	3	7	2	6	9
10	2	9	10	4	6
7	5	11	8	3	0
9	1	3	7	11	9
0	4	10	5	6	2

SQUARES

Counting On/Back +/-1 &/or +/-2

The goal of SQUARES is to be the first player to have markers/chips on four numbers that form a square on the game board.

Students either need a game board per person or different colored markers/chips.

SQUARES spinners or decks of cards (addition and/or subtraction equations) are also needed.

Players take turns spinning or drawing a card, finding the sum/difference and placing a marker/chip on the board. If the student cannot place a marker/chip because the sum is not showing, s/he loses that turn.

The first player to have 4 markers/chips arranged to form a square is the winner.

For a noncompetitive option, have partners work together to spin/draw, add/subtract, and talk together about where to place each marker/chip as they try to form a square.

More information on SQUARES is in the back of the FSB. Look for game cards to use either in the Counting On/Back section of this book or in the back of the book.

TOC

Strategy: Counting On or Back	**Name of Activity: Squares (up through 12)** **F9**
Description: Facts that have addends of 1 or 2 and/or subtrahends of 1 or 2	**Materials:** this game board per pair of students, tiny clear chips to cover spaces, +/-1 and/or +/-2 cards, number cards up to 10

2	4	8	12	5	11
9	3	7	2	6	9
10	2	9	12	4	6
7	5	11	8	3	0
9	1	3	7	11	9
12	4	10	5	6	2

SQUARES

Counting On/Back +/-1 &/or +/-2

The goal of SQUARES is to be the first player to have markers/chips on four numbers that form a square on the game board.

Students either need a game board per person or different colored markers/chips.

SQUARES spinners or decks of cards (addition and/or subtraction equations) are also needed.

Players take turns spinning or drawing a card, finding the sum/difference and placing a marker/chip on the board. If the student cannot place a marker/chip because the sum is not showing, s/he loses that turn.

The first player to have 4 markers/chips arranged to form a square is the winner.

For a noncompetitive option, have partners work together to spin/draw, add/subtract, and talk together about where to place each marker/chip as they try to form a square.

More information on SQUARES is in the back of the FSB. Look for game cards to use either in the Counting On/Back section of this book or in the back of the book.

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Strategy: Counting On or Back	**Name of Activity: Ball Bounce Bump (+1)** **F10**
Description: Facts that have addends of 1.	**Materials:** this game board per pair of students, 10-sided dice, equation cards for Counting On +1 or number cards 0 -10, two different colored markers/chips (transparent chips are best)

ball bounce bump +

Counting On +1

Material Needed: Either 10-sided dice, equation cards for Counting On +1, or number cards 0-10

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Roll the die or draw a card.
2. If using the die or number cards, add one to the number. If using the equation cards, find the sum.
3. Locate the sum on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If you calculate a sum that you have already covered, you can stack one of your chips on top of the one that is there on the board and "lock" your chip into place. No one can bump you off of that number now.

   If you roll a number or draw a card that the sum is not available on the board, the next player takes his/her turn.
4. The player to use all of his/her chips first wins the game!

TOC

Strategy: Counting On or Back	**Name of Activity: Ball Bounce Bump (+2)** **F11**
Description: Facts that have addends of 2	**Materials:** this game board per pair of students, 10-sided dice, equation cards for Counting On +2 or number cards 0 -10, two different colored markers/chips (transparent chips are best)

ball bounce bump +

Counting On +2

Material Needed: Either 10-sided dice, equation cards for Counting On +2, or number cards 0-10

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Roll the die or draw a card.
2. If using the die or number cards, add 2 to the number. If using the equation cards, find the sum.
3. Locate the sum on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If you calculate a sum that you have already covered, you can stack one of your chips on top of the one that is there on the board and "lock" your chip into place. No one can bump you off of that number now.

   If you roll a number or draw a card that the sum is not available on the board, the next player takes his/her turn.
4. The player to use all of his/her chips first wins the game!

3	5	11	10	2
4	9	8	11	7
1	6	2	6	4
5	9	3	8	7

TOC

Strategy: Counting On or Back	**Name of Activity: Ball Bounce Bump (-1)** **F12**
Description: Facts that have 1 as a subtrahend	**Materials:** this game board per pair of students, equation cards for Counting Back -1 or number cards 1 -10, two different colored markers/chips (transparent chips are best)

ball bounce bump −

Counting Back -1

Material Needed: equation cards for Counting Back -1, or number cards 1-10

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Roll the die or draw a card.
2. If using the die or number cards, subtract 1 from the number. If using the equation cards, find the difference.
3. Locate the difference on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If you calculate a difference that you have already covered, you can stack one of your chips on top of the one that is there on the board and "lock" your chip into place. No one can bump you off of that number now.

   If you roll a number or draw a card that the difference is not available on the board, the next player takes his/her turn.

4. The player to use all of his/her chips first wins the game!

TOC

Strategy: Counting On or Back	**Name of Activity: Ball Bounce Bump (-2)** **F13**
Description: Facts that have a subtrahend of 2	**Materials:** this game board per pair of students, equation cards for Counting Back -2 or number cards 2 -10, two different colored markers/chips (transparent chips are best)

ball bounce bump

Counting Back -2

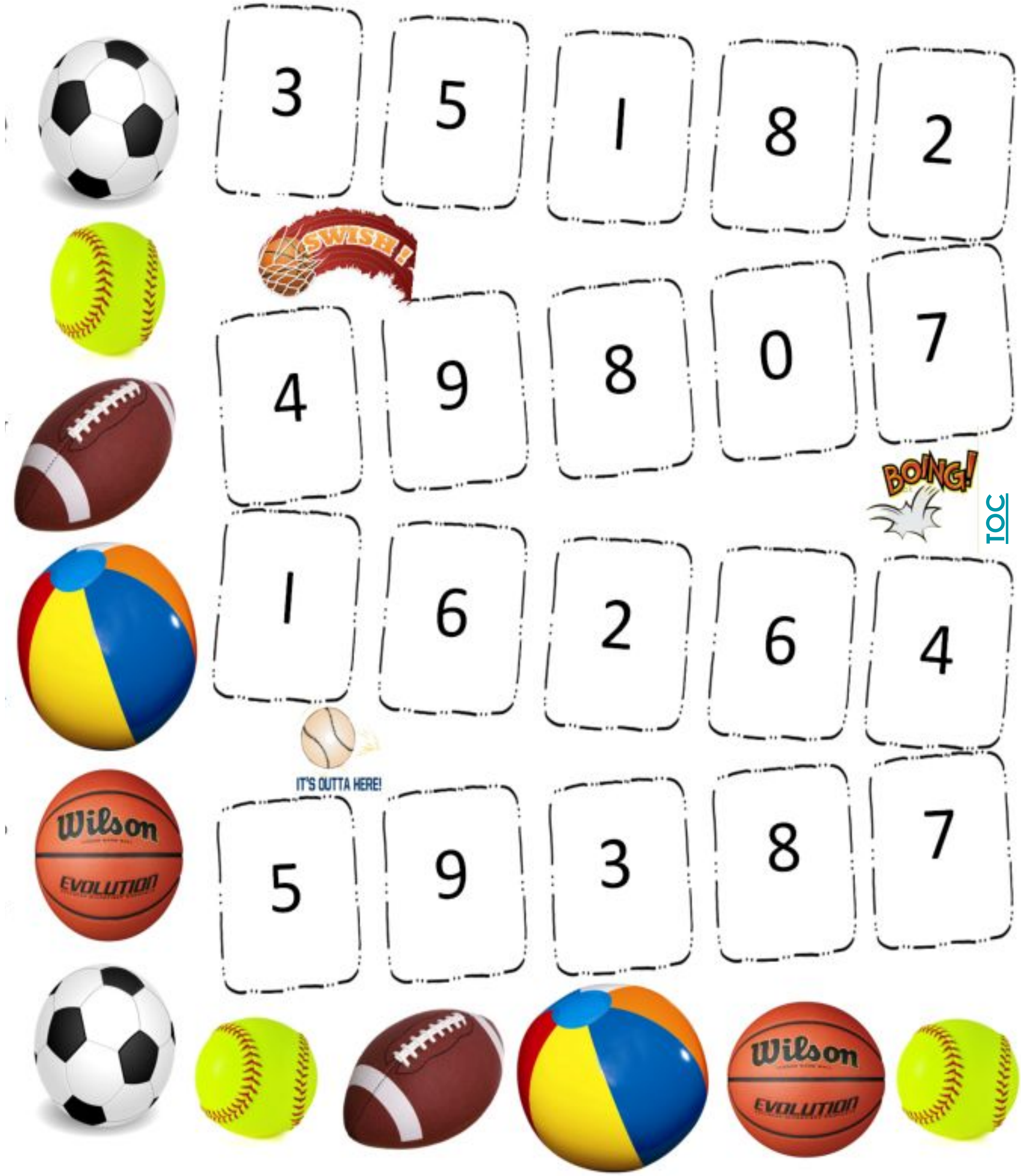
Material Needed: equation cards for Counting Back -2, or number cards 2-10

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Roll the die or draw a card.
2. If using the die or number cards, subtract 2 from the number. If using the equation cards, find the difference.
3. Locate the difference on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If you calculate a difference that you have already covered, you can stack one of your chips on top of the one that is there on the board and "lock" your chip into place. No one can bump you off of that number now.

   If you roll a number or draw a card that the difference is not available on the board, the next player takes his/her turn.
4. The player to use all of his/her chips first wins the game!



TOC

ONLY USE when students are ready for "know from memory" or are using the PPPs for this strategy

Strategy: Counting On or Back	**Name of Activity: Random Numbers Counting On Or Back** **F14**
Description: Facts that have addends of 1 or 2	**Materials:** random numbers CD or internet site with numbers being called, recording sheet

Opportunity to Practice Counting On & Counting Back Strategies/Directions:

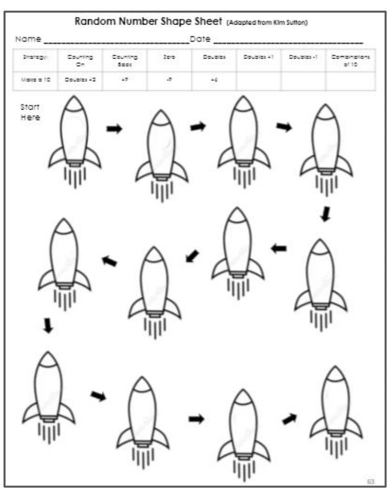
If possible, use the Random Number CD or digital download by Kim Sutton.

The Random Number CD is a valuable tool for motivating students to practice. The CD is designed to generate the digits 0 - 9 with background music. This helps students learn to filter out unnecessary sounds and listen for important information. Students also can't ask the CD to repeat itself! Students find this form of practice fun. There are several tracks to choose from, as well as a variety of rates.

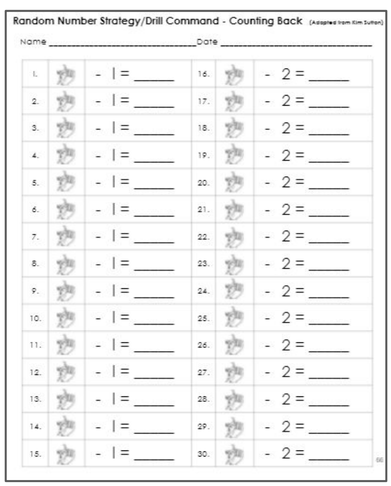
The random number CD can be used with any drill command using the four operations. When a number is called out, the student would perform that drill command *(add 1, add 2, subtract 1, etc.)* and record the sum or difference. This would continue down the columns.

There may be other online number generators if you have not purchased the CD or digital download.

Teachers can use the Random Number Recording Sheet or Random Number Strategy/Drill Command Sheet. See the back of the book for the Random Number Recording Sheets.



Student writes the sums/differences in the shapes on the page.


Random Number Strategy/Drill Command - Counting Back (Adapted from Kim Sutton)

Name ____ Date ____

1.		- 1 = ____	16.		- 2 = ____
2.		- 1 = ____	17.		- 2 = ____
3.		- 1 = ____	18.		- 2 = ____
4.		- 1 = ____	19.		- 2 = ____
5.		- 1 = ____	20.		- 2 = ____
6.		- 1 = ____	21.		- 2 = ____
7.		- 1 = ____	22.		- 2 = ____
8.		- 1 = ____	23.		- 2 = ____
9.		- 1 = ____	24.		- 2 = ____
10.		- 1 = ____	25.		- 2 = ____
11.		- 1 = ____	26.		- 2 = ____
12.		- 1 = ____	27.		- 2 = ____
13.		- 1 = ____	28.		- 2 = ____
14.		- 1 = ____	29.		- 2 = ____
15.		- 1 = ____	30.		- 2 = ____

Student listens for the number called on the CD, follows the command, then writes the sum/difference.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:

- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

Reminder: Students in K-5th grade do not work with negative numbers. If the CD calls out "1" and the command is "- 2", just say "Skip it!" and wait for the next number. Explain to students you CAN solve the problem 1 - 2 = ?, but they will not learn about this until middle school.

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Random Number Strategy/Drill Command - Counting On (Adapted from Kim Sutton)

Name ______________________________ Date ______________________________

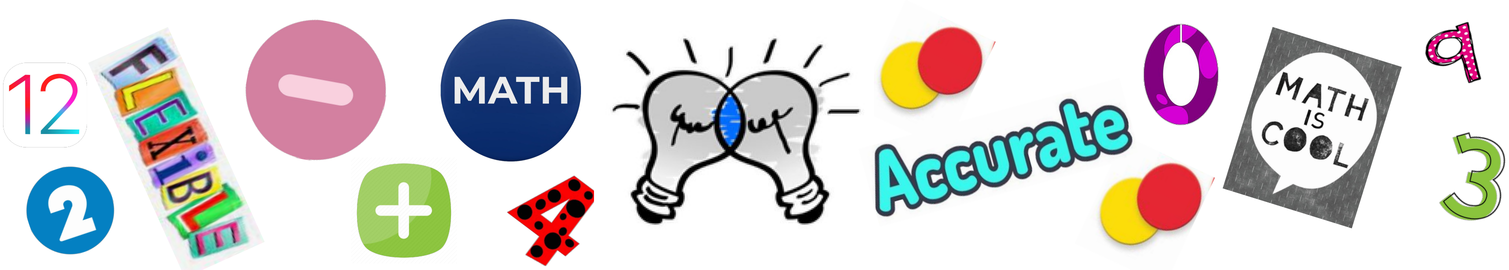
1.		+ 1 = ______	16.		+ 2 = ______
2.		+ 1 = ______	17.		+ 2 = ______
3.		+ 1 = ______	18.		+ 2 = ______
4.		+ 1 = ______	19.		+ 2 = ______
5.		+ 1 = ______	20.		+ 2 = ______
6.		+ 1 = ______	21.		+ 2 = ______
7.		+ 1 = ______	22.		+ 2 = ______
8.		+ 1 = ______	23.		+ 2 = ______
9.		+ 1 = ______	24.		+ 2 = ______
10.		+ 1 = ______	25.		+ 2 = ______
11.		+ 1 = ______	26.		+ 2 = ______
12.		+ 1 = ______	27.		+ 2 = ______
13.		+ 1 = ______	28.		+ 2 = ______
14.		+ 1 = ______	29.		+ 2 = ______
15.		+ 1 = ______	30.		+ 2 = ______

Random Number Strategy/Drill Command - Counting Back (Adapted from Kim Sutton)

Name ______________________________ Date ______________________________

1.		- 1 = ______	16.		- 2 = ______
2.		- 1 = ______	17.		- 2 = ______
3.		- 1 = ______	18.		- 2 = ______
4.		- 1 = ______	19.		- 2 = ______
5.		- 1 = ______	20.		- 2 = ______
6.		- 1 = ______	21.		- 2 = ______
7.		- 1 = ______	22.		- 2 = ______
8.		- 1 = ______	23.		- 2 = ______
9.		- 1 = ______	24.		- 2 = ______
10.		- 1 = ______	25.		- 2 = ______
11.		- 1 = ______	26.		- 2 = ______
12.		- 1 = ______	27.		- 2 = ______
13.		- 1 = ______	28.		- 2 = ______
14.		- 1 = ______	29.		- 2 = ______
15.		- 1 = ______	30.		- 2 = ______

Zero



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Strategy: Zero (Identity Property)	**Application and Teaching the Strategy**
Description: Facts where at least one of the addends or the subtrahend is zero	**Materials:** document camera, some manipulatives, part-part-whole mat in a plastic sleeve, dry erase marker/eraser, chart paper, markers

There are 19 facts that have 0 as an addend. Though these facts are generally considered simple, there are students that over-generalize the idea that answers to addition problems must be bigger and get confused with the + 0 facts. Word problems involving zero are especially helpful for understanding zero facts. As you discuss the following problems, use concrete examples and drawings that show two parts with one part empty. Show students what the number fact looks like first (manipulatives or drawing)and then show the abstract number sentence.

Application:

Materials for Application: manipulatives, models and/or dry erase boards/markers/erasers

Application:
"Let's take a look at a problem and talk about how we might solve it."

"There are 3 baby birds in a nest. No more birds have hatched. How many baby birds are in the nest?" *(Have students discuss the problem and illustrate it. It may also be helpful for some students to act it out.)*

"Let's try another one.
The next spring a robin built a nest. Rosa peeked into the nest one day and saw that it was empty. The next day she peeked and saw 4 eggs. How many eggs are in the nest?"
(Have students discuss the problem and illustrate it. It may also be helpful for some students to act it out.)

"What do these problems have in common?" *(Both of these problems had 0 as an addend.)*

Teaching Strategy - Part 1:

Materials for Part 1: document camera, some manipulatives, Part-Part-Whole mat in a plastic sleeve, dry erase marker/eraser

Put a Part-Part-Whole model under the document camera. Tell students you are going to practice some addition problems.
"I am going to put a quantity on one of the parts (pointing to the model). Close your eyes. *(Teacher puts on 4 manipulatives.)* Okay now open. How many manipulatives did I put on our Part-Part-Whole mat? *(Students count/state.)* Yes...4! Okay close your eyes again and I'm going to put another quantity on the mat. *(Students close their eyes again and the teacher does not put any manipulatives on the mat in the other "part".)* Okay open! How many do you see in this part *(pointing to the model)*? Right! Zero...I did not add any more. So let's add these together. 4 + 0 = 4. I'm going to add 4 manipulatives at the top of our model where it says, 'Whole'. Let's try this again."

Teacher continues to do this, having the zero quantity be the first or second addend. Have students talk about what they are noticing.
"There is a special name for this strategy. It is called the Zero Strategy."

The teacher should also repeat this with subtraction - having students close their eyes, putting manipulatives on the "whole" part, take none away, discuss and put manipulatives on the "part" portion of the mat.

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Teaching Strategy - Part 2 (Addition):

Materials for Part 1: problems listed on chart paper, marker to record student discoveries and comments

Make a list of about 10 zero addition facts (make sure the 0 is not always in the same addend position). Some of your facts can be symbols (numbers) while others should be quantities (draw squares, triangles, etc.). Draw some horizontally and others vertically.

"Let's look at a list of zero addition facts."

* Have students explain how these facts are alike and different.
* Ask some of the students to share their discoveries.
* What generalizations can they make about adding "0"?
    * Adding zero does not change the quantity or number. The sum (answer) remains the same.
    * The zero can be in either addend position.
* Have them say the name of the strategy. (Zero Strategy)

Circle/ highlight/ record what students are discovering on the chart paper. Be sure to label with precise vocabulary (SMP 6).

Teaching Strategy - Part 3 (Subtraction):

Make a list of about 10 zero subtraction facts. Some of your facts can be symbols (numbers) while others should be quantities (draw squares, triangles, etc.). Draw some horizontally and others vertically.

"Let's look at a list of zero subtraction facts."

* Have students explain how these facts are alike and different.
* Ask some of the students to share their discoveries.
* What generalizations can they make about subtracting "0"?
    * Subtracting zero does not change the quantity or number. The difference (answer) is the same.
    * The zero can only be in the second addend position.

    **If a student tries to explain that the zero can be in the first addend position, agree with him/her, but follow that with a further explanation. For subtraction and the Zero Strategy, in elementary school, we learn about the zero being in the second position (subtrahend) or the amount that is being taken away from the number (minuend). HOWEVER, once they enter middle school, they will learn more about how the zero can be in the first position (minuend). But for now, we'll only have zero be the subtrahend (or the number that is being taken away). Do NOT tell them that a zero can never be the "first number". This simply isn't true and we do not want students to think this in their elementary years.

* Have them say the name of the strategy. (Zero Strategy)

Circle/ highlight/ record what students are discovering on the chart paper. Be sure to label with precise vocabulary (SMP 6).

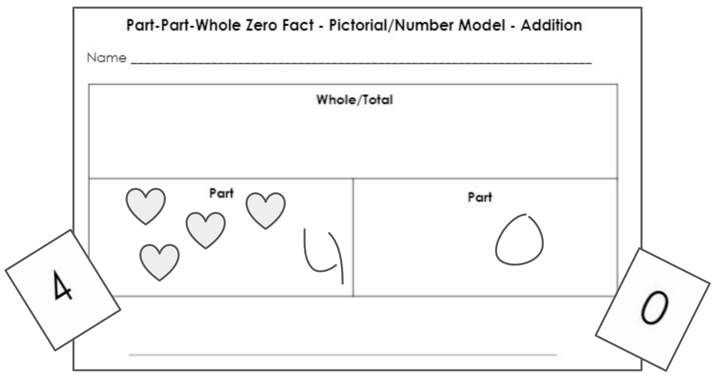
Note: The two posters with student contributions will make excellent anchor charts - keep them! :)

Strategy: Zero (Identity Property)	**Name of Activity: Part-Part-Whole Zero Facts Addition** **G2**
Description: Facts where at least one of the addends or the subtrahend is zero	**Materials:** part-part-whole mats, counters, zero cards, number cards or ten-sided die (cards work well because the number 0 can be drawn which would produce 0 + 0)

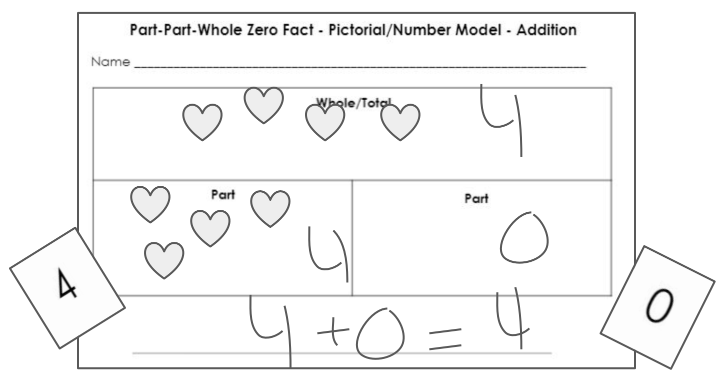
Opportunity to Practice Zero (Addition) Strategy/Directions:

Part-Part Whole

1. Students work in pairs.
2. Student A will draw a card or roll the die and write that number in the part box. The student will also draw a picture to represent that number. The student will also draw a "0" card and write a 0 in the other part box.



3. The student says to his/her partner, "This is the Zero Strategy. That means I'm not adding anything to my number. 4 + 0 = 4"
4. The student then writes the number in the whole/total box.
5. The student then writes the equation (number sentence).



6. Student B checks for accuracy.
7. The students switch roles.

** Be sure students practice putting the non-zero addend in both the left and right hand side "part" boxes. We want students to recognize and be able to explain the commutative property.

Adaptation: If students are struggling at the pictorial level, have them use counters on the manipulative mat.

Note: Although it may seem obvious that a zero card does not need to be drawn, students need to make a connection that "nothing" or zero objects is a number and does have a symbol.

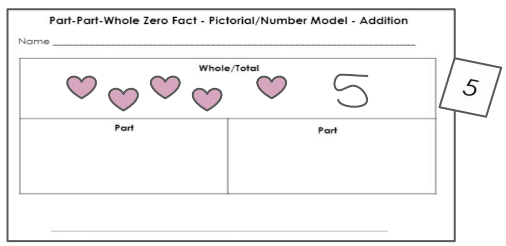
The teacher will need to run several copies of the recording sheet because there are only two models on the page.

Strategy: Zero (Identity Property)	**Name of Activity: Part-Part-Whole Zero Facts Subtraction** **G3**
Description: Facts where at least one of the addends or the subtrahend is zero	**Materials:** part-part-whole mats, counters, zero cards, number cards or ten-sided die (cards work well because the number 0 can be drawn which would produce 0 + 0)

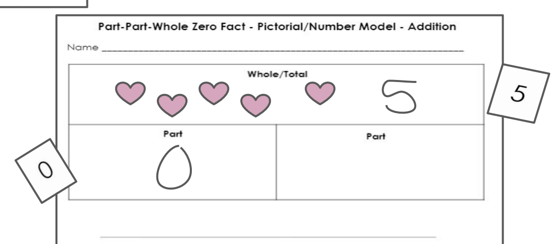
Opportunity to Practice Zero (Subtraction) Strategy/Directions:

Part-Part-Whole - Be sure to remind the students over and over that they are working on subtraction.

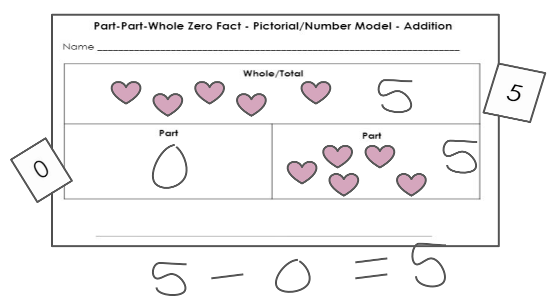
1. Students work in pairs.
2. Student A will draw a card or roll the die and write that number in the whole box. The student will also draw a picture to represent that number.



3. Student A now draws a "0" card and writes a 0 in one of the part boxes.



4. Student A says to his/her partner, "This is the Zero Strategy. That means I'm not subtracting anything from my number. 5 - 0 = 5."
5. Student A then writes the number in the other part box and draws the quantity.
6. Student A also writes the equation (number sentence).
7. Student B checks for accuracy.
8. The students switch roles.



Adaptation: If students are struggling at the pictorial level, have them use counters on the manipulative mat.

Note: Although it may seem obvious that a zero card does not need to be drawn, students need to make a connection that "nothing" or zero objects is a quantity and does have a symbol (number to represent it). Be sure they draw a zero card.

The teacher will need to run several copies of the recording sheet because there are only two models on the page.

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Number Cards 0 - Part-Part-Whole Zero Fact Cards

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Part-Part-Whole Zero Fact - Manipulative Mat

(Put in plastic sleeve if students are going to write on this mat.)

Whole/Total	
Part	**Part**

Part-Part-Whole Zero Fact - Pictorial/Number Model - Addition

Name ____

Whole/Total	
Part	Part

____

Whole/Total	
Part	Part

____

Part-Part-Whole Zero Fact - Pictorial/Number Model - Subtraction

Name ______________________________

Whole/Total	
Part	Part

____

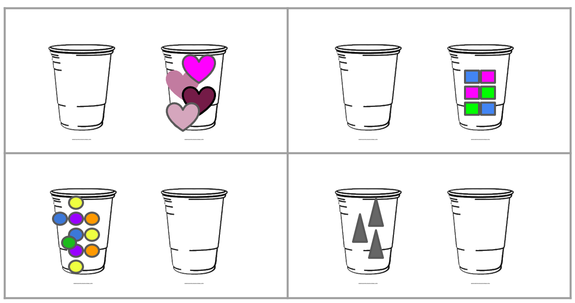
Whole/Total	
Part	Part

____

Strategy: Zero (Identity Property)	Name of Activity: Rotating Zeros G4
Description: Facts where at least one of the addends or the subtrahend is zero	**Materials:** two Dixie cups (or any small container) per student participating, several small manipulatives, recording sheet

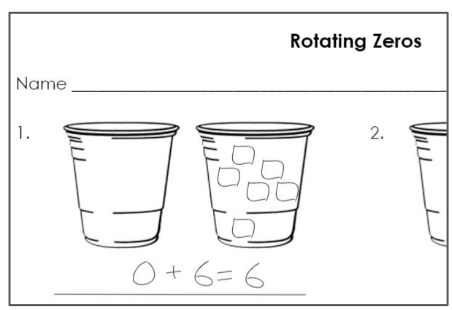
Opportunity to Practice Zero (Addition) Strategy/Directions:

1. Students work individually within a small group or whole class rotation.
2. Each student will have two cups on their desk. One of the cups will have nothing in it ("0") and the other cup will have up to 10 manipulatives in it (each desk should have a different number as much as possible). If four desks are together in a classroom, it would look something like this:



***Be sure to alter which cup has the "0" quantity (in other words, do not always have it be the cup on the right).

3. The student pours his/her cup on the table and counts the manipulatives. S/he turns to his/her partner and says, "This cup has nothing in it. This cup has 6 in it. This is the <u>Zero Strategy</u>. My number sentence/<u>equation</u> is 0 + 6 = 6."
4. Student A checks for accuracy.
5. The student draws his/her pictorial representation and writes the equation.



6. The student sets the cups back up for the next person, leaving the "0" cup in the same spot. S/he then rotates to another desk at his/her foursome or chooses another student's desk in the room to repeat the process.

Adaptation: If students are struggling with counting, limit the tables they can choose by only having up to 5 manipulatives in certain cups. (i.e. "Please choose from the tables that have blue cups as you rotate around the room."

Note: Although it may seem obvious that a zero cup isn't needed, students need to make a connection that "nothing" or zero objects is a quantity and does have a symbol (a number to represent it).

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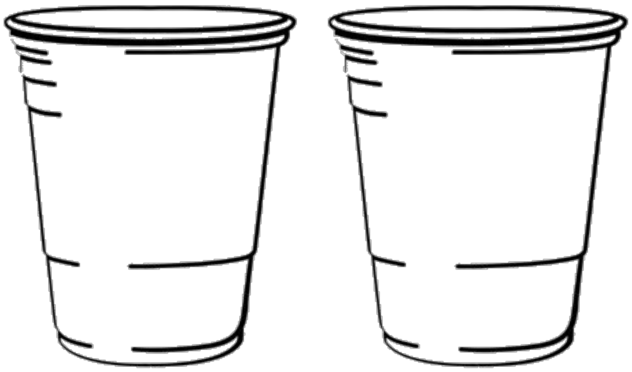
Rotating Zeros

Name ______________________________

1. 

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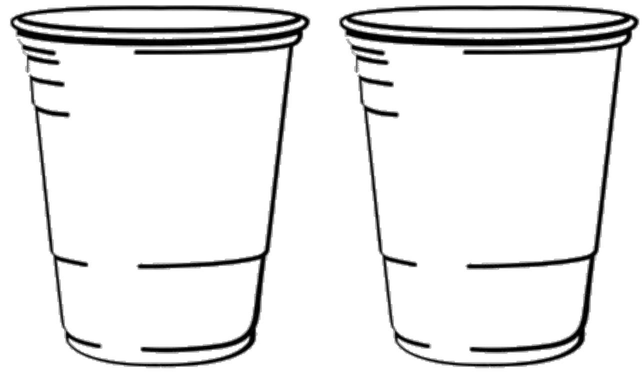
2. 

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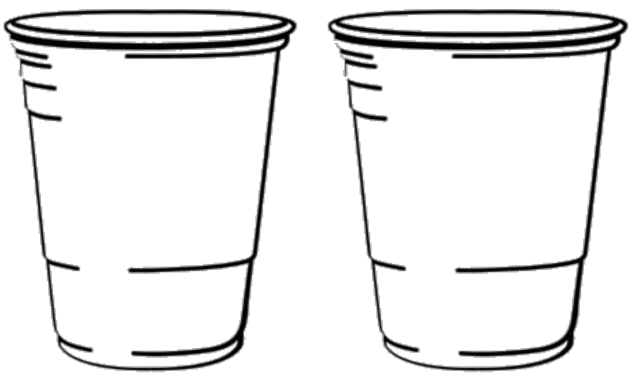
3. 

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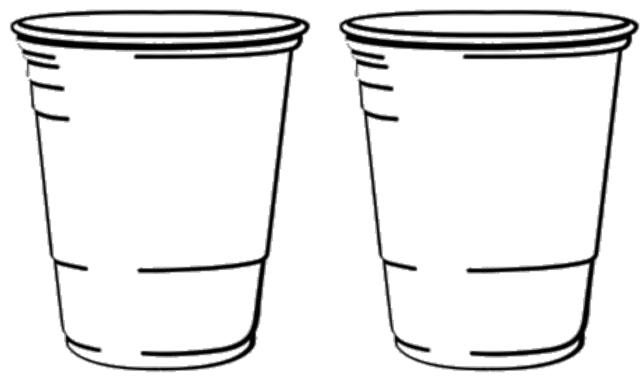
4. 

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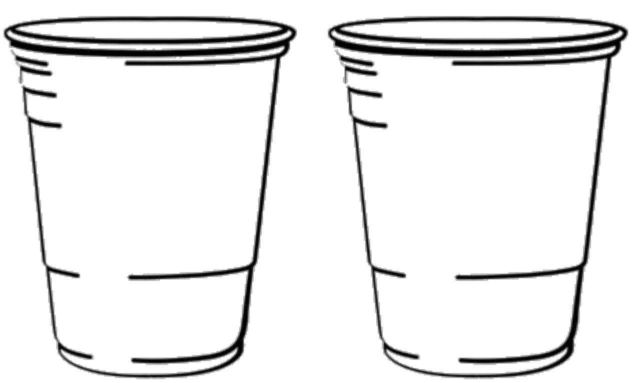
5. 

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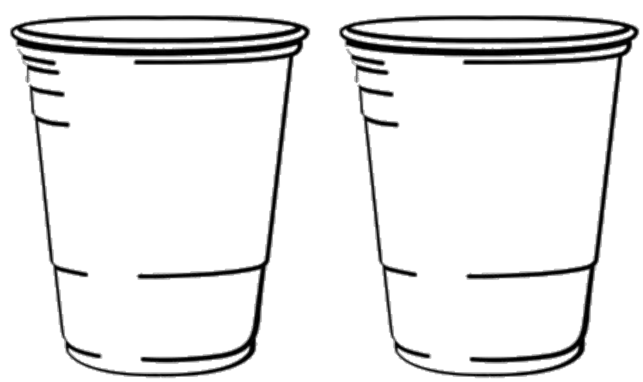
6. 

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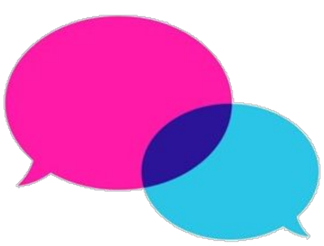
Strategy Focus Review

Counting On/Back

Zero



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Strategy Focus Review - Counting On/Back & Zero

Students need to practice the strategies that have been taught and defend which facts are best solved with particular strategies.

Materials:

1 Spinner per two students (use paperclip/pencil to create a spinner or buy spinners and add)

Fact Cards that align to this strategy (cut out)

1 Fact Cards sheet per student that aligns to this strategy (NOT cut out)

1 Strategy Sorting Mat that aligns to this strategy

Abbreviations to Play:

Counting On = CO   Counting Back = CB   Zero = Z+   Zero = Z-

To Model How to Play:

Option 1: Part A: Ask a student to join you to model this process. You will need the spinner and the Fact Cards sheet (NOT cut out, 1 per person), and pencils. Put the spinner under a document camera. Spin it. As a class, read the strategy (i.e. Counting Back). Identify 1 problem that you could apply this strategy and write "CO" in tiny print next to those problems (i.e., 5 + 1 = __, 1 + 9 = ___, etc.) Read the equation (including the sum/difference). Continually explain WHY this strategy is a successful one. Now the student spins, names the strategy, reads the equation, and writes the abbreviation on his/her sheet - again explaining WHY that strategy works. Agree? Disagree? Encourage discourse. Model another round.

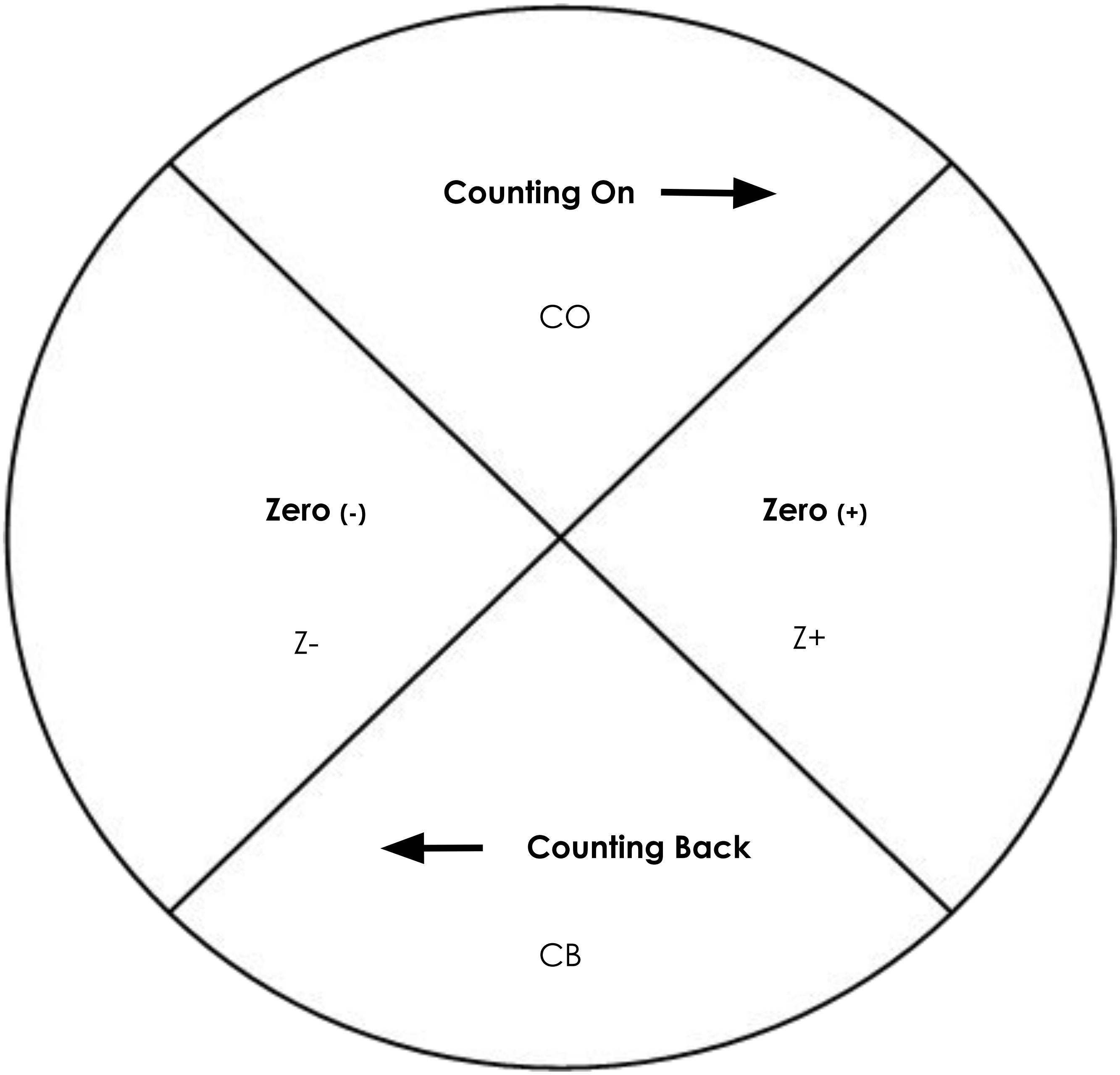
****Once students learn more strategies, multiple strategies can be applied to problems (i.e., 7 + 8 = ___ Make a 10 or Doubles +/-1). Students are encouraged to agree/disagree and explain why.*

Part B: After a few turns, you and the student solve the labeled problems. When the problems have been solved, students can choose a few and explain which strategy they applied. Multiple opportunities to make connections between the strategies and the problems themselves will lead to students being able to move this learning to memory (automaticity).

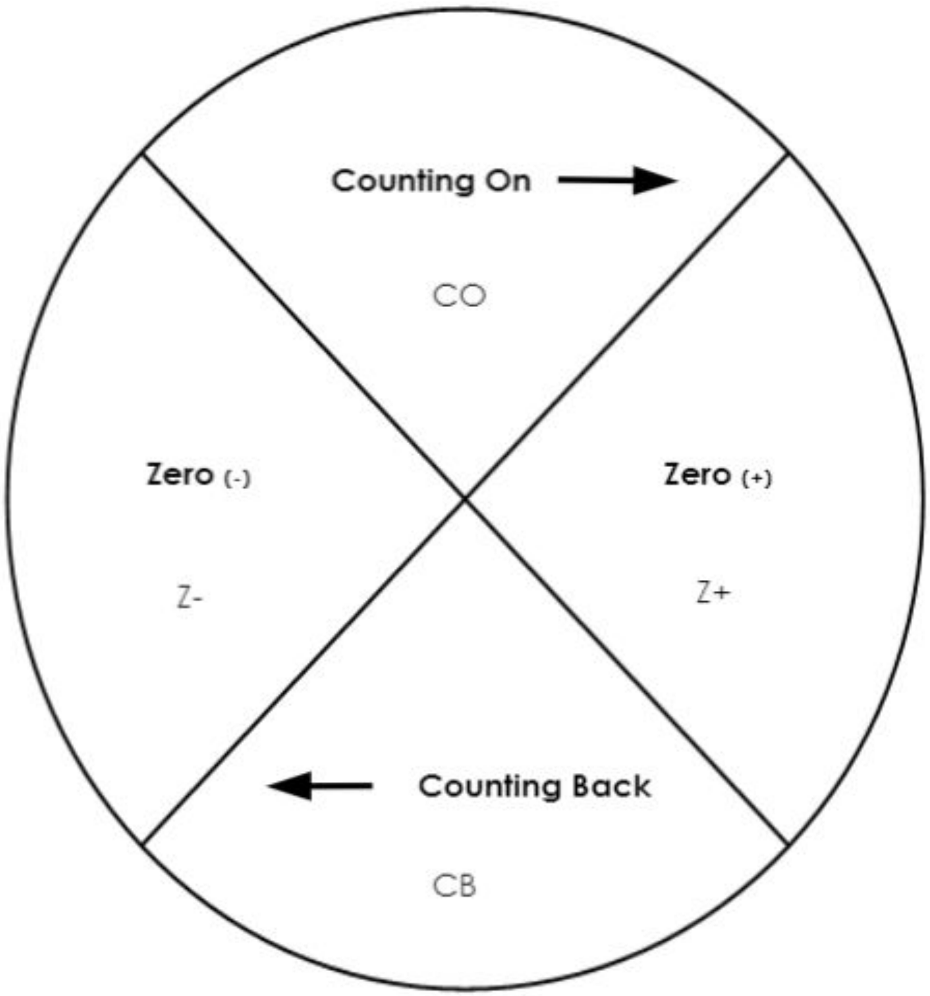
Option 2: Ask a student to join you to model this process. You will need the Fact Cards (cut out) and a copy of the sorting mat. Put the spinner under the document camera. Spin it. As a class, read the strategy (i.e., Counting On). Each person picks one card that represents this strategy, reads the equation to their partner and places it on the sorting mat. (i.e., "4 + 1 = 5. I will place it in the Counting On space because I just counted up one more from 4." "1+ 8 = 9. This is the Counting On strategy so I will place it here. I started with 8 and counted up 1 more to get a sum of 9."). Be sure to acknowledge when students apply the properties. Ask students to identify all strategies applied to make further connections! In the example just mentioned, the student applied the Commutative Property by changing the two addends around. Layer in that vocabulary so students comprehend there is a classroom expectation of being precise.

Continue to sort the cards. Students could also move cards to another part of the sort if they can defend why that strategy would also work (FLEXIBLE THINKING...part to the definition of 'fluency'! :o)

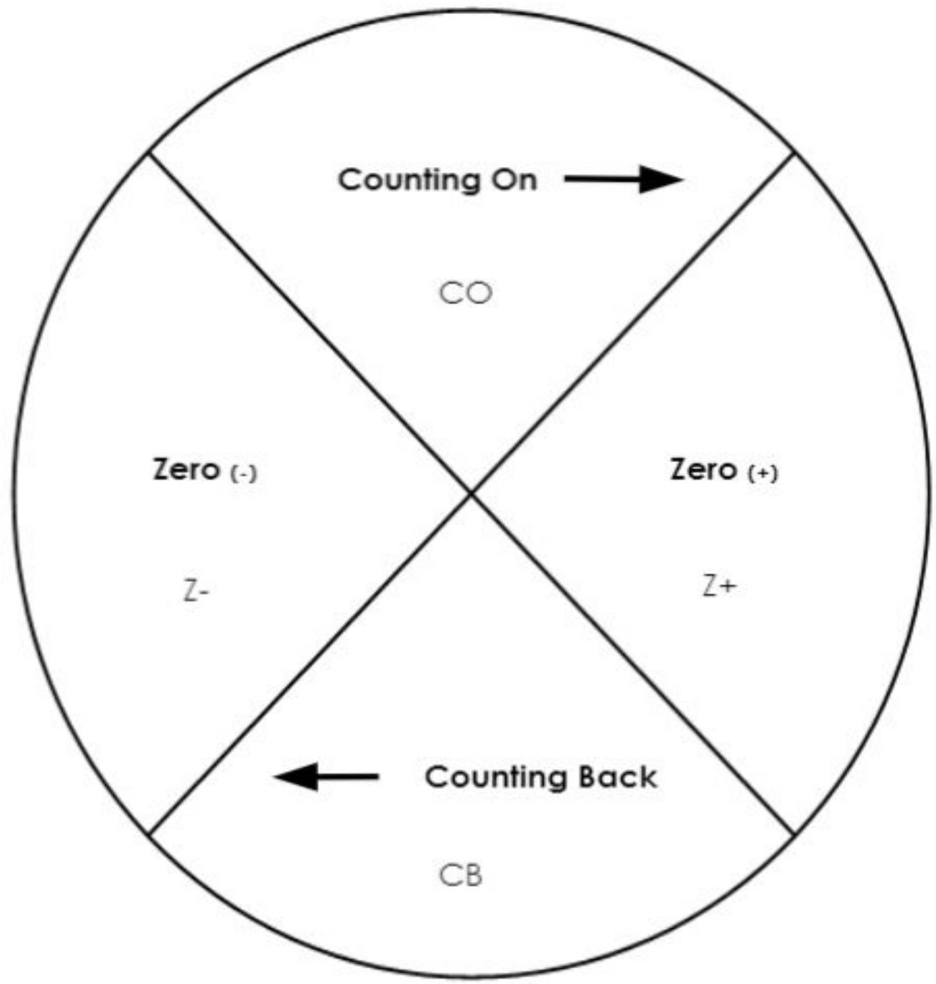
Strategy Focus Review - Counting On/Back & Zero



Strategy Focus Review - Counting On/Back & Zero



Strategy Focus Review - Counting On/Back & Zero



Strategy Focus Review Sorting Mat - Counting On/Back & Zero

Zero (+)	**Zero (-)**
Counting On	**Counting Back**

Strategy Focus Review Sorting Mat - Counting On/Back & Zero

Zero (+)	**Zero (-)**
Counting On →	← **Counting Back**

Write at least 3 problems in each box above that aligns to that strategy.

Choose 1 of the strategy boxes above and explain how it works below (pictures/models/words).

Fact Cards - Counting On/Back & Zero - Only 0s and 1s

0 + 3 = ___	4 + 1 = ___	7 - 0 = ___	1 + 9 = ___
___ = 5 - 0	___ = 1 + 2	___ = 6 - 1	___ = 3 - 0
8 - 1 = ___	0 - 0 = ___	4 + 1 = ___	10 + 0 = ___
___ = 9 - 1	___ = 1 + 1	___ = 0 + 8	___ = 1 + 7

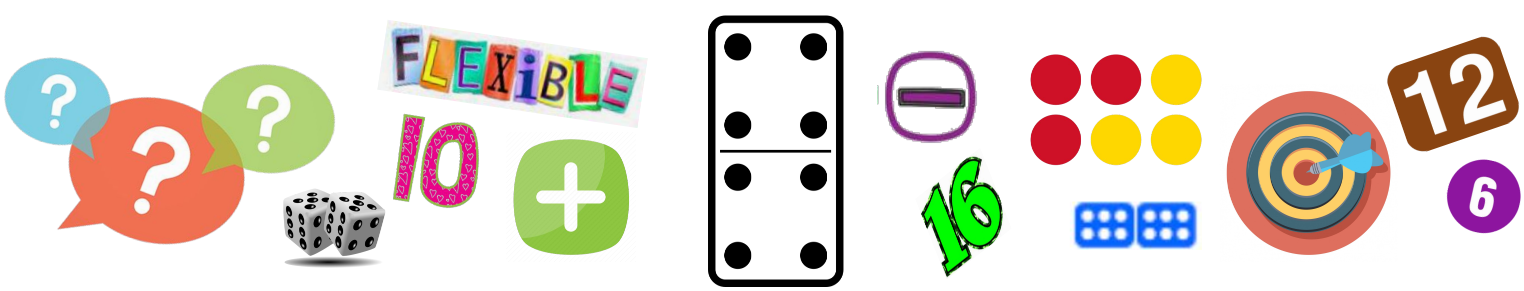
10 - 1 ___	8 + 1 ___	5 - 0 ___	0 + 7 ___	1 + 8 ___	3 - 0 ___	1 + 9 ___
5 - 1 ___	9 + 1 ___	3 - 1 ___	0 + 4 ___	1 + 6 ___	7 - 1 ___	1 + 8 ___

Fact Cards - Counting On/Back & Zero

0 + 3 = ___	4 + 1 = ___	7 - 0 = ___	1 + 9 = ___
___ = 5 - 0	___ = 1 + 2	___ = 6 - 1	___ = 3 - 0
8 - 2 = ___	0 - 0 = ___	4 + 2 = ___	10 + 0 = ___
___ = 9 - 1	___ = 1 + 1	___ = 0 + 8	___ = 2 + 7

10 - 2 ___	8 + 1 ___	5 - 0 ___	0 + 7 ___	2 + 8 ___	3 - 0 ___	1 + 9 ___
5 - 2 ___	9 + 1 ___	3 - 1 ___	0 + 4 ___	1 + 6 ___	7 - 2 ___	2 + 8 ___

Doubles



Strategy: Doubles	**Application and Teaching the Strategy**
Description: Facts where both addends are the same.	**Materials:** whiteboard/paper, document camera, some manipulatives, double trouble poster, dry erase marker/eraser, chart paper, markers, paper for double trouble booklets, crayons/markers, part-part-whole mat

Children usually memorize doubles quickly and easily. Even so, the Doubles strategy is so critical in learning many of the other fact strategies that students need to have time to discuss this strategy with their peers in order to have a deep, foundational understanding.

Application:

Materials for Application: paper, whiteboard

Application:
"Let's take a look at a problem and talk about how we might solve it."

"Butterfly wings have the same pattern on both wings. If each wing has 5 dots, how many dots are on the butterfly?" *(Have students discuss the problem and illustrate it. It may also be helpful for some students to act it out.)*

"Let's try a couple more."
"A car with four wheels is in the driveway. Another car just like it pulls into the driveway. How many wheels are on the driveway?"
(Have students discuss the problem and illustrate it. It may also be helpful for some students to act it out.)

"Vinnie got some new neon shoestrings. His shoe has 6 eyelet holes on each side. How many eyelet holes are there on one shoe?"

"What do these problems have in common?" *(All of these problems had addends that are the same.)*

Teaching Strategy - Part 1 (addition):

Materials for Part 1: paper for "Double Trouble" booklet, crayons/markers, Double Trouble poster, document camera
Because the Doubles facts are so important, students can create a "Double Trouble" booklet to use as a reference. To create books, take 3 sheets of paper and fold them in half, then staple the fold.

Teacher displays the "Double Trouble" poster on document camera and asks students to look at the addition sentences shown. "What do you notice about the addends in the number sentences or equations on this poster?" Students should notice that each sentence has addends that are the same. "There is a special name for this strategy. It is called the Doubles Strategy."

Pass out "Double Trouble" paper booklets to each student. Students will label each page with a double fact (0+0, 1+1, etc.) and illustrate each of the double facts. Students may choose to draw the same pictures that are on the "Double Trouble" poster or their own double pictures that make sense to them.

Teaching Strategy - Part 2: (addition)

Have students stand and face one another. Each student puts up one hand (facing each other/mirror hands). Teacher says, "Pointer fingers touch." The kids put up their pointer fingers and have them touch. "Let's say the equation, ready? 1 + 1 = 2." Teacher writes that equation on the board. Now put up your index fingers and tall/middle fingers. Have them touch your partner's fingers. Let's say this equation. 2 + 2 = 4." Teacher writes that equation. About half way through, ask the students what they recognize about their fingers and the numbers in the equations. Go up through all 10 fingers.

Teaching Strategy - Part 3 (addition/subtraction):

Materials for Part 2: cubes/manipulatives; Part-Part-Whole mat, chart paper, markers

Using Part-Part-Whole mat and manipulatives, have students model doubles addition facts. "Let's use cubes to show one of our doubles facts, 1+1." *Students place one cube in each "part" section of mat.* "Now add those parts together and move them to the 'whole' section of your mat to show the total." *Teacher records the complete addition sentence on chart paper.* "Remember, the name for this strategy is the Doubles Strategy when we have a number sentence with two addends that are the same."

"Now let's practice using this strategy for subtraction." Have students start with cubes/manipulatives in "whole" section of mat, then split the manipulatives into the two "part" sections to see that they are equal amounts. Record the subtraction fact next to the addition fact on class chart (see example below).

Doubles Strategy	
1 + 1 = 2	2 - 1 =1
2 + 2 = 4	4 - 2 = 2
3 + 3 = 6	6 - 3 = 3

Double Trouble

2 + 2 =

1 + 1 =

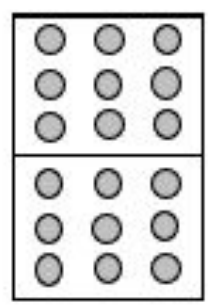
3 + 3 =

4 + 4=

6 + 6 =

5 + 5 =

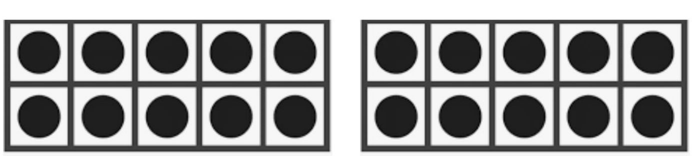
February						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28



7 + 7 =

8 + 8 =

9 + 9 =



10 + 10 =

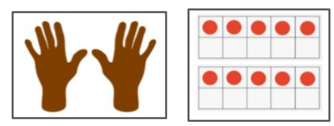
Strategy: Doubles	**Name of Activity: Seeing Doubles - Multiple Games** I2
Description: Facts that have addends that are the same	**Materials:** seeing double cards, dice or spinner, generic game board, paper/pencil

Opportunity to Practice the Doubles (Addition) Strategy/Directions:

Seeing Doubles Concentration

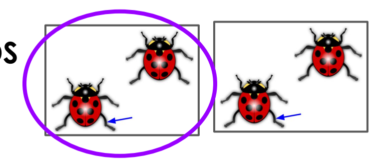
1. Determine the number of cards to use for this game. Using all the cards might be too much.
2. The cards are shuffled and put face down in an array.
3. Student A:

   A. Flips over two cards.
   B. States the <u>quantity</u> for each one. For example: 4 and 6.
      If it is not a match (picture on the cards), then s/he says, "4 and 6 - This is not a match!"



5 + 5 = 10   5 + 5 = 10

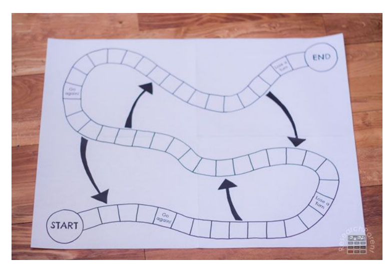
   C. If the picture is not a match, but it is a double, the students says, "This is not a match, but they both have the <u>same double equation</u> (holding up the hand picture) This is 5 + 5 = 10 (then holding up the ten frame picture) This is 5 + 5 = 10". Because the pictures do not match, s/he does flip the cards back over.



   D. If the pictures **ARE** a match, the student **HOLDS UP ONE OF THE CARDS** and says, "This is a match AND it is a <u>double</u>! 6 + 6 = 12." The student would keep both cards and go again. If the student says the <u>equation</u> or the <u>sum</u> incorrectly, then s/he loses his turn.
4. The student with the most cards at the end wins the game.

Adaptation: When students flip over a match, they write the equation.

Generic Game Board/Use Seeing Doubles Cards



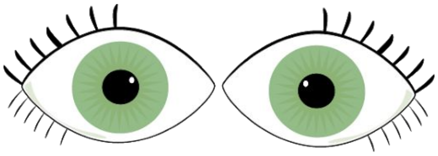
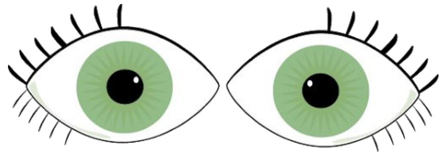
1. Students use the Seeing Doubles cards for any generic board game.
2. Student A draws a card, states or write the equation as a double to be able to roll the dice or flick the spinner to advance on the game board.

Seeing Double War Style

1. Students play the game of War using the Seeing Doubles cards.
2. Cut the deck in half. Each player puts their cards face down.
3. Each player flips over one card. They say their "doubles" equations aloud. The player with the larger sum keeps the cards.
4. If the players flip over equal equations (i.e., 4 + 4 = 8 and 4 + 4 = 8), then they flip over another card to determine the winner.

TOC

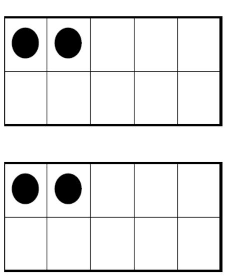
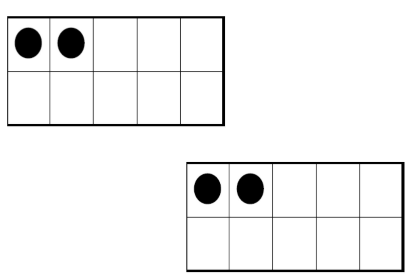
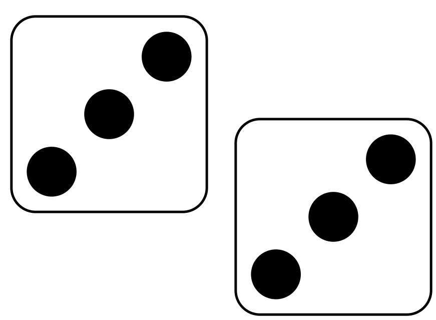
Seeing Double Cards

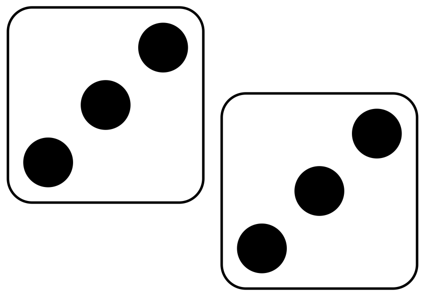


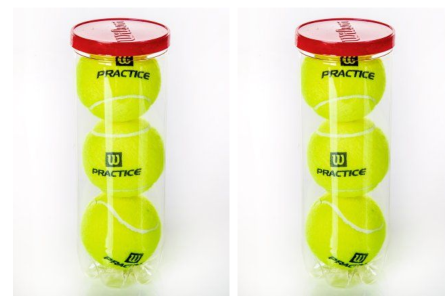
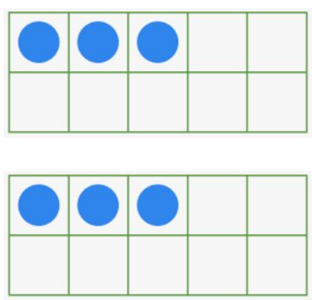
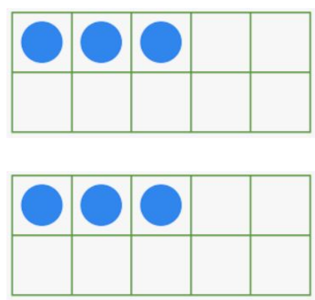
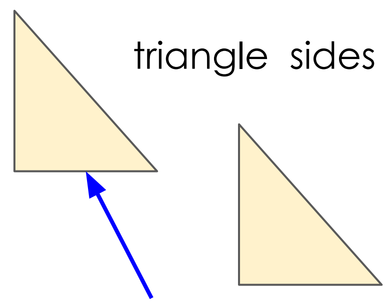


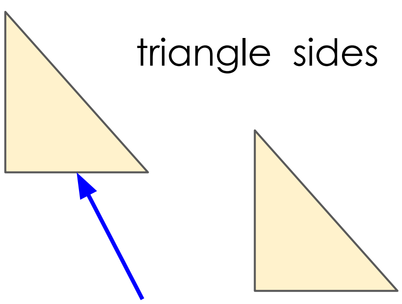


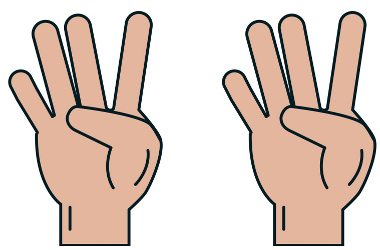
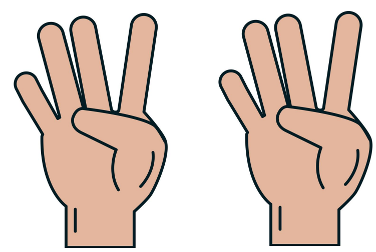
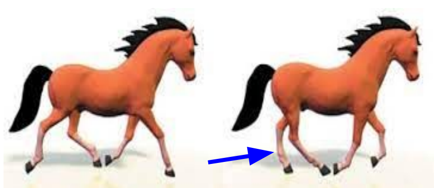
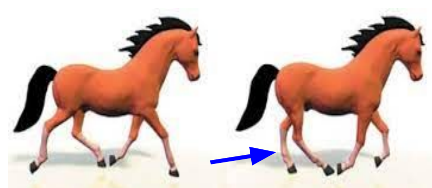
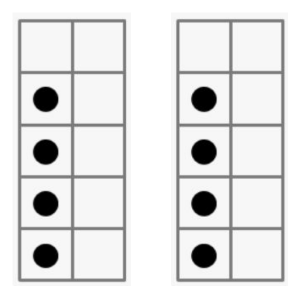
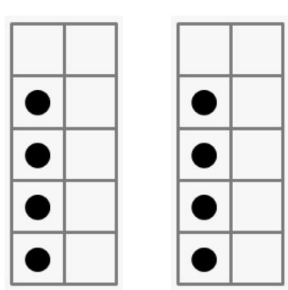
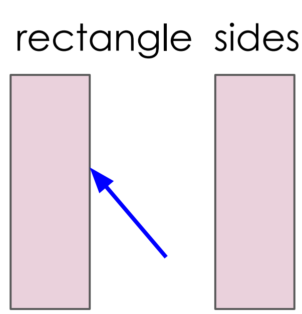





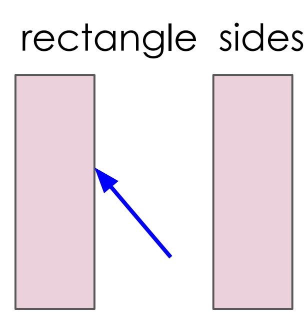
Seeing Double Cards



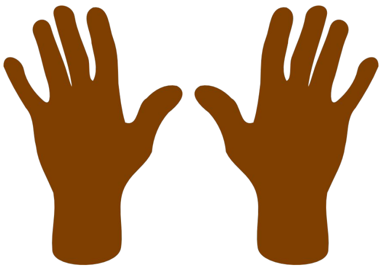
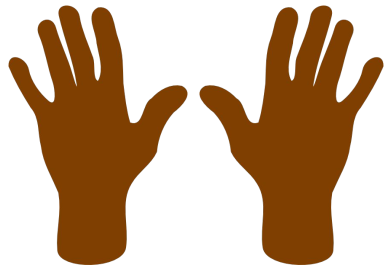
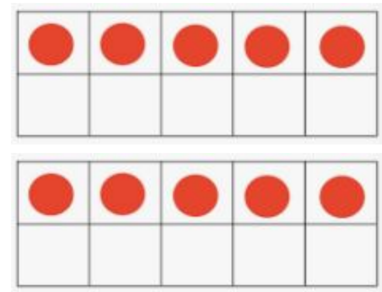
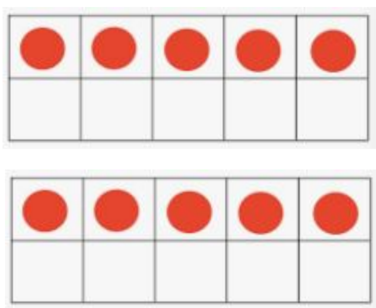
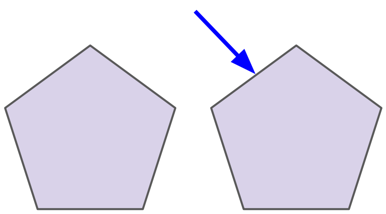
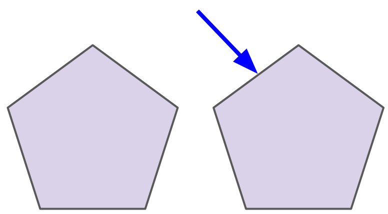
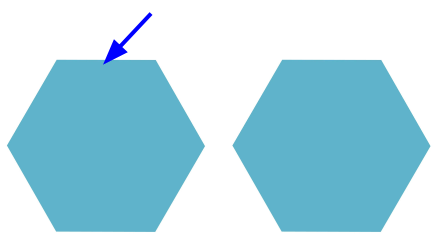
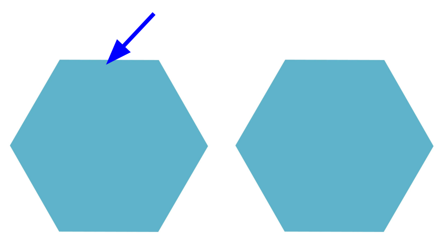
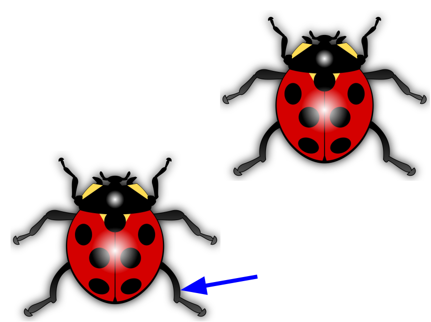







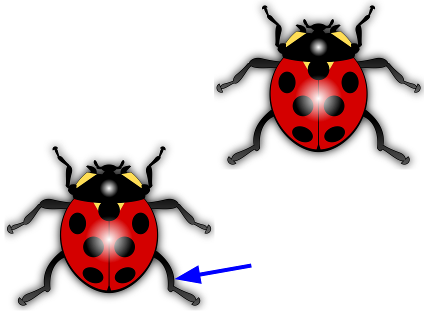








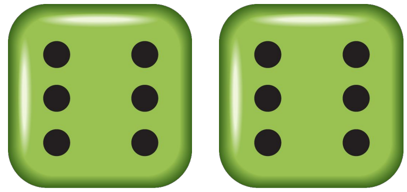


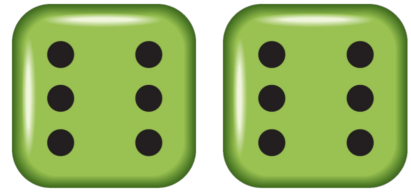
Seeing Double Cards

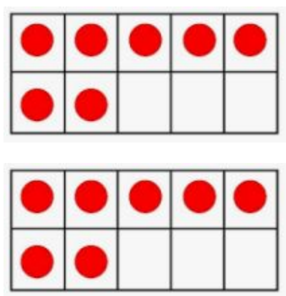
		
		
 pentagon sides	 pentagon sides	
	 hexagon sides	 hexagon sides
		

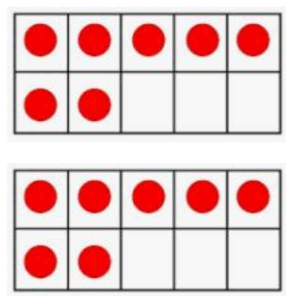
Seeing Double Cards











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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

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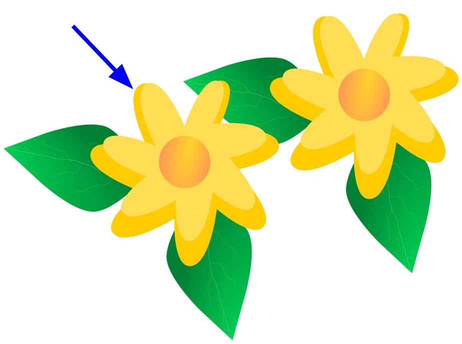
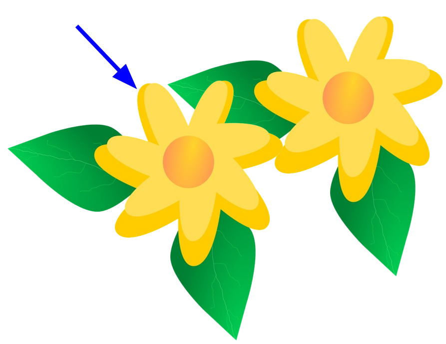
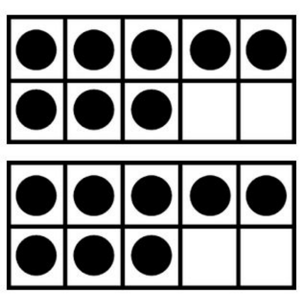
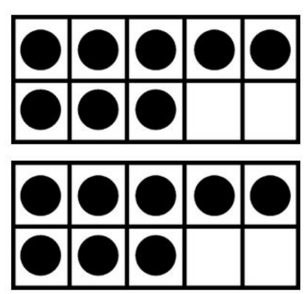
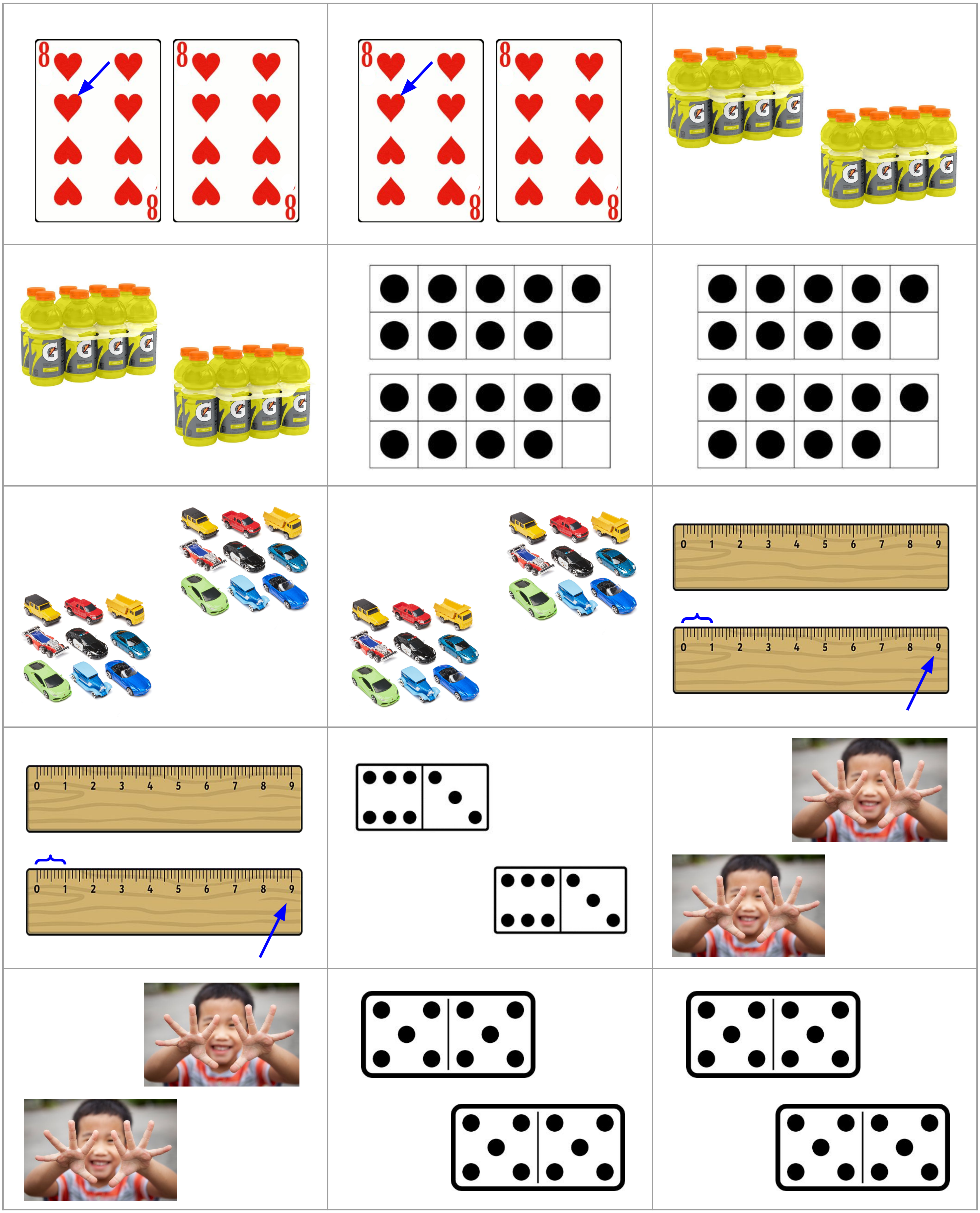




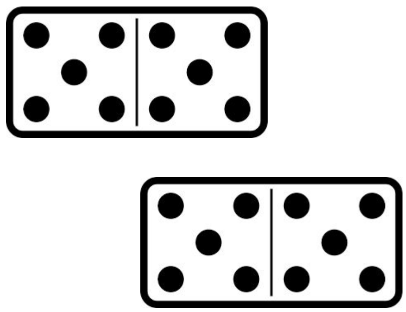


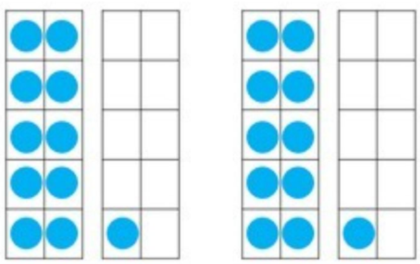


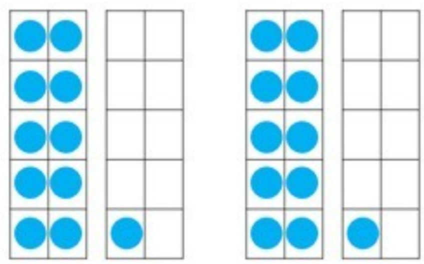
Seeing Double Cards

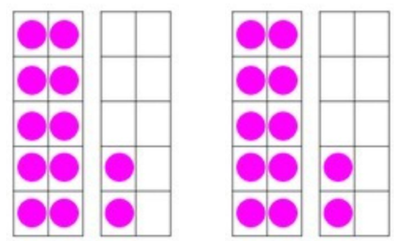


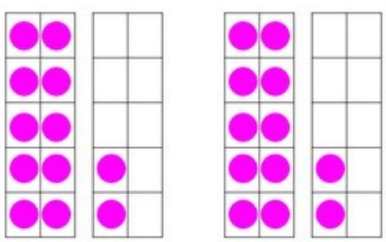
Seeing Double Cards

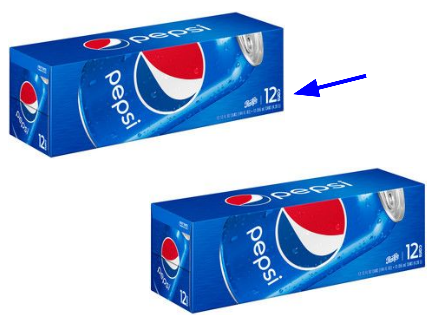


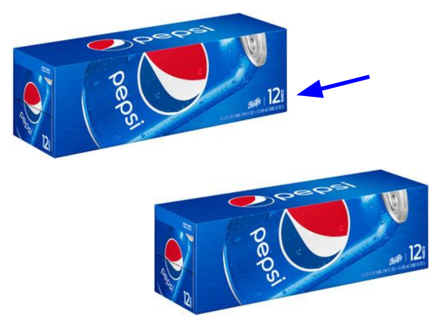






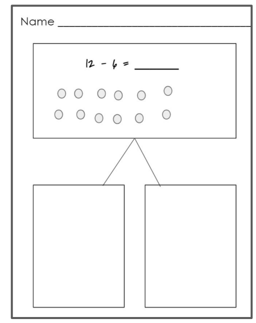




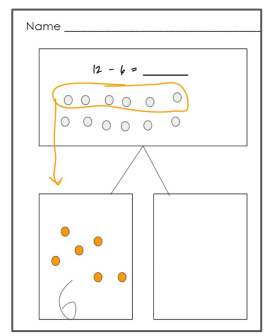


Strategy: Doubles	**Name of Activity: The Missing Double** I3
Description: Facts that have addends that are the same	**Materials:** missing doubles sheet(s), doubles subtraction cards, (for students who need support offer manipulatives, too - tiny ones like beans), 2 different colored pencils

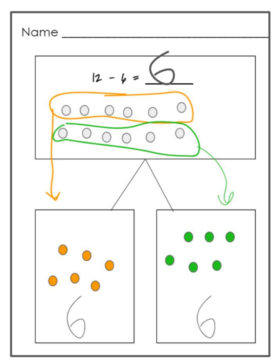
Opportunity to Practice the Doubles (Missing Addend & Subtraction) Strategy/Directions:



1. Each student needs at least one copy of the Missing Double number bond sheet (two different options offered). Partners can share a deck of the subtraction cards.
2 Student A flips over one of the cards (i.e., 12 - 6 _____). The student writes the equation in the top of the number bond and draws 12 dots.



3. Then s/he circles 6 of the dots in one of the colored pencils, draws an arrow down to the left part of the number bond and draws 6 dots in that colored pencil. Student A writes the number 6 in that part of the number bond.



4. Student A then circles the remaining 6 in a different colored pencil and follows the same steps. S/he is also writes the difference.

5. S/he turns to Partner B and says. "12 - 6 = 6 because 6 + 6 = 12. This is the <u>Doubles strategy</u>."

Adaptation: For students who are struggling with the symbolic level, have these kids solve them with tiny manipulatives on the mat first, then draw. If tiny manipulatives are not available, use regular classroom ones on a full-sized number bond then the students use the recording sheet.

For students who are ready for a challenge, use the missing addend cards,

Doubles Subtraction Cards

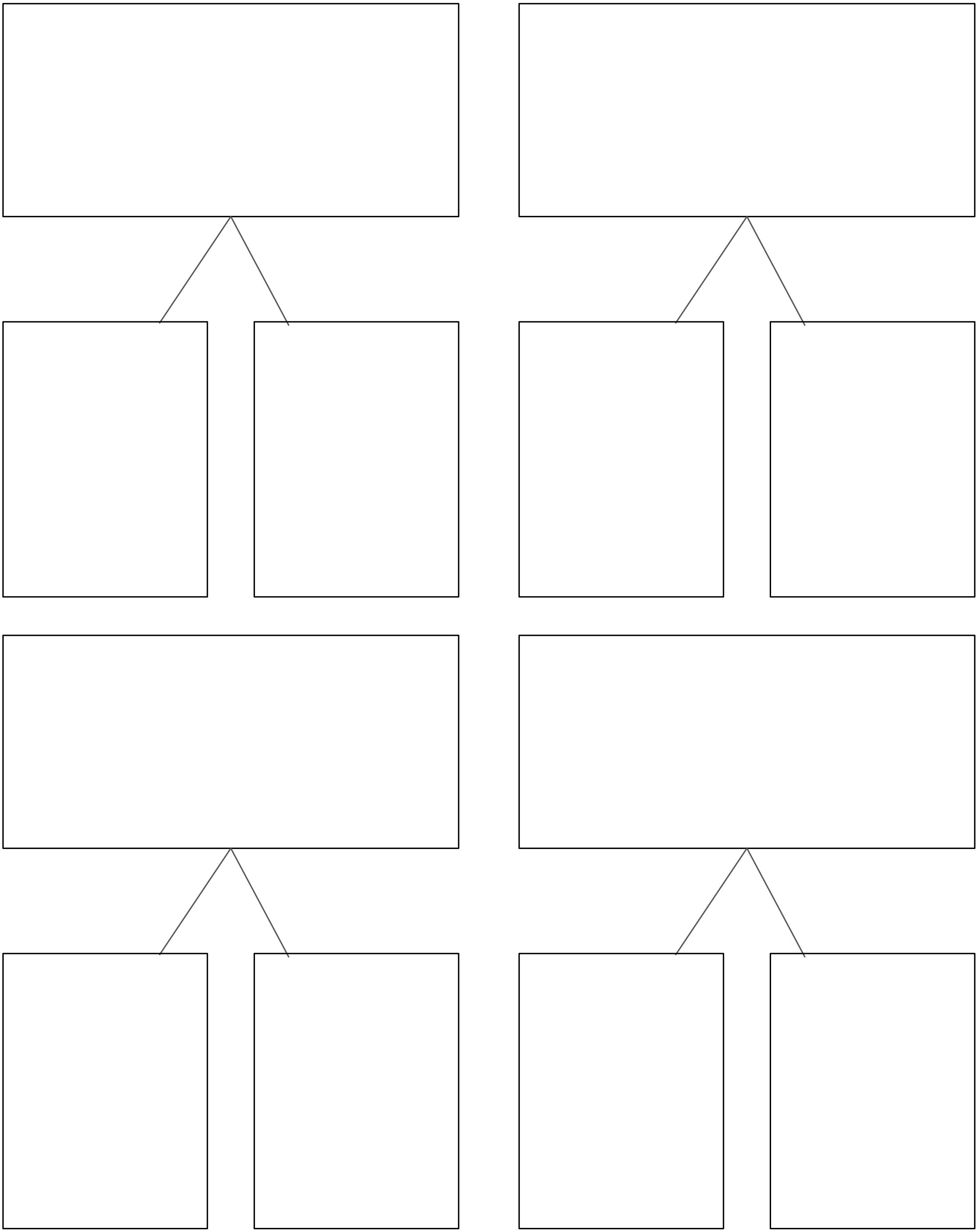
20 - 10 = ___	18 - 9 = ___	16 - 8 = ___	14 - 7 = ___
___ = 12 - 6	___ = 10 - 5	___ = 8 - 4	___ = 6 - 3
___ = 4 - 2	2 - 1 = ___	20 − 10 ______	18 − 9 ______
16 − 8 ______	14 − 7 ______	12 − 6 ______	10 − 5 ______
8 − 4 ______	6 − 3 ______	4 − 2 ______	2 − 1 ______

Doubles Subtraction Cards - Missing Addend

20 - ___ = 10	18 - ___ = 9	16 - ___ = 8	14 - ___ = 7
12 - ___ = 6	10 - ___ = 5	8 - ___ = 4	6 - ___ = 3
4 - ___ = 2	2 - ___ = 1	$\begin{array}{r} 20 \\ -\ \square \\ \hline 10 \end{array}$	$\begin{array}{r} 18 \\ -\ \square \\ \hline 9 \end{array}$
$\begin{array}{r} 16 \\ -\ \square \\ \hline 8 \end{array}$	$\begin{array}{r} 14 \\ -\ \square \\ \hline 7 \end{array}$	$\begin{array}{r} 12 \\ -\ \square \\ \hline 6 \end{array}$	$\begin{array}{r} 10 \\ -\ \square \\ \hline 5 \end{array}$
$\begin{array}{r} 8 \\ -\ \square \\ \hline 4 \end{array}$	$\begin{array}{r} 6 \\ -\ \square \\ \hline 3 \end{array}$	$\begin{array}{r} 4 \\ -\ \square \\ \hline 2 \end{array}$	$\begin{array}{r} 2 \\ -\ \square \\ \hline 1 \end{array}$

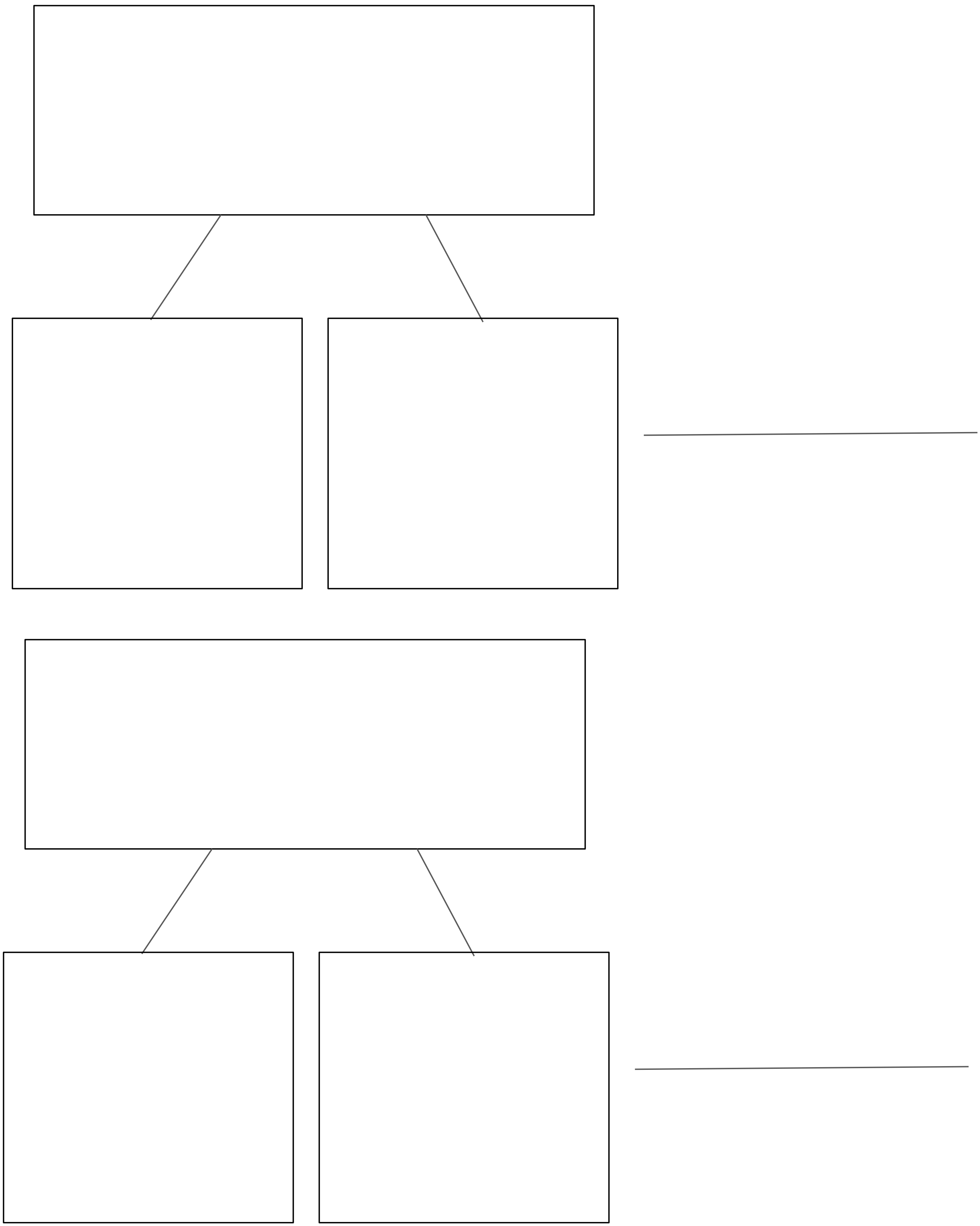
The Missing Double

Name ____



The Missing Double

Name ____



Strategy: Doubles	Name of Activity: Doubles Bingo I4
Description: Facts that have addends that are the same	**Materials:** 1 bingo board per student, chips or manipulatives to cover the boards, doubles +/- cards

Opportunity to Practice the Doubles (and/or Missing Addend & Subtraction) Strategy/Directions:

1. This game is best played with a small group of students.

2. Each student gets a blank bingo board.

3. Do a quick oral review of the sums by having kids saying the equations aloud chorally as the teacher writes the sums on the board:

Kids say:	Teacher writes on the board:
"1 + 1 = 2	2
2 + 2 = 4	4
3 + 3 = 6…"	6, etc.

4. Let the students know they need to fill in their own bingo boards with the numbers you have written on the board.

5. Teacher flips over the cards one at a time under the document camera. The class reads the equation aloud (including the answer).
   **Consider different groups of students to call on for this part, "All students wearing tennis shoes, ready? Read!"

6. The first student to have a full row, column or oblique line wins.

Adaptation: Use the Doubles Subtraction or Missing Addend cards.

Bingo Board

Bingo Board

Doubles Addition Cards

1 + 1 = ___	2 + 2 = ___	3 + 3 = ___	4 + 4 = ___
___ = 5 + 5	___ = 6 + 6	___ = 7 + 7	___ = 8 + 8
___ = 9 + 9	10 + 10 = __	$\begin{array}{r} 10 \\ +\ 10 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 5 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ +\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ +\ 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ +\ 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ +\ 1 \\ \hline \end{array}$

Strategy: Doubles	**Name of Activity: Doubles**	I5
Description: Facts that have the same addends	**Materials:** this game board per pair of students, tiny clear chips to cover spaces, Doubles equation cards (addition, subtraction and/or missing addend)	

2	18	8	12	6	14
16	4	20	4	6	12
8	14	12	10	4	18
20	2	10	8	16	12
14	18	2	10	14	20
6	4	10	8	16	18

Squares

Doubles: 1-10

The goal of SQUARES is to be the first player to have markers/chips on four numbers that form a square on the game board.

Students either need a game board per person or different colored markers/chips.

SQUARES spinners or decks of cards (Doubles addition and/or subtraction equations) are also needed.

Players take turns spinning or drawing a card, finding the sum/difference/ missing addend and placing a marker/chip on the board. If the student cannot place a marker/chip because the sum is not showing, s/he loses that turn.

The first player to have 4 markers/ chips arranged to form a square is the winner.

For a noncompetitive option, have partners work together to spin/draw, add/subtract, and talk together about where to place each marker/ chip as they try to form a square.

More information on SQUARES is in the back of the FSB. Look for equation game cards to use either in the Doubles section of this book or in the back of the book. If none are available, students can just draw a card and double it.

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Strategy: Doubles	**Name of Activity: Social Media Bump - Doubles (+ and -)** **I6**
Description: Facts that have the same addend or subtraction facts that the minuend is double of the subtrahend	**Materials:** this game board per pair of students, equation cards for Doubles (both + an -), two different colored markers/chips (transparent chips are best)

Doubles (+/-)

Material Needed: equation cards for Doubles (+/-)

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Draw a card.
2. Find the sum or the difference.
3. Locate the sum or difference on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If you calculate a sum or difference that you have already covered, you can stack one of your chips on top of the one that is there on the board and "lock" your chip into place. No one can bump you off of that number now.

   If the sum or difference is not available on the board, the next player takes his/her turn.

4. The player to use all of his/her chips first wins the game!

2	6	8	6	
10	12		4	14
	16	20	8	4
18	10	14	2	
18	20	16		12

TOC

ONLY USE when students are ready for “know from memory” or are using the PPPs for this strategy

Strategy: Doubles	**Name of Activity: Random Numbers Doubles** I7
Description: Facts that have addends that are the same	**Materials:** random numbers CD or internet site with numbers being called, recording sheet

Opportunity to Practice the Doubles (Addition) Strategy/Directions:

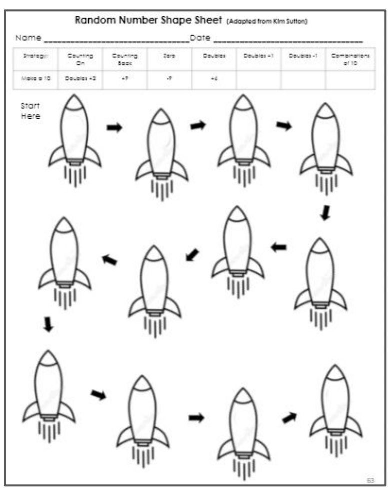
If possible, use the Random Number CD or digital download by Kim Sutton.

The Random Number CD is a valuable tool for motivating students to practice. The CD is designed to generate the digits 0 - 9 with background music. This helps students learn to filter out unnecessary sounds and listen for important information. Students also can’t ask the CD to repeat itself! Students find this form of practice fun. There are several tracks to choose from, as well as a variety of rates.

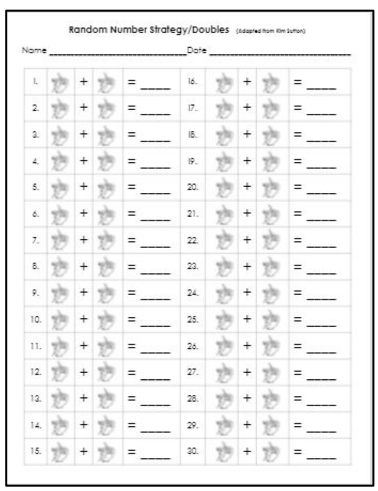
The random number CD can be used with any drill command using the four operations. When a number is called out, the student would perform that drill command *(double the number heard)* and record the sum. This would continue down the columns.

There may be other online number generators if you have not purchased the CD or digital download. You could also use a spinner or 10-sided die.

Teachers can use the Random Number Recording Sheet or Random Number Strategy/Drill Command Sheet. See the back of the book for the Random Number Recording Sheets.



Student doubles the number they hear and writes the sum in the shapes on the page.



Student listens for the number called on the CD, records it as both addends, then writes the sum.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:

- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

Random Number Strategy/Doubles (Adapted from Kim Sutton)

Name ______________________________ Date ______________________________

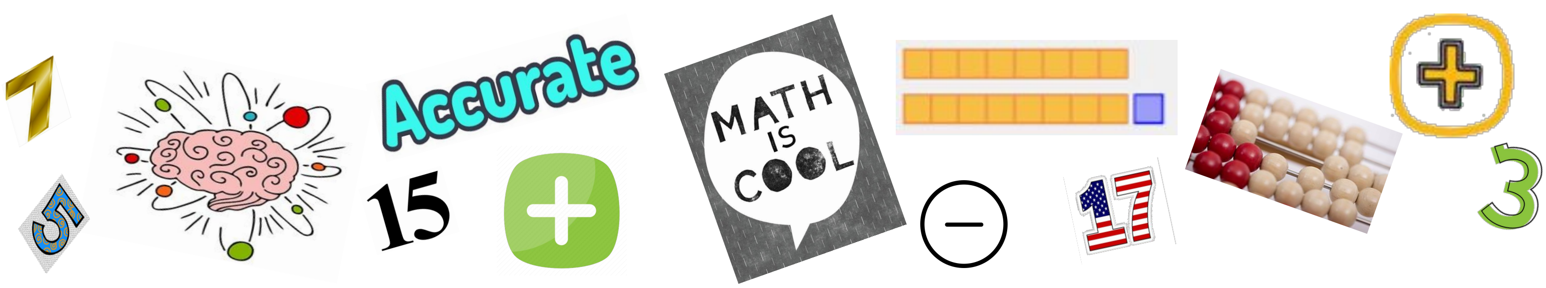
1.		+		= ______	16.		+		= ______
2.		+		= ______	17.		+		= ______
3.		+		= ______	18.		+		= ______
4.		+		= ______	19.		+		= ______
5.		+		= ______	20.		+		= ______
6.		+		= ______	21.		+		= ______
7.		+		= ______	22.		+		= ______
8.		+		= ______	23.		+		= ______
9.		+		= ______	24.		+		= ______
10.		+		= ______	25.		+		= ______
11.		+		= ______	26.		+		= ______
12.		+		= ______	27.		+		= ______
13.		+		= ______	28.		+		= ______
14.		+		= ______	29.		+		= ______
15.		+		= ______	30.		+		= ______

Random Number Strategy/Doubles **(Adapted from Kim Sutton)**

Name ______________________________ Date ______________________________

1. double ☐ = _____
2. double ☐ = _____
3. double ☐ = _____
4. double ☐ = _____
5. double ☐ = _____
6. double ☐ = _____
7. double ☐ = _____
8. double ☐ = _____
9. double ☐ = _____
10. double ☐ = _____
11. double ☐ = _____
12. double ☐ = _____
13. double ☐ = _____
14. double ☐ = _____
15. double ☐ = _____
16. double ☐ = _____
17. double ☐ = _____
18. double ☐ = _____
19. double ☐ = _____
20. double ☐ = _____
21. double ☐ = _____
22. double ☐ = _____
23. double ☐ = _____
24. double ☐ = _____

Doubles
+ 1 / - 1



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Strategy: Doubles +/ -1	Application and Teaching the Strategy
Description: Facts that have addends that are one away from each other.	**Materials:** document camera, some manipulatives, dry erase marker/eraser, whiteboard, chart paper, markers, two-sided colored counters, ten frames (1 and 2), plastic sleeves, Near Doubles Fact Cards

Students will be working on a strategy that is a combination of the doubles and counting-on strategies. It involves facts whose addends differ by one. To understand these facts, students should compare them to the related double fact then complete the sum. For example, to solve the fact 4 + 5, a student would think, "4 + 4 = 8, so 4 + 5 is one more which would be a total of 9."

Application:

Materials for Application: paper, whiteboard, document camera

Application:
"We are going to use the Doubles strategy to help us understand the Doubles +1 strategy. Let's talk about the following problems together."

"Today is the 7th day of the month? What will the date be in 8 days?" *(Have students discuss how to solve the problem with a Doubles +1 strategy. Let them discuss it with each other and with the whole group. Have students illustrate the problem. Some students may find it helpful to act it out.)*

"After a party, your mom gathered up the leftover cans of pop. She found a pack of 6 in the kitchen and then 7 more cans in the refrigerator. How many cans of pop did she find?"

"There are two cars in the parking lot. One is a convertible and the other is an SUV with an extra wheel attached to the back. How many wheels are there in the parking lot?"
(Have students discuss the problem and illustrate it. It may also be helpful for some students to act it out.)

Teaching Strategy - Part 1 (addition):

Materials for Part 1: two-sided colored counters, ten frames (1 and 2), plastic sleeves, dry erase markers

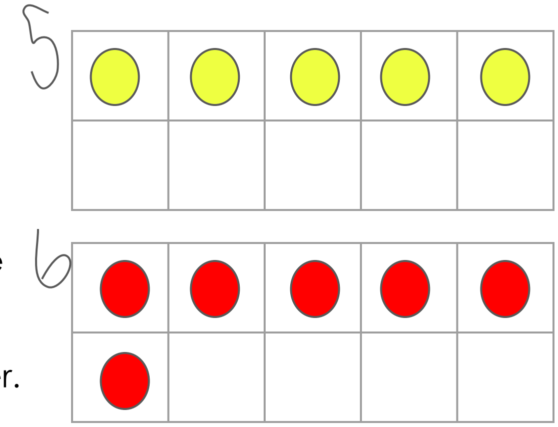
Doubles +1 (and/or -1) can be challenging for students who struggle with decomposition, hierarchical inclusion, or numeration. When you ask students to identify the "double" in 4 + 5, some students are truly confused. They see two different numbers. They don't "see" the 4 within the 5. In fact, some children think 5 is a quantity within itself…. unique...when in fact, it is comprised of smaller quantities or numbers. Therefore, it is CRITICAL students have an opportunity to use **manipulatives and tools to SEE/EXPERIENCE** decomposition of one of the numbers to IDENTIFY the double.

Provide students with a ten frame and two sided colored counters. Have students practice putting on 5 red and 4 yellow counters. Have students discuss how the quantities are similar. What could be done to change one of the numbers/quantities to make doubles? Students should flip over 4 of the red counters to yellow showing 4 and 4 yellow counters (and 1 red counter). Have the ten frames in a plastic sleeves so the students can label with numbers. Keep practicing this with numbers 2-5. Once students are ready, move to 2 ten frames and practice with numbers 6 - 10. Be sure to have students use precise vocabulary, clearly identify the "hidden double", name the strategy they are practicing (Doubles +1),and explain how they know the sum.

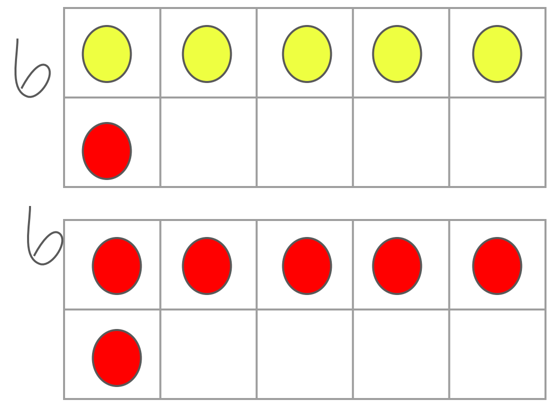
TOC

Teaching Strategy - Part 2 (subtraction):

Materials for Part 2: two-sided colored counters, ten frames (1 and 2), plastic sleeves, dry erase markers



Like Doubles +1, Doubles -1 can be tricky for some kids. With ten frames and two-sided colored counters, practice manipulating the smaller addend to become equal the larger addend. For example, 5 + 6. Have students put 5 yellow counters on a ten frame and 6 red ones on another. Have them talk about how the 5 could become a 6 to create a double.



"What needs to happen?"
Have students add one red counter to the 5 so they can see the change. "Did we create a double?" Ask them to double it.
"What needs to be done now and why?"
They need to subtract one because the original addends were not equal.

$6 + 6 = 12$

Students may need to cover the one they added to see the original problem.

$12 - 1 = 11$

Practice this several times having students choose two addends that are <u>near doubles</u>.

Teaching Strategy - Part 3 (addition/subtraction):

Materials for Part 3: Near-Doubles Fact Cards (one per student), document camera or chart paper

(Pass out the fact cards to your students and place the Doubles page under the document camera. You may want to have students work as partners.)

This is more abstract and challenging than Part 1 or Part 2.
"I have some problems I want you to examine." Put these problems under the document camera or on chart paper:

6 + 7 =	5 + 4 =	4 + 3 =	5 + 6 =	7 + 8 =
9	6	3	8	7
+8	+5	+4	+9	+6

As each problem is revealed or written on chart paper, have students discuss which double fact is close to the problem shown. *(Some may double the smaller number and add one while others may double the larger and subtract one.)* Discussion and explanation of how the double is "hidden" in each of these problems is an important component of truly understanding the Doubles +1 strategy.

"Look at the fact that has been passed out to you. Think about the doubles fact that helps you solve this problem. Be ready to explain your thinking."
(If students respond that they "just know it", have them approach the problem as though they don't know it or are explaining it to a younger student. If students are working with a partner, they will need to spend time discussing their thoughts. After students have had time to process their thoughts, have them share which double helps them solve their problem and how it helped.)

Doubles +1 (Near-Doubles) Fact Cards

9 + 8 = __	8 + 9 = __	8 + 7 = __	7 + 8 = __
__ = 6 + 7	__ = 7 + 6	__ = 5 + 6	__ = 6 + 5
4 + 5 = __	5 + 4 = __	3 + 4 = __	4 + 3 = __
__ = 2 + 3	__ = 3 + 2	__ = 9 + 10	__ =10 + 9
__ = 9 + 8	__ = 8 + 9	7 + 8 = __	8 + 7 = __

Doubles Addition Cards

1 + 1 = ___	2 + 2 = ___	3 + 3 = ___	4 + 4 = ___
___ = 5 + 5	___ = 6 + 6	___ = 7 + 7	___ = 8 + 8
___ = 9 + 9	10 + 10 = __	10 + 10 ______	9 + 9 ______
8 + 8 ______	7 + 7 ______	6 + 6 ______	5 + 5 ______
4 + 4 ______	3 + 3 ______	2 + 2 ______	1 + 1 ______

Strategy: Doubles +/ - 1	**Name of Activity: Decompose to Double** - **Adapted from Bay-Williams & SanGiovanni** **J2**
Description: Facts that have addends that are one away from each other.	**Materials:** part-part-whole models (both bigger one and page with smaller ones), manipulatives (ideally two-sided colored counters), near-doubles fact cards (in teaching section), plastic sleeves/dry erase markers/erasers

Opportunity to Practice Doubles +/ -1 Strategy/Directions:

****This activity should be practiced before some of the more abstract activities offered for Doubles +/-1.

Decide how the students will show their work:

A. Put the larger model in a plastic sleeve, students put manipulatives on the model and use a dry erase marker to show their work.

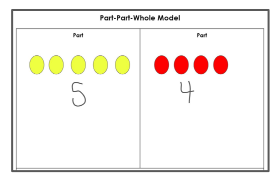
B. Put the manipulatives on the larger model, but then use the smaller ones to record their thinking.

***Either way, students should use manipulatives to demonstrate understanding.

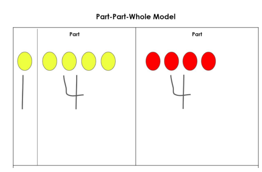
1. Students work in pairs.
2. Student A draws a near double equation card.

5 + 4 = __

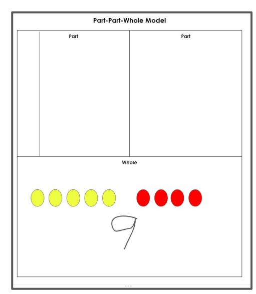
3. (Using the larger model in a plastic sleeve) Student A puts the number of manipulatives on the "parts" portion of the model and labels the boxes with numbers. The student says, "These 5 and 4 are the addends and they are the 'parts' in this problem."



4. Student A now explains to Student B how to find the double within the problem to help solve it. The student also draws a line and decomposes the larger addend to reveal the double.
For example, "I will move 1 from the 5 over and draw a line.
I decomposed the 5 into 1 and 4. Now I can use the Doubles +1 Strategy to solve this."



5. The student says "4 + 4 + 1 = 9." and pushes the total quantity/sum to the bottom portion (whole).



6. Since the model is in a plastic sleeve the student can also write the equations at the bottom: 5 + 4 = 9   1 + 4 + 4 = 9

5 + 4 = 9   1 + 4 + 4 = 9

Encourage students to challenge one another.

Is there another way to say or write this? How? Why does it work?

After placing the manipulatives on the larger model, instead of writing on the plastic sleeve, students could draw/write on the smaller models with pencils and/or colored pencils.

Reminder: This activity lends itself to opportunities for students to apply both the Commutative and Associative Properties. Be sure students apply precise language/vocabulary when sharing their ideas.

For example: If the student decomposed the 5 into 4 and 1 and wrote 4 + 1 + 4 then rewrote it (or said it) by grouping the 4s together (4 + 4 + 1), be sure to remind them to label their strategy as the Associative Property!

Part-Part-Whole Model

<table>
<tr><td>Part</td><td>Part</td></tr>
<tr><td colspan="2">Whole</td></tr>
</table>

Part-Part-Whole Models

Part	Part
Whole	

Part	Part
Whole	

Part	Part
Whole	

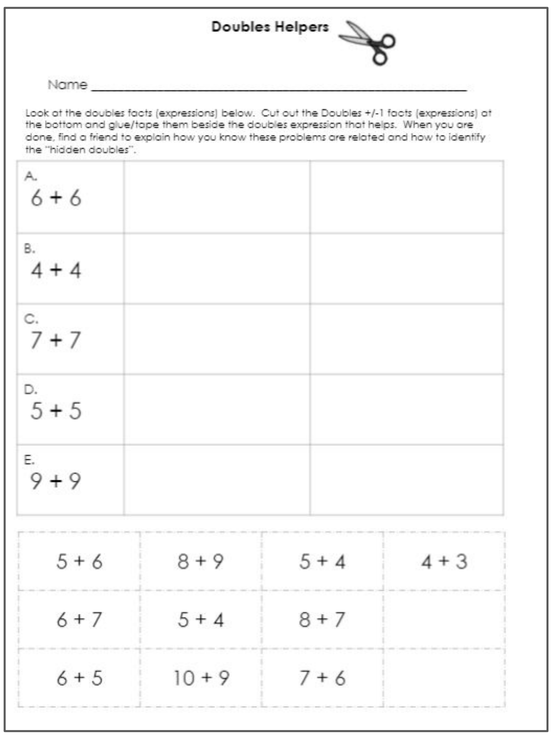
Part	Part
Whole	

Strategy: Doubles +/ - 1	**Name of Activity: Doubles Helpers** **J3**
Description: Facts that have addends that are one away from each other.	**Materials:** "Doubles Helpers" worksheet, scissors, glue/tape, pencil

Opportunity to Practice Doubles +/ -1 Strategy/Directions:

Students may work independently or in pairs.

1. Students will need scissors, pencil, tape/glue, and a copy of "Doubles Helpers" worksheet.
2. At the bottom of the worksheet, there are facts that need to be cut out.
3. Students decide which doubles fact could help solve each of the cut-out facts. Tape/glue the cut-out fact to the paper.
4. Students then explain to their partner how knowing the doubles facts helps to solve the other two problems.



Doubles Helpers

Name ______________________________

Look at the doubles facts (expressions) below. Cut out the Doubles +/-1 facts (expressions) at the bottom and glue/tape them beside the doubles expression that helps. When you are done, find a friend to explain how you know these problems are related and how to identify the "hidden doubles".

A. 6 + 6		
B. 4 + 4		
C. 7 + 7		
D. 5 + 5		
E. 9 + 9		

5 + 6	8 + 9	5 + 4	4 + 3
6 + 7	5 + 4	8 + 7	
6 + 5	10 + 9	7 + 6	

Doubles Helpers

Name ____

Look at the doubles facts (expressions) below. Cut out the Doubles +/-1 facts (expressions) at the bottom and glue/tape them beside the doubles expression that helps. When you are done, find a friend to explain how you know these problems are related and how to identify the "hidden doubles". You will have extra cards.

A. 6 + 6		
B. 4 + 4		
C. 7 + 7		
D. 5 + 5		
E. 9 + 9		

5 + 6	8 + 9	5 + 4	4 + 3
6 + 7	4 + 5	8 + 7	4 + 5
6 + 5	10 + 9	7 + 6	9 + 8

Strategy: Doubles +/ - 1	**Name of Activity: Double Down** **J4**
Description: Facts that have addends that are one away from each other.	**Materials:** 4 blank dice with 3 numbers written on it (see details below) or Double Down cards, recording sheet

Opportunity to Practice Doubles +/ -1 Strategy/Directions:

Students should work in pairs.

1. Create dice with 3 of the same numbers on them. For instance:
   3, 3, 4, 4, 5, 5
   5, 5, 6, 6, 7, 7
   7, 7, 8, 8, 9, 9

   You want sets of dice that have numbers that will likely roll a near-double.

2. Students pair up. Student A gets 2 dice that are the same (i.e. 2, 2, 3, 3, 4, 4) and Student B gets 2 dice that are <u>different</u> from Student A (i.e., 6, 6, 7, 7, 8, 8).

3. Student A rolls both of her dice. If she rolls a near double (i.e., 3 and 4), both partners say, "Double down!", record the equation, and solve. Partner A explains why the <u>Doubles +1/-1</u> works for that problem.

4. Now it is Partner B's turn. Since he has difference dice, the equations will be different. If he rolls a near-double, the partners again say, "Double down!", record the equation and solve. Partner B explains why the <u>Doubles +1/-1</u> is a <u>useful strategy</u>.

5. If either partner rolls and it is not a near-double (i.e. 2 and 4), that person just loses the turn.

**If access to blank dice is not an option, cards can be made. Just make two different stacks for each player.

Double Down Cards 2-5 - use if making dice is not an option

2	2	2	2
3	3	3	3
3	4	4	4
4	4	5	5
5	5	5	5

Double Down Cards 5-8 - use if making dice is not an option

5	5	5	5
<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>
<u>6</u>	7	7	7
7	8	8	8
8	8	8	8

Double Down Cards 7-10 - **use if making dice is not an option**

7	7	7	7
7	8	8	8
8	8	8	8
9	9	9	9
10	10	10	10

Double Down

Name ____

Each player needs their own sheet. Record all near-doubles (Doubles +1/-1) below. The person who rolls or flips over two numbers that are a near-double, explains how the Doubles +1/-1 strategy works for that problem.	
1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.
17.	18.
19.	20.

When you are done playing the game, choose one problem above. By drawing a model and labeling it with numbers and words, show how the Doubles +1/-1 strategy applies.

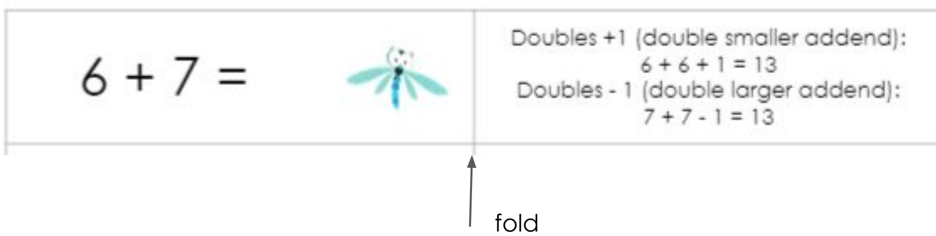
Strategy: Doubles +/ - 1	**Name of Activity: Hidden Doubles Fold It** **J5**
Description: Facts that have addends that are one away from each other.	**Materials:** hidden doubles fold it cards

Opportunity to Practice Doubles +/ -1 Strategy/Directions:

Students should work in pairs.

1. The Hidden Doubles Fold It cards need to be cut out and folded in half.

cut

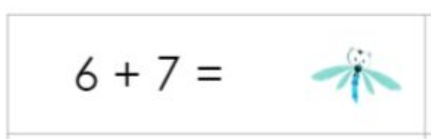


cut

fold

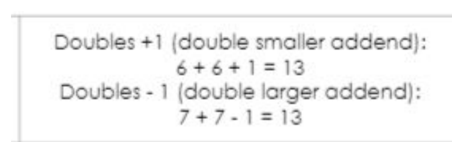
2. Students work in pairs.

3. Partner A shows Partner B the near-double equation (card folded back so Partner A can see the answers).



Partner A side

Partner B side



4. Partner B says,
"I can use the <u>Doubles +1</u> and the <u>Doubles -1</u> to solve this.
For Doubles +1, I double the <u>smaller addend</u> 6 to get 12 then <u>add</u> on 1 more for 13.
For Doubles -1, I double the <u>larger addend</u> 7 to get 14 then <u>subtract</u> 1 for 13."

5. Students switch roles.

Hidden Doubles Fold It

6 + 7 =		Doubles +1 (double smaller addend): 6 + 6 + 1 = 13 Doubles - 1 (double larger addend): 7 + 7 - 1 = 13
7 + 8 =		Doubles +1 (double smaller addend): 7 + 7 + 1 = 15 Doubles - 1 (double larger addend): 8 + 8 - 1 = 15
8 + 9 =		Doubles +1 (double smaller addend): 8 + 8 + 1 = 17 Doubles - 1 (double larger addend): 9 + 9 - 1 = 17
10 + 9 =		Doubles +1 (double smaller addend): 9 + 9 + 1 = 18 Doubles - 1 (double larger addend): 10 + 10 - 1 = 18
6 + 5 =		Doubles +1 (double smaller addend): 5 + 5 + 1 = 11 Doubles - 1 (double larger addend): 6 + 6 - 1 = 11
5 + 4 =		Doubles +1 (double smaller addend): 4 + 4 + 1 = 9 Doubles - 1 (double larger addend): 5 + 5 - 1 = 9
4 + 3 =		Doubles +1 (double smaller addend): 3 + 3 + 1 = 7 Doubles - 1 (double larger addend): 4 + 4 - 1 = 7
7 + 6 =		Doubles +1 (double smaller addend): 6 + 6 + 1 = 13 Doubles - 1 (double larger addend): 7 + 7 - 1 = 13
9 + 8 =		Doubles +1 (double smaller addend): 8 + 8 + 1 = 17 Doubles - 1 (double larger addend): 9 + 9 - 1 = 17

Strategy: Doubles +/ - 1	**Name of Activity: If…Then… Near Doubles** **J6**
Description: Facts that have addends that are one away from each other.	**Materials:** if…then…cards (copy in colored ink), generic game board, 1 die per pair of students

Opportunity to Practice Doubles +/ -1 Strategy/Directions:

The cards should be printed in colored ink so students can see the difference in the model.

1. Students work in pairs.
2. Student A draws a card, reads the statement aloud and fills in the answer. If Student A is correct, s/he rolls the die and moves forward that many spaces. If the student is incorrect, Student B can coach.
3. The students continue taking turns.

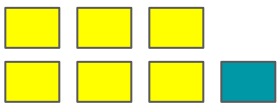
Adaptations: There are different sets of cards - some have visual models and others do not.

Students could also use these as a quick warm-up during the fluency part of core math by pairing up and using these without a game board.

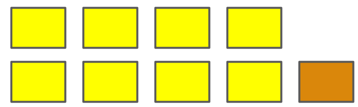
Another option would be to use these for Quiz-Quiz-Trade.

If… Then...Near Doubles (Doubles +1)

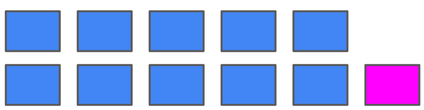
If I know
3 + 3 = ____,
then I know
3 + 4 = ____.



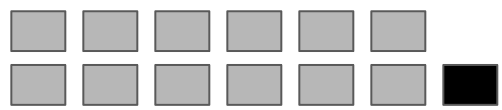
If I know
4 + 4 = ____,
then I know
4 + 5 = ____.



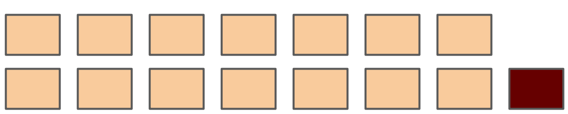
If I know
5 + 5 = ____,
then I know
5 + 6 = ____.



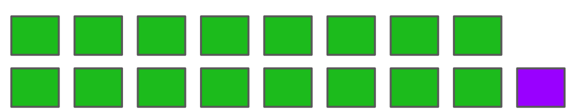
If I know
6 + 6 = ____,
then I know
6 + 7 = ____.



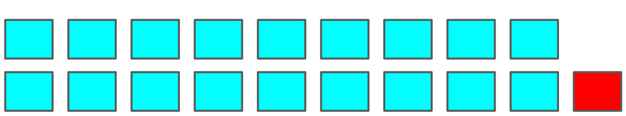
If I know
7 + 7 = ____,
then I know
7 + 8 = ____.



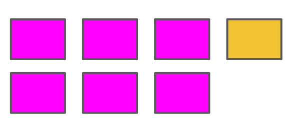
If I know
8 + 8 = ____,
then I know
8 + 9 = ____.



If I know
9 + 9 = ____,
then I know
9 + 10 = ____.

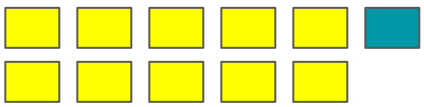


If I know
3 + 3 = ____,
then I know
4 + 3 = ____.

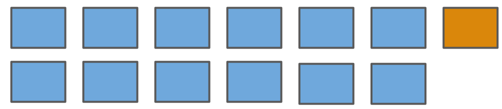


If… Then…Near Doubles (Doubles +1)

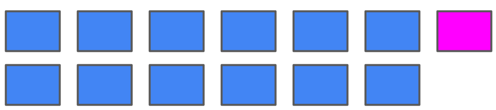
If I know
4 + 4 = ____,
then I know
5 + 4 = ____.



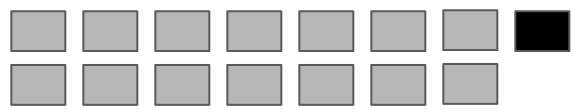
If I know
5 + 5 = ____,
then I know
6 + 5 = ____.



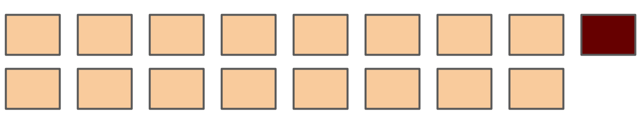
If I know
6 + 6 = ____,
then I know
7 + 6 = ____.



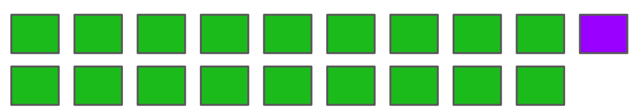
If I know
7 + 7 = ____,
then I know
8 + 7 = ____.



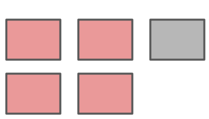
If I know
8 + 8 = ____,
then I know
9 + 8 = ____.



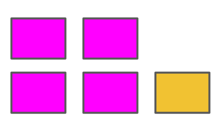
If I know
9 + 9 = ____,
then I know
10 + 9 = ____.



If I know
2 + 2 = ____,
then I know
3 + 2 = ____.



If I know
2 + 2 = ____,
then I know
2 + 3 = ____.



If… Then...Near Doubles (Doubles +1)

If I know 3 + 3 = _____, then I know 3 + 4 = _____.	If I know 4 + 4 = _____, then I know 4 + 5 = _____.
If I know 5 + 5 = _____, then I know 5 + 6 = _____.	If I know 6 + 6 = _____, then I know 6 + 7 = _____.
If I know 7 + 7 = _____, then I know 7 + 8 = _____.	If I know 8 + 8 = _____, then I know 8 + 9 = _____.
If I know 9 + 9 = _____, then I know 9 + 10 = _____.	If I know 3 + 3 = _____, then I know 4 + 3 = _____.

If… Then...Near Doubles (Doubles +1)

If I know 4 + 4 = _____, then I know 5 + 4 = _____.	If I know 5 + 5 = _____, then I know 6 + 5 = _____.
If I know 6 + 6 = _____, then I know 7 + 6 = _____.	If I know 7 + 7 = _____, then I know 8 + 7 = _____.
If I know 8 + 8 = _____, then I know 9 + 8 = _____.	If I know 9 + 9 = _____, then I know 10 + 9 = _____.
If I know 2 + 2 = _____, then I know 3 + 2 = _____.	If I know 2 + 2 = _____, then I know 2 + 3 = _____.

****ONLY USE when students are ready for "know from memory" or are using the PPPs for this strategy****

Strategy: Doubles + / -1	**Name of Activity: Random Numbers Doubles +1** **J7**
Description: Facts that have addends that are one away from each other.	**Materials:** random numbers CD or internet site with numbers being called, recording sheet

Opportunity to Practice Doubles +/-1 Strategies/Directions:

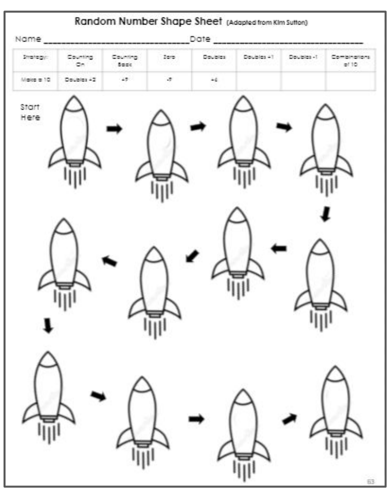
If possible, use the Random Number CD or digital download by Kim Sutton.

The Random Number CD is a valuable tool for motivating students to practice. The CD is designed to generate the digits 0 - 9 with background music. This helps students learn to filter out unnecessary sounds and listen for important information. Students also can't ask the CD to repeat itself! Students find this form of practice fun. There are several tracks to choose from, as well as a variety of rates.

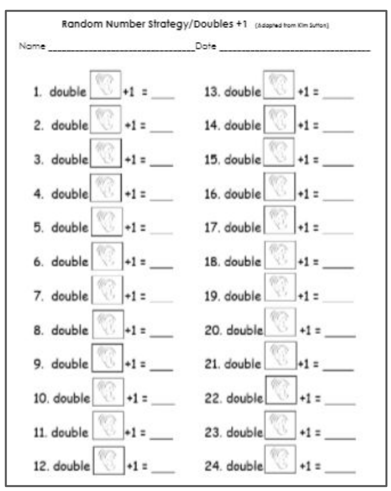
The random number CD can be used with any drill command using the four operations. When a number is called out, the student would perform that drill command *(double the number heard and add 1)* and record the sum. This would continue down the columns.

There may be other online number generators if you have not purchased the CD or the digital download. You could also use a spinner or 10-sided die.

Teachers can use the Random Number Recording Sheet or Random Number Strategy/Drill Command Sheet. See the back of the book for the Random Number Recording Sheets.



Student doubles the number they hear, adds 1 more and writes the sum in the shapes on the page.



Student listens for the number called on the CD, follows the command, then writes the sum.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:

- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

TOC

Random Number Strategy/Doubles +1 (Adapted from Kim Sutton)

Name ______________________________ Date ______________________________

1. double ☐ +1 = ____
2. double ☐ +1 = ____
3. double ☐ +1 = ____
4. double ☐ +1 = ____
5. double ☐ +1 = ____
6. double ☐ +1 = ____
7. double ☐ +1 = ____
8. double ☐ +1 = ____
9. double ☐ +1 = ____
10. double ☐ +1 = ____
11. double ☐ +1 = ____
12. double ☐ +1 = ____
13. double ☐ +1 = ____
14. double ☐ +1 = ____
15. double ☐ +1 = ____
16. double ☐ +1 = ____
17. double ☐ +1 = ____
18. double ☐ +1 = ____
19. double ☐ +1 = ____
20. double ☐ +1 = ____
21. double ☐ +1 = ____
22. double ☐ +1 = ____
23. double ☐ +1 = ____
24. double ☐ +1 = ____

****ONLY USE when students are ready for “know from memory” or are using the PPPs for this strategy****

Strategy: Doubles + / -1	**Name of Activity: Random Numbers Near Doubles** **J8**
Description: Facts that have addends that are one away from each other.	**Materials:** random numbers CD or internet site with numbers being called, recording sheet

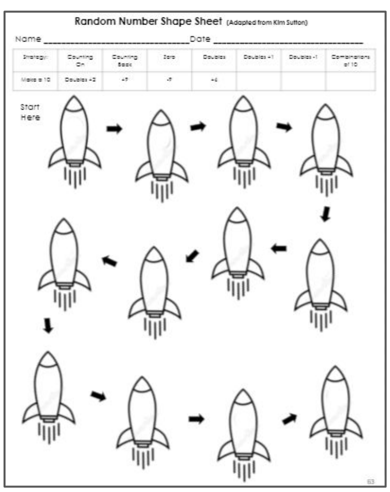
Opportunity to Practice Doubles +/-1 Strategies/Directions:

If possible, use the Random Number CD or digital download by Kim Sutton.

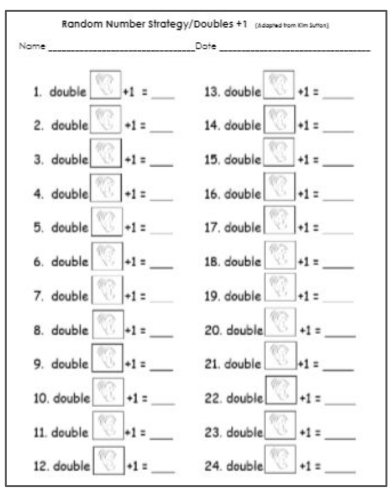
When the Random Number CD calls out a number, the teacher then calls out the second addend that is a near double (1 more or 1 less than the first number called).
For example: the CD calls a 6 the teacher would call out a 5 or 7.

The students then mentally apply the Doubles +1 or -1 strategy and writes the sum.

See the back of the book for the Random Number Recording Sheets.



Student doubles the number they hear, adds 1 more and writes the sum in the shapes on the page.



Student listens for the number called on the CD, follows the command, then writes the sum.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:
- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

TOC

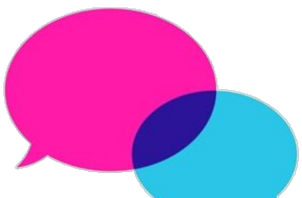
Random Number Strategy/Near Doubles **(Adapted from Kim Sutton)**

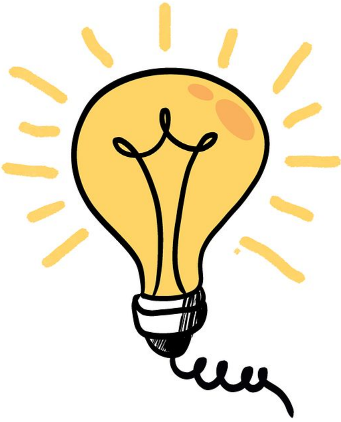
Name ______________________________ Date ______________________________

1.				16.			
2.				17.			
3.				18.			
4.				19.			
5.				20.			
6.				21.			
7.				22.			
8.				23.			
9.				24.			
10.				25.			
11.				26.			
12.				27.			
13.				28.			
14.				29.			
15.				30.			

Strategy
Focus Review

Counting On/Back
Zero
Doubles
Doubles +1/-1





TOC

Strategy Focus Review - Counting On/Back/Zero/Doubles/Double +1/-1

Students need to practice the strategies that have been taught and defend which facts are best solved with particular strategies.

Materials:

1 Spinner per two students (use paperclip/pencil to create a spinner or buy spinners and add)

Fact Cards that align to this strategy (cut out)

1 Fact Cards sheet per student that aligns to this strategy (NOT cut out)

1 Strategy Sorting Mat that aligns to this strategy

Abbreviations to Play:

Counting On = CO	Counting Back = CB	Zero = Z+	Zero = Z-
Doubles = D	Doubles +1/-1 or Near Doubles = D+1 or D-1		

To Model How to Play:

Option 1: Part A: Ask a student to join you to model this process. You will need the spinner and the Fact Cards sheet (NOT cut out, 1 per person), and pencils. Put the spinner under a document camera. Spin it. As a class, read the strategy (i.e., Doubles +1/-1). Identify 1 problem that you could apply this strategy and write "D+1 or D-1" in tiny print next to those problems (i.e., 6 + 7 = __, 7 + 8 = ___, etc.) Read the equation (including the sum/difference). Continually explain WHY this strategy is a successful one. Now the student spins, names the strategy, reads the equation, and writes the abbreviation on his/her sheet - again explaining WHY that strategy works. Agree? Disagree? Encourage discourse. Model another round.

****Once students learn more strategies, multiple strategies can be applied to problems (i.e., 7 + 8 = ___ Make a 10 or Doubles +/-1). Students are encouraged to agree/disagree and explain why.*

Part B: After a few turns, you and the student solve the labeled problems. When the problems have been solved, students can choose a few and explain which strategy they applied. Multiple opportunities to make connections between the strategies and the problems themselves will lead to students being able to move this learning to memory (automaticity).

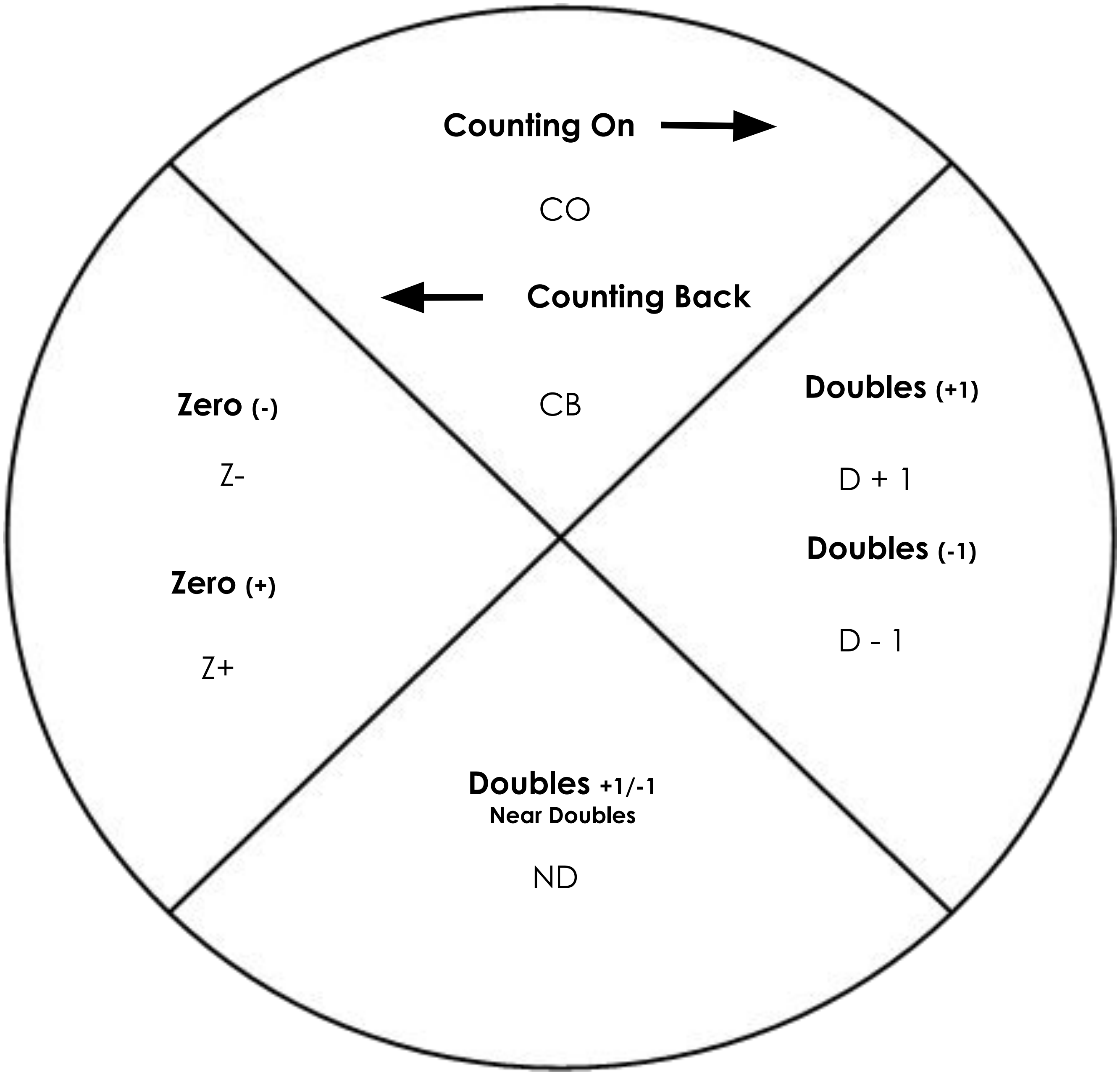
Option 2: Ask a student to join you to model this process. You will need the Fact Cards (cut out) and a copy of the sorting mat. Put the spinner under the document camera. Spin it. As a class, read the strategy (i.e., Doubles +1/-1). Each person picks one card that represents this strategy, reads the equation to their partner and places it on the sorting mat. (i.e., "4 + 5 = 9. I will place it in the Doubles +1/-1 space because I decomposed the 5 into 4 and 1. Then I added the double 4 + 4 which is 8 then added 1 more." Be sure to acknowledge when students apply the properties. Ask students to identify all strategies applied to make further connections! Layer in that vocabulary so students comprehend there is a classroom expectation of being precise.

Continue to sort the cards. Students could also move cards to another part of the sort if they can defend why that strategy would also work (FLEXIBLE THINKING...part to the definition of 'fluency'! :o)

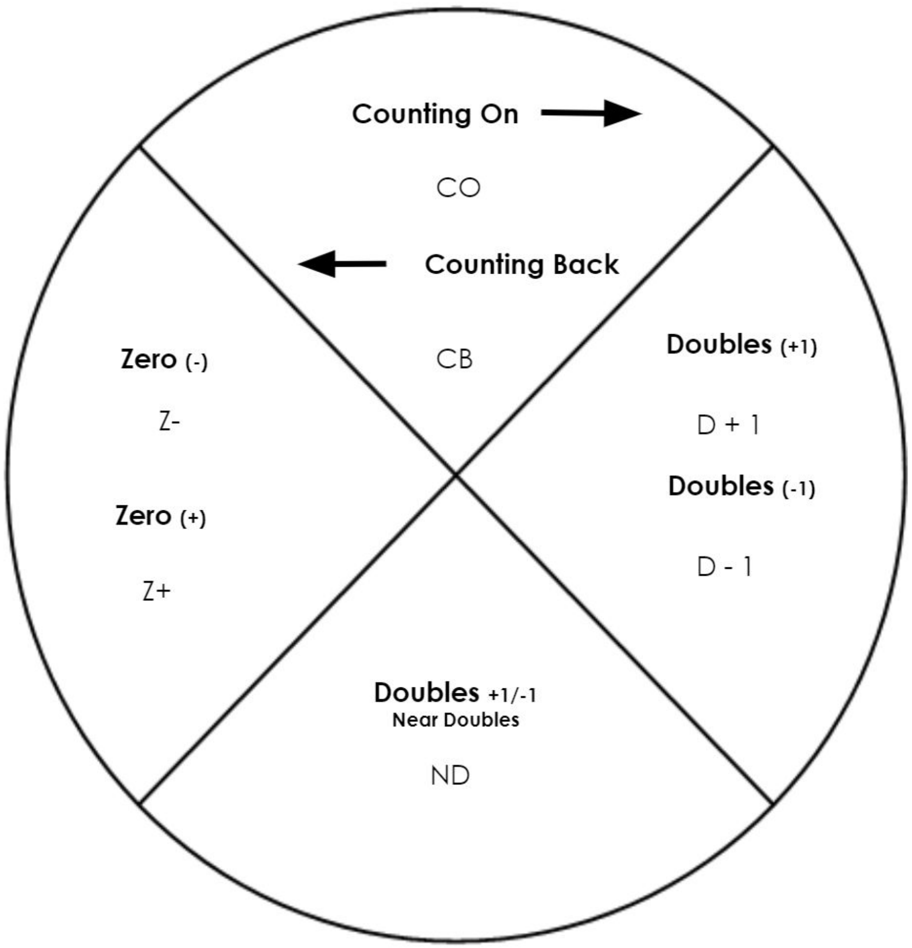
**For kindergarten and first grade, one option is to limit the equation cards to align with the required computational fluency or create your own computational cards for the sort.

TOC

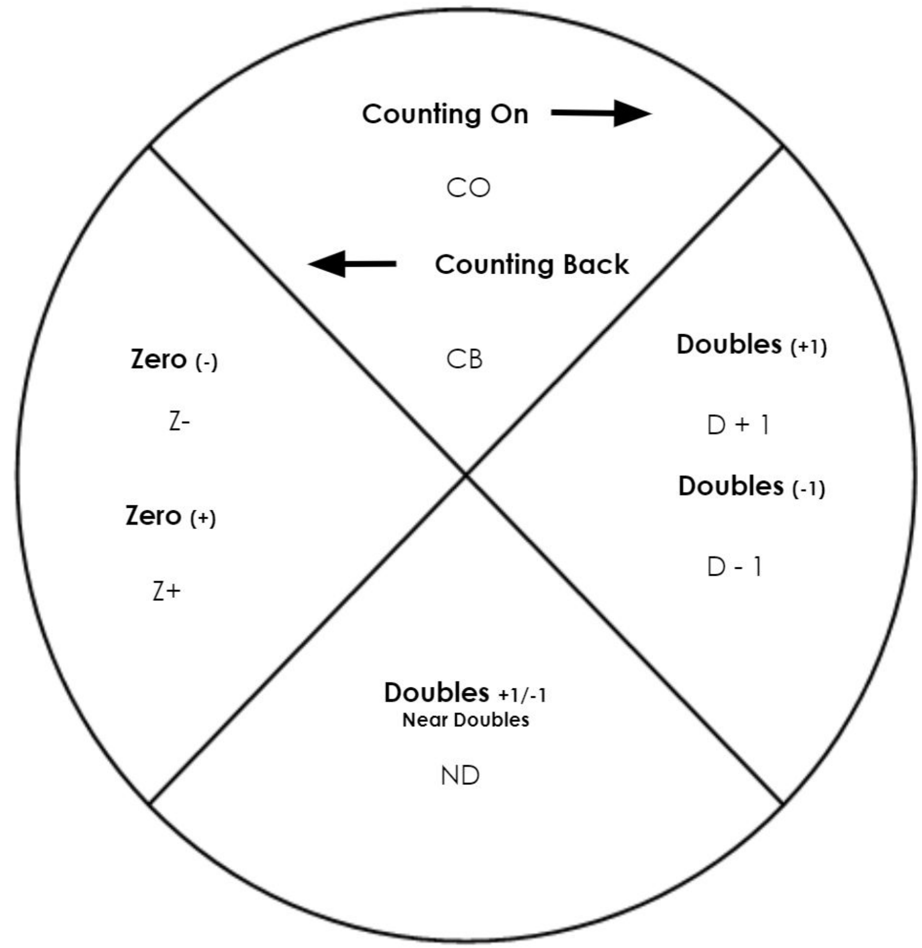
Strategy Focus Review - Counting On or Back/Zero/Doubles/Doubles +1/-1



Strategy Focus Review - Counting On or Back/Zero/Doubles/Doubles +1/-1



Strategy Focus Review - Counting On or Back/Zero/Doubles/Doubles +1/-1



Strategy Focus Review Sorting Mat - Counting On or Back/Zero/Doubles/Doubles +1/-1

Zero (+ /-)	**Counting On or Counting Back**
Doubles	**Doubles +1/-1 or Near Doubles**

Strategy Focus Review Sorting Mat - Counting On/Back/Zero/Doubles/Doubles +1/-1

Zero (+/-)	**Counting On or Counting Back** → ←
Doubles	**Doubles +1/-1 or Near Doubles**

Write at least 3 problems in each box above that aligns to that strategy.

Choose 1 of the strategy boxes above and explain how it works below (pictures/models/words).

Fact Cards - **Counting On or Back, Zero, Doubles, Doubles +1/-1 - <u>Fluency Through 10</u>**

3 + 3 = ___	4 + 5 = ___	10 - 2 = ___	1 + 9 = ___
___ = 5 - 0	___ = 10 - 5	___ = 6 - 1	___ = 4 + 4
8 - 2 = ___	0 - 0 = ___	2 + 3 = ___	5 + 4 = ___
___ = 9 - 1	___ = 7 + 2	___ = 9 - 5	___ = 5 - 2

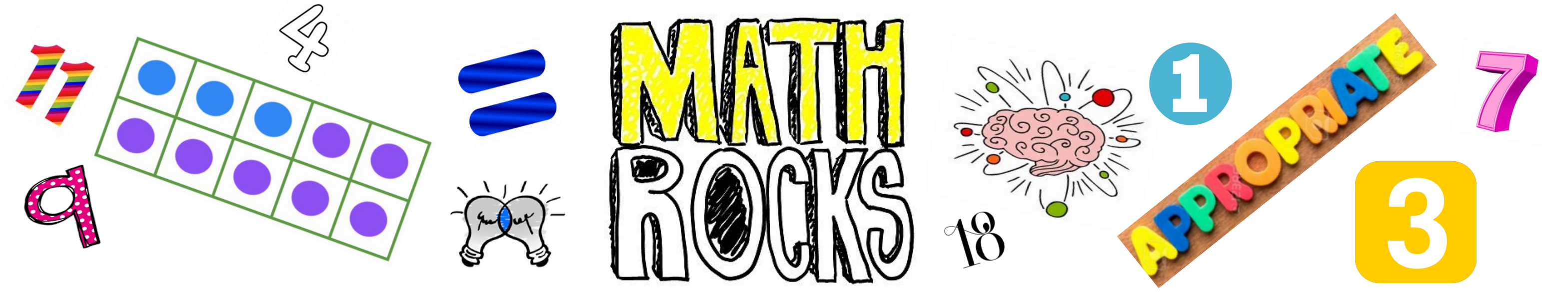
10 - 5 ___	7 + 2 ___	5 - 0 ___	3 + 3 ___	4 + 3 ___	3 - 0 ___	2 + 2 ___
5 - 1 ___	3 + 4 ___	9 - 4 ___	0 + 4 ___	2 + 3 ___	7 - 1 ___	1 + 1 ___

Fact Cards - **Counting On or Back, Zero, Doubles, Doubles +1/-1 -** **Fluency Through 20**

6 + 6 = ___	4 + 5 = ___	10 - 2 = ___	1 + 9 = ___
___ = 5 - 0	___ = 10 - 5	___ = 6 - 1	___ = 4 + 4
8 - 2 = ___	0 - 0 = ___	2 + 3 = ___	6 + 7 = ___
___ = 11 - 6	___ = 7 + 7	___ = 9 - 5	___ = 5 - 2

16 - 8 ____	7 + 2 ____	20 - 10 ____	3 + 3 ____	7 + 8 ____	3 - 0 ____	8 + 8 ____
5 - 1 ____	3 + 4 ____	9 - 4 ____	2 + 9 ____	9 + 8 ____	14 - 7 ____	9 + 9 ____

Combinations of 10



TOC

Strategy: Combinations of 10	**Application and Teaching the Strategy**
Description: Facts that have sums of ten.	**Materials:** document camera, some manipulatives, dry erase marker/eraser, chart paper, markers, ten-frame flash cards, blank ten-frame, whiteboard, counters

The ten-frame model is valuable in seeing essential number relationships. The ten-frame is one model that assists children in learning combinations that make 10.

Application:

Materials for Application: paper, whiteboard, document camera, blank Ten Frames, counters

Application:
"We are going to use problems to help us understand the Combinations of Ten strategy. Let's talk about the following problems together."

"Linda is supposed to have 10 crayons. She has 7 in her box. How many more does she need to have all of her crayons?" *(Have students discuss the Combinations of Ten strategy. Show a blank ten frame and use counters to show how this tool can be used to solve the problem. Pass these tools out for the students to use.)*

"Celia has 3 of her crayons. How many does she need to make 10?" *(Have students discuss the strategy they would use to solve the problem. Encourage them to use the ten-frame and counters to model their solution. Some may also make connections from this problem to the previous problem as they are related facts.)*

"David has 4 crayons in his desk and 6 crayons on the floor. How many crayons does he have?" *(Have students discuss the problem and model it.)*
Students may need more work with the Ten Frame if this is not a tool that is familiar to them. Give more situations and have them use the tools to find the combinations. Eventually, students should start to see a pattern, and you should encourage them to discuss this and have students write down all combinations of ten.

Teaching Strategy - Part 1:

Materials for Part 1: Ten Frame flash cards (use the set from the Counting On or Back strategy)

"We are going to continue working with our Combinations of Ten strategy by using Ten Frame flashcards. To start, let's warm up with saying how many dots you see on each card." *(Flash each card, in random order, and have students state the number of dots that they see. Stop periodically and have students explain how they know they have the correct answer.)*

"Now let's go through the cards again, but this time you will tell me how many spaces you see on each card. *(Flash each card and have students state the number of spaces they see. Stop periodically and have students explain how they know they have the correct answer.)*

"Now let's go through the cards again, and this time you will tell me a Combination of Ten strategy fact. For example, if I show you are card with 7 dots, you will say, 'Seven and three is ten.'" *(These cards and this flash-a-frame activity can be used again as a whole group warm-up, in small groups, or for independent practice.*

Teaching Strategy - Part 2:

Materials: dry erase boards/markers/erasers

This activity is adapted from O'Connell/SanGiovanni, 2001.

Lining Up for Lunch: Students sit on the carpet with their dry erase board/marker/eraser. Teacher asks them to draw a number bond or tape diagram (part-part-whole).

Teacher explains, "Today we are going to pretend we are lining up for lunch. In a moment, I will ask you to close your eyes. I will walk around and tap some of you on the top of your head. If I tap you, you will stand up and pretend you are lining up for lunch. We'll have the girls go to the front and the boys line up behind the girls. Be super-duper quiet!"

Students close their eyes and the teacher chooses 6 girls and 4 boys. The students quietly line up.

"Okay, the rest of you open your eyes. On your number bond, write the number of girls in the left hand circle and the number of boys in the right hand circle." (Students count and write the numbers). Write the total number of children in the top circle. Turn to your partner. Talk about your number bonds." (Student do a quick turn and talk.)

"Let's do this a couple more times." (Teacher chooses 2/8, 1/9, 5/5, etc.)

For one of the line ups, don't have the students sit back down, just change the order of the students (boys in front and girls in the back - modeling the Commutative Property). Ask the students to talk about how their number bonds changed and how they stayed the same.

Another option could be to let the boys and girls to line up in any order (b, b, g, g, g, b, g, etc.) Ask the students if this impacts the sum and why or whynot?

Strategy: Combinations of 10	**Name of Activity: Catch a Ten** **L2**
Description: Facts that have sums of ten.	**Materials:** decks of cards (face cards removed, aces used as ones) -- 1 per student pair/group

Opportunity to Practice Combinations of Ten Strategy/Directions:

Two or more players may play this game.

1. The player with the most buttons or the most pockets gets to shuffle the deck of cards first and be the dealer.
2. The dealer deals out the cards (with face cards removed) to every player until all of the cards have been dealt.
3. Every player places their cards face down in front of them.
4. When the dealer says "Go" every player turns the top card over so that all players can see them. All players look at the cards and try to see if they can make a sum of 10 with two or more of the cards shown.
5. When a player sees a sum of 10, they must "catch" the cards by slapping them with their hands and saying the addition sentence. (Example – a player sees a 6 and a 4, so the cards are slapped to "catch" them and the number sentence is said – "6 plus 4 equals 10")
6. If everyone agrees that this number sentence is correct, the player takes the cards and puts in a pile that is separate from their original deck. These "caught" cards will be points.
7. If players do not see a 10, the dealer will say "Go" and the next card in each stack will be turned over and placed on <u>top of the other card</u> that is already on the table. If a 10 can be made this time, the quickest student (catcher) slaps the addends, states the equation, and only takes off the top layer (or top two cards) that makes a ten. Because cards were already on the table, there are new addends showing and ANOTHER sum of ten MIGHT be available. If a sum of 10 can be made, the quickest person then slaps again, states the equations and takes those cards.
8. Play continues in this way until all cards have been turned over and the winner is the one with the largest number of "caught" cards.

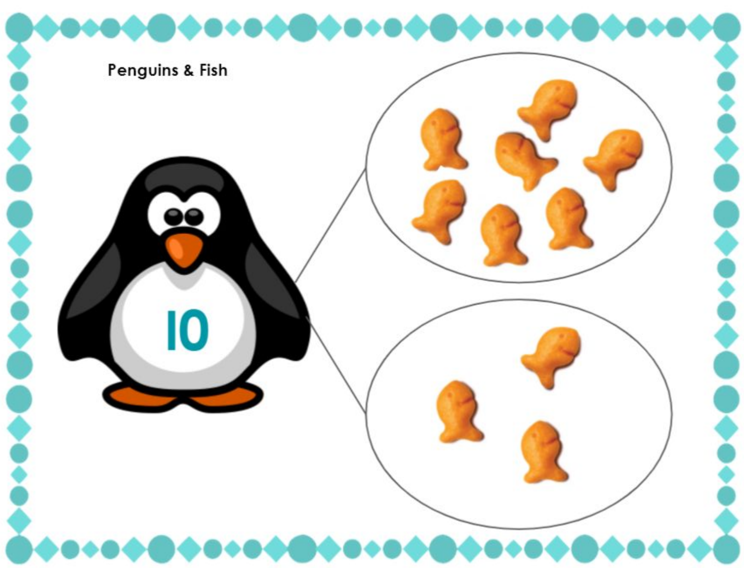
Adaptation: Students can use the same deck of cards (face cards removed) and lay them out face up in four rows with four or five cards in each row -- all remaining cards are left in a pile. Player 1 looks at the cards showing and finds two that make a total of 10. They will state the Combination of Ten fact (ex. "Six and four makes ten"), pick up those two cards, and place the cards in front of them. They then take two cards from the remaining deck and lay them face up in the empty spots on the board. Remaining players continue in the same way until there are no remaining combinations of ten left (if using a deck of cards, only the ten cards should be left at the end of the game.)

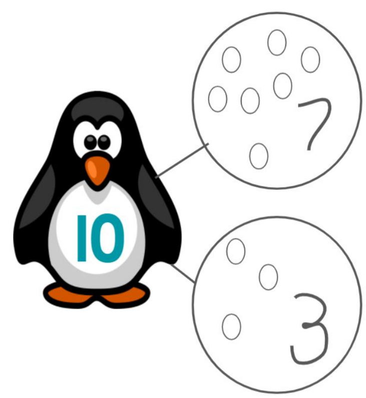
TOC

Strategy: Combinations of 10	**Name of Activity: Penguins & Fish** **L3**
Description: Facts that have sums of ten.	**Materials:** penguins & fish boards, (edible) goldfish crackers or paper fish manipulatives, plastic sleeves for boards, penguin & fish sheet

Opportunity to Practice Combinations of 10 (Addition) Strategy/Directions:

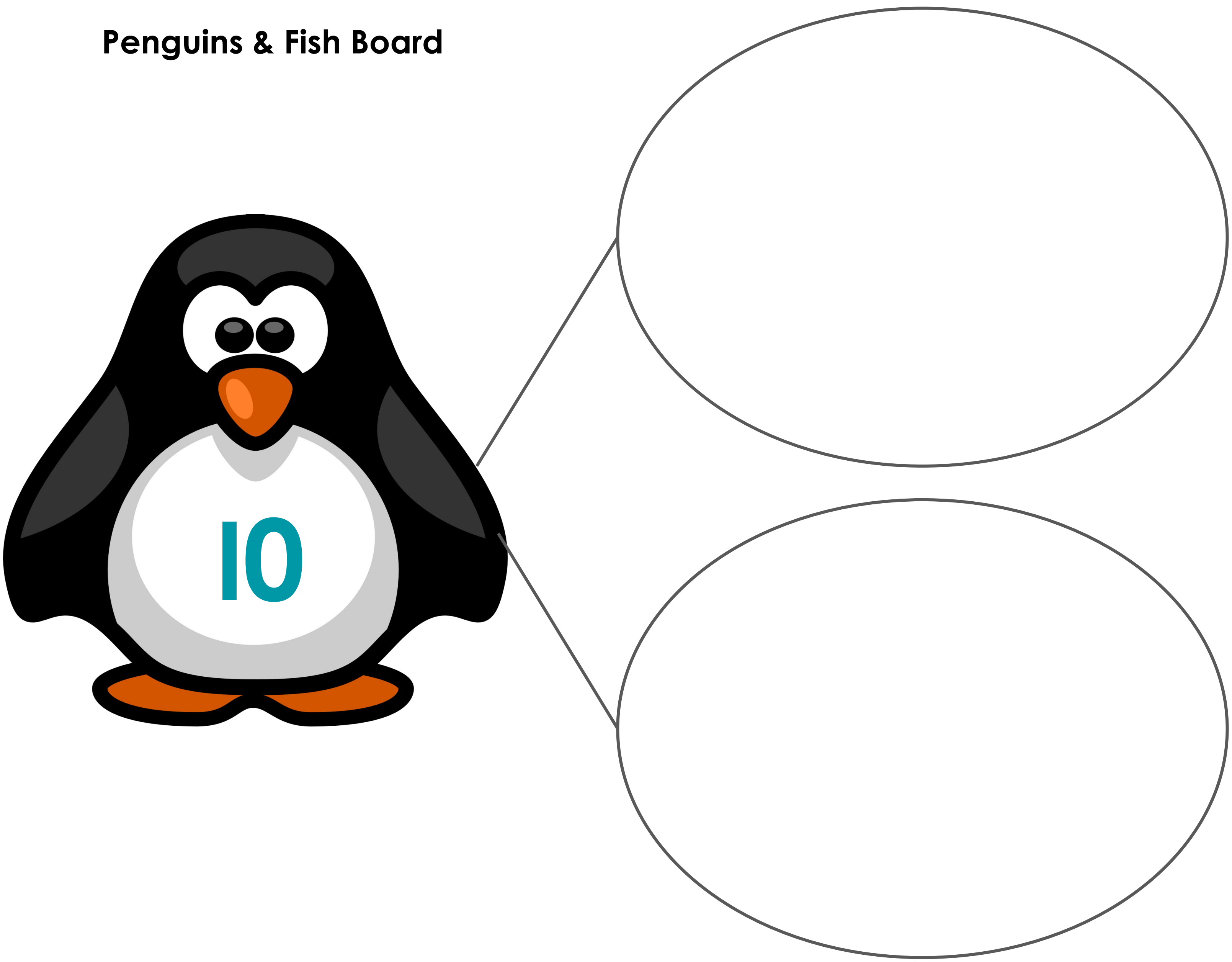
1. Students work in pairs.
2. Students each get 10 goldfish crackers. Each student decides how s/he wishes to decompose the 10 goldfish.
3. Partner A says to Partner B: "I <u>decomposed</u> 10. 7 and 3 are the <u>Combination</u> that make <u>10</u>.'
4. Student A draws and <u>labels</u> his decomposition on the sheet.
5. Students take turns <u>modeling</u> and <u>explaining</u> this process.





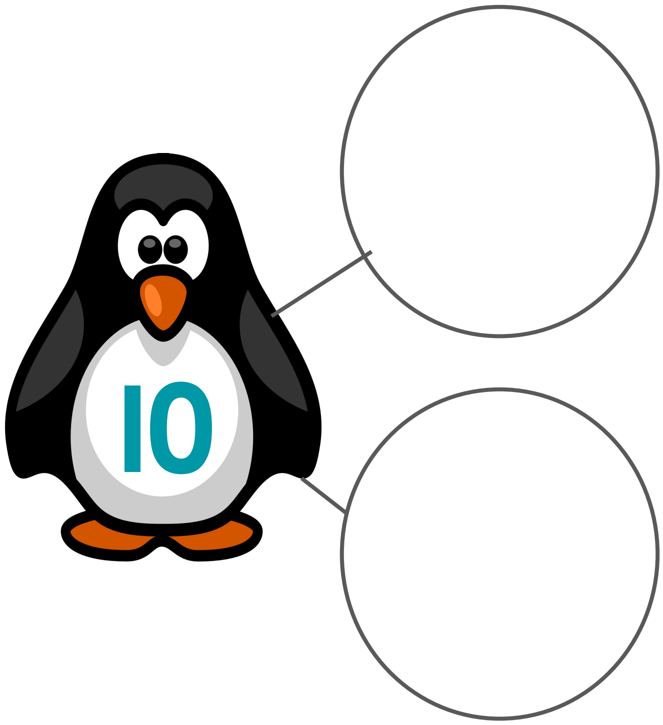
Adaptations: For students who are ready for <u>equation</u> work, they fill out the <u>Combinations of 10</u> Equation Sheet. Students should have several opportunities to <u>decompose</u>/label first.

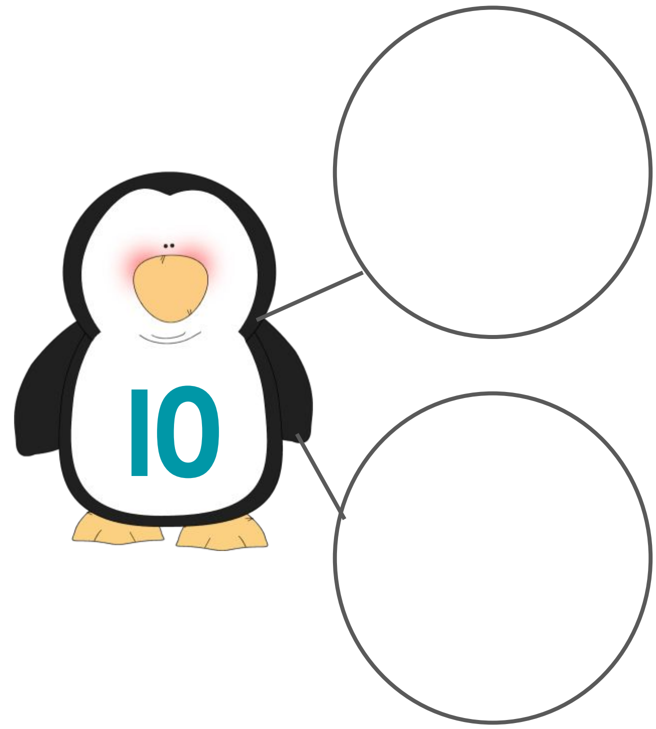
Penguins & Fish Board

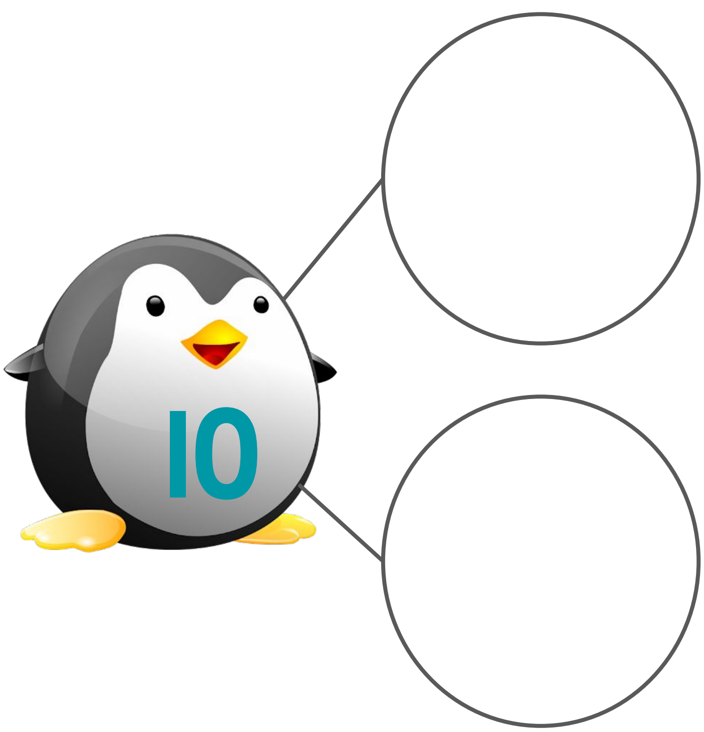


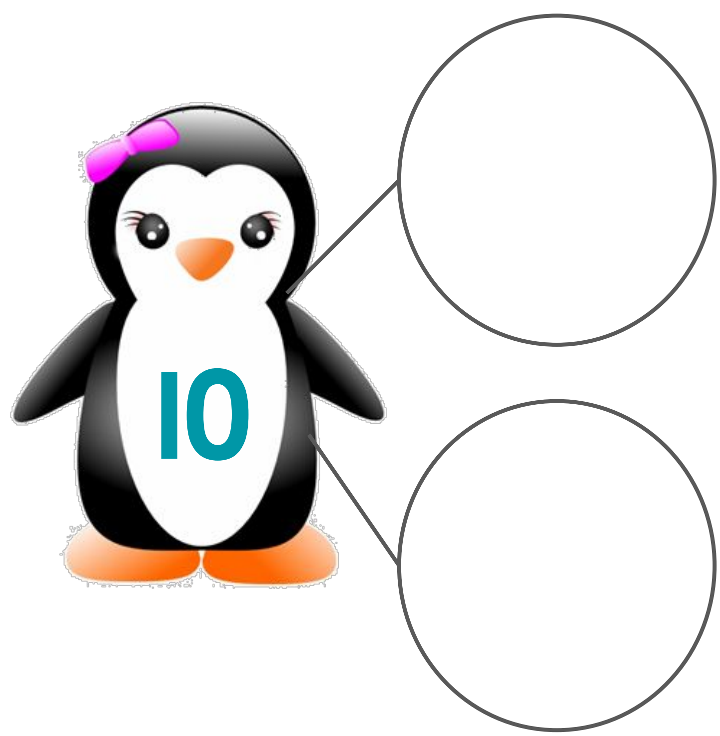
Penguins & Fish

Name ____

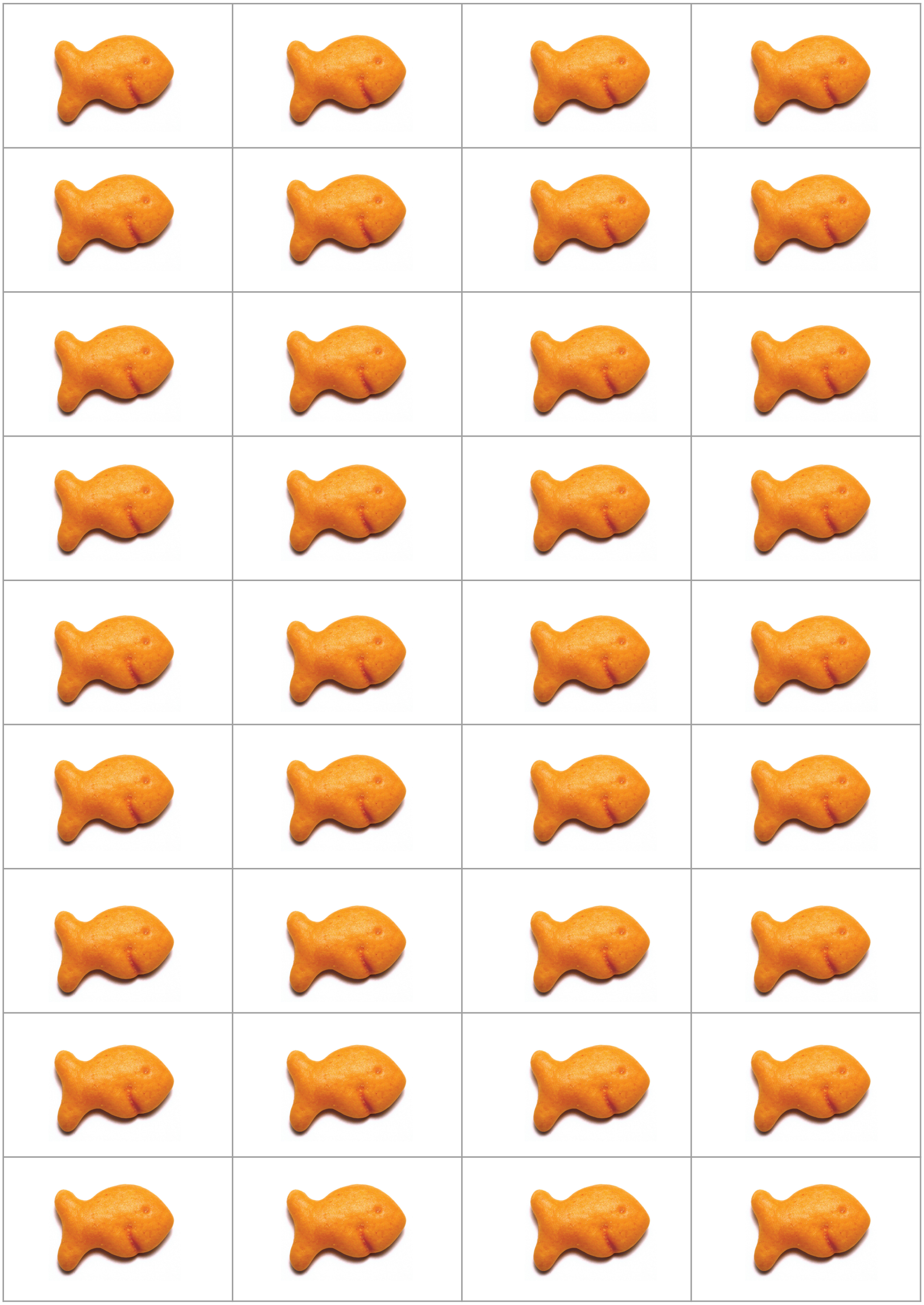








Penguins & Fish



Strategy: Combinations of 10	**Name of Activity: Tens Go Fish** **L4**
Description: Facts that have sums of ten.	**Materials:** decks of cards (face cards removed, aces used as ones) -- 1 per student pair/group, combinations of 10 equations sheet

Opportunity to Practice Combinations of Ten (Addition) Strategy/Directions:

The object of the game is to get two cards that total 10.

1. Each player is dealt five cards. The rest of the cards are placed face down in the center of the table.

2. If a student has any pairs of cards that total 10, they put them down and replace those cards with cards from the deck.

3. Students take turns. On a turn, a student ask one other player for a card that will go with a card in your hand to make 10. (i.e., Student A is holding a 4 and she asks Student B for a 6.)

4. If the student gets a card that makes 10, the student puts the cards down. The student says, "I have a Combination of 10. 4 + 6 = 10!!" Then s/he take one card from the deck. The next student takes a turn.

   If a student does not get a card that makes 10, the student draws a card from the deck. That student's turn is over.
   If the student draws a missing addend from the deck (i.e., student has a 7 and draws a 3), the student puts the pair down and takes another card. The next student takes a turn.

5. If the student is left with no cards but there are still cards in the deck, the student draws two cards.

6. The game is over when there are no more cards.

7. At the end of the game, use the Combinations of 10 Equations sheet to record the equations.

Strategy: Combinations of 10	**Name of Activity: Sleeping Bears -** **Adapted from Bay-Williams & Kling** **L5**
Description: Facts that have sums of ten.	**Materials:** plastic bears (or any small manipulative), bowl (or anything to cover the manipulatives), ten frames, combinations of 10 equations sheet (optional)

Opportunity to Practice Combinations of 10 (Missing Addend) Strategy/Directions:

Students should work in pairs.

1. Students work in pairs.

2. Student A puts 10 bears on the desk. The students discuss that there will always be 10 bears in all for each turn.

3. Student B covers his/her eyes or turns around. Student A puts some of the bears in the den (under the bowl).

4. Student A asks Student B to open his/her eyes. "Some of the bears are awake (pointing to the bears on the desk) Some of the bears are sleeping in their den (pointing to the bowl). How many are sleeping?"

5. Student B does a "think aloud" explaining how s/he knows how many bears are in the den.
**If students need support, provide them with a ten frame.
****Student B could put the "awake bears" on the ten frame to help determine how many bears are in the den.

Adaptations: Students write their equations on the Combinations of 10 Equations Sheet.

Combinations of 10 Equations

Name ______________________________Date ______________________________

A. 6 + 4 = 10 10 - 6 = 4	B.
C.	D.

TOC

Combinations of 10 Equations

Name ________________________________Date ________________________________

A.	B.
C.	D.
E.	F.
G.	H.
I.	J.
K.	L.
M.	N.
O.	P.

Choose two equations above that are similar. Explain how they are alike. (Think Commutative Property!!)

Strategy: Combinations of 10	**Name of Activity: Speedy 50** **L6**
Description: Facts that have sums of ten.	**Materials:** cards 0-10 or a deck of cards (Ace = 1, Jacks = 0, remove Queen and Kings) - need 40 cards

Opportunity to Practice Combinations of 10 (Addition) Strategy/Directions:

This game is best played on the floor.

1. Students work in pairs.

2. The cards are shuffled and dealt. Each player should have 20 cards.

3. At the same time, both players turn over the cards to create an array (2 rows of 10 - all cards face up).

4. Once the cards are set up, the students stand up, look at each other, and say, "1, 2, 3 Speedy 50" and switch places on the carpet (Student A is now in front of Student B's cards and Student B is now in front of Student A's cards).

5. Both players are to remove two cards that equal a sum of 10 as fast as they can. Two cards must be removed (i.e., if a student has a 10 card, they most also have a 0 card).

6. The first student to remove 5 sets of cards, yells "Speedy 50!"

7. The student then shows the cards s/he set aside in pairs and reads the equations that would be created, "2 + 8 = 10, 7 + 3 = 10, 10 + 0 = 10….etc. I have 5 sets of 10 so I have 50!"

8. The other student checks and listens for accuracy.

9. If neither player can create 5 pairs, the game stops and the player with the greatest number of pairs wins.

Adaptations: All 40 cards can be flipped over together (i.e., one giant array of 8 x 5). Students stand, turn around so they can't see the cards, and say "1, 2, 3 Speedy 50!" Both players spin around quickly, go to the floor and race against each other grabbing the cards as fast as they can.

Strategy: Combinations of 10	**Name of Activity: What's My Partner?** **L7**
Description: Facts that have sums of ten.	**Materials:** game board (see choices), 0-10 dice/spinner with 0-10/cards 0-10, counters to cover the board (two different colored ones if students are sharing a board), combinations of 10 equations sheet (optional), ten frame with manipulatives (optional)

Opportunity to Practice Combinations of 10 (Missing Addend) Strategy/Directions:

1. Students work in pairs (students either share a board with two different colored counters or they each have their own board).

2. Student A rolls the die/spins the spinner or draws a card (i.e., 6). She says "To have 10, 6 and 4 are partners."

3. Student A places a counter on a 4 on her board. If a 4 is not available (already taken), the student loses his/her turn.

4. Students keep taking turns.

5. If sharing a board, when all the spaces are covered, the student with the most spaces wins. If using their own boards, the first student to cover his/her entire board wins.

Adaptations: Give students a ten frame to fill in with manipulatives to support determining the missing addend.

Students could also write the equations as they take turns on the Combinations of 10 Equation Sheet.

Combinations of 10 Equations

Name ________________________________Date ________________________________

A. $6 + 4 = 10$ $10 - 6 = 4$	B.
C.	D.

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What's My Partner? - School

0	4	5	9	2	6
10					1
1					3
9					7
6					8
8					10
4	2	7	5	3	0

What’s My Partner? - Fall

<table>
<tr><td>0</td><td>4</td><td>5</td><td>9</td><td>2</td><td>6</td></tr>
<tr><td>10</td><td colspan="4" rowspan="5">

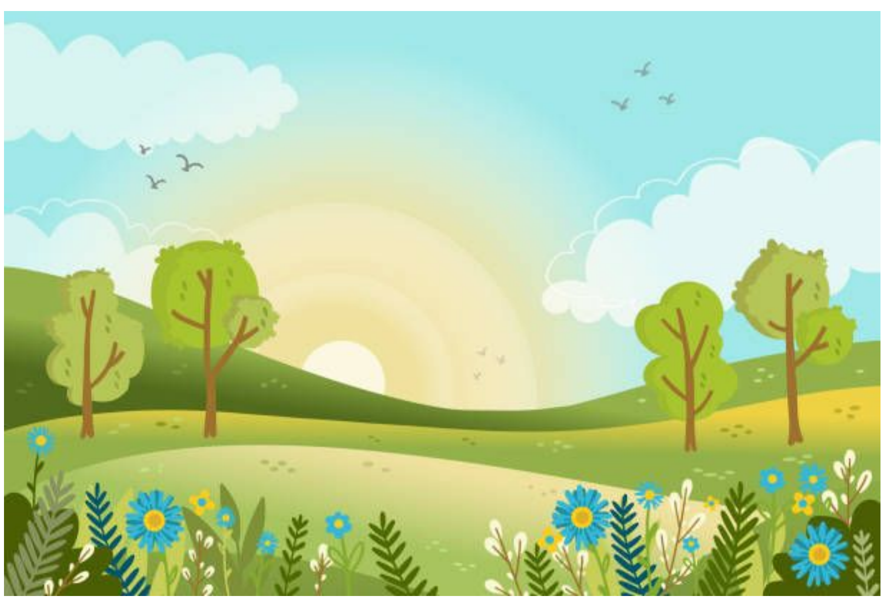
</td><td>1</td></tr>
<tr><td>1</td><td>3</td></tr>
<tr><td>9</td><td>7</td></tr>
<tr><td>6</td><td>8</td></tr>
<tr><td>8</td><td>10</td></tr>
<tr><td>4</td><td>2</td><td>7</td><td>5</td><td>3</td><td>0</td></tr>
</table>

What's My Partner? - Winter

<table>
<tr><td>0</td><td>4</td><td>5</td><td>9</td><td>2</td><td>6</td></tr>
<tr><td>10</td><td colspan="4" rowspan="6">

</td><td>1</td></tr>
<tr><td>1</td><td>3</td></tr>
<tr><td>9</td><td>7</td></tr>
<tr><td>6</td><td>8</td></tr>
<tr><td>8</td><td>10</td></tr>
<tr><td>4</td><td>2</td><td>7</td><td>5</td><td>3</td><td>0</td></tr>
</table>

What’s My Partner? - Spring

<table>
<tr><td>0</td><td>4</td><td>5</td><td>9</td><td>2</td><td>6</td></tr>
<tr><td>10</td><td colspan="4" rowspan="5">hello sunshine
</td><td>1</td></tr>
<tr><td>1</td><td>3</td></tr>
<tr><td>9</td><td>7</td></tr>
<tr><td>6</td><td>8</td></tr>
<tr><td>8</td><td>10</td></tr>
<tr><td>4</td><td>2</td><td>7</td><td>5</td><td>3</td><td>0</td></tr>
</table>

Strategy: Combinations of 10	**Name of Activity: Ball Bounce Bump - Combinations of 10 (Addition and Subtraction)** **L8**
Description: Facts where the two addends equal ten	**Materials:** this game board per pair of students, equation (fact) cards for Combinations for 10, two different colored markers/chips (transparent chips are best)

ball bounce bump

Combinations of 10

Material Needed: equation cards for Combinations of 10

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Draw a card.
2. Determine the missing addend, the difference or the sum.
3. Locate the answer on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If the answer is already covered by one of your chips, you can stack another one of your chips on top of the one that is there and "lock" your chip into place. No one can bump you off of that number now.

   If the answer is not available on the board, the next player takes his/her turn.

4. The player to use all of his/her chips first wins the game!

1	5	0	10	4
7	8	2	9	3
6	2	6	4	7
8	9	3	0	5

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Combinations of 10 Fact Cards

9 + 1 = __	8 + 2 = __	7 + 3 = __	6 + 4 = __
__ = 5 + 5	__ = 4 + 6	__ = 3 + 7	__ = 2 + 8
1 + 9 = __	0 + 10 = __	10 - 1 = __	10 - 2 = __
__ = 10 - 3	__ = 10 - 4	__ = 10 - 5	__ = 10 - 6
__ =10 - 7	__ = 10 - 8	10 - 9 = __	10 - 10 = __

Combinations of 10 Fact Cards

__ + 10 = 10	__ + 9 = 10	__ + 8 = 10	__ + 7 = 10
__ + 6 = 10	__ + 5 = 10	__ + 4 = 10	__ + 3 = 10
__ + 2 = 10	__ + 1 = 10	__ + 0 = 10	10 + __ = 10
9 + __ = 10	8 + __ = 10	7 + __ = 10	6 + __ = 10
5 + __ = 10	4 + __ = 10	3 + __ = 10	2 + __ = 10

Add or Subtract 10

Strategy: Add or Subtract 10	**Application and Teaching the Strategy**
Description: Facts that one of the addends is 10 or the subtrahend (or in some cases, the minuend) is 10	**Materials:** document camera, chips/counters, ten frame with 10 dots filled in, chart paper for anchor chart/markers, dry erase boards/markers/erasers

Application:

Materials for Application: chart paper or document camera, possibly manipulatives

Application:
When working through these, ask students:

- "How would you represent this problem with manipulatives or in a model and why?"
- "What do these problems have in common?"
- "What do the answers (sum/difference) have in common with the expressions?"

***Looking for a connection with "10" and the impact it has on the number of digits and place value.

"We are going to use problems to help us understand the Add and Subtract 10 strategy. Let's talk about the following problems together."

"Lupe found 5 markers under her bed. When she opened her desk drawer, she found a box of 10 markers. How many markers does Lupe have in all?"

"Javon's dad put 19 rubber bands on the kitchen counter for Javon's science experiment. Javon knew that was too many, grabbed 10 of them, and headed off to school. How many rubber bands were left on the counter?"

Teaching Strategy - Parts 1 - 3

Materials for Parts 1 - 3: counters/chips, ten frame with ten dots filled in, document camera, chart paper/markers, dry erase boards/markers/erasers

Teaching Strategy - Part 1:

Put 4 chips under the doc camera. Ask the students, "How many chips are here?" (Students say, "4" and the teacher writes 4.) Put the ten frame with the ten dots filled in under the doc camera (next to the 4). Say, "Pretend these dots are chips, as well. How many chips are here?" (Students say "10" and the teacher writes 10.) "Wow - you didn't even count these! How did you know it was 10 chips that quickly? Turn and talk to your partner about that."
"Let's add these two quantities together. How much is here?" (Students say "14" and the teacher writes 4 + 10 = 14.)

Note: Refrain from explaining in detail what happens when we add 10. Keep encouraging students to discuss and let them discover what is happening. Remember – precise language is critical (**SMP 6 – Attend to precision**)

“Did you need to count all of the chips to arrive at the sum of 14? How did you solve it? Talk to your partner about that.” Teacher then starts a two-column anchor chart (*Add 10* on the left and *Subtract 10* on the right), writing 4 + 10 = 14 under the addition side of the chart (left hand side).
Practice this a few more times with 7, 2, 8 and 1 (placing the chips, adding on the ten frame, etc.) Continue to add the equations to the anchor chart and allow students to share their ideas and patterns taking place.

**Occasionally, change the addends to model the Commutative Property. (i.e., “What if I start with 10 then put down 4? What changes? What does not? How do you know?” Write both problems on the anchor chart and label the anchor chart with the property.

One goal is for student discovery of what is happening with these specific problems! Ask students what they notice and to identify a pattern that is taking place (**SMP 7** - Look for and make use of structure). Write some of the student discoveries on the anchor chart.

Students now practice. Provide them with a filled in ten frame and a handful of chips. Have students write their equations on dry erase boards.

Teaching Strategy - Part 2:

Repeat the process from Part 1 (addition of 10), but this time model subtraction of 10. Teacher will put down 11 - 20 chips (ten frame and some more). Remove the 10 frame and ask, “How many were subtracted? How do you know this? What is the difference?”

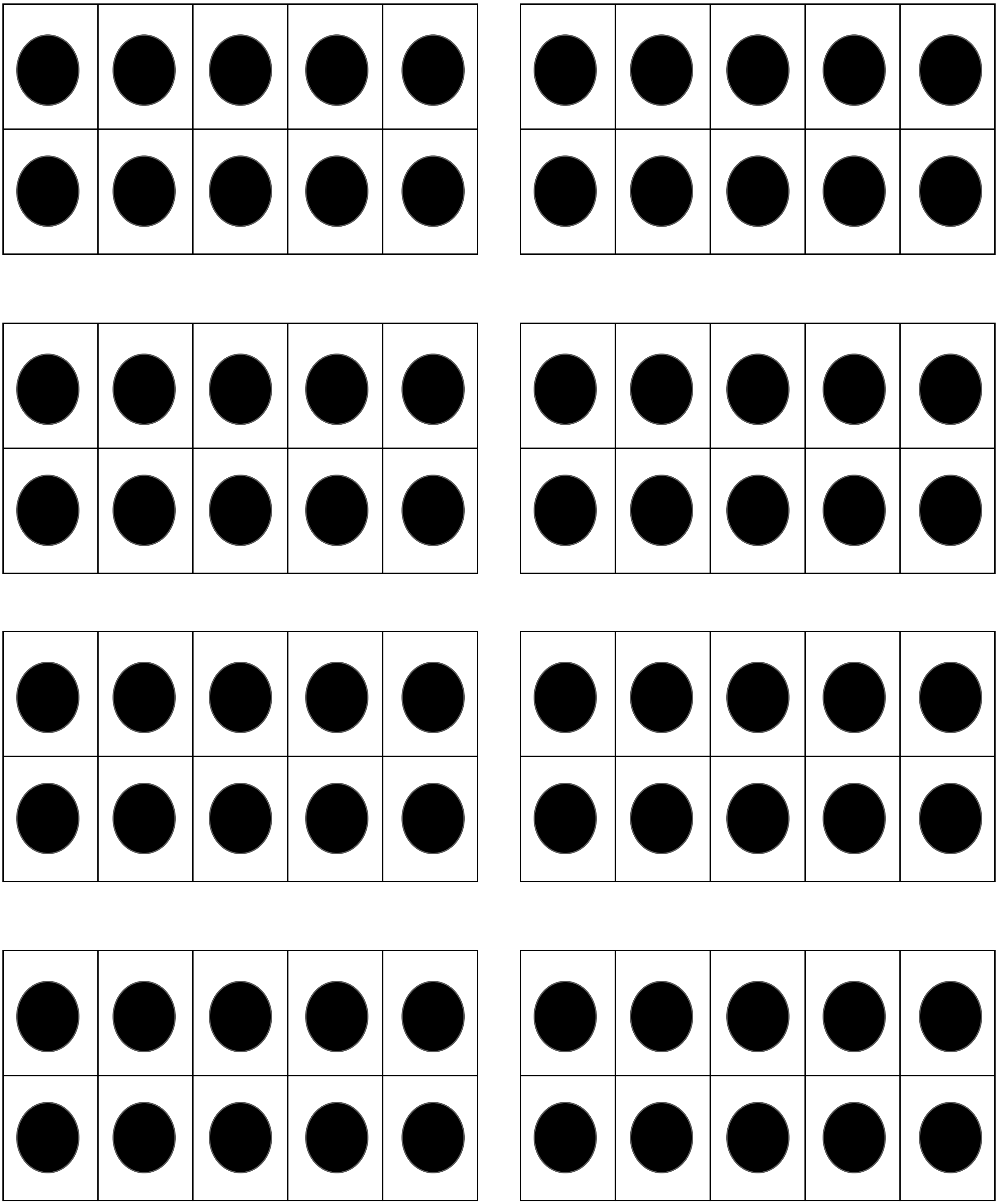
Write the equations and student ideas on the right hand side of the anchor chart.
“What do the two sides of the anchor chart have in common?”

Students now practice. Provide them with a filled in ten frame and a handful of chips. Have students write their equations on dry erase boards.

Teaching Strategy - Part 3:

Repeat the lesson from Part 2, but this time remove the quantity that is not 10. (i.e. 16 - 6 = ____). Practice with a handful of problems. Ask, “Why is the difference always 10 in these problems?”

Ten Frames with 10 Dots



Strategy: Add or Subtract 10	**Name of Activity: Who's Hiding?** **M2**
Description: Facts that have 10 as an addend or 10 as a subtrahend or difference	**Materials:** snap/connecting cubes (at least 20), teen number cards or cards 10 - 20

Opportunity to Practice Add 10 (Subtract 10/Missing Addend) Strategy/Directions:

1. Students work in pairs.

2. One of the students builds a stick/tower of 10 with the cubes. This will remain a stick of 10 the entire game. The rest of the cubes should just be on the table.

3. Student A draws one of the teen cards (cards 10 - 20) without Student B seeing the card.

4. Student B either turns around or closes his/her eyes.

5. Student A builds the other stick. (i.e. Student A draws the number 18. She would create a stick of 8 without Student B watching.)

6. Student A then decides which addend to put behind her back - the 10 stick or the 8 stick. She tells partner B to open his eyes or turn back around. She says, "Who's hiding?"

7. Student A shows Student B the number card. He looks at the stick on the table and has to determine which stick is hiding behind her back. Once Student B figures it out, he says, "I know who is hiding. The 8 stick is hiding!"

8. Student A then reveals the stick behind her back.

9. Student B says, "I can use the Add 10 strategy. 10 + 8 = 18." OR "I can use the Subtract 10 strategy. 18 - 10 = 8."

10. Players switch roles.

Strategy: Add or Subtract 10	**Name of Activity: Number Chart +10** **M3**
Description: Facts that have 10 as an addend or 10 as a subtrahend or difference	**Materials:** twenty charts, 2 clear chips, number cards 1 - 10, + 10 cards (1 per pair of students, located in the back of this resource), sheet of paper or dry erase boards/markers/erasers

Opportunity to Practice Add 10 Strategy/Directions:

1. Students work in pairs.

2. Student A draws a number card and places a chip on that number on the twenty chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

3. Then Student A points to the "+ 10" card and adds on 10 from the chip. S/he places a chip on that number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

4. On the sheet of paper or dry erase board, Student A writes "7 + 10 = 17".

5. Students keep taking turns.

6. Before cleaning up, students discuss:
- "What do you notice about the first <u>addend</u> and the <u>sum</u>?" (always vertically aligned on the chart)
- Can you predict the sum if you only have the cards and not the chart?
- What <u>pattern</u> are they noticing with the digits?

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+10 Cards

+ 10	+ 10	+ 10	+ 10
+ 10	+ 10	+ 10	+ 10
+ 10	+ 10	+ 10	+ 10
+ 10	+ 10	+ 10	+ 10
+ 10	+ 10	+ 10	+ 10

Strategy: Add or Subtract 10	**Name of Activity: Number Chart -10** **M4**
Description: Facts that have 10 as an addend or 10 as a subtrahend or difference	**Materials:** twenty charts, 2 clear chips, number cards 11 - 20 (back of this resource), - 10 cards (1 per pair of students), sheet of paper or dry erase boards/markers/erasers

Opportunity to Practice Subtract 10 Strategy/Directions:

1. Students work in pairs.

2. Student A draws a number card and places a chip on that number on the twenty chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

3. Then Student A points to the "- 10" card and subtracts 10 from the chip. S/he places a chip on that number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

4. On the sheet of paper or dry erase board, Student A writes "15 - 10 = 5".

5. Students keep taking turns.

6. Before cleaning up, students discuss:

- "What do you notice about the first number (minuend) and the difference?" (always vertically aligned on the chart)
- Can you predict the difference if you only have the cards and not the chart?
- What pattern are they noticing with the digits?
- What is the relationship between this activity and the Number Chart +10 one?

-10 Cards

- 10	- 10	- 10	- 10
- 10	- 10	- 10	- 10
- 10	- 10	- 10	- 10
- 10	- 10	- 10	- 10
- 10	- 10	- 10	- 10

Strategy: Add or Subtract 10	**Name of Activity: Flip!** **M5**
Description: Facts that have 10 as an addend or 10 as a subtrahend or difference	**Materials:** ten frame cards - teens

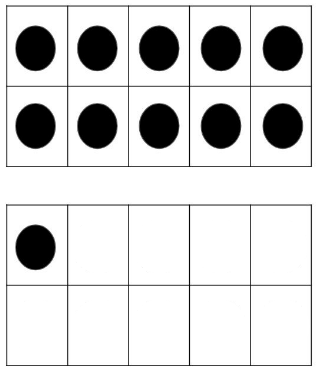
Opportunity to Practice Add 10 Strategy/Directions:

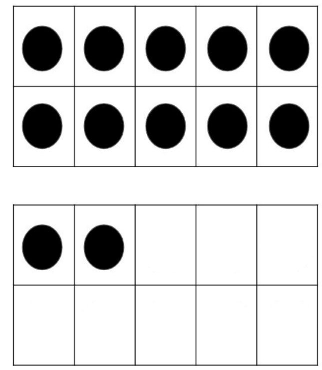
1. Students work in pairs.
2. Shuffle the cards, split them in half, and have them face down in front of each player.
3. In unison, the players say, "1, 2, 3, flip!" and each player flips over the top card in their stack.
4. The goal is to be the first person to state the quantity on their card.
5. The player who says the total first then says the equation. (i.e., "10 + 3 = 13"). The opponent should check for accuracy. If the payer is correct, s/he gets to keep both cards. If the player is incorrect, the opponent gets the opportunity to state his/her equation to win the two cards.

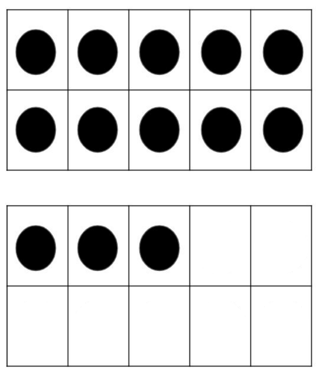
**Keep in mind, depending on the way the card is flipped over, the equation could read 10 + 3 = 13 or 3 + 10 = 13.

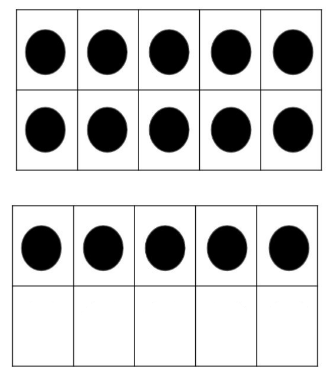
**This game moves quickly, so either make multiple copies of the cards to increase the size of the decks or have them shuffle and start again.

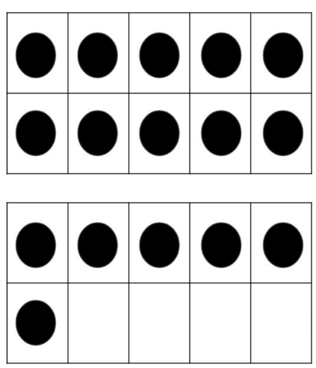
Ten Frame Cards - Teens

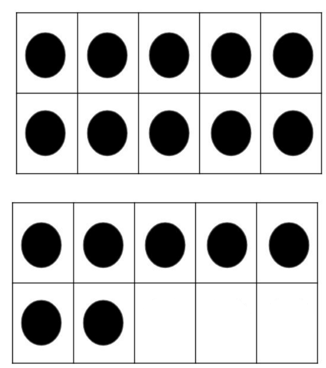


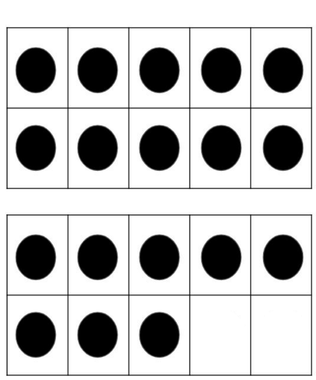


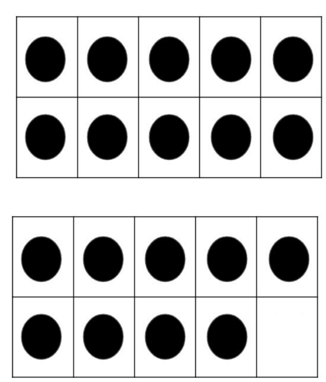




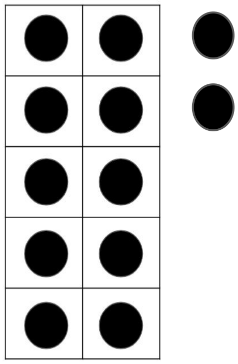


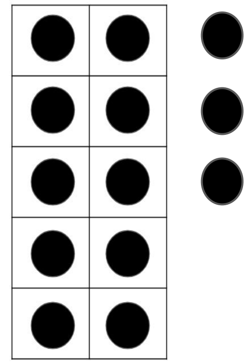


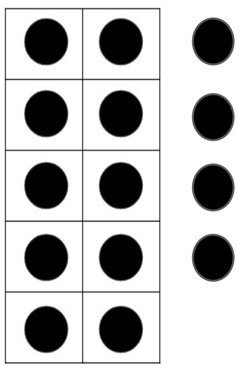


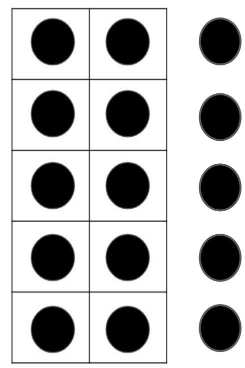


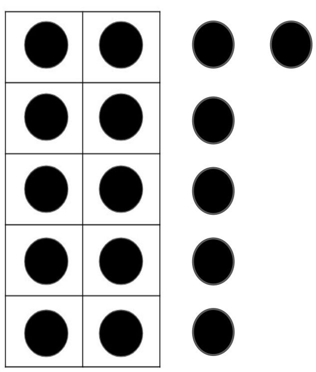
Ten Frame Cards - Teens

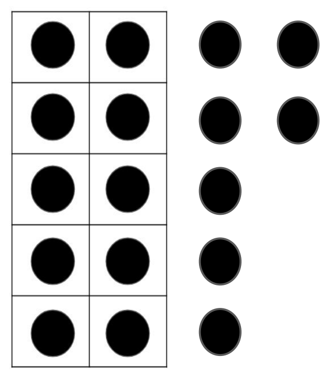


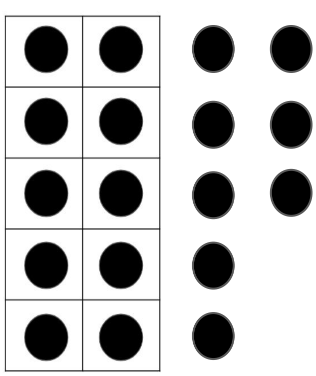


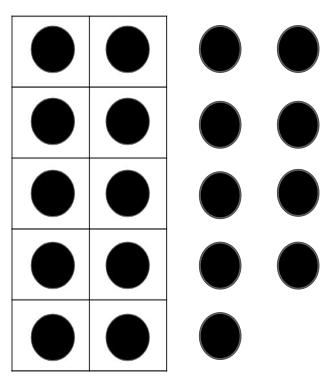












SQUARES: Add (+) or Subtract (-) 10

The goal is to be the first person to cover 4 spaces in the shape of a square.

2	19	11	8	5	16	3
10	7	19	4	12	1	17
6	13	9	14	2	15	3
18	7	11	0	14	9	17
1	19	2	12	6	20	8

Materials:
If sharing a game board, you will need 2 different color semi-clear chips (one color for each player). If using 2 game boards, the semi-clear chips can be any color.

Equation cards (Add & Subtract 10)

Player A draws a card and solves it. If the answer is available on the board, she/he places one of her/his chips on that spot. If the number has already been covered or is not present on the board, she/he loses his turn.

The first player to cover 4 spots that makes a square wins the game.

When the game ends, players should explain to each other how the Add 10 and Subtract 10 strategy works.

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+10 Equation Cards

0 + 10 = ___	1 + 10 = ___	2 + 10 = ___	3 + 10 = ___
___ = 4 + 10	___ = 5 + 10	___ = 6 + 10	___ = 7 + 10
8 + 10 = ___	9 + 10 = ___	10 + 10 = ___	10 + 1 = ___
___ = 10 + 2	___ = 10 + 3	___ = 10 + 4	___ = 10 + 5
10 + 6 = ___	10 + 7 = ___	10 + 8 = ___	10 + 9 = ___

-10 Equation Cards (some cards have 10 as the difference)

10 - 10 = ___	11 - 10 = ___	12 - 10 = ___	13 - 10 = ___
___ = 14 - 10	___ = 15 - 10	___ = 16 - 10	___ = 17 - 10
18 - 10 = ___	19 - 10 = ___	20 - 10 = ___	11 - 1 = ___
___ = 12 - 2	___ = 13 - 3	___ = 14 - 4	___ = 15 - 5
___ = 16 - 6	___ = 17 - 7	18 - 8 = ___	19 - 9 = ___

ONLY USE when students are ready for "know from memory" or are using the PPPs for this strategy

Strategy: Add 10 or Subtract 10	**Name of Activity: Random Numbers Add or Subtract 10** **M7**
Description: Facts that have 10 as an addend or 10 as a subtrahend or difference	**Materials:** random numbers CD or internet site with numbers being called (numbers 0-10 for + 10 and numbers 10 - 20 for -10), recording sheet

Opportunity to Practice Adding 10 & Subtracting 10 Strategies/Directions:

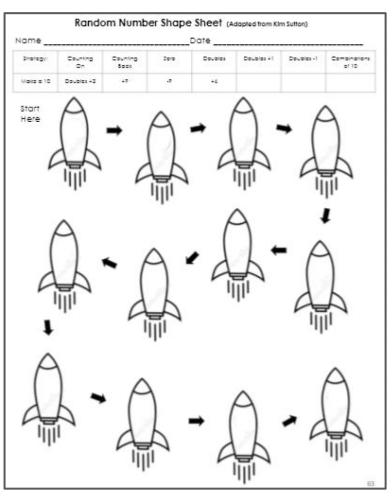
If possible, use the Random Number CD or digital download by Kim Sutton.

The Random Number CD is a valuable tool for motivating students to practice. The CD is designed to generate the digits 0 - 9 with background music. This helps students learn to filter out unnecessary sounds and listen for important information. Students also can't ask the CD to repeat itself! Students find this form of practice fun. There are several tracks to choose from, as well as a variety of rates.

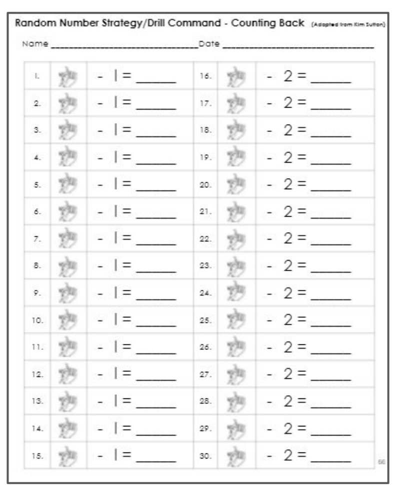
The random number CD can be used with any drill command using the four operations. When a number is called out, the student would perform that drill command *(add 10, subtract 10, etc.)* and record the sum or difference. This would continue down the columns.

There may be other online number generators if you did not purchase the CD or digital download.

Teachers can use the Random Number Recording Sheet or Random Number Strategy/Drill Command Sheet. See the back of the book for the Random Number Recording Sheets.



Student writes the sums/differences in the shapes on the page.



Student listens for the number called on the CD, follows the command, then writes the sum/difference.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:

- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

Reminder: If the command is -10, be sure the numbers being called out are from 10 - 20.

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Random Number Strategy/Drill Command - Add 10 (Adapted from Kim Sutton)

Name ______________________________ Date ______________________________

1.		+ 10 = ______	16.		+ 10 = ______
2.		+ 10 = ______	17.		+ 10 = ______
3.		+ 10 = ______	18.		+ 10 = ______
4.		+ 10 = ______	19.		+ 10 = ______
5.		+ 10 = ______	20.		+ 10 = ______
6.		+ 10 = ______	21.		+ 10 = ______
7.		+ 10 = ______	22.		+ 10 = ______
8.		+ 10 = ______	23.		+ 10 = ______
9.		+ 10 = ______	24.		+ 10 = ______
10.		+ 10 = ______	25.		+ 10 = ______
11.		+ 10 = ______	26.		+ 10 = ______
12.		+ 10 = ______	27.		+ 10 = ______
13.		+ 10 = ______	28.		+ 10 = ______
14.		+ 10 = ______	29.		+ 10 = ______
15.		+ 10 = ______	30.		+ 10 = ______

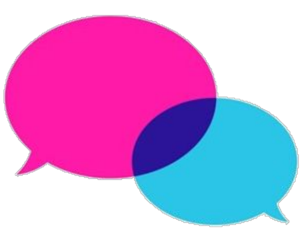
Random Number Strategy/Drill Command - Subtract 10 (Adapted from Kim Sutton)

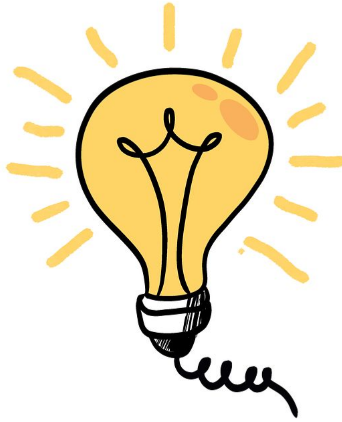
Name ________________________________ Date ________________________________

1.		- 10 = ______	16.		- 10 = ______
2.		- 10 = ______	17.		- 10 = ______
3.		- 10 = ______	18.		- 10 = ______
4.		- 10 = ______	19.		- 10 = ______
5.		- 10 = ______	20.		- 10 = ______
6.		- 10 = ______	21.		- 10 = ______
7.		- 10 = ______	22.		- 10 = ______
8.		- 10 = ______	23.		- 10 = ______
9.		- 10 = ______	24.		- 10 = ______
10.		- 10 = ______	25.		- 10 = ______
11.		- 10 = ______	26.		- 10 = ______
12.		- 10 = ______	27.		- 10 = ______
13.		- 10 = ______	28.		- 10 = ______
14.		- 10 = ______	29.		- 10 = ______
15.		- 10 = ______	30.		- 10 = ______

Strategy Focus Review

Doubles +1/-1
Combinations of 10
Add/Subtract 10





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Strategy Focus Review - Doubles +1 or -1/Combinations of 10/Add/Sub. 10

Students need to practice the strategies that have been taught and defend which facts are best solved with particular strategies.

Materials:

1 Spinner per two students (use paperclip/pencil to create a spinner or buy spinners and add)

Fact Cards that align to this strategy (cut out)

1 Fact Cards sheet per student that aligns to this strategy (NOT cut out)

1 Strategy Sorting Mat that aligns to this strategy

Abbreviations to Play:

Doubles +1/-1 or Near Doubles = ND   Combinations of 10 = C10 + or C10 -

Add 10 = A10   Subtract 10 = S10

To Model How to Play:

Option 1: Part A: Ask a student to join you to model this process. You will need the spinner and the Fact Cards sheet (NOT cut out, 1 per person), and pencils. Put the spinner under a document camera. Spin it. As a class, read the strategy (i.e., Add 10). Identify 1 problem that you could apply this strategy and write "A10" in tiny print next to that problem (i.e., 4 + 10 = ___, etc.) Read the equation (including the sum/difference). Continually explain WHY this strategy is a successful one. Now the student spins, names the strategy, reads the equation, and writes the abbreviation on his/her sheet - again explaining WHY that strategy works. Agree? Disagree? Encourage discourse. Model another round.

****Once students learn more strategies, multiple strategies can be applied to problems (i.e., 7 + 8 = ___ Make a 10 or Doubles +/-1). Students are encouraged to agree/disagree and explain why.*

Part B: After a few turns, you and the student solve the labeled problems. When the problems have been solved, students can choose a few and explain which strategy they applied. Multiple opportunities to make connections between the strategies and the problems themselves will lead to students being able to move this learning to memory (automaticity).

Option 2: Ask a student to join you to model this process. You will need the Fact Cards (cut out) and a copy of the sorting mat. Put the spinner under the document camera. Spin it. As a class, read the strategy (i.e., Add 10). Each person picks one card that represents this strategy, reads the equation to their partner and places it on the sorting mat. (i.e., "4 + 10 = 14 Adding 10 to a single digit number will make a two digit number. The number in the ones column stays the same as the other addend." Be sure to acknowledge when students apply the properties. Ask students to identify all strategies applied to make further connections! Layer in that vocabulary so students comprehend there is a classroom expectation of being precise.

Continue to sort the cards. Students could also move cards to another part of the sort if they can defend why that strategy would also work (FLEXIBLE THINKING...part to the definition of 'fluency'! :o)

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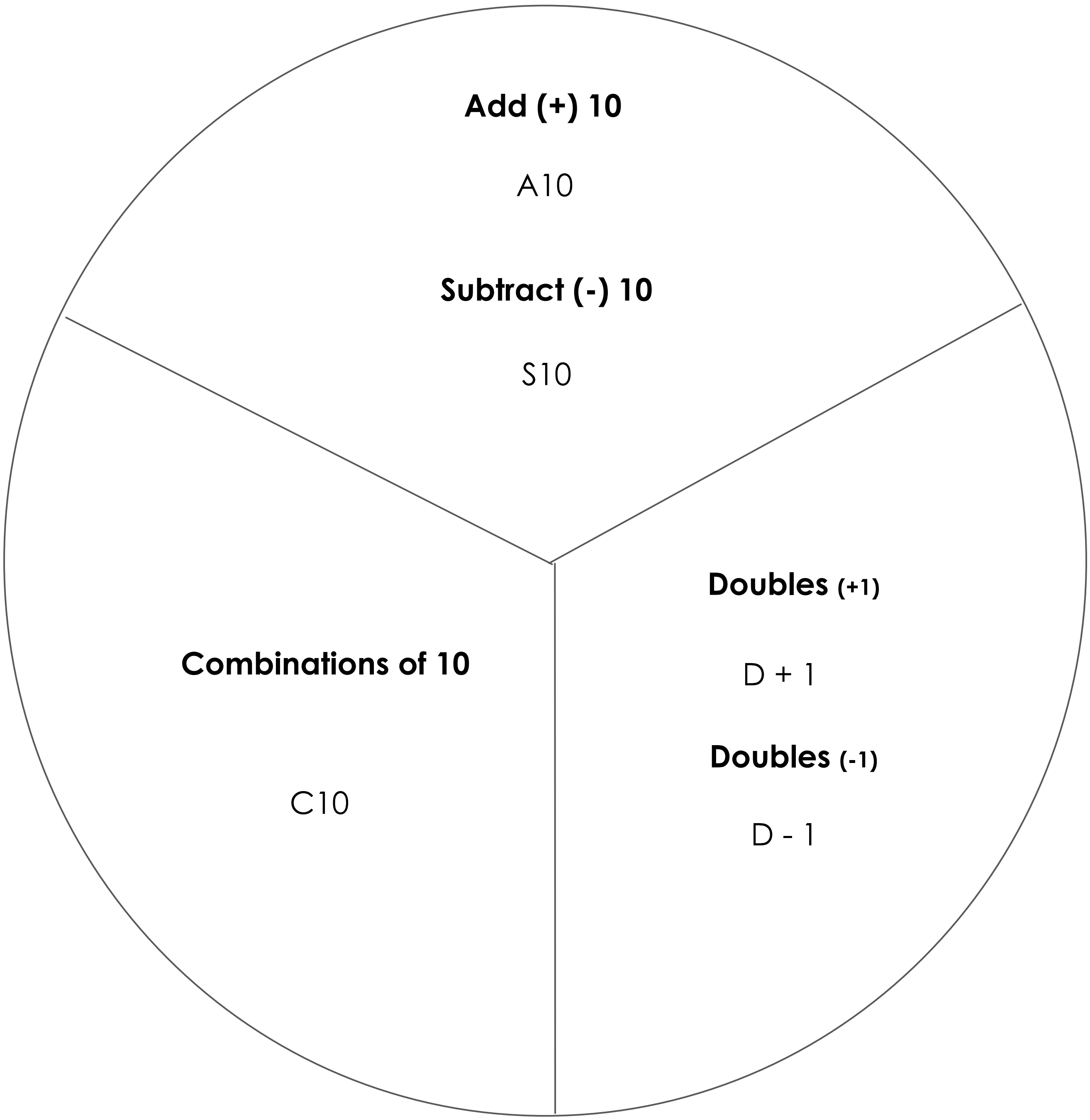
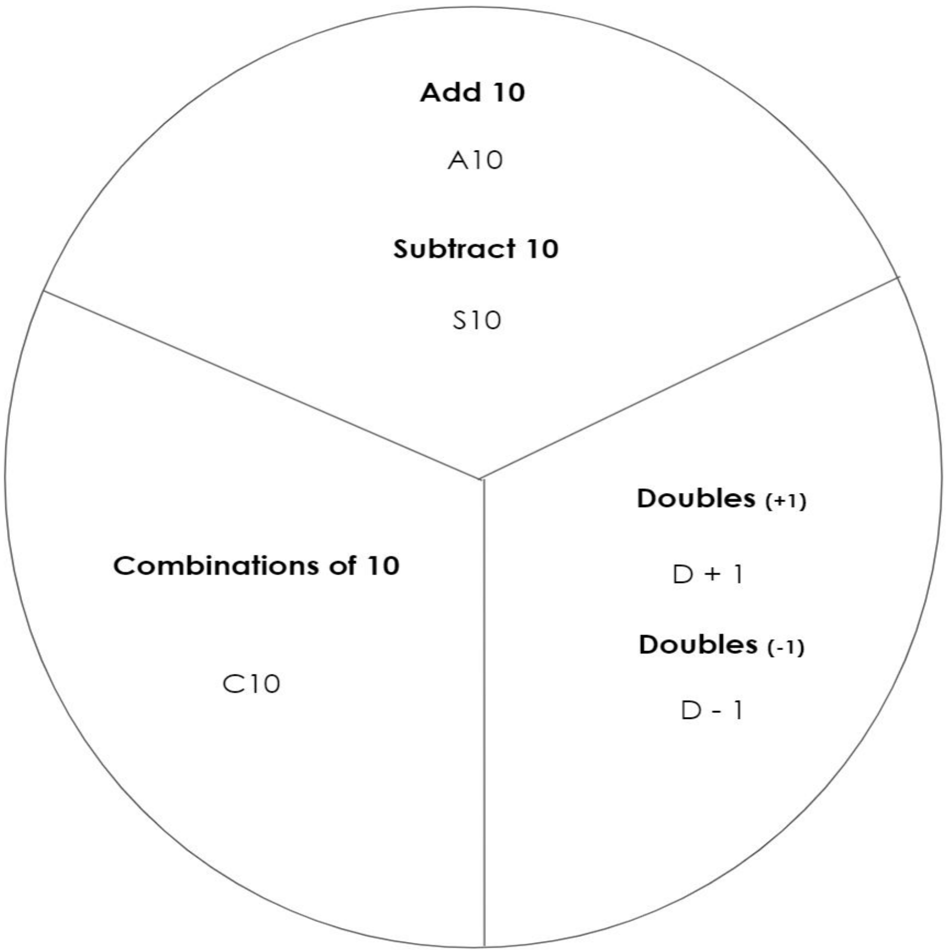
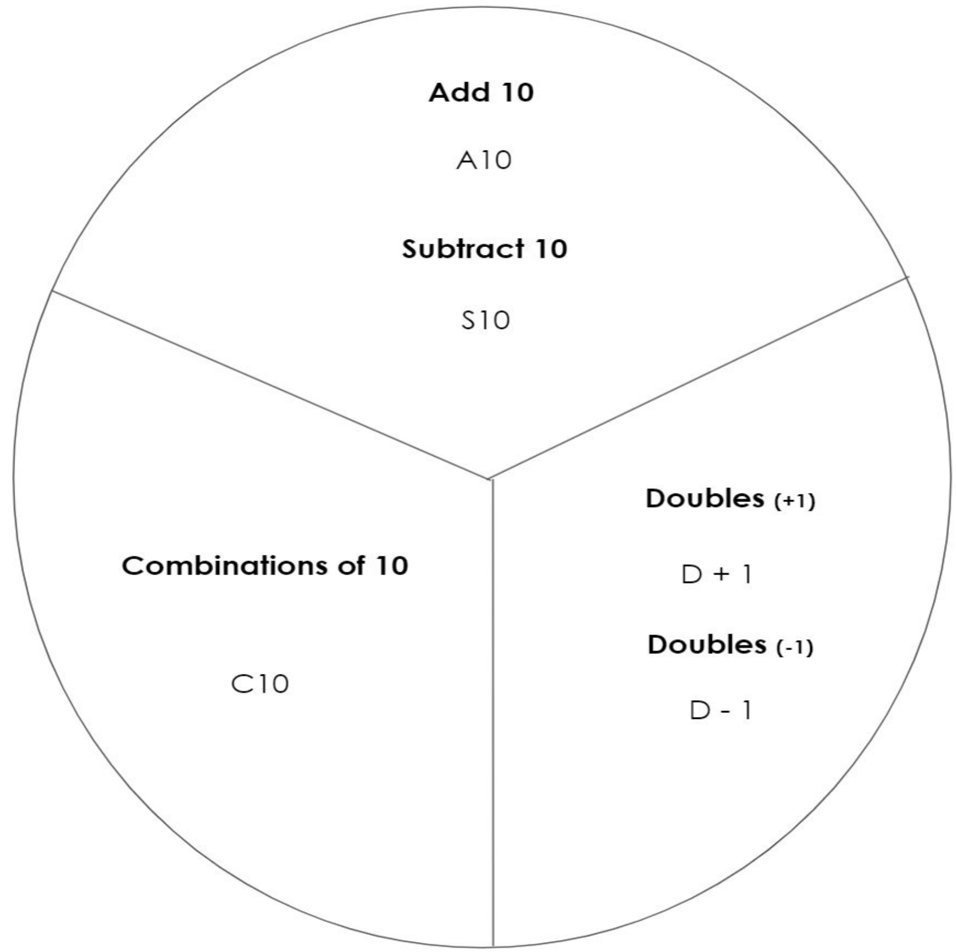
Strategy Focus Review - Doubles +1 or -1/Combinations of 10/Add/Sub. 10



Strategy Focus Review - Doubles +1 or -1/Combinations of 10/Add 10



Strategy Focus Review - Doubles +1 or -1/Combinations of 10/Add 10



Strategy Focus Review Sorting Mat - Doubles +1 or -1, Combinations of 10, Add/Subtract 10

Doubles +1/-1 or Near Doubles	Combinations of 10
Add (+) 10	**Subtract (-) 10**

Strategy Focus Review Sorting Mat - Doubles +1 or -1, Combinations of 10, Add/Sub. 10

Doubles +1/-1 or Near Doubles	Combinations of 10
Add (+) 10	**Subtract (-) 10**

Write at least 3 problems in each box above that aligns to that strategy.

Choose 1 of the strategy boxes above and explain how it works below (pictures/models/words).

Fact Cards - **Doubles +1 or -1/Combinations of 10/Add/Sub. 10**

3 + 10 = ___	4 + 5 = ___	19 - 10 = ___	2 + 8 = ___
___ = 10 - 6	___ = 10 - 8	___ = 15 - 10	___ = 7 + 8
10 - 0 = ___	12 - 10 = ___	2 + 3 = ___	9 + 8 = ___
___ = 10 - 3	___ = 7 + 10	___ = 11 - 10	___ = 13 - 10

10 - 5 ___	6 + 4 ___	15 - 7 ___	4 + 10 ___	1 + 9 ___	3 - 0 ___	2 + 8 ___
13 - 6 ___	8 + 2 ___	9 - 4 ___	4 + 6 ___	5 + 5 ___	10 - 1 ___	3 + 7 ___

Make a 10


13
10
efficient
7
MATH
STRATEGY
Mistakes
Allow
Thinking to
Happen

TOC

Strategy: Make a 10	**Application and Teaching the Strategy**
Description: Facts that have sums greater than ten and at least one addend of 8 or 9.	**Materials:** document camera, some manipulatives, dry erase marker/eraser, chart paper, markers, student copies of blank double ten-frame, counters

This strategy can be used with facts that have at least one addend of 8 or 9 (sometimes 7). Students build onto the 8 or 9 up to 10 and then add on the rest. For example, with 6 + 8, start with 8, then 2 more makes 10, and that leaves 4 more for 14.

Application:

Materials for Application: paper/whiteboard, document camera

Application:
"I'm going to give you some addition facts and I would like you to give me the sum of those facts using your mental math. What is 10+4? What about 10+8? 10+7?"
"Why are these facts easy for you to solve quickly?" *(Have students explain their thinking and reinforce their ideas.)*

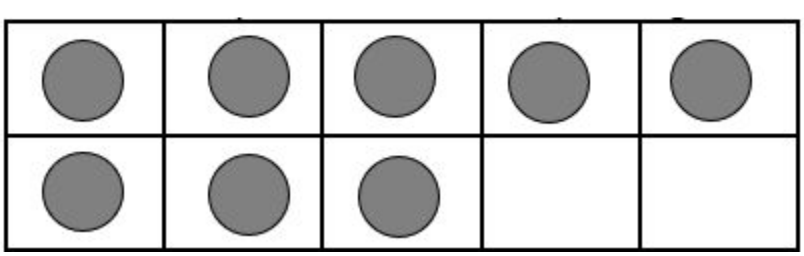
"We will be learning a strategy that will help make addition fact problems with sums greater than 10 into facts of 10+ __."

Teaching Strategy - Part 1:

Materials for Part 1: Blank Double Ten Frame, counters, paper/whiteboard, document camera

Write "8 + 5 = ___" on chart paper or whiteboard, then put the Ten Frame under the document camera with counters close by for demonstration. Review the purpose of the Ten Frame tool and have students explain it has 10 squares within the larger rectangle frame.

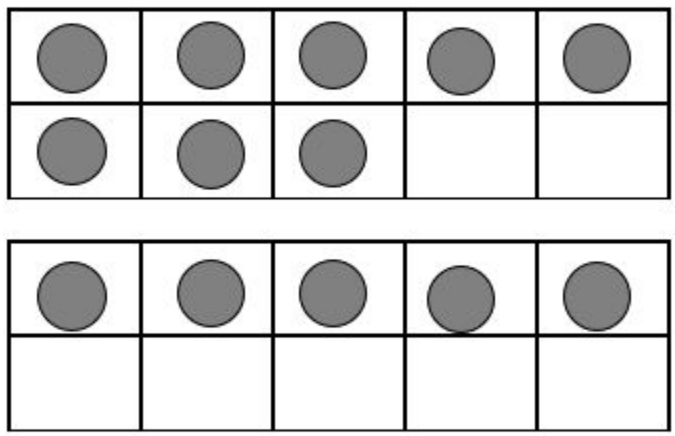
"Take a look at this problem, 8+5=___. Which number is the larger addend?" *(8)*.
"I will show this amount on my ten frame, placing the counters like you are reading -- starting at the top on the left and working to the right. When the top row is full, I will keep going in the bottom row." *(Demonstrate with the counters. Make sure you are very purposeful modeling placing a counter in each square starting at the top and moving right -- see example of finished frame with 8 counters below)*



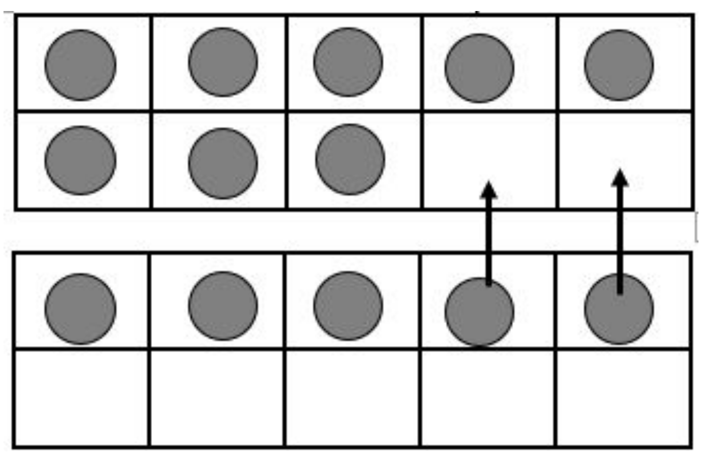
Teaching Strategy - Part 1 (cont.)

"Look again at our addition equation: 8+5=___. Which addend is left for us to show on my ten frames? *(5)*.

"I will show this amount on the second ten frame." *(Demonstrate with the counters. See example of finished frames below)*



"How many spaces are empty in our top ten frame? *(2)* Let's move two counters from our group of 5 in the bottom frame to the top to fill it up. Am I adding any more counters from my bag? *(No)*. That's right -- I just moved 2 from the group of 5 I already had to fill the ten frame." *(See example below)*



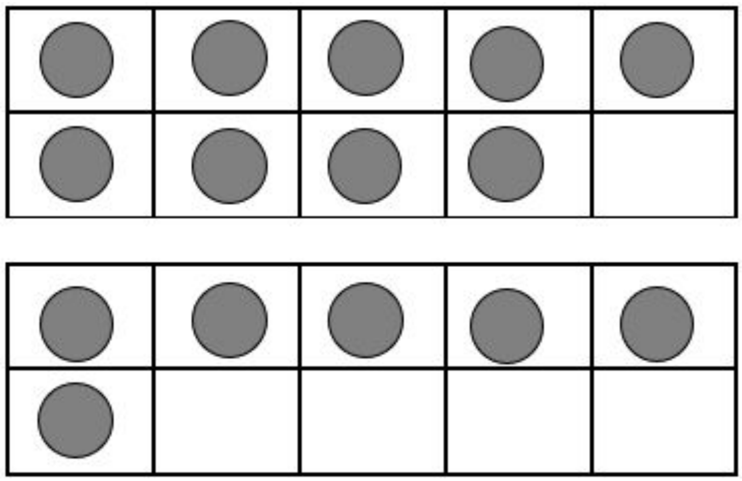
"Now how many do I have in the top ten frame?" *(Have students explain how they know there are 10 in the top frame -- the frame is full).*

"Looking at my ten frames now, I see a 10 + ___ math fact. What fact do you see?" *(10+3 = 13)*. So if 10+3=13, and all I did was rearrange 2 counters from the 5 I already had in my bottom ten frame *(move the 2 counters back down and then back up into the top ten frame)*, then I know 8 + 5 =? *(13)* I just made my starting fact into a 10 + __ fact. I just grouped what I had to make a 10 and then added the rest to find my total."

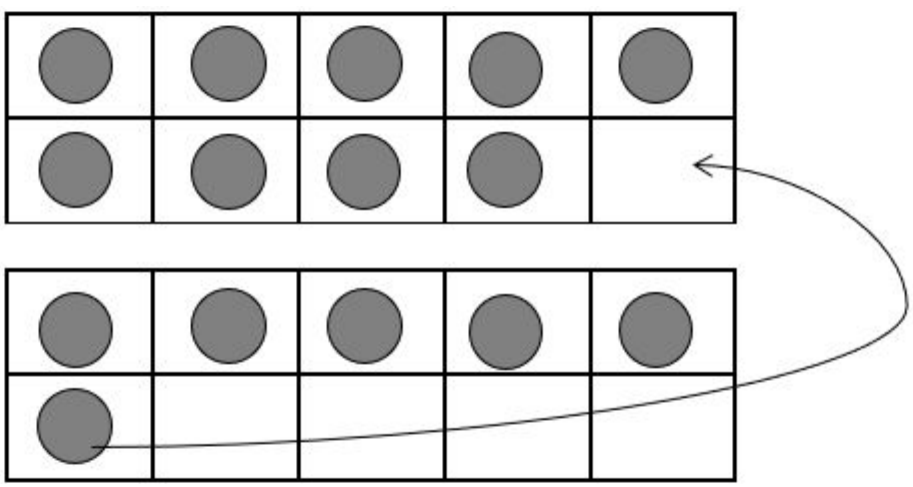
Teaching Strategy - Part 2:

Materials for Part 1: Student copies of blank Double Ten Frame, counters, paper/whiteboard, document camera

"Now let's practice another problem together using your own counters and Double Ten Frame mat. Take a look at this math fact, 6 + 9 = ___. Which addend is the larger number? *(9)* SInce we know about the <u>Commutative Property of Addition</u>, we will start with the larger addend in our top ten frame and then build our other addend in the bottom ten frame." *(Model and have students mirror their mat to match yours -- see example below)*



"How many spaces are empty in our top ten frame? *(1)* Let's move one counter from our group of 6 in the bottom frame to the top to fill it up. Am I adding any more counters from my bag? *(No)*. That's right -- I just moved 1 from the group of 6 I already had to fill the ten frame." *(See example below)*



"Now how many do I have in the top ten frame?" *(Have students explain how they know there are 10 in the top frame -- the frame is full).*

"Looking at my ten frames now, I see a 10 + ___ math fact. What fact do you see?" *(10+5 = 15)*. So if 10+5=15, and all I did was rearrange 1 counter from the 6 I already had in my bottom ten frame *(move the 1 counter back down and then back up into the top ten frame)*, then I know 6 + 9 =? *(15)* I just made my starting fact into a 10 + __ fact. I just grouped what I had to make a 10 and then added the rest to find my total. This is the Making 10 Strategy."

Teaching Strategy - Part 3:

Materials for Part 1: Student copies of blank Double Ten Frame, counters, paper/whiteboard, document camera

"Let's try some using the Make 10 strategy to help solve some more addition facts."
(Problems for additional practice could include 9+4; 5+9; 8+6; etc. Circulate the room at each step in the modeling process with the Double Ten Frame mat and counters to make sure students are correctly placing counters. The goal is for students to start forming a mental picture of the ten frames in their heads and eventually be able to maneuver the counters in their heads quickly.)

Note: Students will likely need multiple opportunities over several days practicing with counters and physically moving them to create groups of 10 to utilize the Make 10 strategy. After these repeated practice opportunities, tell students they can no longer physically move the counters from the bottom ten frame to the top to fill it -- they must "move" the counters in their heads. (Some students will have already been at this step before others.) After practicing mentally moving the counters, the students can skip the step of placing the counters for the smaller addend on their work mat at all. Finally, move students away from the concrete phase and to creating a mental picture for the entire process to solve the addition facts using the Make 10 strategy.

Ten Frames

Strategy: Make a 10	**Name of Activity: Munchin' Monsters** **O2**
Description: Use this strategy when one of the addends is a 8 or 9 (sometimes 7)	**Materials:** monster work mats, recording sheets, small snack to use as counters, monster game board, 1 die or number cards, game pieces

Opportunity to Practice Make a 10 (Addition) Strategy/Directions:

Munchin' Monsters

Math: Addition Fact Fluency—Make a Ten Strategy

1st: WPS1.OA.6B Demonstrate fluency for addition and subtraction within a total of 10 using and explaining mental strategies

Materials: monster work mats (attached—cut apart); recording sheets; pencil; small snack to use as counters (fish crackers, Cheerios, raisins, etc.); monster game board; 1 die (or make number cards out of a cut up piece of paper); game pieces (1 per person) - ****game board, die and game pieces are all optional*

Goal of Game: Students (primarily in 1st and 2nd grades) are expected to deeply understand, explain and apply fact strategies. One of them is Make a Ten. In an addition equation, the goal is to decompose (break apart) one of the addends (numbers being added together) to take part of it to add to the other addend to make a 10. Students then add the remaining number on to 10. See the example below.

Directions:

1. Once the monster work mats have been cut apart, mix them up and turn them face down.

2. The player draws one mat and looks at the addition equation. (Do not write on the monster mats.) The larger addend (either a 7, 8 or 9) has already been represented by dots on the ten frame. The player then uses his/her food counters to represent the smaller addend (first by filling in the remainder of the ten frame then placing the rest of the "counters" below the ten frame). This represents the decomposition of the smaller number and the Make a 10 strategy.

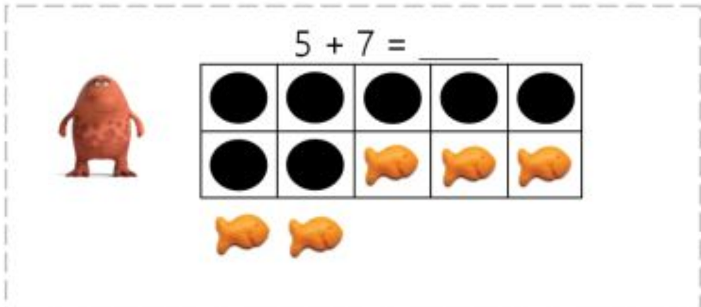
3. The player finds the matching recording sheet. (The monsters on the mat will match the monsters on the recording sheets.) The player then records his/her thinking on the sheet. See the example below. The player should also do a "think aloud" where he/she talks aloud about the steps he/she went through to make a 10 and solve the problem.

4. If playing with the game board, after filling out the recording sheet, the player should roll the die (or draw a number) and move that many spaces. If you are using edible counters, every once and awhile, munch on your counters! :)

Strategy: Make a 10	**Name of Activity: Munchin' Monsters**
Description: Use this strategy when one of the addends is a 8 or 9 (sometimes 7)	**Materials:** monster work mats, recording sheets, small snack to use as counters, monster game board, 1 die or number cards, game pieces

Opportunity to Practice Make a 10 (Addition) Strategy/Directions:

Monster Work Mat



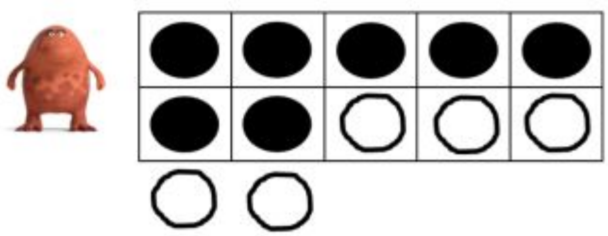
Recording Sheet

1. Leave your snacks or counters on your monster work mat while you write on the recording sheet to record your thinking.

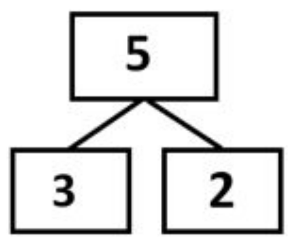
2. Write the equation (number sentence) from the monster work mat here.

5 + **7** = ___

3. As you can see below, the larger addend (number) has already been filled in for you on the ten frame. Your job is to draw the circles that represent the other addend. Fill in the ten frame and draw the remaining dots under the ten frame.



4. Write the smaller addend in the number bond to decompose (break apart).



5. Finally, write the equation so that it includes a 10 and the other addend you decomposed from the 5 which is 2.

10 + **2** = **12**

The goal is to Make a 10 so 5 needs to be decomposed (broken) into 3 and 2, because as mathematicians, we know the Combinations of 10: 7 + 3.

**Optional: IF you are playing Munchin' Monsters with the game board, roll the die (or draw a card), and move that many spaces. don't forget to munch now and again!

Munchin' Monsters Recording Sheet (7s)

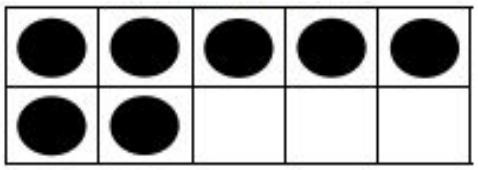
Name ____

Look for these monsters on the mats and/or your own monster if you made a mat. →

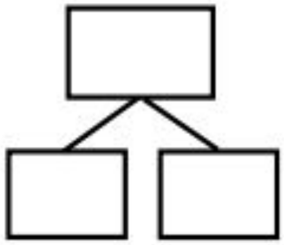
Write the equation from the monster work mat and decompose the smaller addend.

Write the equation that includes a 10 as one of the addends.

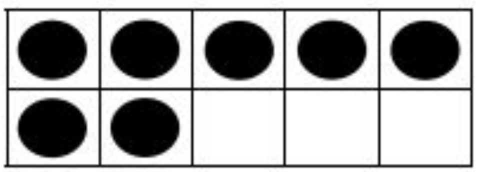
Fill in the ten frame. Some dots may need to go below it.



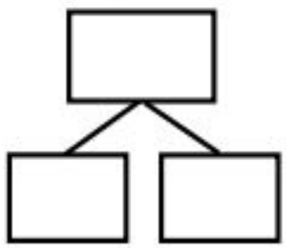
___ + ___ = ___



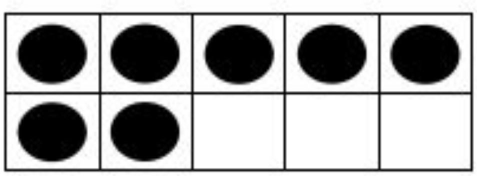
___ + ___ = ___



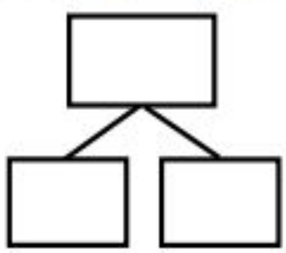
___ + ___ = ___



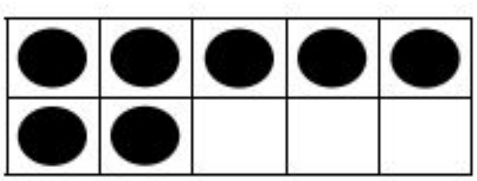
___ + ___ = ___



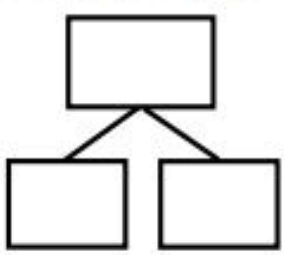
___ + ___ = ___



___ + ___ = ___



___ + ___ = ___



___ + ___ = ___

If you are playing Munchin' Monsters with the game board, a die/cards, and you move spaces on the board, ask your teacher if you can MUNCH now and again! :)

Munchin' Monsters Recording Sheet (8s)

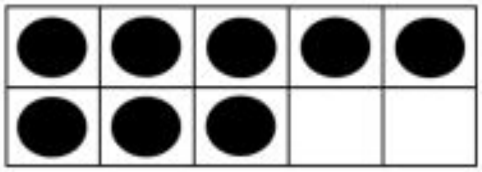
Name ____

Look for these monsters on the mats and/or your own monster if you made a mat. →

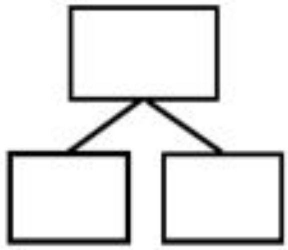
Write the equation from the monster work mat and decompose the smaller addend.

Write the equation that includes a 10 as one of the addends.

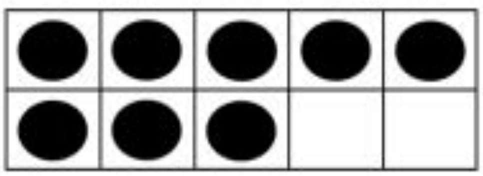
Fill in the ten frame. Some dots may need to go below it.



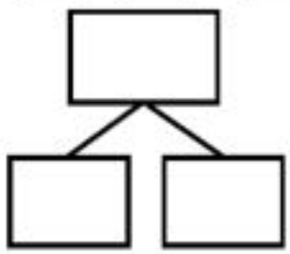
___ + ___ = ___



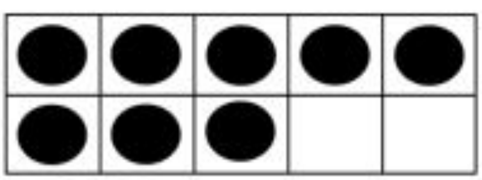
___ + ___ = ___



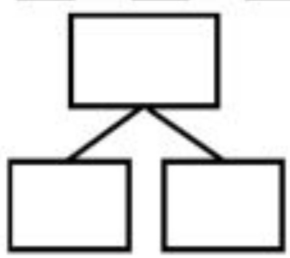
___ + ___ = ___



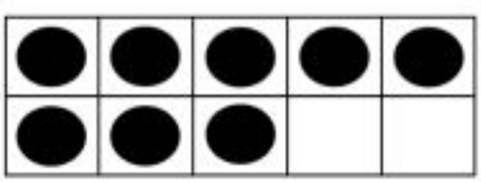
___ + ___ = ___



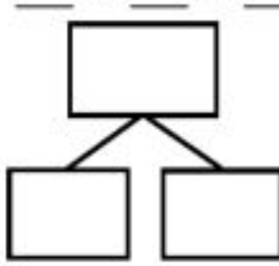
___ + ___ = ___



___ + ___ = ___



___ + ___ = ___



___ + ___ = ___

If you are playing Munchin' Monsters with the game board, a die/cards, and you move spaces on the board, ask your teacher if you can MUNCH now and again! :)

Munchin' Monsters Recording Sheet (9s)

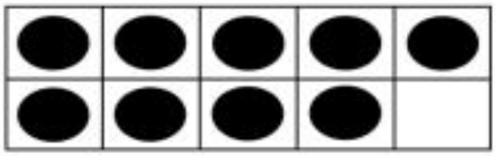
Name ____

Look for these monsters on the mats and/or your own monster if you made a mat.

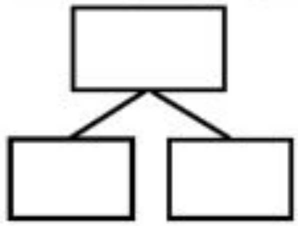
Write the equation from the monster work mat and decompose the smaller addend.

Write the equation that includes a 10 as one of the addends.

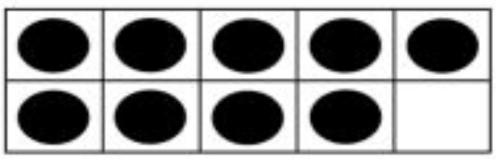
Fill in the ten frame. Some dots may need to go below it.



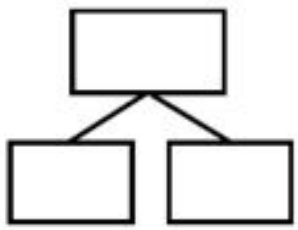
___ + ___ = ___



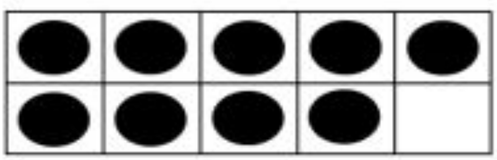
___ + ___ = ___



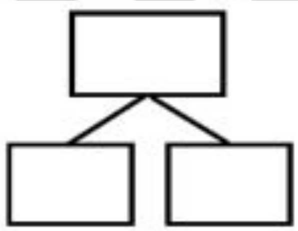
___ + ___ = ___



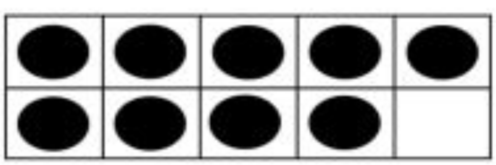
___ + ___ = ___



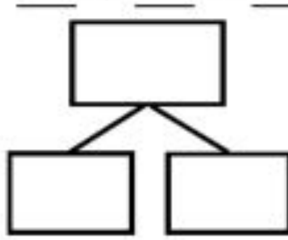
___ + ___ = ___



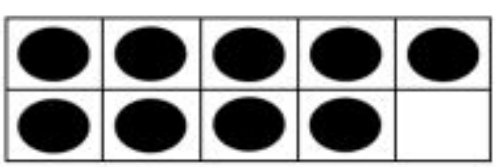
___ + ___ = ___



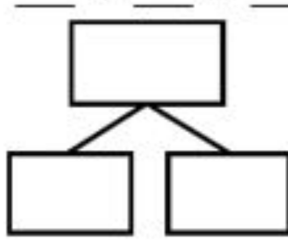
___ + ___ = ___



___ + ___ = ___



___ + ___ = ___

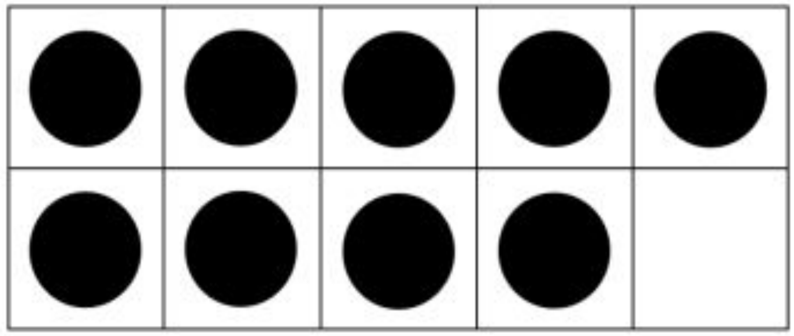


___ + ___ = ___

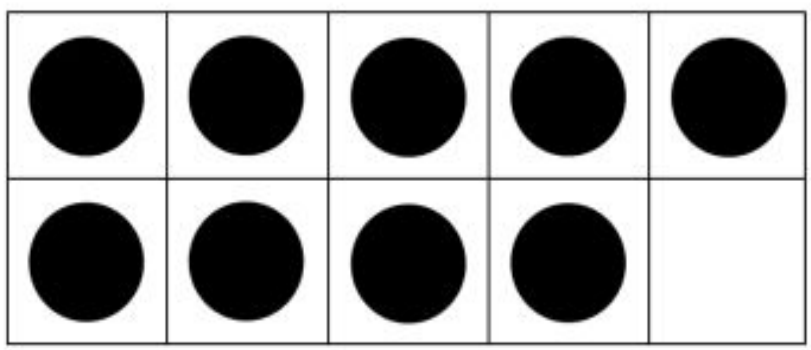
If you are playing Munchin' Monsters with the game board, a die/cards, and you move spaces on the board, ask your teacher if you can MUNCH now and again! :)

Munchin' Monsters Work Mats (9s)

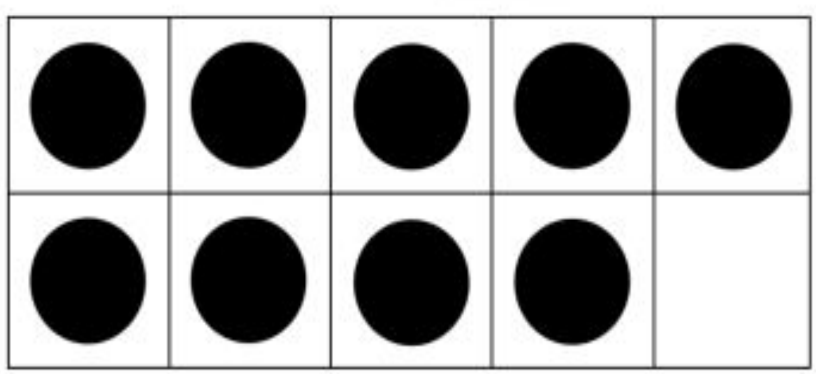
$9 + 2 =$ _____



$9 + 3 =$ _____

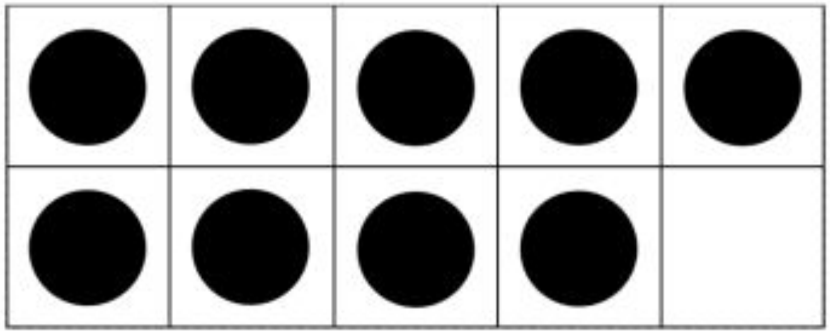


$4 + 9 =$ _____

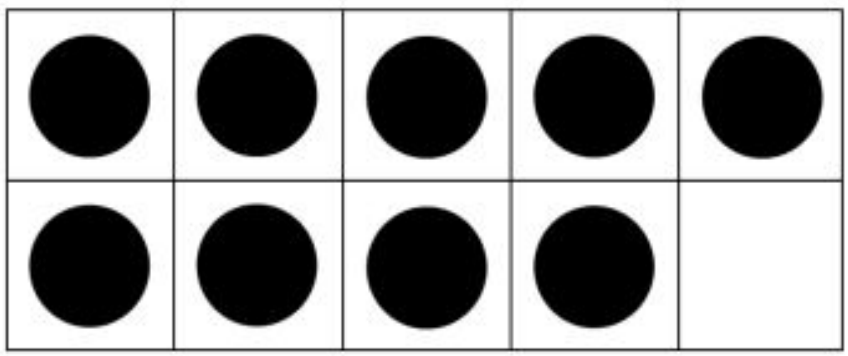


Munchin' Monsters Work Mats (9s & 8s)

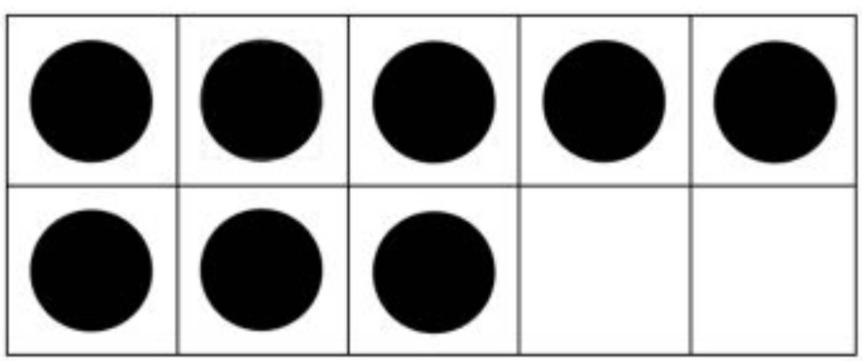
$5 + 9 =$ ______



$9 + 6 =$ ______

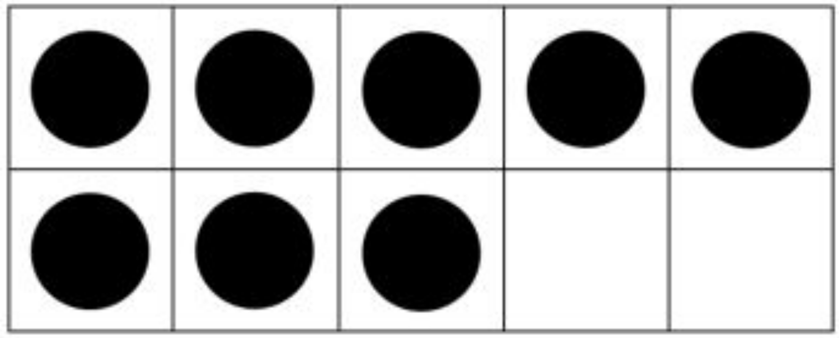


$8 + 3 =$ ______

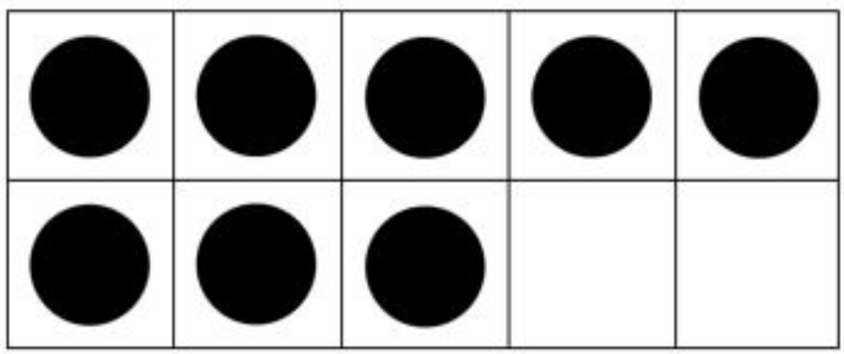


Munchin' Monsters Work Mats (8s & 7s)

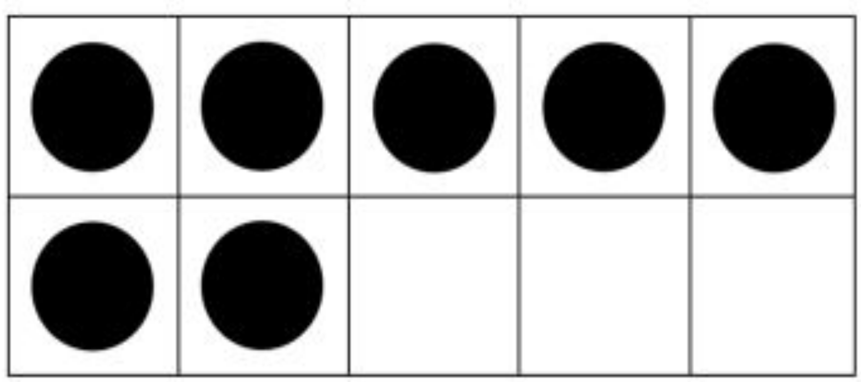
$4 + 8 =$ _____



$8 + 5 =$ _____

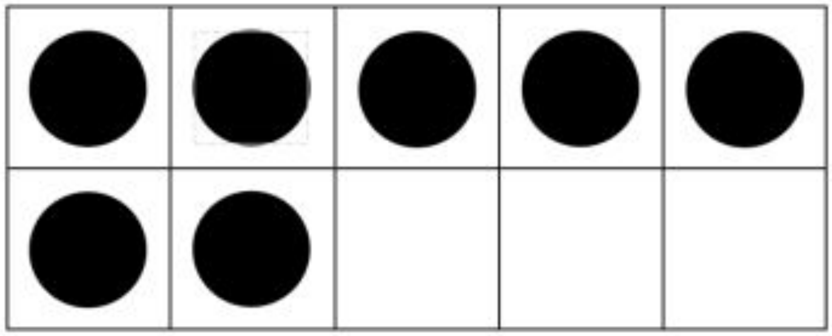


$4 + 7 =$ _____

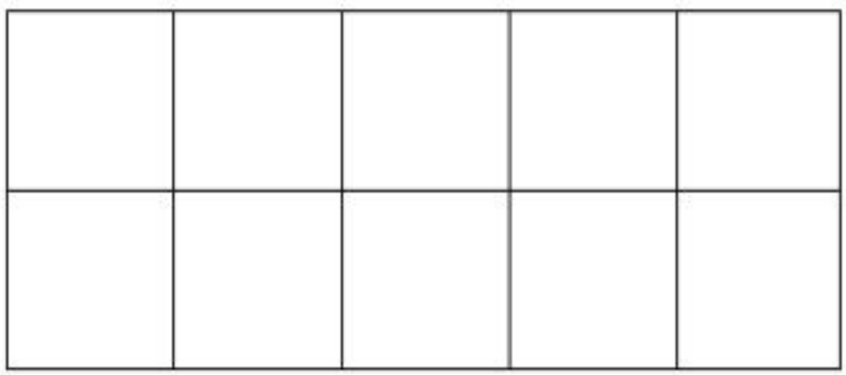


Munchin' Monsters Work Mats (8s & 7s)

$7 + 5 =$ _____

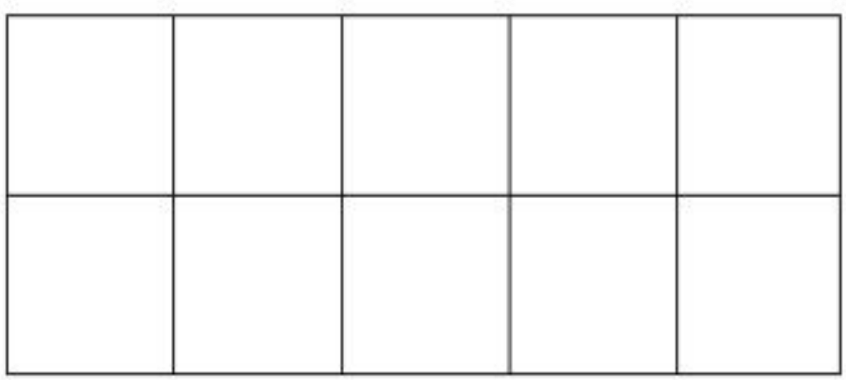


___ + ___ = ___

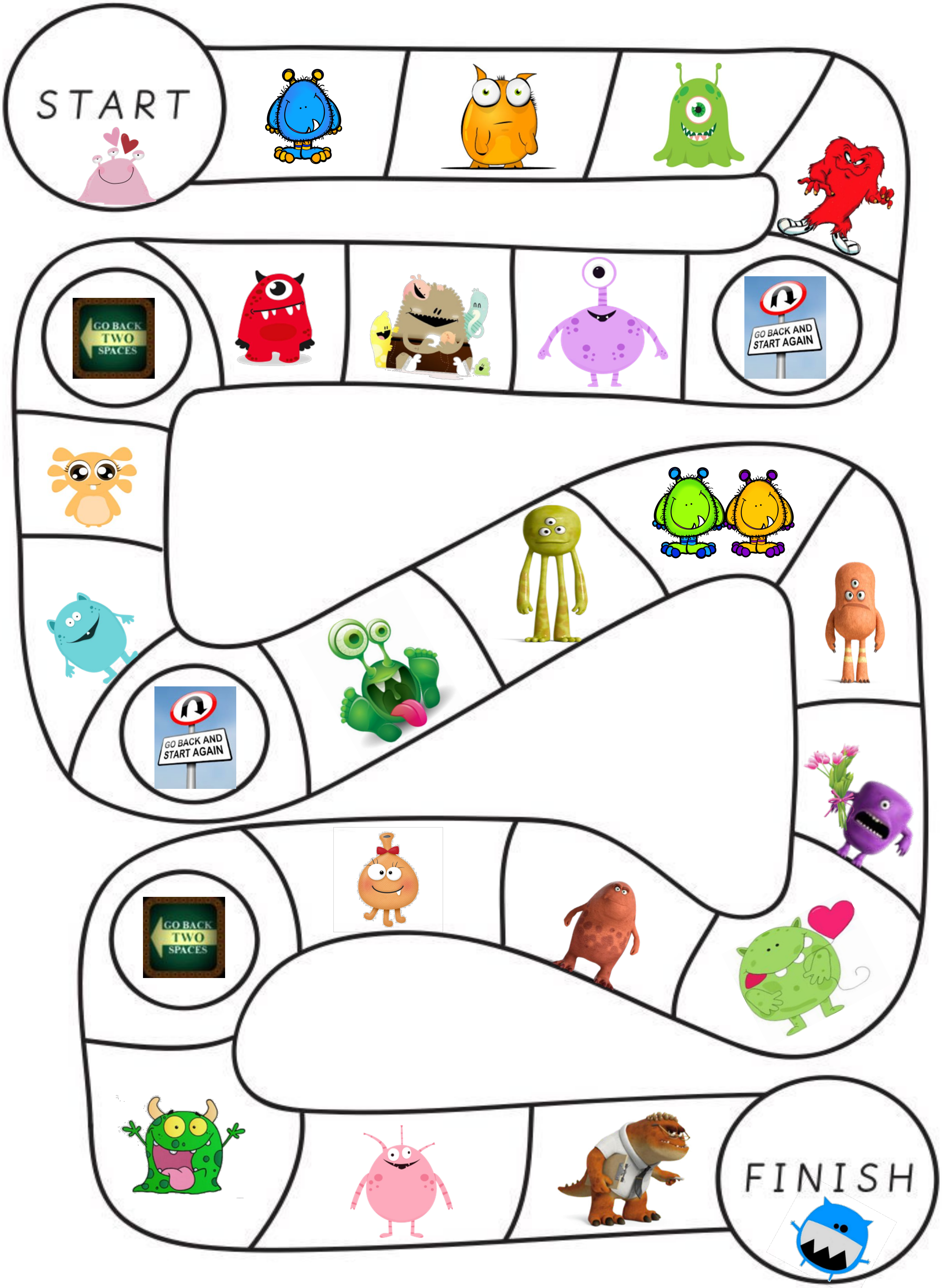


Make your own monster work mat with 7, 8, or 9 as one of the addends. Fill in the ten frame with 7, 8, or 9 dots (leaving the other spot or spots empty). Write an equation. Do not write the sum (answer). Draw your own monster!

___ + ___ = ___



Make your own monster work mat with 7, 8, or 9 as one of the addends. Fill in the ten frame with 7, 8, or 9 dots (leaving the other spot or spots empty). Write an equation. Do not write the sum (answer). Draw your own monster!


START
GO BACK TWO SPACES
GO BACK AND START AGAIN
GO BACK AND START AGAIN
GO BACK TWO SPACES
FINISH

Strategy: Make a 10	**Name of Activity: Make a 10** **O3**
Description: Use this strategy when one of the addends is a 8 or 9	**Materials:** Make a 10 Mat, counters, Make a 10 Equation Cards, dry erase board/markers (optional)

Opportunity to Practice Make a 10 (Addition) Strategy/Directions:

1. Students work with a partner to share their thinking.
2. Students place a Make a 10 Equation Card on the mat.
3. With counters, model the equation in the ten frames.
4. Decompose: Move counters from one ten frame to make a 10 in the other ten frame.
5. (Optional) Using a dry erase board, students write the original equation and the new equation they created.
6. Every few problems, discuss with a friend how and why we often build a ten when math problems have addends with 7s, 8s, or 9s.

Make a 10

1. Place a Make a 10 card in the rectangle.

2. With counters, model each number in the 2 ten frames.

3. Decompose: Move counters from one ten frame to make a 10 in the other ten frame.

4. (Optional) Using your dry erase board, write the original equation and the new equation you have created.

5. Every few problems, discuss with a friend how and why we often build a ten when math problems have addends with 7s, 8s, or 9s.

Make a 10 Equation Cards

___ = 2 + 9	___ = 3 + 9	___ = 4 + 9	___ = 5 + 9
6 + 9 = ___	7 + 9 = ___	8 + 9 = ___	9 + 8 = ___
___ = 9 + 2	___ = 9 + 3	___ = 9 + 4	___ = 9 + 5
9 + 6 = ___	9 + 7 = ___	9 + 8 = ___	3 + 8 = ___
___ = 4 + 8	___ = 5 + 8	6 + 8 = ___	7 + 8 = ___

Make a 10 Equation Cards

8 + 8 = ___	8 + 3 = ___	8 + 4 = ___	8 + 5 = ___
___ = 8 + 6	___ = 8 + 7	___ = 7 + 4	___ = 7 + 5
7 + 6 = ___	7 + 7 = ___	4 + 7 = ___	5 + 7 = ___
___ = 6 + 7	___ = 5 + 9	___ = 6 + 9	___ = 7 + 9
4 + 8 = ___	5 + 8 = ___	6 + 8 = ___	9 + 4 = ___

Strategy: Make a 10	**Name of Activity: Highlight a 10** **O4**
Description: Use this strategy when one of the addends is a 8 or 9	**Materials:** Highlight a 10 (8 and 9 cards - copy on one color bristol), Highlight a 10 (3 - 9 cards - copy on a different color of bristol), 2 different color highlighters (or colored pencils), Highlight a 10 Sheet

Opportunity to Practice Make a 10 (Addition) Strategy/Directions:

1. Students work in pairs.

2. Put both decks of cards face down.

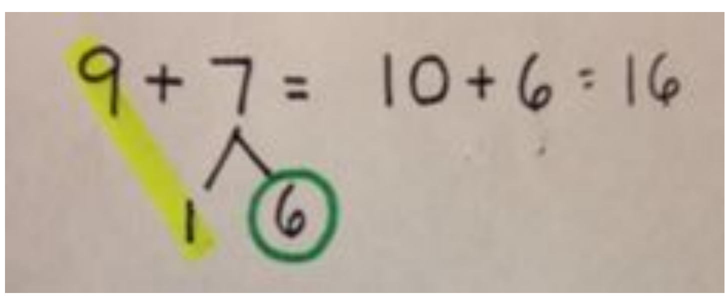
3. Student A draws 1 card from each pile (i.e., 9 and 7).

4. Student A states that 9 is close to 10 so s/he will use the Make a 10 strategy. S/he then states that s/he will decompose the other addend (7) to do this.

5. Student A uses the Highlight a 10 Sheet to write the equation (9 + 7 = __).

6. Student A conducts a think aloud as s/he decomposes the 7 into 1 and 6.
   Highlights the 9 and 1 (Make a 10).
   Circles the 6 in the other color highlighter
   Rewrite the equation as 10 + 6 = 16.
   Student B listens and asks questions as needed.

7. Students switch roles.



Highlight a 10 Cards (8s & 9s - copy one color bristol)

8	8	8	8
8	8	8	8
8	8	9	9
9	9	9	9
9	9	9	9

Highlight a 10 Cards (3 - 9 - copy different color bristol)

3	3	3	4
4	4	5	5
5	5	6	6
6	7	7	7
8	8	9	9

Highlight a 10

Name ______________________________ Date ______________________________

1.	2.
3.	4.
5.	6.

Look at your work above. Explain what the problems have in common and how or why the Make a 10 strategy is helpful.

____

____

____

____

Doubles +2
Two Apart
Facts

TOC

Strategy: Doubles +2 (Two Apart Facts)	**Application and Teaching the Strategy**
Description: Facts that have addends that are two away from each other.	**Materials:** chart paper or document camera, dry erase boards/markers/erasers, number cards (see Part 1 directions), chips, ten frames

Application:

Materials for Application: paper/whiteboard, document camera

Application:
"As you know, we always start a new fact strategy with application problems. When we go over this problem, I want you to think about the relationship between these numbers and a way to decompose one of them to apply a friendly strategy. Here is our first question..."

"Neva has 7 paperclips in her left hand and 9 paperclips in her right hand. How many paperclips does she have in all?"

"What do you know about 7 and 9? How are they related in some way?"

Looking for students to recognize:

- they are only 2 apart
- if you decompose 9, you could have a double 7 and 2 more (7 + 7 + 2)

Have student share what they know. Ask questions if students are not making connections to the two bullets above.
Continue to solve the problem as a group.

"We call this strategy the <u>Doubles + 2 or Two Apart Facts</u>."
"7 and 9 are two apart from one another. When you <u>decompose</u> the 9 into 7 and 2, you can apply the <u>Doubles Strategy</u> then add on the other 2: 7 + 7 + 2 = 16"

Keep in mind, students may want to apply the Make a 10 strategy - which is fine and demonstrates retention and <u>flexibility</u>! However, the goal is to teach them this strategy as another option.

"For this one, I will want you and your partner to talk it out. If you need a dry erase board to show your thinning, feel free to use one."
"Len has 8 sticks of butter in the refrigerator and bought 6 more for a baking project. How many sticks of butter does he now have?"

Teaching Strategy - Part 1:

Materials for Part 1: number cards (choose ones that are 2 apart from each other like 5, 6, 7, 8, 9), ten frames, chips, dry erase boards/markers/erasers

The teacher will ask a student to come up and model this activity for the class.
Under the document camera, the teacher hands the student a 6 and keeps a 4 for her/himself. Both show the class their numbers.
"You have a 6 and I have a 4. Let's have both of us show this on our ten frames with chips." Both do this. Ask the student, "What do you notice about these two numbers or quantities?" If the student doesn't acknowledge that they are two away from each other or that 4 is part of 6 (hierarchical inclusion), then ask guiding questions.
"Yes - these two numbers are two apart from each other. Which number should we decompose to have a double?"
The student should say 6. "Go ahead and show me how you would decompose 6 so that we have a double." The student can flip the chips over exposing a different color or move them off of the 10 frame.
"If we were to add these two numbers, can you explain to the class how we now have a doubles +2 problem?" The student would explain and write the equation that is represented in the chips: 4 + 4 + 2 = 10
**Ask the class to be flexible mathematicians and explain to their partners a DIFFERENT strategy that works with 4 + 6. A strategy already learned and practiced would be Combinations of 10!

If needed, model this again with another student.

Have students pair up with their dry erase boards/markers/erasers, chips and ten frames. Give pairs of students numbers that are 2 apart from one another. Ask them to show, defend and write how their equation could be a Doubles + 2 problem.

If there is time, have students change numbers with another pair and practice again.

Strategy: Doubles +2 (Two Apart Facts)	**Name of Activity: Doubles +2 Decompose to Double -** **Adapted from Bay-Williams & SanGiovanni** **P2**
Description: Facts that have addends that are two away from each other.	**Materials:** part-part-whole models (both bigger one and page with smaller ones), manipulatives (ideally two-sided colored counters), doubles +2 fact cards, plastic sleeves/dry erase markers/erasers

Opportunity to Practice Doubles +2 Strategy/Directions:

****This activity should be practiced before some of the more abstract activities offered for Doubles +2.

Decide how the students will show their work:

A. Put the larger model in a plastic sleeve, students put manipulatives on the model and use a dry erase marker to show their work.

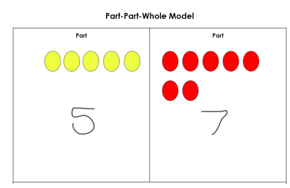
B. Put the manipulatives on the larger model, but then use the smaller ones to record their thinking.

***Either way, students should use manipulatives to demonstrate understanding.

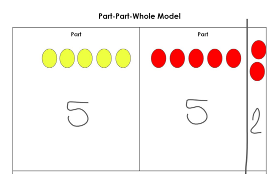
1. Students work in pairs.

2. Student A draws an equation card.

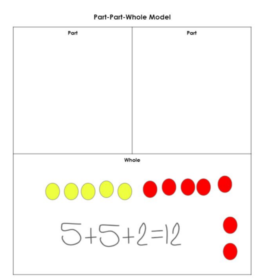
5 + 7 = __



3. (Using the larger model in a plastic sleeve) Student A puts the number of manipulatives on the "<u>parts</u>" portion of the model and labels the boxes with numbers. The student says, "These 5 and 7 are the <u>addends</u> and they are the '<u>parts</u>' in this problem."



4. Student A now explains to Student B how to find the <u>double</u> within the problem to help solve it. The student also draws a line and decomposes the <u>larger addend</u> to reveal the double. For example, "I will move 2 from the 7 over and draw a line. I <u>decomposed</u> the 7 into 5 and 2. Now I can use the <u>Doubles +2 Strategy</u> to solve this."



5. The student says "5 + 5 + 2 = 12." and pushes the <u>total quantity/sum</u> to the bottom portion (<u>whole</u>).

5 + 7 = 12 5 + 5 + 2 = 12

6. Since the model is in a plastic sleeve the student can also write the <u>equations</u> at the bottom: 5 + 7 = 12 5 + 5 + 2 = 12

Encourage students to challenge one another.

Is there another way to say or write this? How? Why does it work? (see example below)

After placing the manipulatives on the larger model, instead of writing on the plastic sleeve, students could draw/write on the smaller models with pencils and/or colored pencils.

Reminder: This activity lends itself to opportunities for students to apply both the <u>Commutative and Associative Properties</u>. Be sure students apply <u>precise language/vocabulary</u> when sharing their ideas.

For example: If the student decomposed the 7 into 5 and 2 and wrote 5 + 2 + 5 then rewrote it (or said it) by grouping the 5s together (5 + 5) + 2, be sure to remind them to <u>label their strategy</u> as the Associative Property!

TOC

Part-Part-Whole Model

Part	Part
Whole	

Part-Part-Whole Models

Part	Part
Whole	

Part	Part
Whole	

Part	Part
Whole	

Part	Part
Whole	

Doubles + 2 Fact Cards

9 + 7 = __	7 + 9 = __	8 + 6 = __	6 + 8 = __
5 + 7 = __	7 + 5 = __	4 + 6 = __	6 + 4 = __
3 + 5 = __	5 + 3 = __	9 + 7 = __	7 + 9 = __
8 + 6 = __	6 + 8 = __	8 + 10 = __	10 + 8 = __
7 + 5 = __	5 + 7 = __	6 + 4 = __	4 + 6 = __

Strategy: Doubles + 2	**Name of Activity: If...Then… Doubles + 2** **P3**
Description: Facts that have addends that are two away from each other.	**Materials:** if...then...cards (copy in colored ink), generic game board, 1 die per pair of students

Opportunity to Practice Doubles + 2 (Addition) Strategy/Directions:

The cards should be printed in colored ink so students can see the difference in the model.

1. Students work in pairs.
2. Student A draws a card, reads the statement aloud and fills in the answer. If Student A is correct, s/he rolls the die and moves forward that many spaces. If the student is incorrect, Student B can coach.
3. The students continue taking turns.

Adaptations: There are different sets of cards - some have visual models and others do not.

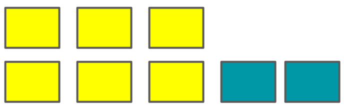
Students could also use these as a quick warm-up during the fluency part of core math by pairing up and using these without a game board.

Another option would be to use these for Quiz-Quiz-Trade.

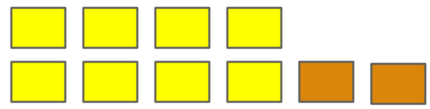
Accountability Recommendation: When there is only approximately 5 minutes left, have students choose one or two of the cards <u>without</u> the models (pictures). On a sheet of paper or in a math journal, have the draw a model and write equation(s) that defend how the strategy works. For example, they could draw ten frames or number bonds to help explain the <u>decomposition</u> and revealing of the <u>double</u>.

If… Then…Doubles +2

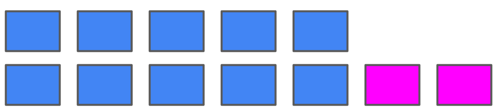
If I know
3 + 3 = ____,
then I know
3 + 5 = ____.



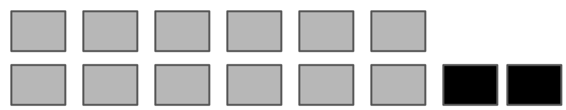
If I know
4 + 4 = ____,
then I know
4 + 6 = ____.



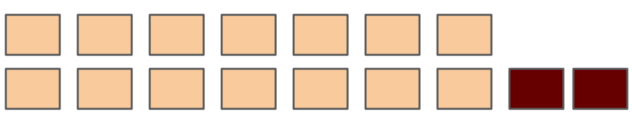
If I know
5 + 5 = ____,
then I know
5 + 7 = ____.



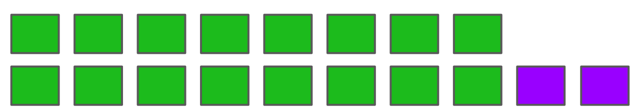
If I know
6 + 6 = ____,
then I know
6 + 8 = ____.



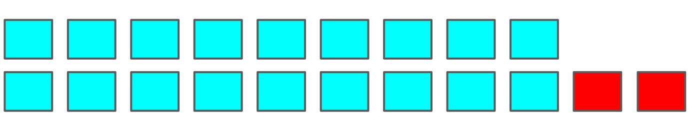
If I know
7 + 7 = ____,
then I know
7 + 9 = ____.



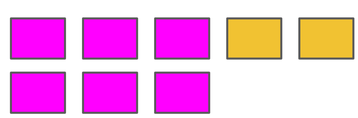
If I know
8 + 8 = ____,
then I know
8 + 10 = ____.



If I know
9 + 9 = ____,
then I know
9 + 11 = ____.

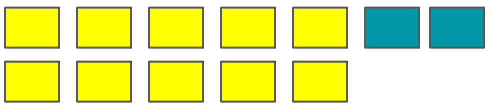


If I know
3 + 3 = ____,
then I know
5 + 3 = ____.

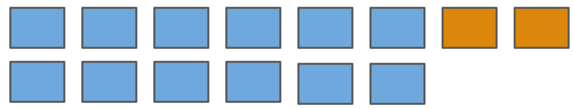


If… Then...Doubles +2

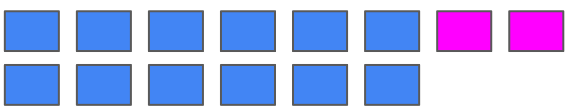
If I know
4 + 4 = ____,
then I know
6 + 4 = ____.



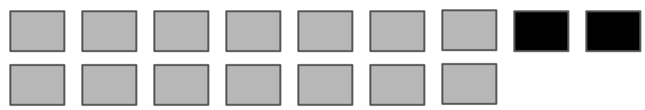
If I know
5 + 5 = ____,
then I know
7 + 5 = ____.



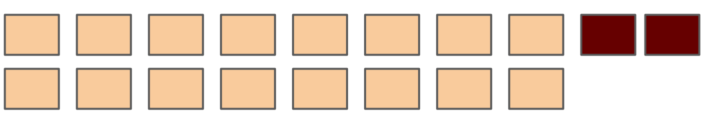
If I know
6 + 6 = ____,
then I know
8 + 6 = ____.



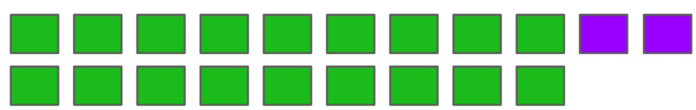
If I know
7 + 7 = ____,
then I know
9 + 7 = ____.



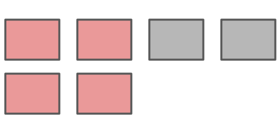
If I know
8 + 8 = ____,
then I know
10 + 8 = ____.



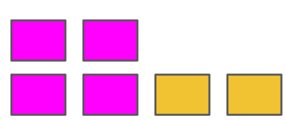
If I know
9 + 9 = ____,
then I know
11 + 9 = ____.



If I know
2 + 2 = ____,
then I know
4 + 2 = ____.



If I know
2 + 2 = ____,
then I know
2 + 4 = ____.



If… Then...Doubles +2

If I know 3 + 3 = _____, then I know 3 + 5 = _____.	If I know 4 + 4 = _____, then I know 4 + 6 = _____.
If I know 5 + 5 = _____, then I know 5 + 7 = _____.	If I know 6 + 6 = _____, then I know 6 + 8 = _____.
If I know 7 + 7 = _____, then I know 7 + 9 = _____.	If I know 8 + 8 = _____, then I know 8 + 10 = _____.
If I know 9 + 9 = _____, then I know 9 + 11 = _____.	If I know 3 + 3 = _____, then I know 5 + 3 = _____.

If… Then...Doubles +2

If I know 4 + 4 = ____, then I know 6 + 4 = ____.	If I know 5 + 5 = ____, then I know 7 + 5 = ____.
If I know 6 + 6 = ____, then I know 8 + 6 = ____.	If I know 7 + 7 = ____, then I know 9 + 7 = ____.
If I know 8 + 8 = ____, then I know 10 + 8 = ____.	If I know 9 + 9 = ____, then I know 11 + 9 = ____.
If I know 2 + 2 = ____, then I know 4 + 2 = ____.	If I know 2 + 2 = ____, then I know 2 + 4 = ____.

SQUARES: Doubles +2

The goal is to be the first person to cover 4 spaces in the shape of a square.

7	19	14	8	12	16	10
10	12	18	13	9	8	12
8	13	18	14	12	10	16
18	16	12	15	14	16	14
10	14	18	17	16	20	8

Materials:
If sharing a game board, you will need 2 different color semi-clear chips (one color for each player). If using 2 game boards, the semi-clear chips can be any color.

Equation cards (+2)

Player A draws a card and solves it. If the answer is available on the board, she/he places one of her/his chips on that spot. If the number has already been covered or is not present on the board, she/he loses his turn.

The first player to cover 4 spots that makes a square wins the game.

When the game ends, players should explain to each other how the +2 strategy works.

****ONLY USE when students are ready for “know from memory” or are using the PPPs for this strategy****

Strategy: Doubles + 2	**Name of Activity: Random Numbers Doubles + 2** **P5**
Description: Facts that have addends that are 2 away from each other	**Materials:** random numbers CD or internet site with numbers being called (teacher will call out the other number), recording sheet

Opportunity to Practice Doubles +2 Strategies/Directions:

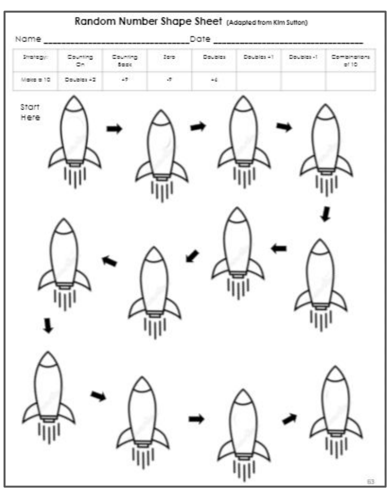
If possible, use the Random Number CD or digital download by Kim Sutton.

The Random Number CD is a valuable tool for motivating students to practice. The CD is designed to generate the digits 0 - 9 with background music. This helps students learn to filter out unnecessary sounds and listen for important information. Students also can’t ask the CD to repeat itself! Students find this form of practice fun. There are several tracks to choose from, as well as a variety of rates.

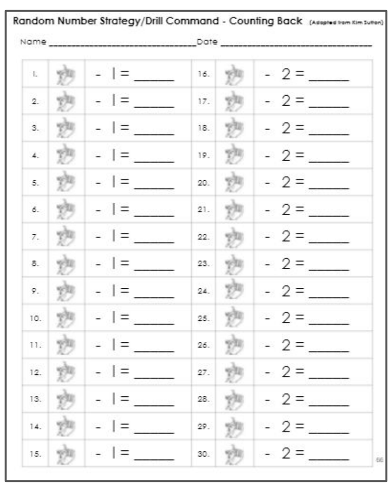
The random number CD can be used with any drill command using the four operations. When a number is called out, the student would perform that drill command *(double it then add 2 etc.)* and record the sum or difference. This would continue down the columns.

There may be other online number generators if you have not purchased the CD or digital download.

Teachers can use the Random Number Recording Sheet or Random Number Strategy/Drill Command Sheet. See the back of the book for the Random Number Recording Sheets.



Student writes the sums/differences in the shapes on the page.



Student listens for the number called on the CD, follows the command, then writes the sum/difference.

Tip: If this activity is too challenging for students, consider providing them more opportunities at the concrete level. Also, there are additional foundational lessons that precede these lessons in the book, *Math Drills to Thrill* (Kim Sutton).
For example:
- Numbers I Hear
- Numbers I Know
- What Comes Before?
- Etc.

This activity can be conducted two ways:
1. The number is called out from the CD, the student doubles it, and then adds 2.
2. (Recommended) The number is called out from the CD (1-9), the teacher calls out the other addend that is two away (i.e., CD calls out 6. The teacher immediately calls out 4 or 8). The students apply the Doubles + 2 strategy to solve (i.e., 6 + 4 = 10   4 + 4 + 2 = 10   or   6 + 8 = 14   6 + 6 + 2 = 14)

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Random Number Strategy/Drill Command - Doubles + 2 **(Adapted from Kim Sutton)**

****CD/digital call of numbers 1 - 9. The teacher calls a number that is 2 away from that number (greater or lesser). The students apply the Doubles + 2 strategy to solve and writes the sum.)**

Name ________________________________ Date ________________________________

1.				16.			
2.				17.			
3.				18.			
4.				19.			
5.				20.			
6.				21.			
7.				22.			
8.				23.			
9.				24.			
10.				25.			
11.				26.			
12.				27.			
13.				28.			
14.				29.			
15.				30.			

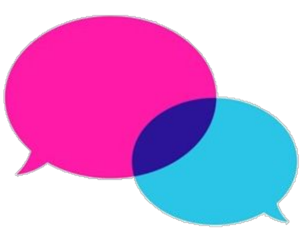
Random Number Strategy/Drill Command - Doubles + 2 (Adapted from Kim Sutton)

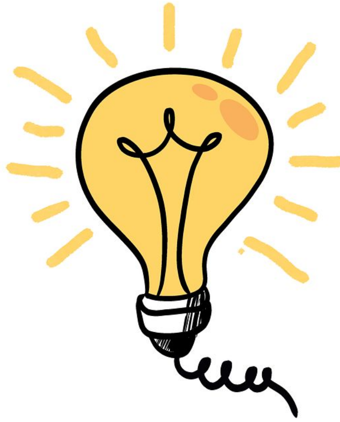
Name ______________________________ Date ______________________________

1.		double + 2 = ________	16.		double + 2 = ________
2.		double + 2 = ________	17.		double + 2 = ________
3.		double + 2 = ________	18.		double + 2 = ________
4.		double + 2 = ________	19.		double + 2 = ________
5.		double + 2 = ________	20.		double + 2 = ________
6.		double + 2 = ________	21.		double + 2 = ________
7.		double + 2 = ________	22.		double + 2 = ________
8.		double + 2 = ________	23.		double + 2 = ________
9.		double + 2 = ________	24.		double + 2 = ________
10.		double + 2 = ________	25.		double + 2 = ________
11.		double + 2 = ________	26.		double + 2 = ________
12.		double + 2 = ________	27.		double + 2 = ________
13.		double + 2 = ________	28.		double + 2 = ________
14.		double + 2 = ________	29.		double + 2 = ________
15.		double + 2 = ________	30.		double + 2 = ________

Strategy Focus Review

Make a 10
Doubles + 2 or Two Apart Facts
Add/Subtract 10





Strategy Focus Review - **Make a 10/Doubles + 2 or Two Apart Facts/Add/Sub. 10**

Students need to practice the strategies that have been taught and defend which facts are best solved with particular strategies.

Materials:

1 Spinner per two students (use paperclip/pencil to create a spinner or buy spinners and add)

Fact Cards that align to this strategy (cut out)

1 Fact Cards sheet per student that aligns to this strategy (NOT cut out)

1 Strategy Sorting Mat that aligns to this strategy

Abbreviations to Play:

Doubles + 2 = D+2	Make a 10 = M10
Add 10 = A10	Subtract 10 = S10

To Model How to Play:

Option 1: Part A: Ask a student to join you to model this process. You will need the spinner and the Fact Cards sheet (NOT cut out, 1 per person), and pencils. Put the spinner under a document camera. Spin it. As a class, read the strategy (i.e., Doubles + 2). Identify 1 problem that you could apply this strategy and write "D+2" in tiny print next to that problem (i.e., 4 + 6 = ___, etc.) Read the equation (including the sum/difference). Continually explain WHY this strategy is a successful one. Now the student spins, names the strategy, reads the equation, and writes the abbreviation on his/her sheet - again explaining WHY that strategy works. Agree? Disagree? Encourage discourse. Model another round.

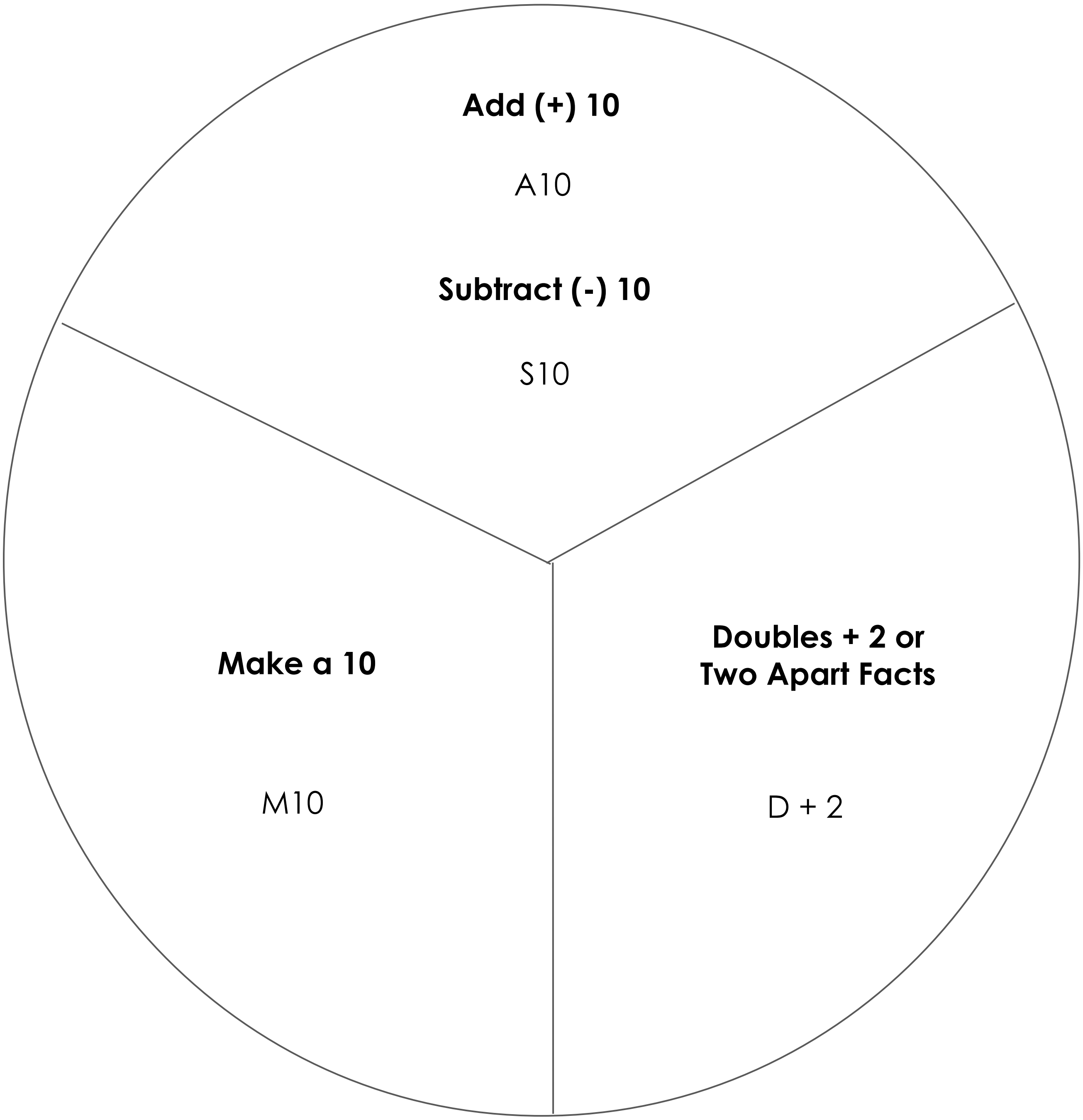
****At this point in the year, multiple strategies can be applied to problems (i.e., 6 + 8 = ___ Doubles +2 or Make a 10). Students are encouraged to agree/disagree and explain why.*

Part B: After a few turns, you and the student solve the labeled problems. When the problems have been solved, students can choose a few and explain which strategy they applied. Multiple opportunities to make connections between the strategies and the problems themselves will lead to students being able to move this learning to memory (automaticity).

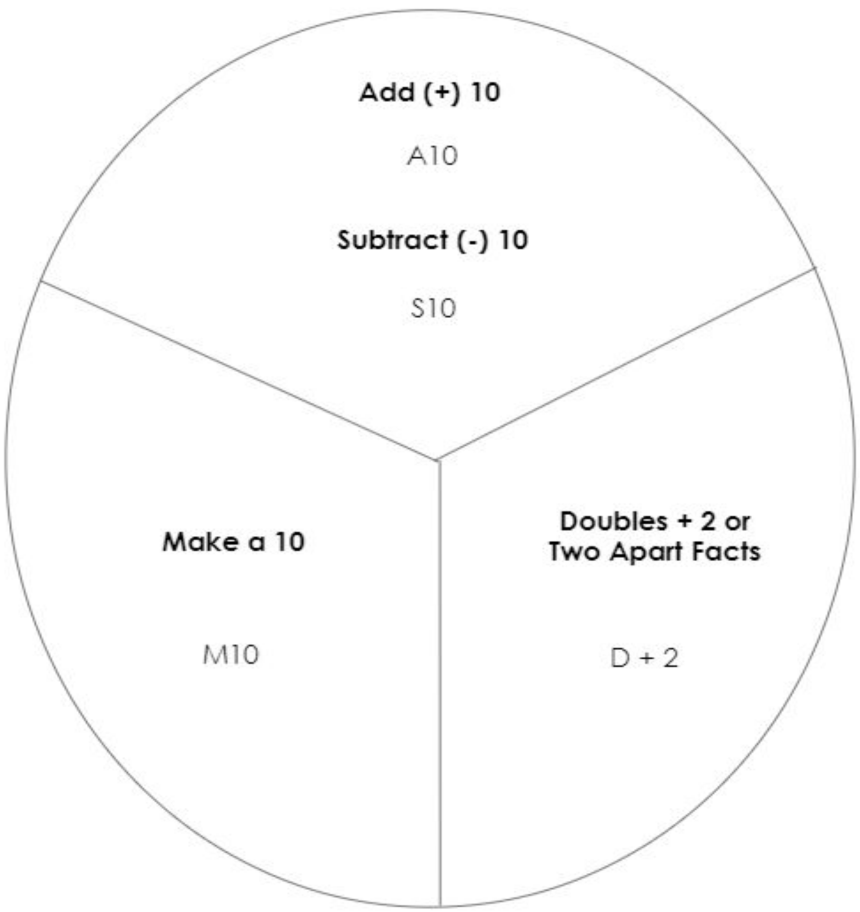
Option 2: Ask a student to join you to model this process. You will need the Fact Cards (cut out) and a copy of the sorting mat. Put the spinner under the document camera. Spin it. As a class, read the strategy (i.e., Add 10). Each person picks one card that represents this strategy, reads the equation to their partner and places it on the sorting mat. (i.e., "4 + 10 = 14 Adding 10 to a single digit number will make a two digit number. The number in the ones column stays the same as the other addend." Be sure to acknowledge when students apply the properties. Ask students to identify all strategies applied to make further connections! Layer in that vocabulary so students comprehend there is a classroom expectation of being precise.

Continue to sort the cards. Students could also move cards to another part of the sort if they can defend why that strategy would also work (**FLEXIBLE THINKING**...part to the definition of 'fluency'! :o)

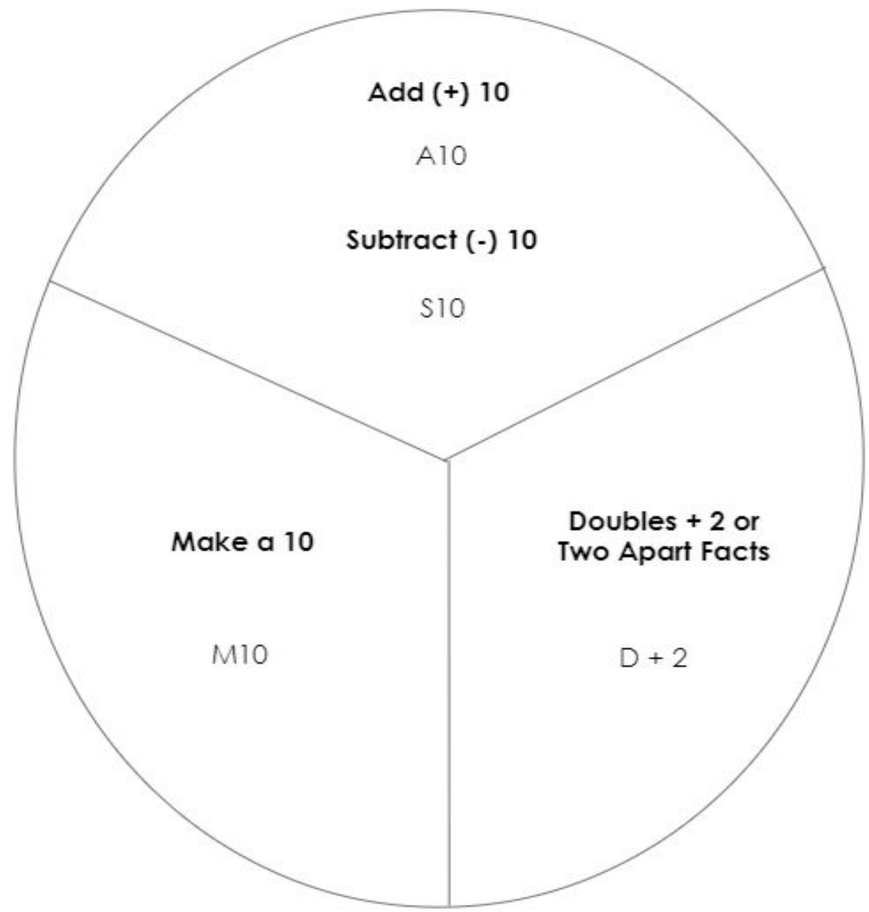
Strategy Focus Review - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10



Strategy Focus Review - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10



Strategy Focus Review - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10



Strategy Focus Review Sorting Mat - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10

Doubles +2 or Two Apart Facts	Make a 10
Add (+) 10	**Subtract (-) 10**

Strategy Focus Review Sorting Mat - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10

Doubles +2 or Two Apart Facts	Make a 10
Add (+) 10	**Subtract (-) 10**

Write at least 3 problems in each box above that aligns to that strategy.

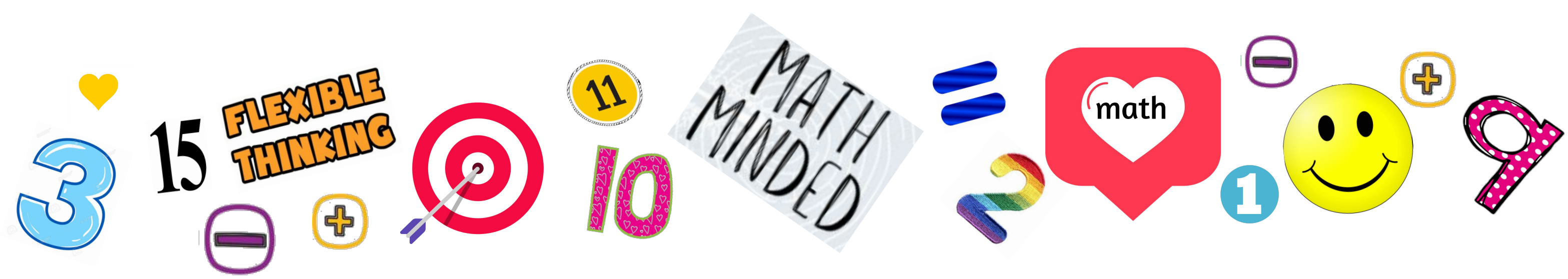
Choose 1 of the strategy boxes above and explain how it works below (pictures/models/words).

Fact Cards - Make a 10/Doubles + 2 or Two Apart Facts/Add & Sub. 10

___ = 3 + 10	___ = 4 + 6	___ = 19 - 10	___ = 7 + 8
10 - 10 = ___	18 - 10 = ___	9 + 6 = ___	7 + 8 = ___
___ = 10 - 10	___ = 12 - 10	___ = 5 + 3	___ = 9 + 8
17 - 10 = ___	7 + 9 = ___	11 - 10 = ___	13 - 10 = ___

6 + 8 ___	6 + 4 ___	15 - 10 ___	4 + 10 ___	4 + 9 ___	12 - 10 ___	4 + 8 ___
7 + 9 ___	8 + 5 ___	19 - 10 ___	7 + 5 ___	3 + 5 ___	10 + 9 ___	5 + 7 ___

+ 9/- 9



TOC

Strategy: +9/-9	**Application and Teaching the Strategy**
Description: Facts that have 9 as an addend or as the subtrahend.	**Materials:** chart paper (anchor chart), document camera, some students may need a dry erase board/marker/eraser, transparent chips, hundred boards, equation cards

Application:

Materials for Application: paper/whiteboard, document camera, chart paper to start an anchor chart

Application (Addition):
As the teacher is questioning the students and listening to their responses, create an anchor chart for +9/-9.
"Sometimes people think 9 is a tricky or difficult number to work with when we add or subtract. But...I'm wondering if we can think about 9 differently? What benchmark number is 9 close to? Tell your partner." Students say "10".
"Tell your partner why 10 is a friendly or benchmark number. Give an example as you are explaining your thinking." Students could mention we have a lot of strategies that include 10 (Make a 10, Add 10, Subtract 10, Combinations of 10, 10 is easy because it has a zero in the ones place, etc.). Have a few students share out.
"We LOVE 10, don't we? I'm thinking we can use this to our advantage when working with 9. What is the difference between 9 and 10? Tell your partner." Students will say "1".
"Yes...1. So if we are adding 9, could we just add 10? What else would be do? Why?"
"If we are subtracting 9, could we subtract 10? What else would be do? Why?"
"Okay keep these ideas in your mind as we work through a couple of application problems."

"The principal had 7 desks in the hallway. The teacher put 9 more in the hallway. How many desks are sitting in the hallway?"
Have the students discuss the situation with their peers. Have them illustrate the problem on their dry erase boards. If students are not making a connection to adding 10, guide them with questions.

"The baker made 9 cookies on the tray. His helper put 8 more on the tray. How many cookies do they have now?"

Repeat the discussion/opportunity to show thinking.

Teaching Strategy - Part 1:

Materials for Part 1: hundred charts, transparent chips, equation cards

Give each student a hundred chart and a transparent chip/counter. The teacher will have the same supplies under the document camera. Explain that the hundred chart will help show the +9 strategy. Tell the students to place the hundred chart in front of them and put the transparent chip at the top of the hundred chart (meaning above the numbers).

"Watch me. I'm going to put my chip on 8. If I add 10 (count up 10 spaces), where does my chip land?" Students say 18. "Turn and talk - did I *NEED* to count up the spaces? Why or why not?" Have a student share their answer.

"Okay, let's have you do it with me this time. Put your chip on 5. Add 10. Where does your counter stop or land? What is the sum?" Have student discuss.
"Did you need to count all the spaces up to 15? Why or why not?"

"Let's do one more. Put your counter on 7. Add 10. What is the sum?"

SMP 7 & 8

"What is the pattern you are noticing each time we add 10? What generalization can you state?"

"This time, I am going to draw an equation card and solve it using the +9 Strategy." Teacher draws 7 + 9 = ____ "I will put my chip on 7. I will add 10 because it is a friendly number to work with. That gives me 17 for the sum. But...the problem says 7 + 9, not 7 + 10. What do I do to show that I added 9 and not 10? Turn and talk to your partner." Student will share that I need to backup or subtract 1 because 9 is one less than 10. Teacher then moves the chip back to 16.

"This time you do it with me." Teacher draws the card 9 + 9. "I know this is a Double, but I want to practice the +9 Strategy. I put my chip on ___? Yes, 9. Then I add the friendly number of ___. Yes, 10. This gives us a sum of ____. Yes, 19. Now I subtract 1 to have a total of ____. Yes, 18."

Teacher has the class practice a few more as s/he walks around, observes and listens.

Application:

Materials for Application: paper/whiteboard, document camera, chart paper to start an anchor chart

Application (Subtraction):
Continue to add to the anchor chart.

"We know that adding 10 in place of 9 is helpful because 10 is an easy or friendly number to work with. I'm wondering if this is also true when we subtract. Can we subtract 10 instead of 9 to make the problem easier? If we can, would you follow the same step of subtracting 1 to come up with your answer? Talk this out with your partner."

“Let’s see how the -9 Strategy works in an application problem.”

“Tori has 14 hair rubber bands. Her aunt took 9 of them to do her sister’s hair. How many hair rubber bands does Tori have left?”
Students work through the problem with their dry erase boards/markers and/or hundreds boards. Teacher should listen and observe to see how the students are applying the -9 Strategy (subtracting 10/adding 1).

Teaching Strategy - Part 2:

Materials for Part 2: hundred charts, transparent chips, equation cards

This activity is the same as the +9 strategy.

Give each student a hundred chart and a transparent chip/counter. The teacher will have the same supplies under the document camera. Explain that the hundred chart will help show the -9 Strategy.

“Turn to your partner and explain how we used our chip and hundred charts to show the +9 Strategy. What did we do and why?”

“Let’s try this now with -9.” Practice with teen numbers as the minuends and 9 as the subtrahend. Be sure students are using their chips/hundred boards to show this strategy.

“Okay - we have practiced a few. What <u>patterns</u> are you noticing this time? What <u>generalizations</u> can you make?”

SMP 7 & 8

+9 Equation Cards

$2 + 9 =$ ___	$3 + 9 =$ ___	$4 + 9 =$ ___	$5 + 9 =$ ___
___ $= 6 + 9$	___ $= 7 + 9$	___ $= 8 + 9$	___ $= 9 + 9$
$9 + 2 =$ ___	$9 + 3 =$ ___	$9 + 4 =$ ___	$9 + 5 =$ ___
___ $= 9 + 6$	___ $= 9 + 7$	___ $= 9 + 8$	___ $= 9 + 9$
$4 + 9 =$ ___	$5 + 9 =$ ___	$6 + 9 =$ ___	$7 + 9 =$ ___

-9 Equation Cards

12 - 9 = ___	13 - 9 = ___	14 - 9 = ___	15 - 9 = ___
___ = 16 - 9	___ = 17 - 9	___ = 18 - 9	___ = 19 - 9
20 - 9 = ___	12 - 9 = ___	13 - 9 = ___	14 - 9 = ___
___ = 15 - 9	___ = 16 - 9	___ = 17 - 9	___ = 18 - 9
19 - 9 = ___	20 - 9 = ___	16 - 9 = ___	17 - 9 = ___

Strategy: +9/-9	**Name of Activity: Add 10, Subtract 1 or Subtract 10, Add 1** **R2**
Description: Facts that have 9 for at least one addend or have 9 as the subtrahend	**Materials:** hundred charts (or number lines to 20), transparent chips (about 8-10 per student), recording sheet, +9/-9 cards from teaching strategy pages

Opportunity to Practice +9 (Addition) Strategy/Directions:

****This strategy should only be practiced once students have demonstrated proficiency with +10 and -10.

1. Students work in pairs.
2. Student A draws an equation card. With his hundred board (or number line to 20), Student A:
   - States the <u>equation</u>.
   - Places his chip on the <u>addend</u> that is not a 9 (if 9 + 9, then place the chip on 9).
   - <u>Name the +9 Strategy</u> and explain it by doing a think aloud and <u>modeling</u> (moving his chip) adding 10 then subtracting 1.
   - He leaves his chip on the <u>sum</u> (i.e., 15).

   $\boxed{6 + 9 = \_\_\_}$

3. Student A writes his equation on one of the spaces on the recording sheet.
4. Student B checks for accuracy (including listening for precise vocabulary) then takes a turn. Again, leaving the chip on the sum.

   SMP 6

5. If students draw the same equation, they follow the same steps and put a second chip on top of the sum.
6. The first student to have three chips in a row (touching one another) wins.

Opportunity to Practice -9 (Subtraction) Strategy/Directions:

****This strategy should only be practiced once students have demonstrated proficiency with +10 and -10.

Follow the same directions above but:
- Place chip on the minuend
- Subtract 10 then add 1

TOC

+9 Strategy: Add 10, Subtract 1 (+10, -1)

Name ______________________________ Date ____________________

☐ + 9 = ☐	☐ = 9 + ☐
9 + ☐ = ☐	9 + ☐ = ☐
☐ + 9 = ☐	☐ = ☐ + 9
☐ = ☐ + 9	☐ = 9 + ☐
☐ = 9 + ☐	☐ + 9 = ☐
☐ = 9 + ☐	9 + ☐ = ☐

Explain how the +9 Strategy works:

-9 Strategy: Subtract 10, Add 1 (-10, +1)

Name ______________________________ Date ____________________

☐	-	9	=	☐	☐	-	9	=	☐
☐	=	☐	-	9	☐	=	☐	-	9
☐	-	9	=	☐	☐	-	9	=	☐
☐	=	☐	-	9	☐	=	☐	-	9
☐	-	9	=	☐	☐	-	9	=	☐
☐	=	☐	-	9	☐	=	☐	-	9

Explain how the -9 Strategy works:

SQUARES: +9/-9

The goal is to be the first person to cover 4 spaces in the shape of a square.

2	19	13	8	5	16	3
10	7	19	4	12	1	17
6	13	9	14	12	15	3
18	7	11	9	14	9	14
4	19	5	12	6	20	8

Materials:
If sharing a game board, you will need 2 different color semi-clear chips (one color for each player). If using 2 game boards, the semi-clear chips can be any color.

Equation cards (+9/-9)

Player A draws a card and solves it. If the answer is available on the board, she/he places one of her/his chips on that spot. If the number has already been covered or is not present on the board, she/he loses his turn.

The first player to cover 4 spots that makes a square wins the game.

When the game ends, players should explain to each other how the +9 and -9 Strategies work.

Strategy: +9/-9	**Name of Activity: Ball Bounce Bump - +9 (Add 10, Subtract 1)** **R4**
Description: Facts where one of the addends is 9	**Materials:** this game board per pair of students, equation (fact) cards for +9, two different colored markers/chips (transparent chips are best)

ball bounce bump

+9 Strategy
(+ 10 then -1)

Material Needed: equation cards for +9

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Draw a card.
2. Determine the sum.
3. Locate the answer on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If the answer is already covered by one of your chips, you can stack another one of your chips on top of the one that is there and "lock" your chip into place. No one can bump you off of that number now.

   If the answer is not available on the board, the next player takes his/her turn.

4. The player to use all of his/her chips first wins the game!

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Strategy: -9	Name of Activity: Ball Bounce Bump -9 (Subtract 10, Add 1) **R5**
Description: Facts where the subtrahend is 9	**Materials:** this game board per pair of students, equation (fact) cards for -9, two different colored markers/chips (transparent chips are best)

ball bounce bump

-9 Strategy
(- 10 then +1)

Material Needed: equation cards for -9

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Draw a card.
2. Determine the difference.
3. Locate the answer on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If the answer is already covered by one of your chips, you can stack another one of your chips on top of the one that is there and "lock" your chip into place. No one can bump you off of that number now.

   If the answer is not available on the board, the next player takes his/her turn.
4. The player to use all of his/her chips first wins the game!

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Strategy: +9/-9	Name of Activity: Ball Bounce Bump - +9/-9	R6
Description: Facts where one of the addends is 9 or the subtrahend is 9	**Materials:** this game board per pair of students, equation (fact) cards for +9/-9, two different colored markers/chips (transparent chips are best)	

+9/-9 Strategy
(+ 10 then -1 or -10 then +1)

Material Needed: equation cards for +9 and -9

Two different colored markers/chips (transparent ones work best - at least 10 chips per person)

1. Draw a card.
2. Determine the sum or difference.
3. Locate the answer on the board and cover that space with your chip. If your partner is already on that number, you can bump him/her off that space and claim that number. Your partner takes back his/her chip and can use it again later.

   If the answer is already covered by one of your chips, you can stack another one of your chips on top of the one that is there and "lock" your chip into place. No one can bump you off of that number now.

   If the answer is not available on the board, the next player takes his/her turn.
4. The player to use all of his/her chips first wins the game!

12		19	10	
7	16		15	17
13	9	4	18	6
14		5	17	
8	11	14		3

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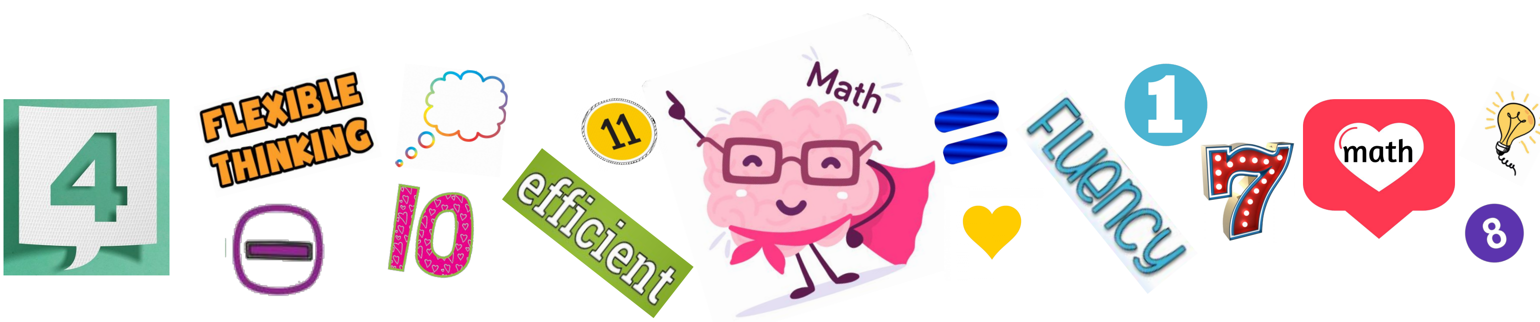
Other Subtraction Strategies & Opportunities

These include related equations/fact families, as well.



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Strategy: Subtraction - Think Addition	**Application and Teaching the Strategy** **S2**
Description: Problems that are subtraction or have a missing addend and/or using the known addition fact to solve a subtraction problem	**Materials:** Addition and Subtraction Common Situations Document, expression cards (inverse relationship)

Opportunity to Practice (Subtraction) Strategy/Directions:

Subtraction facts prove to more difficult than addition. This is especially true when children have been taught subtraction through a "count-count-count" approach. When subtraction is modeled in a way that students are encouraged to think, *"What goes with this part to make the total?"* the child will use known addition facts to produce the unknown quantity or part. **If this important relationship between parts and wholes - between addition and subtraction - can be made, subtraction facts will be much easier.** Word problems that promote think-addition are those that sound like addition but have a missing addend: Add To/Start Unknown; Add To/Change Unknown; and Put Together or Take Apart/Addend Unknown (VandeWalle 106-107).

Use the Common Addition and Subtraction Situation Document to help lesson plan and offer different problems.

Application:

Materials for Application: paper or dry erase board/markers, document camera

Application:
"We are going to use problems to help us understand the Think Addition Strategy. Let's talk about the following problems together:"

"Sara has 8 pencils. Mike has 4. How many more does Sara have than Mike?" (Compare/Difference Unknown)

"Bree has 13 cubes. She has 7 more than Jon. How many does Jon have?" (Compare/Smaller Unknown)

"Sam's grandpa gave him 16 cookies to share. Sam shared some of the cookies. He now has 8 cookies left. How many cookies did Sam share?" (Take Apart/Addend Unknown)

"Josie has 9 carrot sticks. She gave 4 to her friend Juan. How many carrots does Josie have left?" (Taken From/Result Unknown)

"Parker has 13 stuffed animals. 7 of them are new. How many has he had for awhile?" (Put Together-Take Apart/Addend Unknown)

"Shay had 9 pennies. She gave some to Rod. She has 6 left. How many did she give to Rod?" (Taken From/Change Unknown)

Teaching Strategy - Part 1:

Materials for Part 1: Expression cards (+/-), tape diagrams (part/part/whole) or number bond in a plastic sleeve, dry erase markers/erasers
Find a Plus Fact to Help: Adapted from Van de Walle 1st Edition, Vol. 1, Activity 4.16

IMPORTANT: This activity should not be the first opportunity the students are learning about the inverse relationship between addition and subtraction. This foundational and important math concept should be highlighted throughout all the strategies.

Select a couple of subtraction facts (cards cut out) that you wish to practice under the document camera or use the examples below.

Rather than calling out the answer, do a think aloud:

"Sometimes subtraction can feel tricky or difficult. But...it doesn't have to since I know that subtraction and addition are inverse operations. Addition is an operation. Subtraction is an operation. These two operations are inverse or opposite operations. So as I look at 10 - 6 (place that card under the document camera), instead of using my fingers to count back, I can think of as an addition problem, too. I know the strategy Combinations of 10 which means I know that 6 + 4 = 10 so 10 - 6 has to equal 4."

"Let me show you what that looks like on this tape diagram or part/part whole model." (model how 6 + 4 = 10 is the same thing as 10 - 6 = 4)

"I would like for you to do one with me. Let's do 14 - 7. What addition strategy or fact do you know that can help you solve this subtraction problem. Explain it to your partner."

"You have a small deck of addition and subtraction expressions. Take turns. Each choose one subtraction problem and justify how you can use an addition expression to help you think through the problem. Can you apply a specific strategy to help? If so, which one comes to mind and why?"

"What are you noticing about the numbers in the inverse expressions?"

13 - 7 = 6

minuend subtrahend difference and so.....

6 + 7 = 13

the difference becomes an addend, the subtrahend becomes an addend and the minuend become the sum

**This activity can be moved to a partner activity if more practice is needed.

Inverse Operations Expressions

4 + 8	12 - 8	8 + 4	12 - 4
5 + 4	9 - 5	4 + 5	9 - 4
9 + 7	16 - 9	7 + 9	16 - 7
7 + 7	14 - 7	8 + 8	16 - 8
6 + 4	10 - 6	6 + 7	13 - 7

Strategy: Addition/Subtraction Related Equations/Fact Families	**Name of Activity: Missing Number Cards** **S3**
Description: Think of the fact family (8 problems) to recall the missing number.	**Materials:** missing number cards, chart paper/markers (anchor chart)

Teaching Strategy - Part 1:

Materials for Part 1: missing number cards, chart paper/markers

Adapted from Missing Number Cards (Van de Walle, 1st Edition, Vol. 1, Activity 4.14)

Show children, without explanation, related numbers with the sum circled. For example: 6 11 5

"Why do you think the numbers go together? Why is one number circled?"

Have students share out.

On the anchor chart (Related Equations/Fact Families), write the number sentences that represent the relationship (fact family) - be SURE to include all 8:

6 + 5 = 11 11 - 6 = 5
5 + 6 = 11 11 - 5 = 6
11 = 6 + 5 5 = 11- 6
11 = 5 + 6 6 = 11 - 5

**By now students should be used to seeing the equations written both ways (i.e. difference at the end and the difference first).

Now show a related number set with a link and have the students discuss what number should be on the line.

For example: 4 13 ___ ____ 11 4

3

____

6

**If students need more practice, this teaching activity can be moved to a partner activity later.

Missing Number Cards - Smaller Cards

4 ___ 5	8 9 ___	___ 7 14	8 ___ 3
6 ___ 8	11 ___ 3	___ 3 6	___ 10 4
6 ___ 16	10 7 ___	9 ___ 9	___ 9 9
10 ___ 2	___ 17 10	___ 6 13	10 ___ 10
___ 8 8	5 ___ 7	9 5 ___	16 ___ 9

Missing Number Cards - Larger Cards

16 ____ 9	9 5 ____	5 ____ 7
____ 17 10	____ 8 8	10 ____ 2
10 ____ 10	____ 6 13	____ 9 9

Missing Number Cards - Larger Cards

4 ___ 5	8 9 ___	___ 7 14
6 ___ 8	11 ___ 3	___ 3 6
6 ___ 16	10 7 ___	9 ___ 9

Strategy: Missing Number/Related Equations/Fact Families and Review of Multiple Strategies	**Name of Activity: Missing Number Strips** **S4**
Description: Three related numbers (8 related equations) and reviewing most/all of the fact strategies	**Materials:** missing number strips

Opportunity to Practice Missing Number/Related Equations/Fact Families (Addition/Subtraction) Strategy/Directions:

IMPORTANT: This activity serves multiple purposes, two of which are:

- Opportunity to make connections between related numbers and all 8 equations (fact families - with a special focus on subtraction practice)
- Opportunity to review some/all of the fact strategies (students should have demonstrated proficiency on the strategies taught earlier in this resource before using all of the strips)

1. The strips should be cut out ahead of time.
2. Students work in pairs or in a group of 3.
3. The strips are placed face down in the center of the work space (i.e., table, floor, etc.).
4. The students take turns randomly taking one strip at a time, leaving it face down. The strips should be divided as evenly as possible.
5. At the same time, each player flips over a strip. They fill in the strip (this is not a race). As they are working, they are to determine which strategy aligns to the strip (i.e, Doubles, Zero, Add 10/Subtract 10, etc.). The student writes the strategy at the top of the strip.
6. Once the strip is filled out, the student flips over the strip and writes the 8 related equations that align to one of the problems on the strip.
7. Students then exchange strips, check for accuracy and ask their partner to justify how they know the strategy they chose/wrote is the correct one for the strip (explain reasoning).
8. Once both (all) students get to share, they flip over a new strip in their pile and repeat the process.

Adaptation: The teacher could selectively give students certain strips to see if their knowledge of a particular strategy has improved.

Missing Number Strips (cut vertically)

Name ______________________ Name ______________________ Name ______________________

Strategy ____________________ Strategy ____________________ Strategy ____________________

4 ___ 3	9 0 ___	___ 18 9
9 1 ___	0 ___ 0	7 ___ 7
___ 5 2	___ 4 4	12 ___ 6
___ 6 5	7 ___ 0	3 3 ___
7 1 ___	2 2 ___	10 ___ 5
2 6 ___	8 ___ 8	___ 16 8
8 ___ 1	___ 0 3	___ 7 14
1 ___ 9	1 1 ___	8 4 ___
___ 10 2	___ 0 7	10 20 ___
7 ___ 6	___ 5 0	9 ___ 9
9 2 ___	9 9 ___	___ 8 8
3 5 ___	10 ___ 10	10 10 ___

Missing Number Strips (cut vertically)

Name ______________________ Name ______________________ Name ______________________

Strategy ______________________ Strategy ______________________ Strategy ______________________

13 6 ___	___ 5 10	___ 13 4
4 5 ___	10 2 ___	4 12 ___
2 ___ 3	___ 1 9	16 ___ 7
___ 11 6	7 10 ___	9 ___ 5
5 ___ 11	4 6 ___	8 3 ___
___ 17 8	___ 3 10	___ 13 9
4 ___ 7	10 ___ 0	14 8 ___
___ 9 4	10 9 ___	5 ___ 14
___ 8 9	8 2 ___	9 8 ___
7 8 ___	___ 4 10	7 ___ 8
13 ___ 7	10 ___ 5	16 ___ 9
___ 6 5	0 10 ___	17 ___ 9

Missing Number Strips (cut vertically)

Name ______________________ Name ______________________ Name ______________________

Strategy ____________________ Strategy ____________________ Strategy ____________________

10 ___ 10	9 14 ___	
4 10 ___	5 ___ 14	
10 2 ___	3 9 ___	
16 6 ___	___ 9 19	
___ 14 10	6 ___ 9	
1 ___ 11	13 ___ 4	
13 3 ___	5 14 ___	
19 ___ 10	9 9 ___	
___ 7 10	17 ___ 8	
16 ___ 10	___ 9 6	
17 10 ___	9 ___ 17	
___ 20 10	12 9 ___	

Missing Number Strips - Answer Key

Counting On/Back (+1/-1 and +2/-2)			Zero			Doubles		
4	**1**	3	9	0	**9**	**9**	18	9
9	1	**10**	0	**0**	0	7	**14**	7
3	5	2	**0**	4	4	12	**6**	6
1	6	5	7	**7**	0	3	3	**6**
7	1	**8**	2	2	**0**	10	**5**	5
2	6	**4**	8	**0**	8	**8**	16	8
8	**7**	1	**3**	0	3	**7**	7	14
1	**8**	9	1	1	**0**	8	4	**4**
8	10	2	**7**	0	7	10	20	**10**
7	**1**	6	**5**	5	0	9	**18**	9
9	2	**7**	9	9	**0**	**16**	8	8
3	5	**2**	10	**0**	10	10	10	**20**

Missing Number Strips - Answer Key

Doubles +/- 1	Combinations of 10_	Make a 10
13 6 **7**	**5** 5 10	**9** 13 4
4 5 **9**	10 2 **8**	4 12 **8**
2 **5** 3	**10** 1 9	16 **9** 7
5 11 6	7 10 **3**	9 **14** 5
5 **6** 11	4 6 **10**	8 3 **11**
9 17 8	**7** 3 10	**4** 13 9
4 **3** 7	10 **10** 0	14 8 **5**
5 9 4	10 9 **1**	5 **9** 14
17 8 9	8 2 **10**	9 8 **17**
7 8 **15**	**6** 4 10	7 **15** 8
13 **6** 7	10 **5** 5	16 **7** 9
11 6 5	0 10 **10**	17 **8** 9

Missing Number Strips - Answer Key

Add or Subtract 10 **+9/-9**

10 **20** 10	9 14 **5**	
4 10 **14**	5 **9** 14	
10 2 **12**	3 9 **12**	
16 6 **10**	**10** 9 19	
4 14 10	6 **15** 9	
1 **10** 11	13 **9** 4	
13 3 **10**	5 14 **9**	
19 **9** 10	9 9 **18**	
17 7 10	17 **9** 8	
16 **6** 10	**15** 9 6	
17 10 **7**	9 **8** 17	
10 20 10	12 9 **3**	

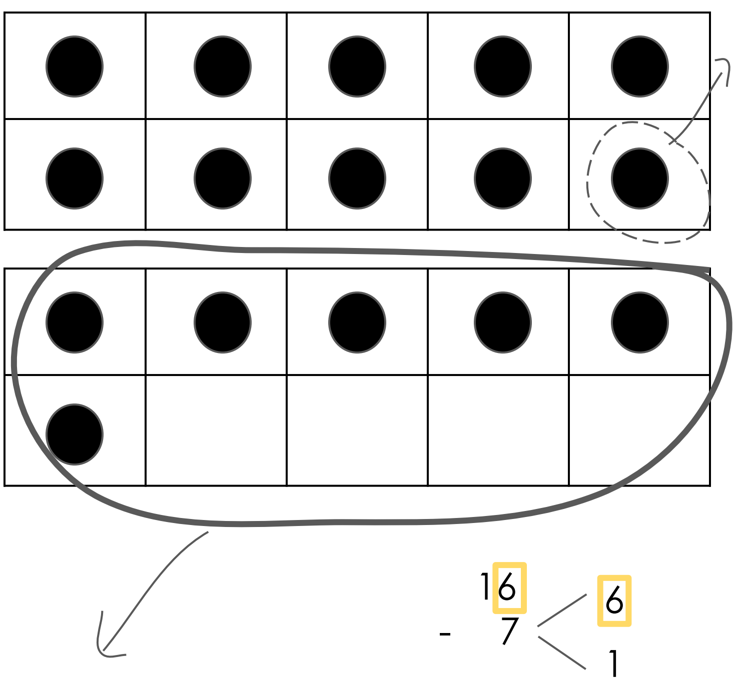
Strategy: Back Down Through 10 or Using 10 as a Bridge	**Teaching the Strategy** **S5**
Description: Subtraction Strategy using decomposition and 10 as a bridge (friendly) number	**Materials:** ten frames, chips/counters, equation cards

Teaching Strategy - Part 1:

Materials for Part 1: ten frames, chips/counters

This strategy is really a take-away and not think-addition. For example, 15 - 6, you start with the total (minuend) of 15 and work backwards using 10 as a 'bridge'. 6 would need to be decomposed to be able to do this.
6 would be decomposed into 5 and 1 since 15 - 5 = 10. Then subtract 1 more to get 9.

With the students, start with 2 ten frames to represent 16 for the problem 16 - 7.



"How many dots do we have?" Students respond.

"Yes, we have 16. We need to subtract 7 but I would like to use 10 as my bridge or friendly number to help me. That means I would decompose it into 6 and 1. Why 6? How is that helpful?" Students respond.

"Yes, if I subtract 6, that would leave 10. We like working with 10 because we have a lot of foundational knowledge with 10."

"But our subtrahend, or the number being subtracted, wasn't 6. It was 7. Remember I decomposed the 7 into a 6 and a ____???" Students respond.

"Yes, 1! So I still need to subtract 1 more which would give me a difference of 9."

"So 16 - 7 = 9. We solved it as 16 - 6 - 1 = 9."

"Let's practice this again with 15 - 7."
Set up the ten frames with 15 counters. Ask the students to defend how to decompose 7 so that 10 is used as a bridge.

Repeat with 16 - 9 or any problem that works well with bridging down to 10.

Have the students pair up and practice solving with ten frames and chips. Expect students to explain their reasoning as they decompose the numbers and manipulate the chips.

SMP 4 & 5

**Move this teaching activity to a practice activity for additional practice with Back Down Through 10.

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Back Down Through 10/Using 10 as a Bridge

13 - 7 = __	13 - 8 = __	13 - 9 = __	14 - 6 = __
__ = 14 - 7	14 - 8 = __	14 - 9 = __	__ = 15 - 6
15 - 7 = __	15 - 8 = __	15 - 9 = __	__ = 16 - 7
16 - 8 = __	16 - 9 = __	17 - 8 = __	17 - 9 = __
12 - 7 = __	__ = 12 - 8	12 - = __	13 - 6 = __

Strategy Review Games & Activities

These games could be used once students have demonstrated proficiency on all of the strategies.

Strategy: Review of All of the Strategies	**Name of Activity: I Spy** **T2**
Description: Review all of the strategies	**Materials:** 2-3 sets of cards (0-20), 2 sets of the I Spy strategy cards, scrap paper or dry erase board/markers to keep points

Students need to practice the strategies that have been taught and defend which facts are best solved with particular strategies.

**There are some blank cards in the I Spy Strategy Cards. These can be used by the teacher or the students. Other strategies learned and practiced in class can be added to these cards before the game begins.

Directions:

1. Students set up an array with the number cards on the floor (cards facing up). The teacher should decide the size of the array (4 x 6? 5 x 5? 5 x 6?). The remaining cards stay in a pile face down.
2. Each student receives a deck of the I Spy Strategy Cards (shuffled and facing down).
3. Student A draws 3 of their I Spy cards. Student A examines the cards on the floor and decides which I Spy card to use.

2	10	4	9	3

4. Student A spies two numbers that are appropriate for the Make a 10 strategy (9 and 3). Student A then says to Student B, "I spy with my little eye numbers that are appropriate for the Make a 10 strategy. Find them and explain to me how the Make a 10 strategy works."
5. Student B then looks at the cards on the floor and chooses two numbers that work for the Make a 10 strategy. It does not have to be the same ones that Student A chose. Student B then says, "I spy with my little eye a 9 and 3. The Make a 10 strategy is appropriate because 9 is close to 10. I can decompose the 3 into 2 and 1. I added 9 and 1 to make 10 then added on 2 more to get a sum of 12."
6. Student A l listens for accuracy and precise language. If Student B is correct, she/he keeps the 9 and 3. Student A sets her/his Make a 10 card aside and draws a new I Spy card from her/his own deck. If Student B is incorrect, Student A provides a correct response and keeps the cards. Since the 9 and 3 were removed from the array of cards, two more cards are now put in their place. For each addition example provided the student gets 1 point. For each subtraction example the student provides, the student gets 2 points (i.e., Doubles could be 16 and 8 by explaining 16 - 8 = 8).

SMP 3

7. Students keep taking turns. The player with the most points at the end wins.

Tip: Have students review some of the "rules" with the strategies before the game is played. For example: Counting On/Back – only with 1 or 2; Make a Ten– one of the addends should be an 8 or 9; they are expected to explain numbers that are decomposed (which numbers/how/why); etc.

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I Spy Strategy Cards

Counting On (+1 or +2)	Counting Back (–1 or –2)	Zero	Doubles
Doubles +1	Doubles –1	Combination of 10	Add 10
Subtract 10	Make a 10	Doubles +2 (2 Apart Facts)	+9
–9	You Choose	You Choose	You Choose

Strategy: Strategy Review	**Name of Activity: Fluentzee** **T3**
Description: demonstrate addition and subtraction fluency (efficiently, accurately, flexibly and appropriately) within a total of 10 using and explaining mental strategies.	**Materials:** game board, light bulb/strategy cards (cut apart), 2 dice or number cards

Opportunity to Practice Strategy Review/Directions:

1. Pass out the light bulb/strategy cards evenly among all the players.
2. Roll two dice.
3. Add the two numbers together mentally and say the number sentence out loud. For example, if you roll a 3 and a 4 you should quickly say, "3 plus 4 equals 7."
4. Then cross off the 7 on your column of numbers. If you roll a number sentence that equals 7 again, you still solve the problem, but do not get to cross off a space on the board.
5. Your opponent(s) has/have the right throughout the game to put one of their light bulb/strategy cards in front of you after you solve the problem. This signals for you to explain a strategy that can be applied when solving the problem. The player should explain how the strategy works. If a double light bulb card is presented, the student should demonstrate FLEXIBILITY by describing more than one APPROPRIATE strategy to apply to the problem.

Here are some examples:

Math Problem	**Strategy Name and/or Property** (Students do not have to name the property - just explain it)	**Student Explanation** (Explanations can vary)
1 + 5	Counting On/Back +/-1 Commutative Property	*"I turned the two numbers around, because it doesn't matter if you add 1 + 5 or 5 + 1 the sum (answer) will turn out the same (Commutative Property). I said "5" to myself and then just counted up 1 in my head to get an answer of 6."* (Counting on or back really should only be used for +/- 1 or 2, not larger numbers. There are other strategies that are more effective and efficient.)
4 + 5	Doubles +/-1	*"I know that 4 + 4 equals 8 so I used the doubles + 1 strategy. I decomposed 5 into 4 and 1. 4 + 4 = 8 and 1 more equals 9.*
6 + 4	Combinations of 10	"There are two numbers that when added together will equal 10 - like 6 and 4 or 4 and 6. Others addends 2 and 8, 7 and 3, etc."
If using cards and not dice: 9 + 5	Make a 10	*"I like to use the make a ten strategy when one of the numbers is close to 10 - like 9. I decomposed the 5 into a 1 and 4. 9 + 1 makes ten. Then I just added on the 5 which is easy! 10 + 5 = 15"*

6. The first player to cross off their entire Fluentzee board wins and should yell "FLUENTZEE!"

Adaptation: If students are struggling with providing answers mentally and/or with the strategies, provide manipulatives to count when adding. For a challenge, use cards with numbers greater than six.

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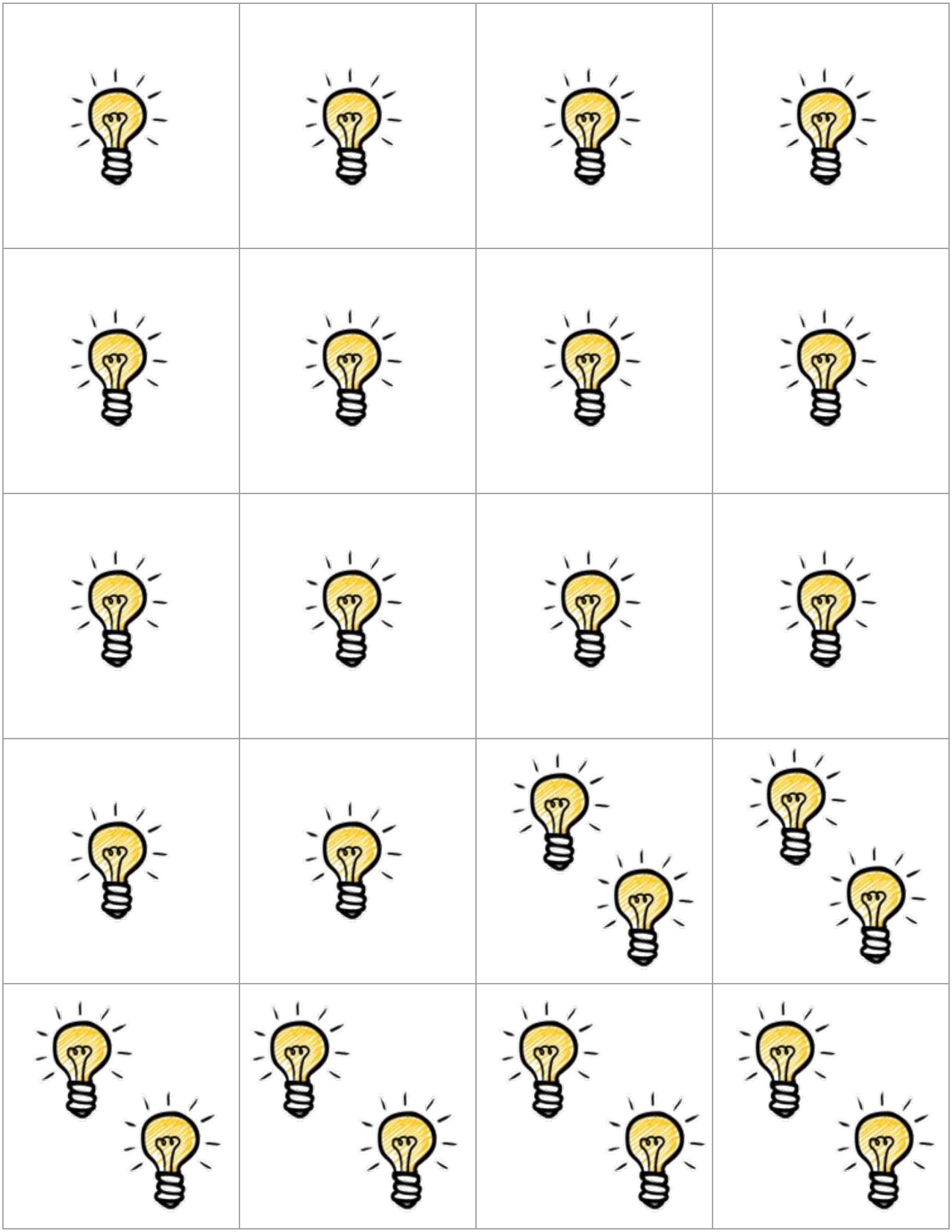
FLUENTZEE!

Player ________	Player ________	Player ________	Player ________
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12



Strategy: Addition Strategy Review - Missing Addend	**Name of Activity: Salute!** **T4**
Description: Practice solving missing addend problems (all numbers 0-10)	**Materials:** deck of cards or number cards 0-10

Opportunity to Practice Strategy Review/Directions:

1. This activity needs 3 participants. Two players will draw cards while the third player will be the referee (provide the answer/sum).

2. If using a deck of cards, the queen and king cards are removed. The jacks stay in the deck and represent a zero. Aces are worth one.

3. Players A and B each draw a card without looking at the number on it. When Player C or referee says, "Salute!", each card holder places the card on his/her forehead (without looking at their own card or their partner's card).

4. The referee tells the two card holders the sum (example from the picture below: "12"). As soon as the two card holders hear the sum, they turn to face one another. By looking a the other person's card, the object is to say the value of their own card (missing addend).

5. The first person to call out the correct missing addend gets to keep the two cards. The participants take turns being the referee.

6. When there are no other cards left to play, the person with the most cards wins the game.

Adaptations: For younger participants or for students who struggle with addition, limit the range of numbers on the dice or cards. Students who are not ready for addition could write the numbers in the boxes instead of adding them. For 3rd grade and up, participants could multiply the two number together and write the products.

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Strategy: Addition or Subtraction Strategy Review/Problem Solving/Number Sense	**Name of Activity: All Lined Up -** **Adapted from SanGiovanni** **T5**
Description: Practice solving missing addend problems (all numbers 0-10)	**Materials:** paper, pencils, 2 dice/decks of cards/or equation cards (playing with dice limits the numbers to 1-6)

Opportunity to Practice Strategy Review/Directions:

1. Students work with a partner.

2. Both players draw 6 boxes on their own paper (left to right/linear fashion).

3. Student A rolls both dice (or draws two cards or draws an equation card) and determines the sum. S/he must determine where s/he wants to write the sum in one of the boxes. (i.e., rolls a 4 and 7 and needs to write 11 in one of the boxes)

4. Student B follows the same steps and enters his/her sum on his/her paper. (i.e., rolls 2 and 3 and need to write a 5 in one of the boxes).

5. Both students take turns entering their sums...being very mindful about numbers that are less than or greater than the numbers they have already written.

6. If a player has a sum that cannot be added to their own boxes, s/he loses that turn. (i.e., If Student A rolls a sum of 12 or 13, s/he cannot add those numer to her/his sheet, because there is not a box between 11 and 14 available.)

Player 1			11	14		
Player 2		5				

Adaptations: Students could play the same game but determine the difference instead of the sum.

If using cards or dice (not the equation cards), students could make their own decisions if they wish to add or subtract.

For student who may struggle, provide them with manipulatives, a rekenrek or a number line.

Strategy: Addition Strategy Review	**Name of Activity: Clear the Cards: Addition** **T6**
Description: Solving addition problems	**Materials:** deck of cards (removing the face cards or see adaptation at the end), 2 dice

Opportunity to Practice Strategy Review/Directions:

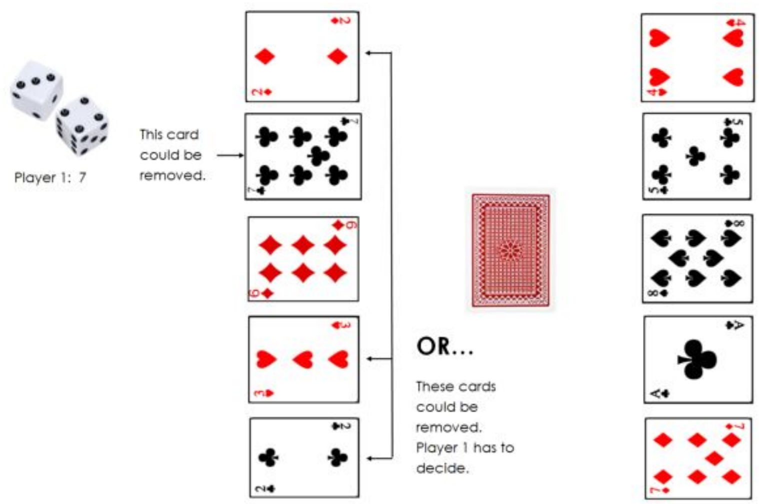
1. This game can be played with 2 or more people.

2. The player with the greatest number of pets at home is the dealer. This player deals 5 cards to each player. All the players turn them face up in a row. The remaining cards go in the middle face down.

3. To take a turn, Student A rolls the dice, announces the equation and states the sum. This player examines her/his own cards and determines if s/he has a card or cards that equal that sum. If Student A does, she/he defends how they are equal and that card or cards is/are removed or cleared. If she/he does not have an appropriate card(s), Student A draws a card from the deck. If possible, she/he now removes the card or cards that equal the sum. If there is more than one option, Student A must make a choice on which cards to remove. Player A cannot remove all the cards that equal the sum. If the sixth card was not removed, it is now added to the five facing-up cards.

4. Player A writes an equivalent or balanced equation on the sheet and reads it to Student B. (i.e., "3 + 4 = 2 + 3 + 2")

5. It is now Student B's turn.



Adaptations: Multiple decks could be used and the range of numbers could be limited for students who are challenged by larger numbers.

Manipulatives or tools (i.e., number line) could be offered to support.

To make the game more challenging, use a couple of decks of cards, keep the tens and face cards in the decks (i.e. Jacks = 11, Queen = 12, Kings = 13) and/or use three dice. If the jokers are left in the deck, those are wild cards. If a participant draws a joker, she/he determines what it is worth at any time.

Strategy: Addition & Subtraction Strategy Review	**Name of Activity: Clear the Cards: Addition & Subtraction**	**T7**
Description: Solving addition and subtraction problems	**Materials:** cards 0-20, 2 dice	

Opportunity to Practice Strategy Review/Directions:

This game is very similar to Clear the Cards: Addition. See that page for a visual for addition.

1. This game can be played with 2 or more people.

2. The player wearing least number of buttons is the dealer. This player deals 6 cards to each player. All the players turn them face up in a row. The remaining cards go in the middle face down.

3. To take a turn, Student A rolls the dice, announces the equation and states the sum. This player examines her/his own cards and determines if s/he has a card or cards that when combined into a subtraction problem (finding the difference) equal the sum of the dice. If Student A does, she/e defends how the difference equals the sum and those 2 cards are removed or cleared. If she/he does not have appropriate cards, Student A draws a card from the deck. If possible, she/he now removes 2 cards (subtracted to find the difference) that equal the sum of the dice. If there is more than one option, Student A must make a choice on which cards to remove. Player A cannot remove all the cards that equal the sum of the dice. If the sixth card was not removed, it is now added to the five facing-up cards.

4. Player A writes an equivalent or balanced equation on the sheet and reads it to Student B. (i.e., "5 + 4 = 12 - 3")

5. It is now Student B's turn.

Adaptations: Multiple decks could be used and the range of numbers could be limited for students who are challenged by larger numbers.

Manipulatives or tools (i.e., number line) could be offered to support.

It may be helpful if students write the sum of the dice first before searching their cards for a minuend and subtrahend. Trying to remember the sum and search for appropriate cards might be tricky for some students.

Clear the Cards - **Circle the game you are playing: Addition or Addition/Subtraction**

Name ______________________________ Date ______________________________

As you identify equivalent or balanced equations, write them below.

=	=
=	=
=	=
=	=
=	=
=	=
=	=

Strategy: Addition Strategy Review	**Name of Activity: A Day at the Races** **T8**
Description: Solving addition problems	**Materials:** 2 dice/deck of cards (cards 2-6, aces (1) and Jacks (0)/or number cards 0-6, beans or chips, game board (see options)

Opportunity to Practice Strategy Review/Directions:

1. 2 or more players can participate.

2. Players have to choose their "horses" (numbers on the chart). The player with the smallest hands gets to choose the first horse of their liking. This person puts her/his initials under the number ("horse") she/he chooses. Then each person takes turns choosing horses by adding their initials until all the horses have been selected.

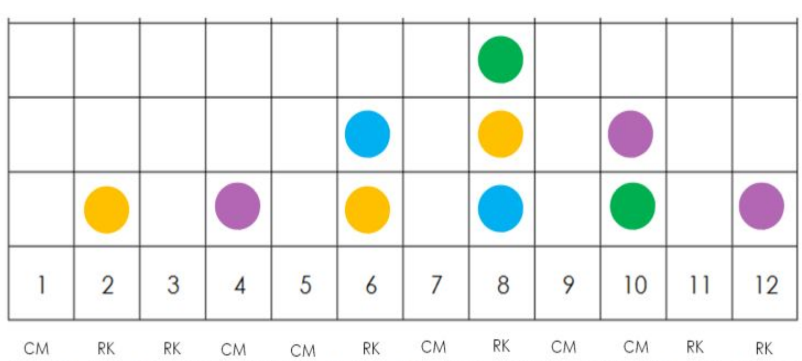
3. Players make predictions which horses will take first, second and third places. Those predictions can be written at the bottom of the game board.

4. The player with the largest feet will roll the dice first. Players take turns rolling the dice, adding the two numbers together to get a <u>sum</u> then putting a chip/bean in the spot of that number whether or not it is their horse (i.e., Player 1 rolls 2 and 6 so this player would add one chip/bean on the 8 column).

5. Players keep rolling and placing one bean/chip on at a time. The first horse to reach the finish line (fills a column with beans/chips) wins the game.

Questions for when the game is over:

- Which horses are more likely to reach the finish line first?
- How do you know?
- Why are some less likely to reach the finish line first? Why?
- How could the game change if all the cards are used (2-10, aces and jacks)?
- Etc.



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A Day at the Races: Number Cards 0-6 or 2 Dice

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**

Prediction: ____

1st Place: Horse Number __________

2nd Place: Horse Number _________

3rd Place: Horse Number ________

Prediction: ____

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

A Day at the Races: Number Cards 0-6 or 2 Dice

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**

____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____

Prediction: ______________________________

1st Place: Horse Number __________

2nd Place: Horse Number __________

3rd Place: Horse Number ________

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

A Day at the Races: Number Cards 0-9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

A Day at the Races: Number Cards 0-9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Prediction: ____________________________________

1st Place: Horse Number _________

2nd Place: Horse Number ________

3rd Place: Horse Number _______

Prediction: ____________________________________

1st Place: Horse Number _______

2nd Place: Horse Number _______

3rd Place: Horse Number _______

Prediction: ____________________________________

1st Place: Horse Number _______

2nd Place: Horse Number _______

3rd Place: Horse Number _______

A Day at the Races: More Than 2 Dice or Cards

0-5	**6-10**	**11 - 15**	**16 - 20**	**21 - 25**	**26 - 30**	**31 - 35**	**36 - 40**

______ ______ ______ ______ ______ ______ ______ ______

Prediction: ______________________________

1st Place: Horse Number __________

2nd Place: Horse Number _________

3rd Place: Horse Number ________

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

Prediction: ______________________________

1st Place: Horse Number ________

2nd Place: Horse Number ________

3rd Place: Horse Number ________

Strategy: Addition or Subtraction Strategy Review	**Name of Activity: War** **T9**
Description: Solving addition or subtractions problems	**Materials:** deck of cards or number cards 0-10

Opportunity to Practice Strategy Review/Directions:

**Beforehand, determine if the face cards are going to stay in the deck and how much they are worth.

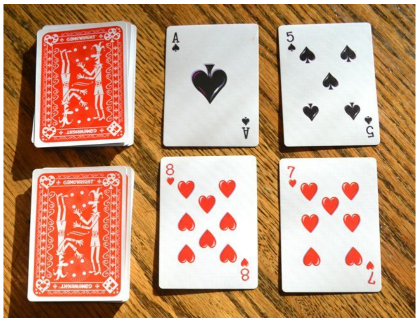
1. Students should play in pairs.

2. Shuffle the deck of cards and deal them so all the cards are given out.

3. Each player flips over two cards.

   Addition: Add the two cards, state the <u>sum</u>, the greater sum takes all 4 cards.

   Subtraction: Subtract the two numbers, state the <u>difference</u>, the player with the smaller difference takes all 4 cards.



4. If it is tie, each player flips over two more cards and repeats the process. The winner takes all of the cards that are facing up.

5. When all cards have been used, the players count the number of cards they won. The player with the most cards wins.

TOC

Strategy: Addition or Subtraction Strategy Review	**Name of Activity: Toss Up** **(Adapted from www.pepnonprofit.org)** **T10**
Description: Solving addition or subtractions problems	**Materials:** deck of cards or number cards 0-10

Opportunity to Practice Strategy Review/Directions:

**Beforehand, determine if the face cards are going to stay in the deck and how much they are worth.

** This game is best played on the floor. Expect students to state the equations and use precise vocabulary.

**Student will need to know if they are playing the addition or the subtraction version.

SMP 6

1. 2 or more players work for this game.

2. Shuffle the deck of cards and each person is given 3 cards. The players are NOT to look at them. Each player is also given 3 Toss Up cards and no more.

3. With the cards face down in their hands, together they say, "1, 2, 3 Toss Up!" and toss the cards into the air.

4. Addition version:

- If 2 cards flip over, the student adds those 2 cards together.

- If only 1 card flips over, the student decides which of the other 2 face down cards to flip over and flips that one over. The student adds those 2 cards together.

- If all 3 cards flip over, the players opponent presents one of her/his Toss Up cards to their opponent. This grants this person permission to select which 2 of the cards this player will add together. Without argument :o), the player adds those two cards together.
    - Once a player has used up all of their Toss Up cards, they cannot have anymore. The person who flipped over all three cards gets to choose their own 2 addends.

- If none of the cards flip over after being tossed into the air, that person automatically wins that hand/all the cards from that round.

- The person with the greater/greatest <u>sum</u> wins all those cards. The player with the most cards at the end of the game wins.

5. If playing the subtraction version, the rules are the same. However, the person with the smaller/smallest <u>difference</u> wins the hand.

TOC

Toss Up Cards

TOSS UP!	TOSS UP!	TOSS UP!	TOSS UP!
TOSS UP!	TOSS UP!	TOSS UP!	TOSS UP!
TOSS UP!	TOSS UP!	TOSS UP!	TOSS UP!
TOSS UP!	TOSS UP!	TOSS UP!	TOSS UP!
TOSS UP!	TOSS UP!	TOSS UP!	TOSS UP!

Strategy: Variety of Strategies (Review formally learned strategies)	**Name of Activity: Knock Your Block/ Chip Off - Addition** **T11**
Description: Students add numbers using a variety of strategies.	**Materials:** snap cubes in two different colors or two different colored transparent chips, two 10 sided dice or equation cards with a variety of addition problems (use both sheets of cards), one board per two players

Opportunity to Practice a Variety of Addition Strategies/Directions:

1. Each student takes one color of snap cubes or chips. The board is placed between the players.

2. Student A rolls the dice or draws an equation card. S/he reads the equation aloud and states the sum. Student A places his/her chip or cube on the sum.

3. Student B follows the same steps. If the sum has already been covered, Student B can knock Student A off of that spot and put his/her chip/cube there. If the space is already covered by their own chip/cube, another chip/cube can be added to lock it into place.

4. If a student draws a card that states "name/explain a strategy", the student must not only determine the sum, but also name and explain a fact strategy that is appropriate for that problem to be able to place his/her chip/cube.

If students are using 10-sided dice, have them explain a strategy every other turn.

For example: Student draws 9 + 7 = ___ *"I can use the Make a 10 strategy. I can decompose 7 into 1 and 6. 9 + 1 = 1 then I just add on 16 to equal a sum of 16."*

Some of the cards expect the student to demonstrate flexibility and appropriateness by explaining 2 different strategies.

**Remember: Counting On or Back is only for +/-1 or 2.

5. The first student to have 5 chips/cubes in a row (horizontally, vertically, or diagonally) wins the game.

TOC

Knock Your Block Off: Addition Cards

7 + 7 = ___	___ = 8 + 8	9 + 9 = ___ Name & Explain 2 Different Strategies	3 + 7 = ___	4 + 6 = ___ Name & Explain a Strategy
2 + 8 = ___	___ = 9 + 2	7 + ___ = 10	2 + ___ = 10 Name & Explain a Strategy	8 + 5 = ___
6 + 8 = ___ Name & Explain 2 Different Strategies	7 + 8 = ___	5 + 9 = ___ Name & Explain a Strategy	4 + 9 = ___	9 + 6 = ___
7 + 9 = ___ Name & Explain a Strategy	3 + 10 = ___	15 = ___ + 10	___ = 7 + 10 Name & Explain a Strategy	6 + 7 = ___
___ = 4 + 5 Name & Explain a Strategy	8 + ___ = 0	5 + 7 = ___ Name & Explain a Strategy	___ = 1 + 8	8 + 9 = ___ Name & Explain 2 Different Strategies

Knock Your Block Off: Addition Cards

5 + 5 = ___	___ = 3 + 3	9 + 9 = ___ Name & Explain 2 Different Strategies	4 + 7 = ___	6 + 10 = ___ Name & Explain a Strategy
5 + 1 = ___	___ = 9 + 2	7 + ___ = 10	3 + ___ = 10 Name & Explain a Strategy	8 + 5 = ___
6 + 8 = ___ Name & Explain 2 Different Strategies	3 + 4 = ___	5 + 9 = ___ Name & Explain a Strategy	4 + 9 = ___	9 + 6 = ___
7 + 9 = ___ Name & Explain a Strategy	10 + 10 = ___	15 = ___ + 10	___ = 10 + 6 Name & Explain a Strategy	0 + 0 = ___
___ = 2 + 2 Name & Explain a Strategy	8 + ___ = 0	7 + 5 = ___ Name & Explain a Strategy	___ = 1 + 8	8 + 9 = ___ Name & Explain 2 Different Strategies

Knock Your Block Off: Addition & Missing Addend Board

16	18	10	3	12
4	5	20	16	13
15	17	0	16	17
10	7	8	9	11
14	13	6	12	4

Strategy: Variety of Strategies (Review formally learned strategies)	**Name of Activity: Knock Your Block/ Chip Off - Subtraction** **T12**
Description: Students solve subtraction equations using a variety of strategies.	**Materials:** snap cubes in two different colors or two different colored transparent chips, equation cards with a variety of subtraction and missing addends problems, one board per two players

Opportunity to Practice a Variety of Subtraction Strategies/Directions:

1. Each student takes one color of snap cubes or chips. The board is placed between the players.

2. Student A draws an equation card. S/he reads the equation aloud and states the difference. Student A places his/her chip or cube on the difference.

3. Student B follows the same steps. If the difference has already been covered, Student B can knock Student A off of that spot and put his/her chip/cube there. If the space is already covered by their own chip/cube, another chip/cube can be added to lock it into place.

4. If a student draws a card that states "name & explain a strategy", the student must not only determine the difference, but also name and explain a fact strategy that is appropriate for that problem to be able to place his/her chip/cube.

For example: Student draws 15 - 7 = ___ *"I can use the Back Down Through 10 strategy . I can decompose 7 into 5 and 2. 15 - 5 = 10 which is a friendly number. Now all I have to do is subtract 2 which is 8. I know my Combinations of 10 so that was easy!"*

If the student needs to explain a second strategy: *"I could also use the Think Addition strategy by doing Doubles +1. I know that 7 + 7 = 14 so 7 + 8 = 15. 15 - 7 has to equal 8."*

5. The first student to have 5 chips/cubes in a row (horizontally, vertically, or diagonally) wins the game.

If students run out of cards, have them shuffle the used deck and use again.

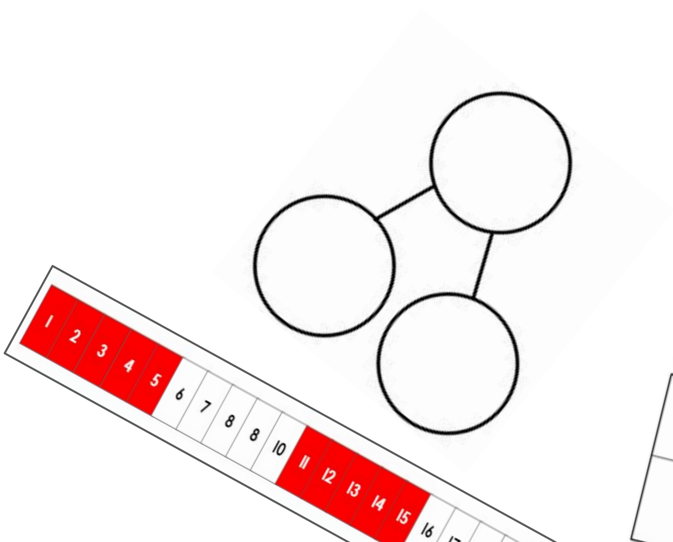
Knock Your Block Off: Subtraction & Missing Addend

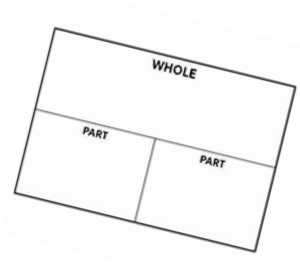
20 - 10 = ___	___ = 19 - 9	18 - 9 = ___ Name & Explain 2 Different Strategies	18 - 10 = ___ Name & Explain a Strategy	17 - 10 = ___ Name & Explain a Strategy
17 - 9 = ___	___ = 17 - 8	7 + ___ = 10	2 + ___ = 12 Name & Explain a Strategy	16 - 10 = ___
16 - 8 = ___ Name & Explain 2 Different Strategies	16 - 9 = ___ Name & Explain a Strategy	16 - 7 = ___ Name & Explain a Strategy	___ = 15 - 9	15 - 8 = ___
15 - 7 = ___ Name & Explain a Strategy	4 + ___ = 10 Name & Explain a Strategy	15 = ___ + 10	___ = 14 - 9 Name & Explain a Strategy	7 - 2 = ___ Name & Explain a Strategy
___ = 14 - 7 Name & Explain a Strategy	8 + ___ = 13	10 - 6 = ___ Name & Explain a Strategy	___ = 10 - 10	9 - 0 = ___ Name & Explain a Strategy

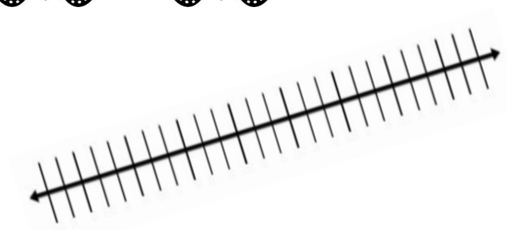
Knock Your Block Off: Subtraction & Missing Addend Board

10	9	4	3	8
7	8	5	5	9
5	7	10	1	6
9	2	6	8	0
5	6	7	4	5

Tools, Bristol Manipulatives, Models, Number Cards, Etc.







Five Frame

Ten Frame

Ten Frames

Number Path

1	2	3	4	5	6	7	8	9	10

Number Path

1	2	3	4	5	6	7	8	9	10

Number Path

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Number Paths

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Twenty Boards/Charts

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Twenty Boards/Charts

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

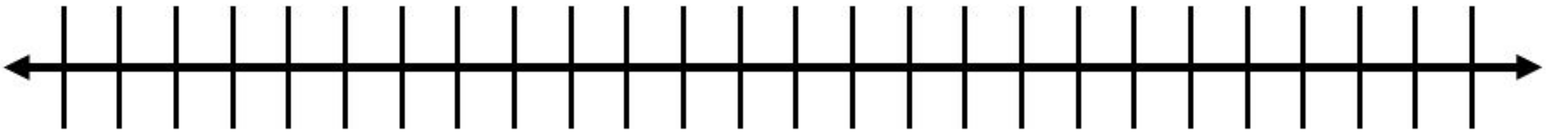
100 Chart

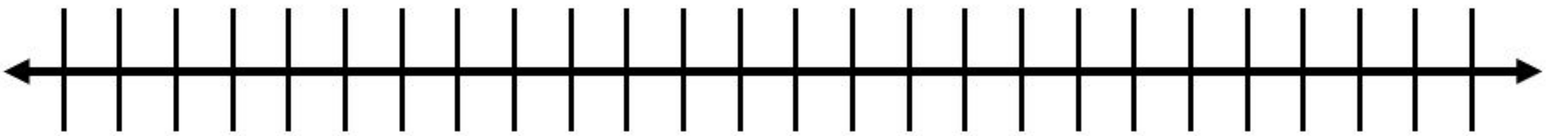
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

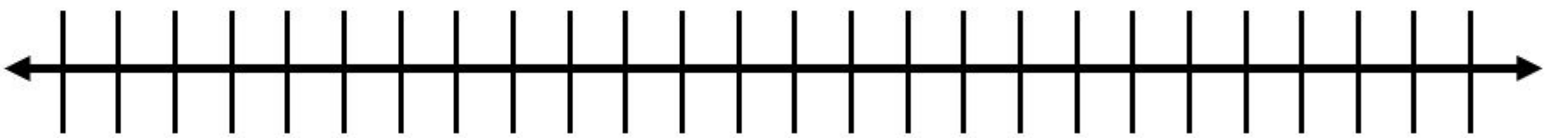
120 Chart

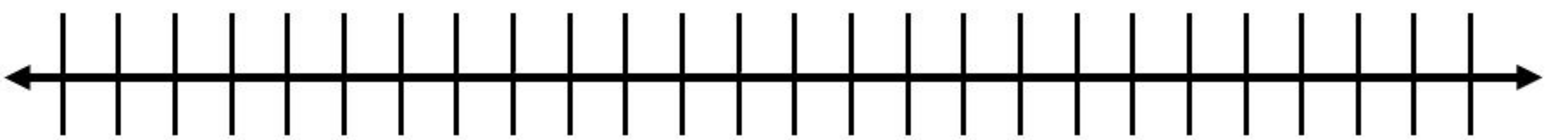
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120

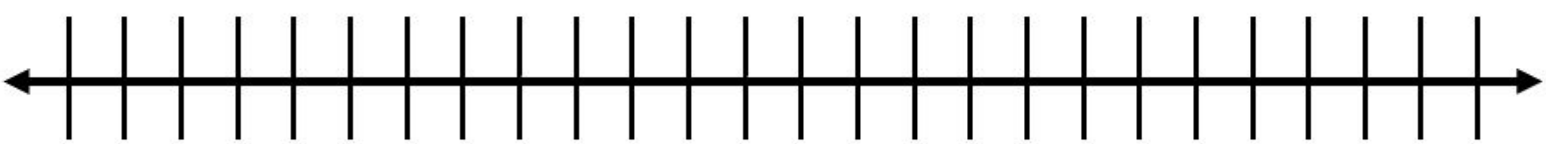
Horizontal Number Lines





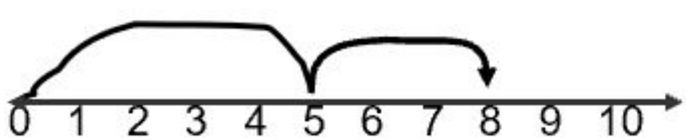




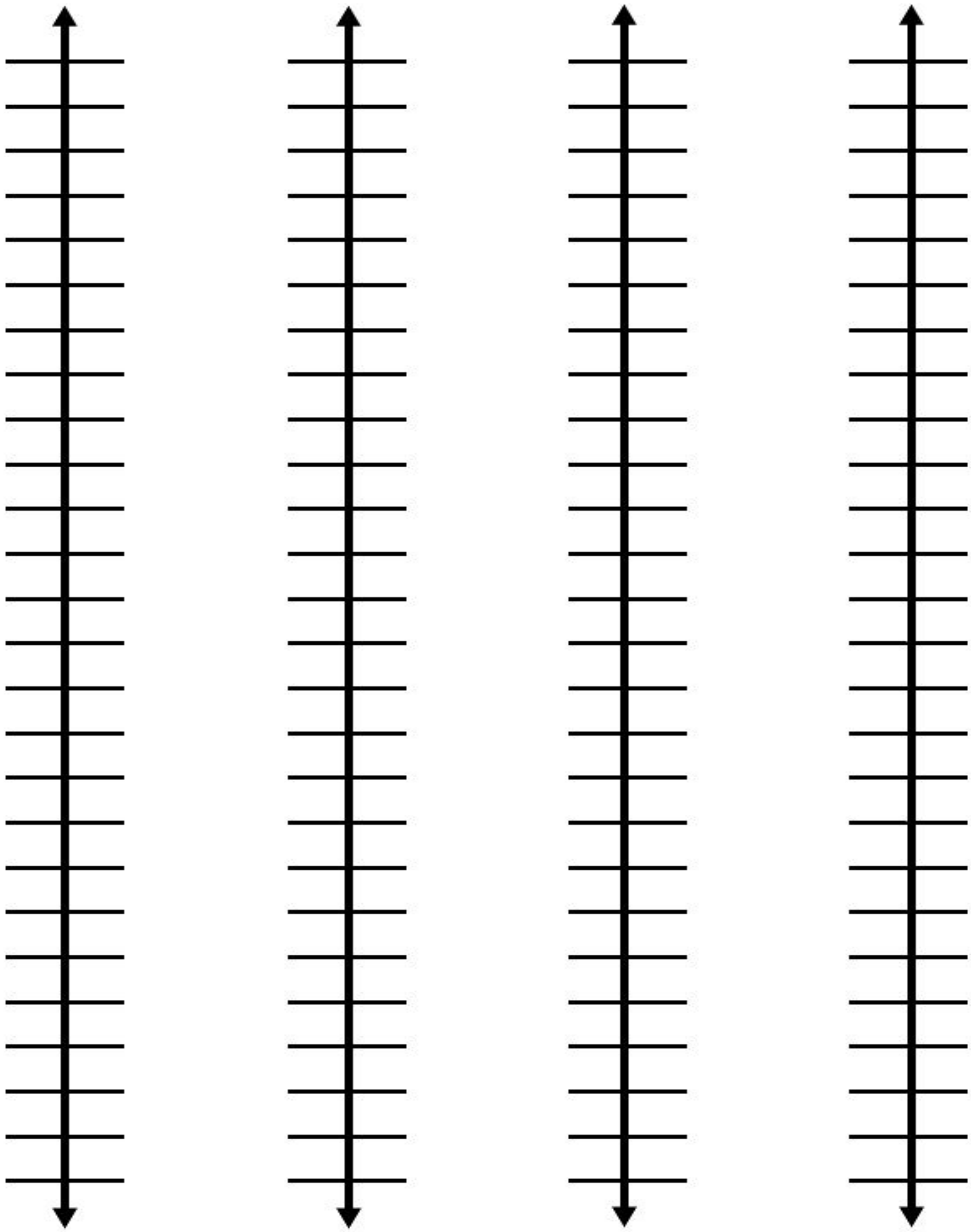


Number lines are another tool students should have the opportunity to use when demonstrating their understanding of computation. Addition of positive numbers would be demonstrated with arrows going to the right. For example: 5 + 3. This could look like:

Teacher note: Subtracting would be represented by a motion to the left OR by counting up to find the difference.

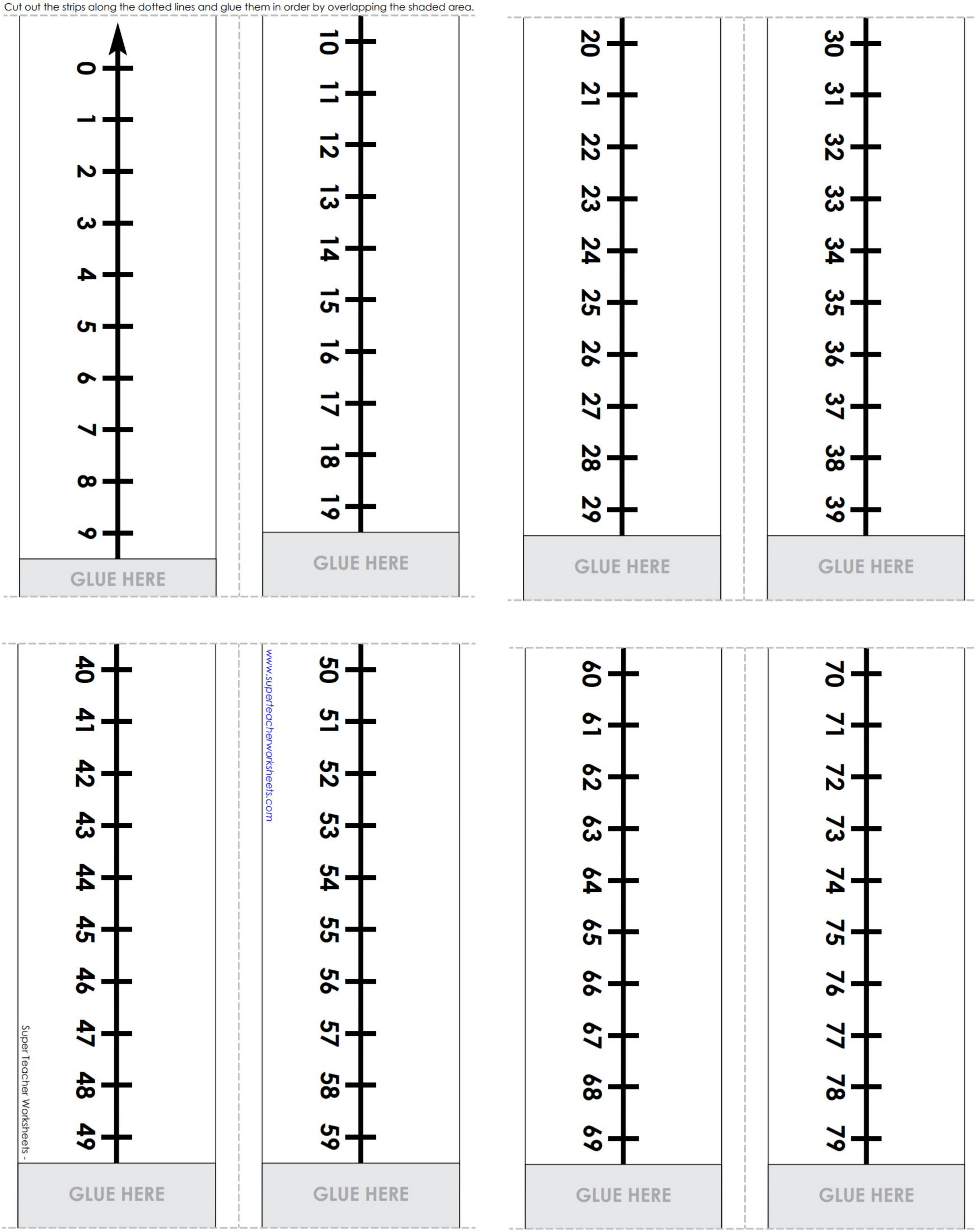


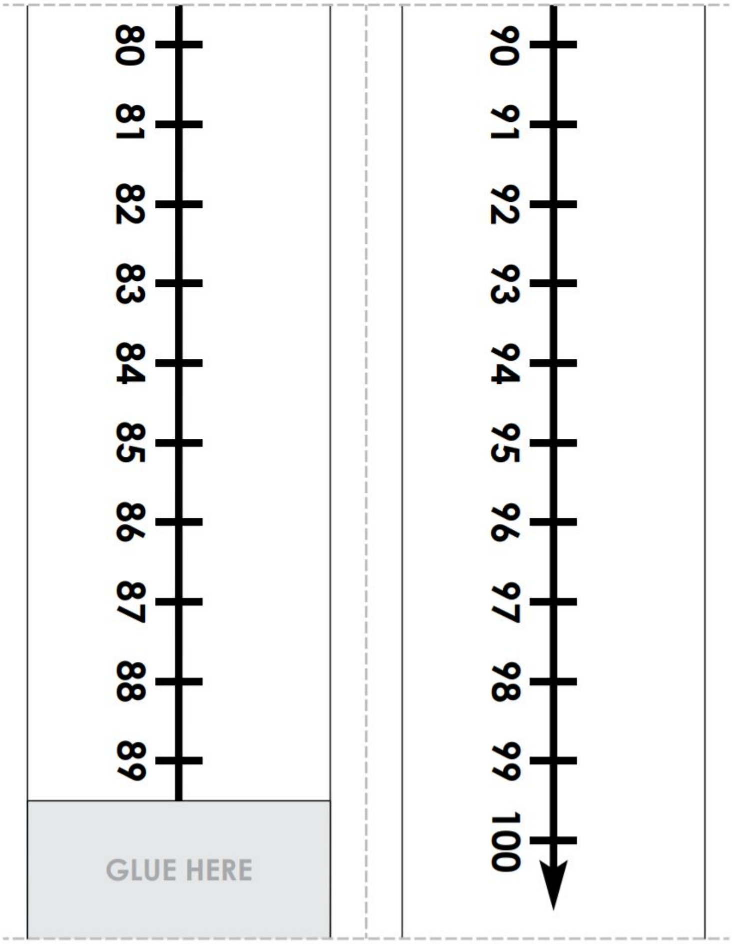
Vertical Number Lines



Number Line

Cut out the strips along the dotted lines and glue them in order by overlapping the shaded area.




80
81
82
83
84
85
86
87
88
89
GLUE HERE
90
91
92
93
94
95
96
97
98
99
100

0	0	1	1
2	2	3	3
4	4	5	5
6	6	7	7
8	8	9	9
10	10		

Number Cards To Cut Out 10-20

10	10	11	11
12	12	13	13
14	14	15	15
16	16	17	17
18	18	19	19
20	20		

Number Cards (if students are sitting across from one another - cut out on the dotted lines - do not cut out on the solid lines)

0	1	2	3
0	1	2	3
4	5	6	7
4	5	6	7
8	9	10	
8	9	10	

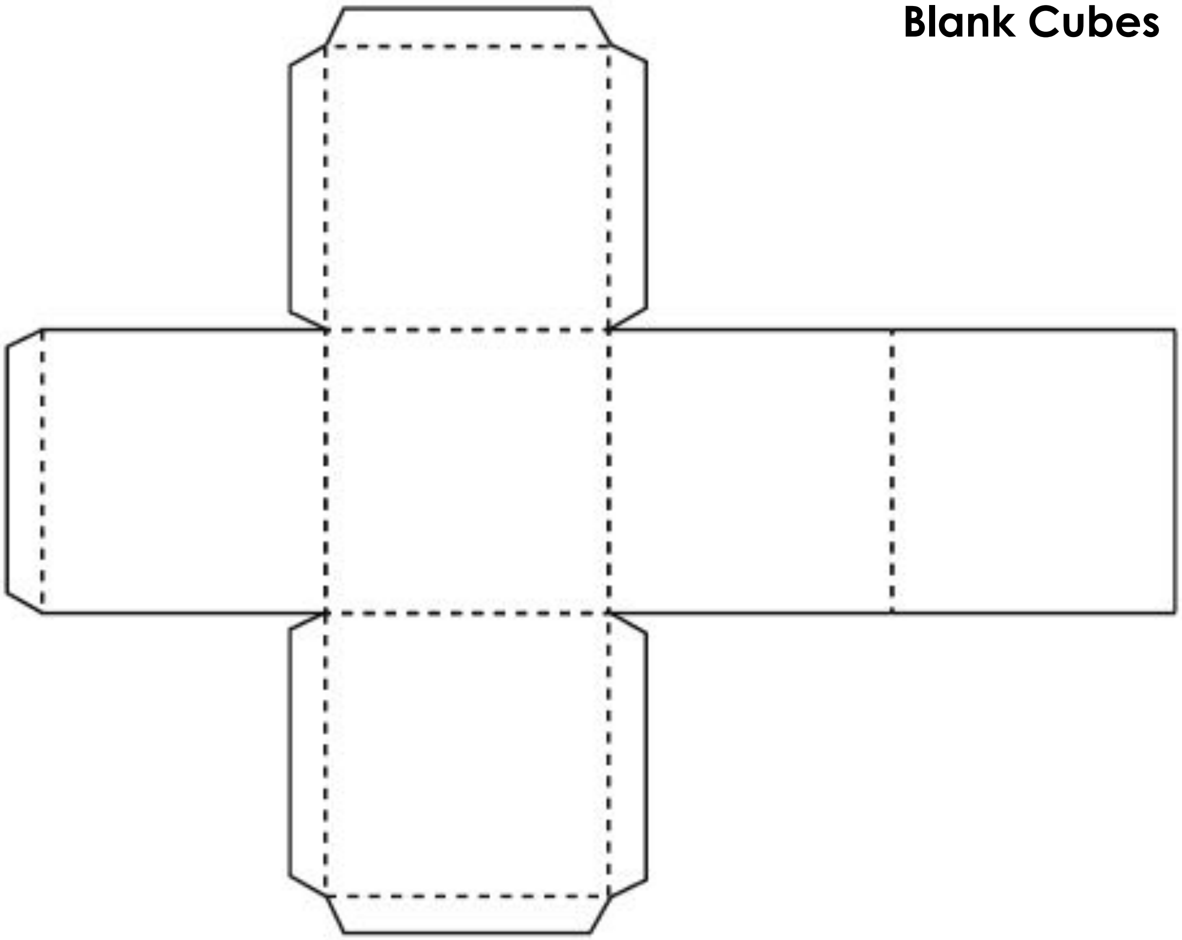
Number Cards (if students are sitting across from one another - cut out on the dotted lines - do not cut out on the solid lines)

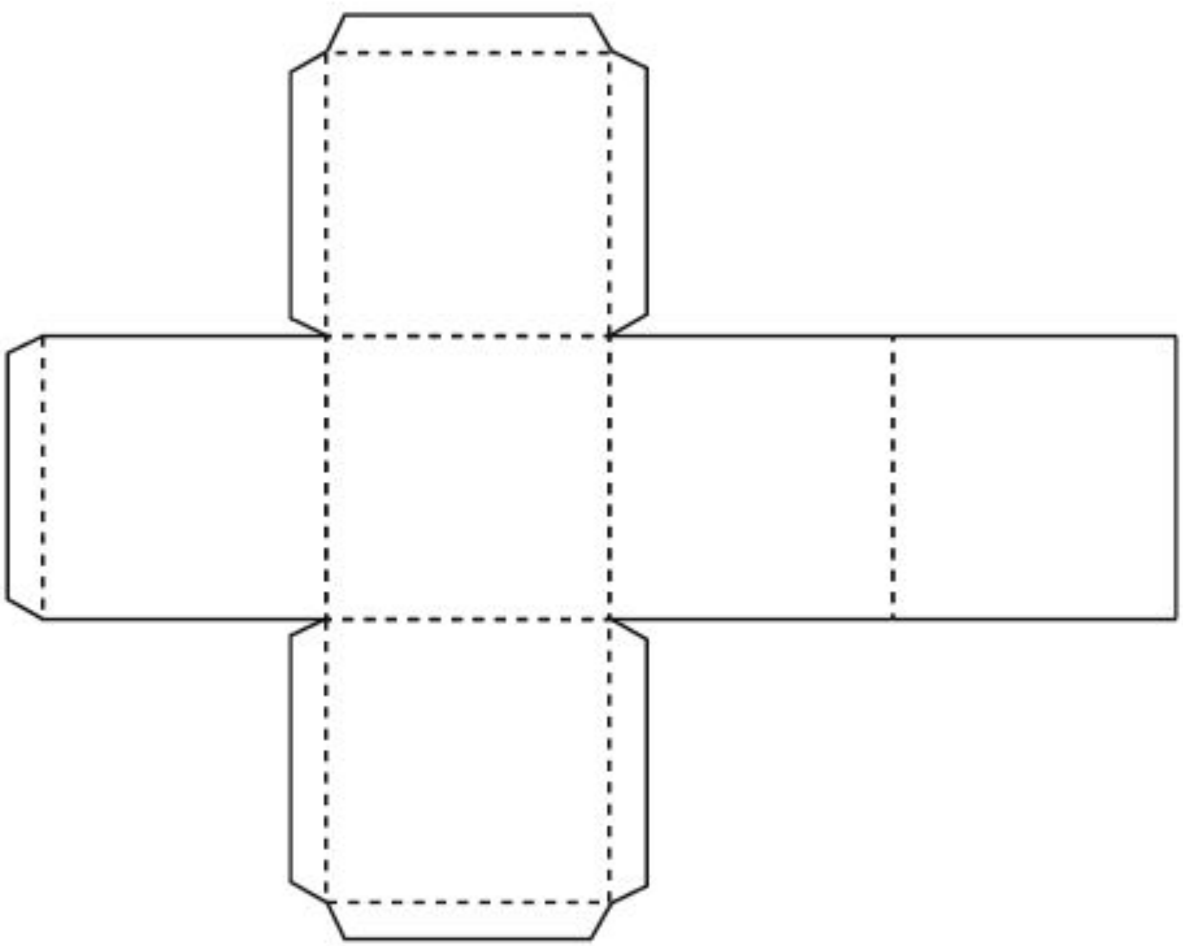
10	11	12	13
10	11	12	13
14	15	16	17
14	15	16	17
18	19	20	
18	19	20	

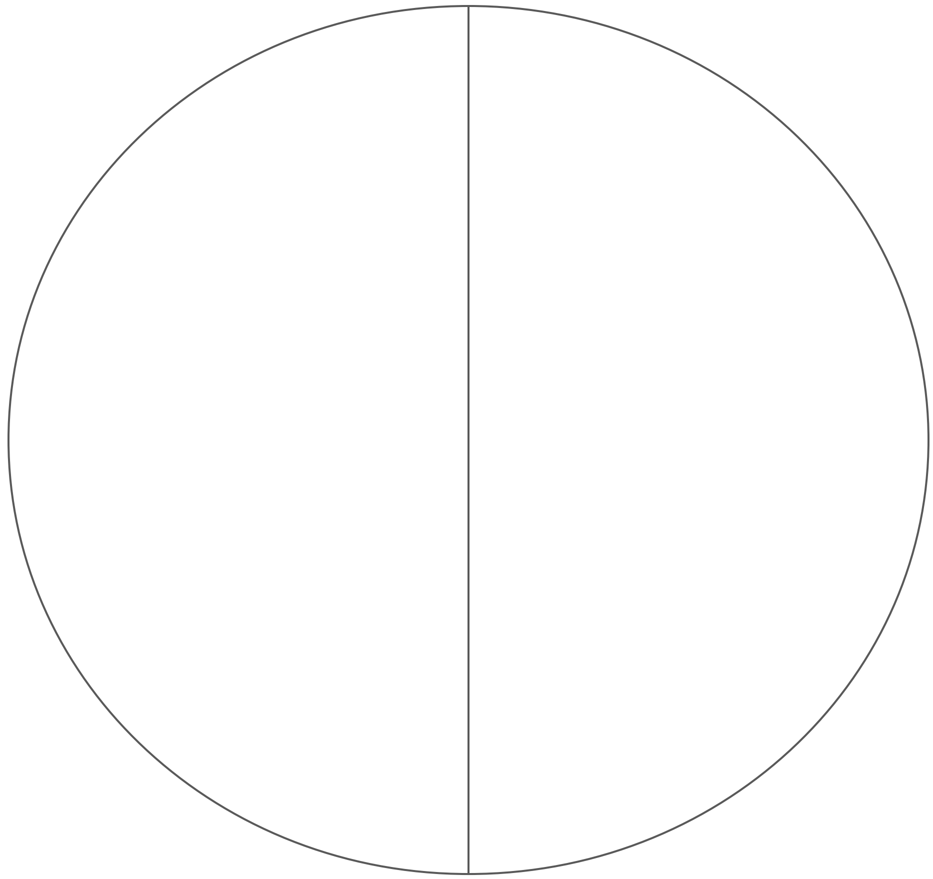
Operational Signs to Cut Out - Addition & Subtraction

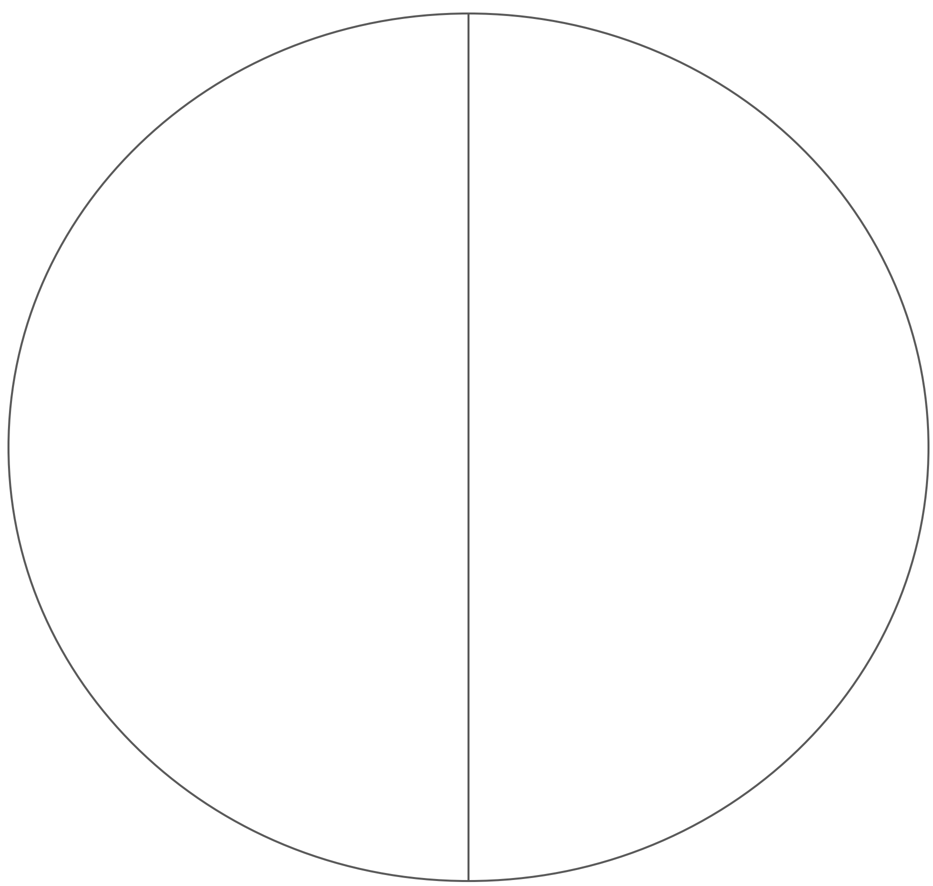
+	+	+	+
+	+	+	+
−	−	−	−
−	−	−	−
=	=	=	=
=	=	=	=

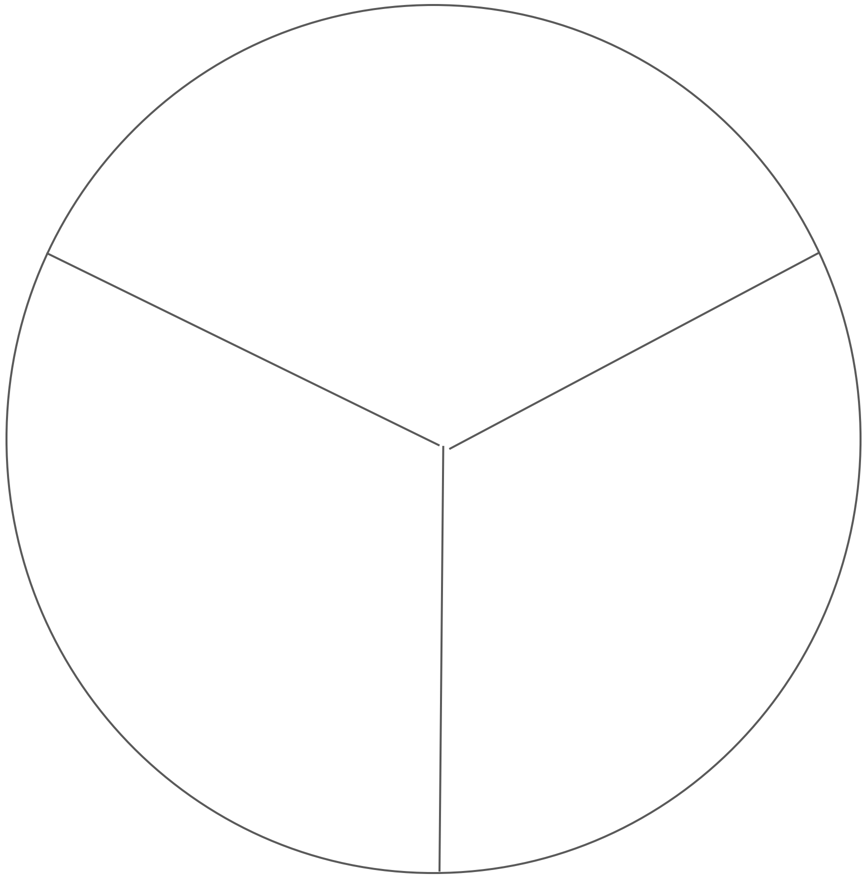
Blank Cubes

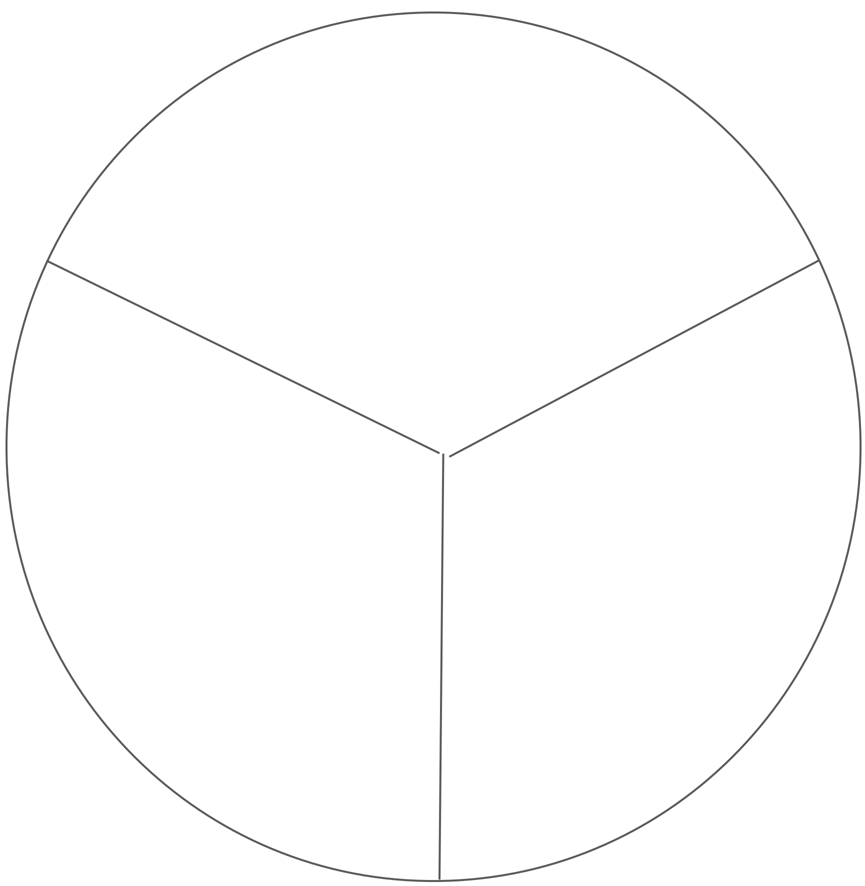


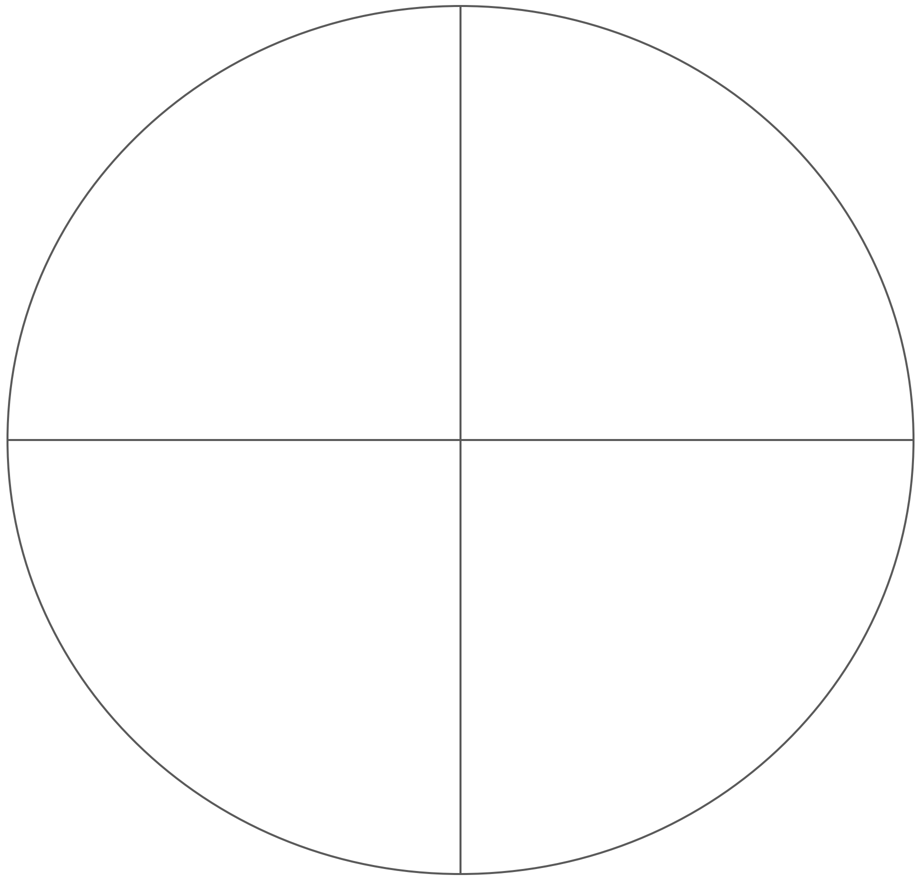


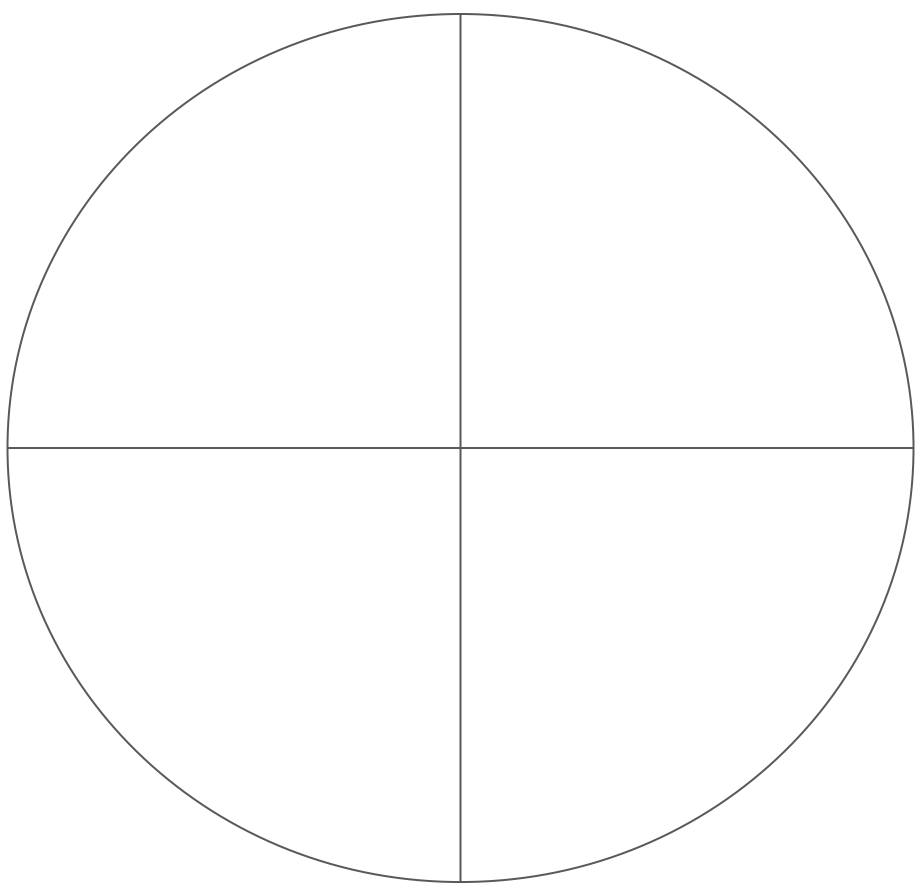


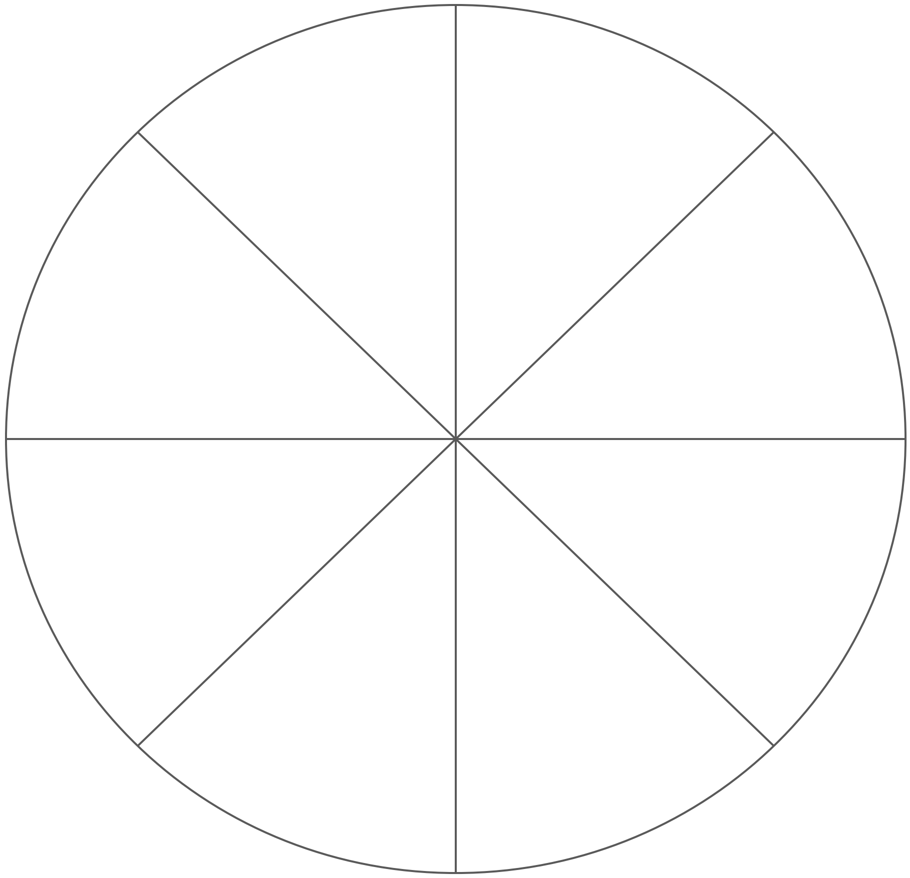


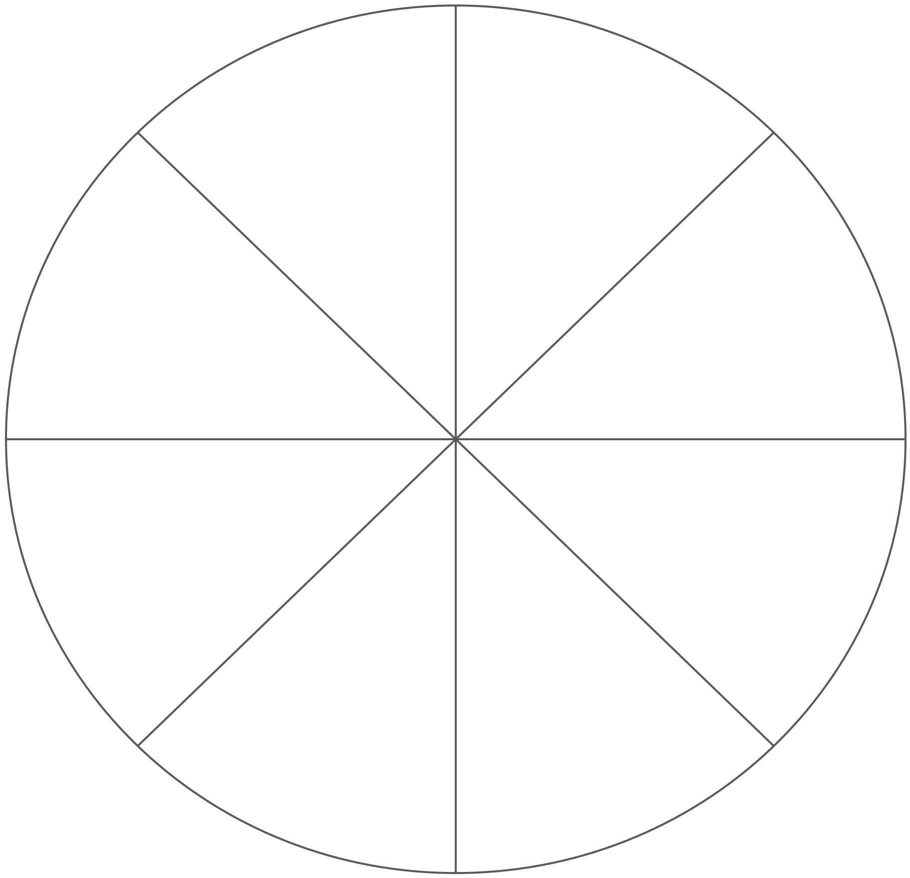












Addition Table

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Every student should have an addition table. Each time they master a set of facts, they should color in the addition facts they now know (or write them into the blank one). This lets them celebrate the facts they know and view the facts they have left to learn.

Addition Table

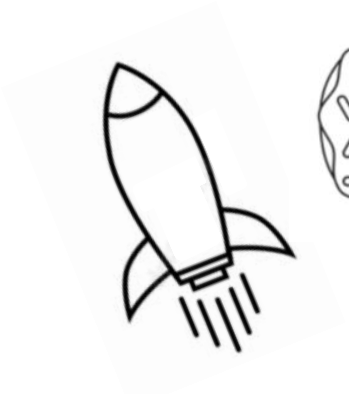
+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

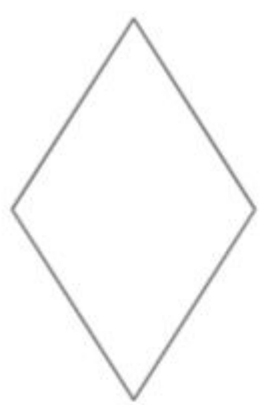
V1

Random Numbers Recording Sheets

Students can start using these once they are ready for Phase 3: Know from Memory. If students are using the PPPs for specific strategies, consider using these as a supplement activity.

Tip: These could also be used as generic game boards (just fold the top portion of the paper over).



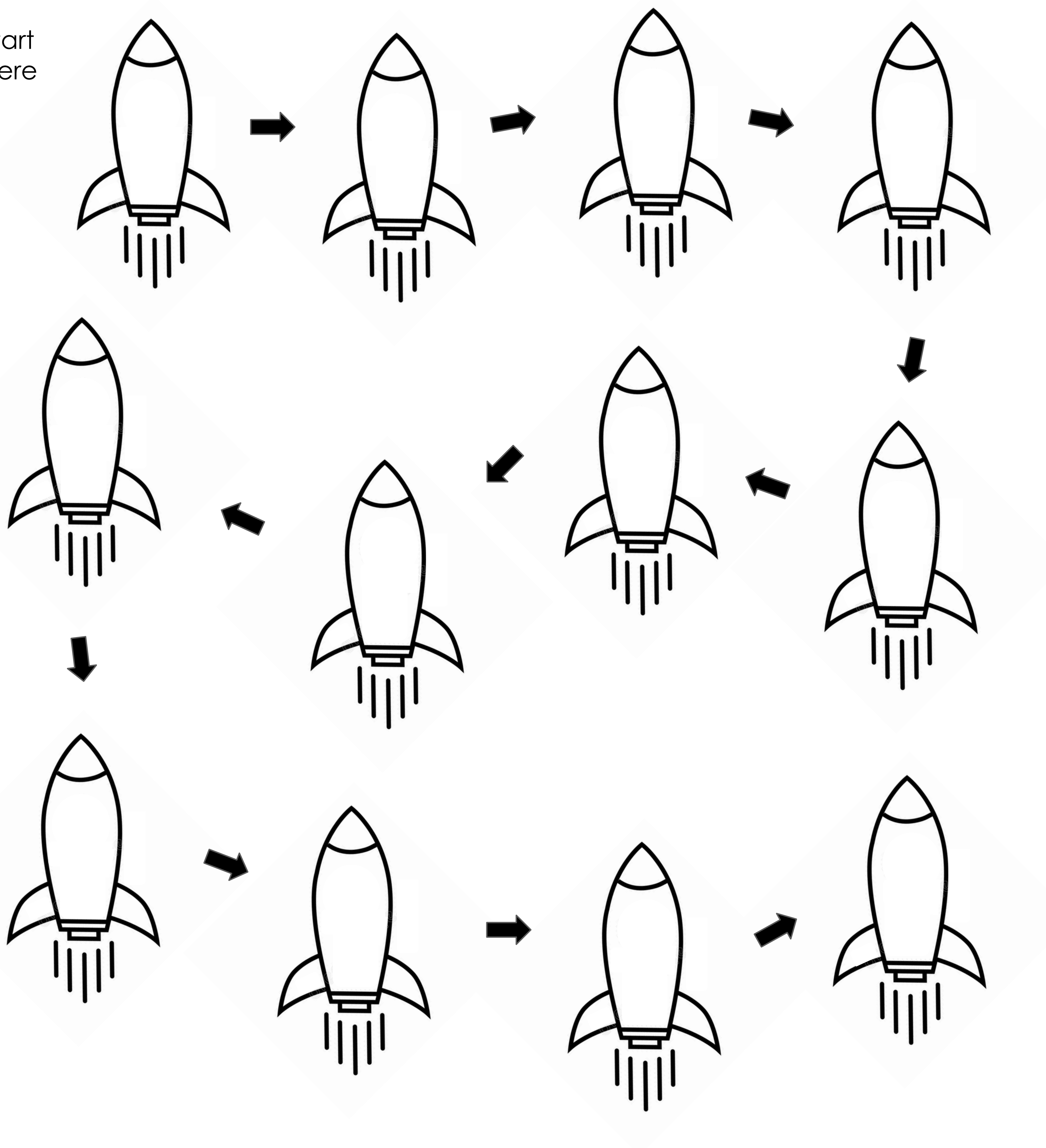


Random Number Recording Sheet **(Adapted from Kim Sutton)**

Name __________________________________ Date ___________________________________

Strategy:	Counting On	Counting Back	Zero	Doubles	Doubles +1	Doubles -1	Combinations of 10
Add 10	Subtract 10	Make a 10	Doubles +2	+9	-9		

Start Here

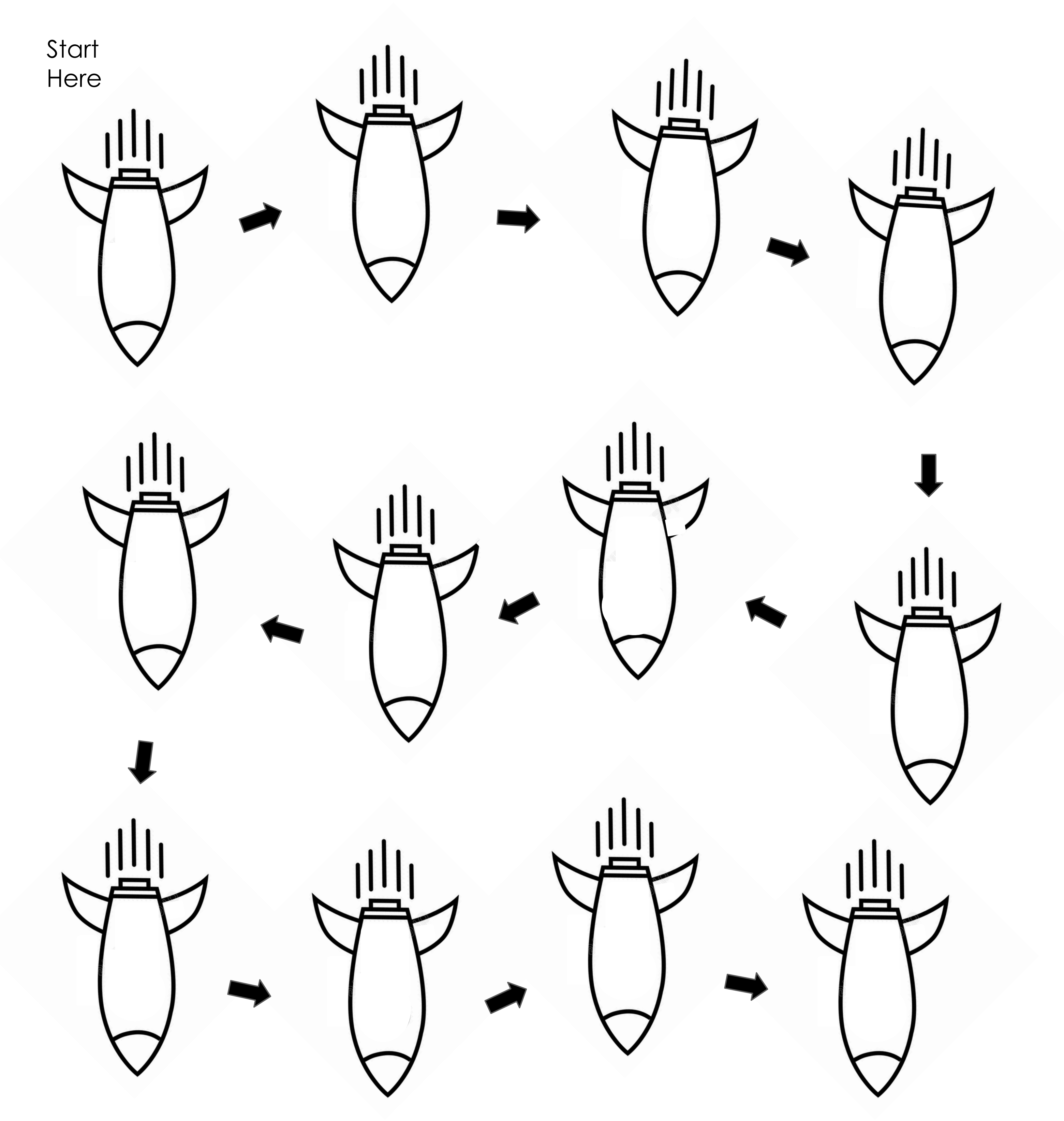


Random Number Recording Sheet (Adapted from Kim Sutton)

Name ________________________________Date __________________________________

Strategy:	Counting On	Counting Back	Zero	Doubles	Doubles +1	Doubles -1	Combinations of 10
Add 10	Subtract 10	Make a 10	Doubles +2	+9	-9		

Start Here

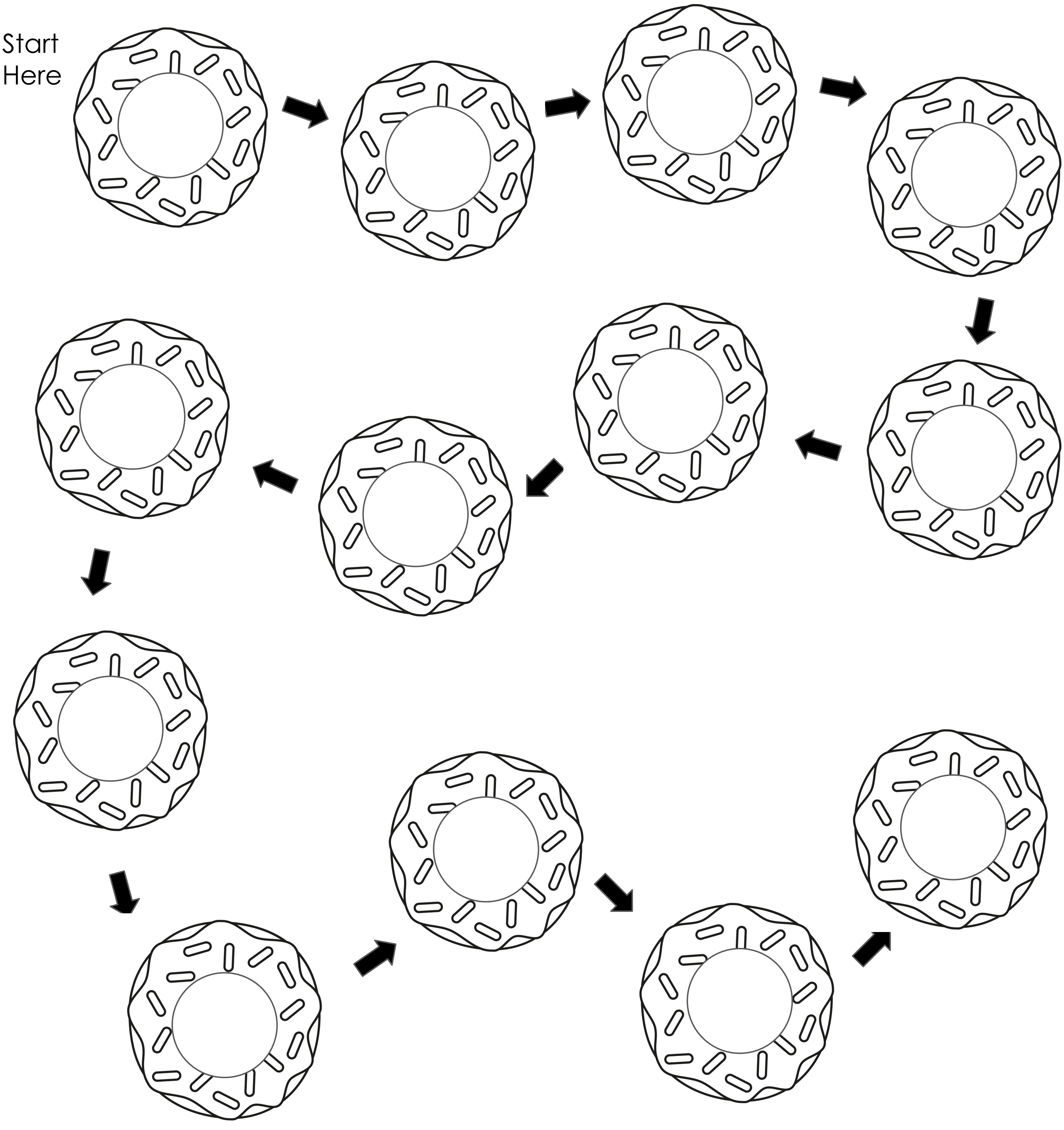


Random Number Recording Sheet (Adapted from Kim Sutton)

Name ________________________________ Date ________________________________

Strategy:	Counting On	Counting Back	Zero	Doubles	Doubles +1	Doubles -1	Combinations of 10
Add 10	Subtract 10	Make a 10	Doubles +2	+9	-9		

Start Here



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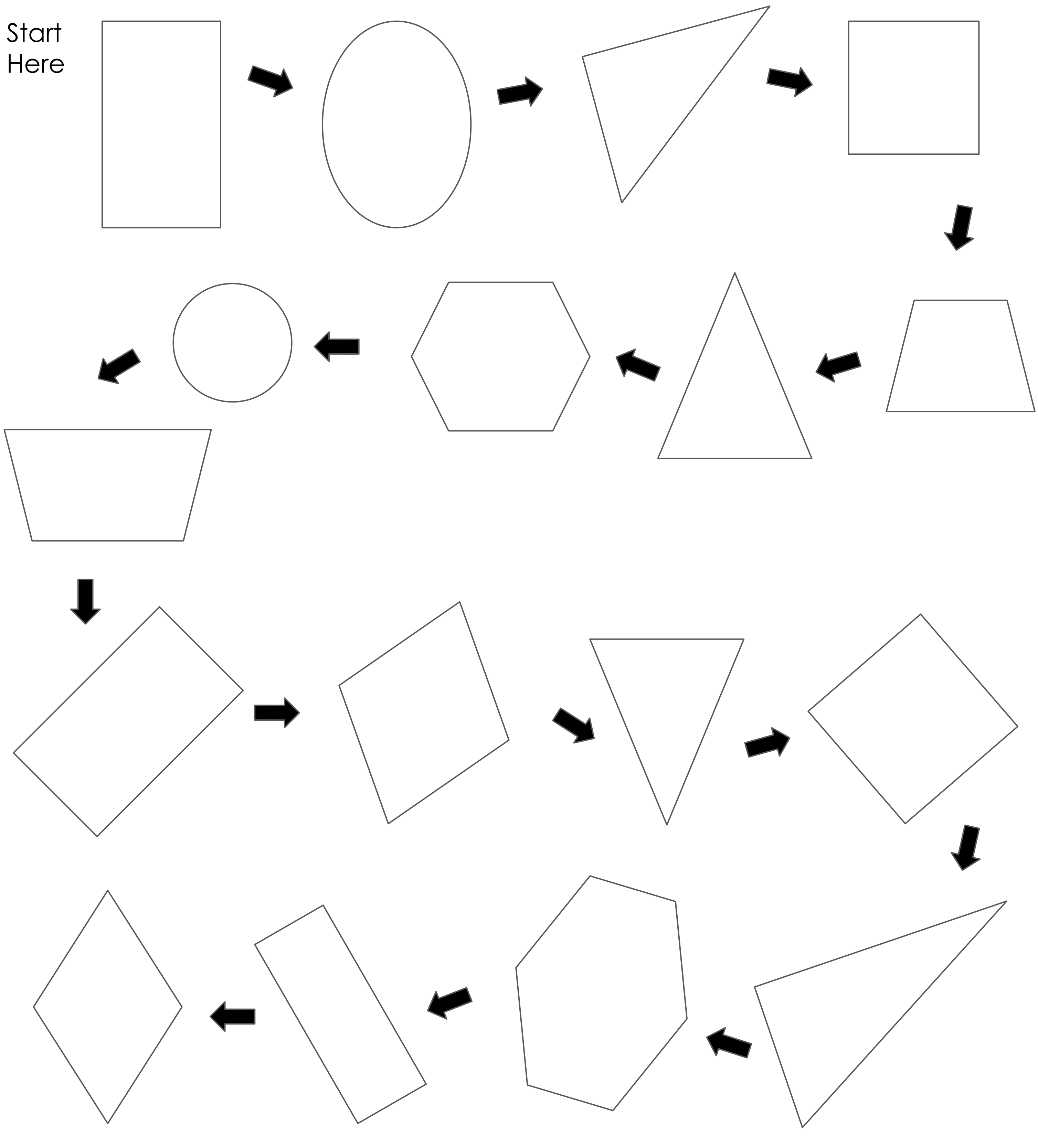

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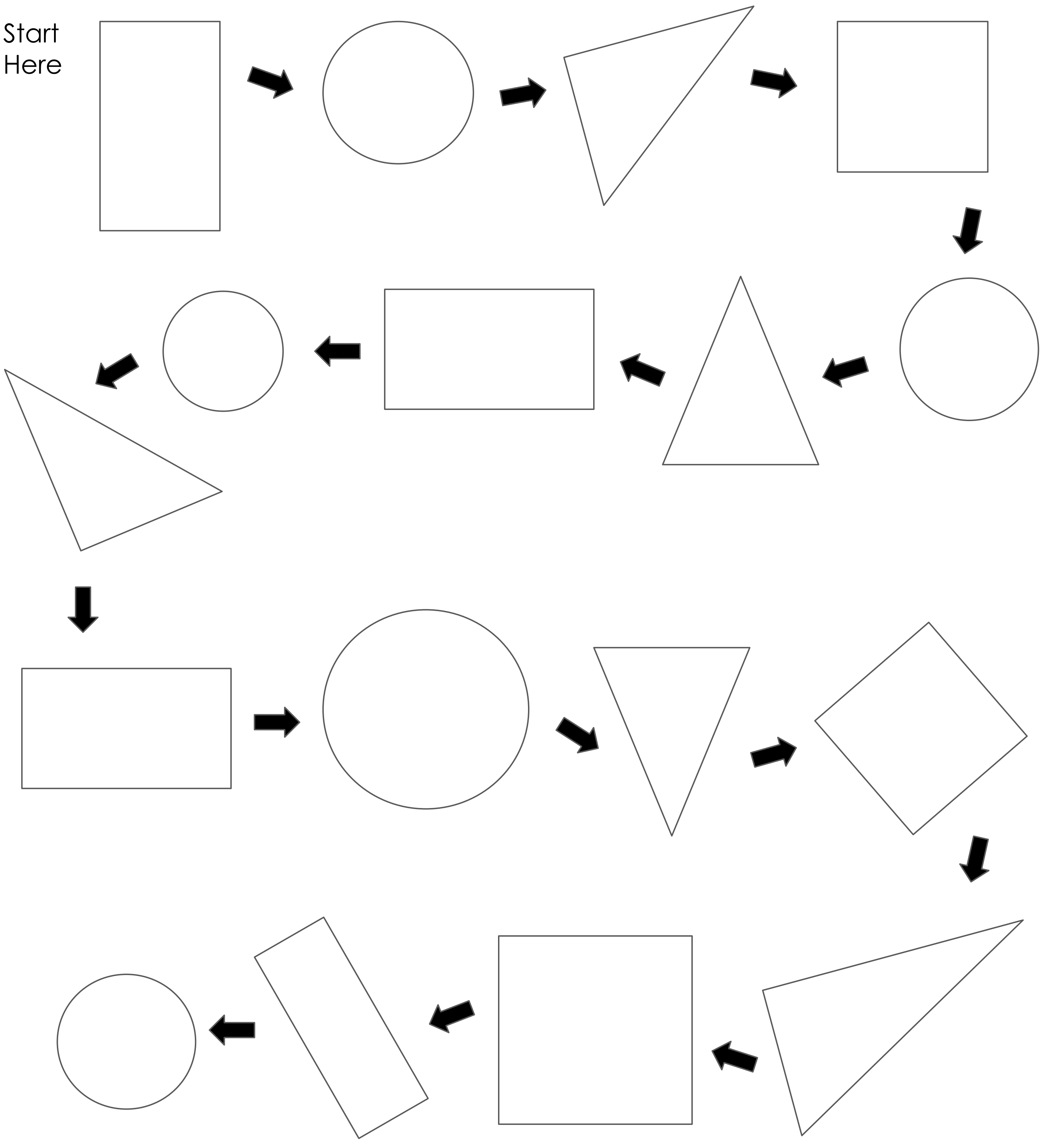

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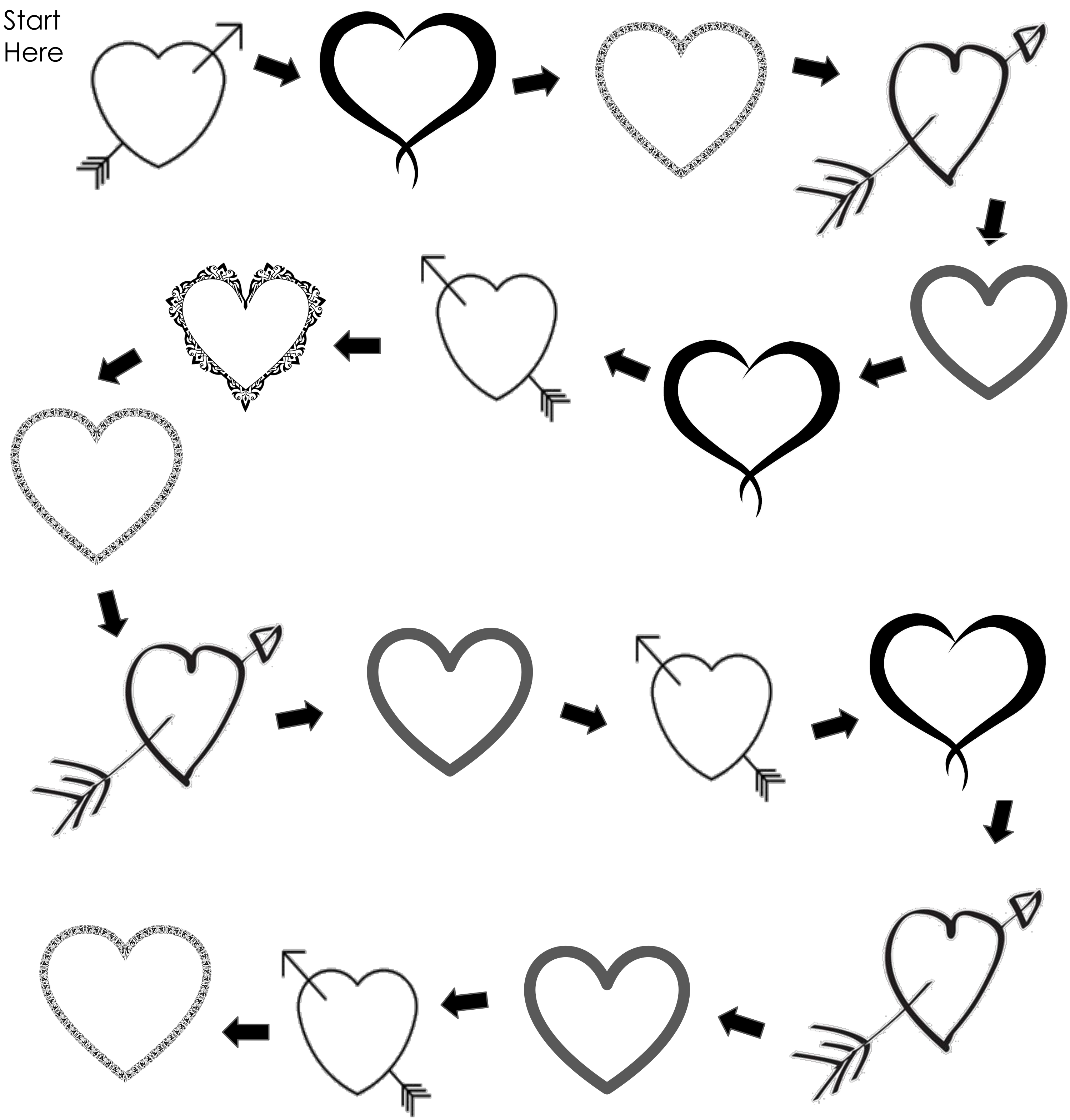

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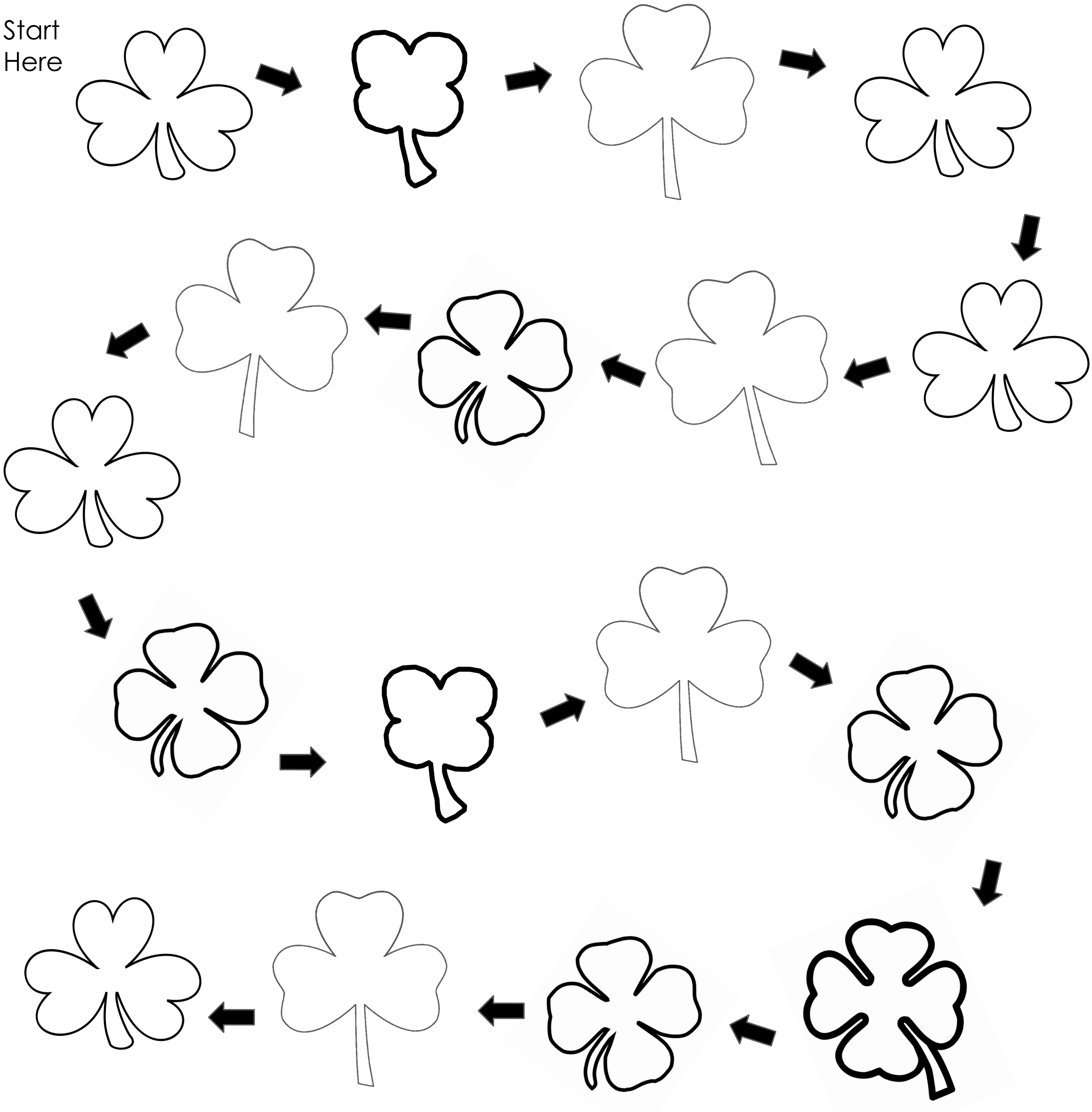
Name ________________________________ Date ________________________________

Strategy:	Counting On	Counting Back	Zero	Doubles	Doubles +1	Doubles -1	Combinations of 10
Add 10	Subtract 10	Make a 10	Doubles +2	+9	-9	+4	



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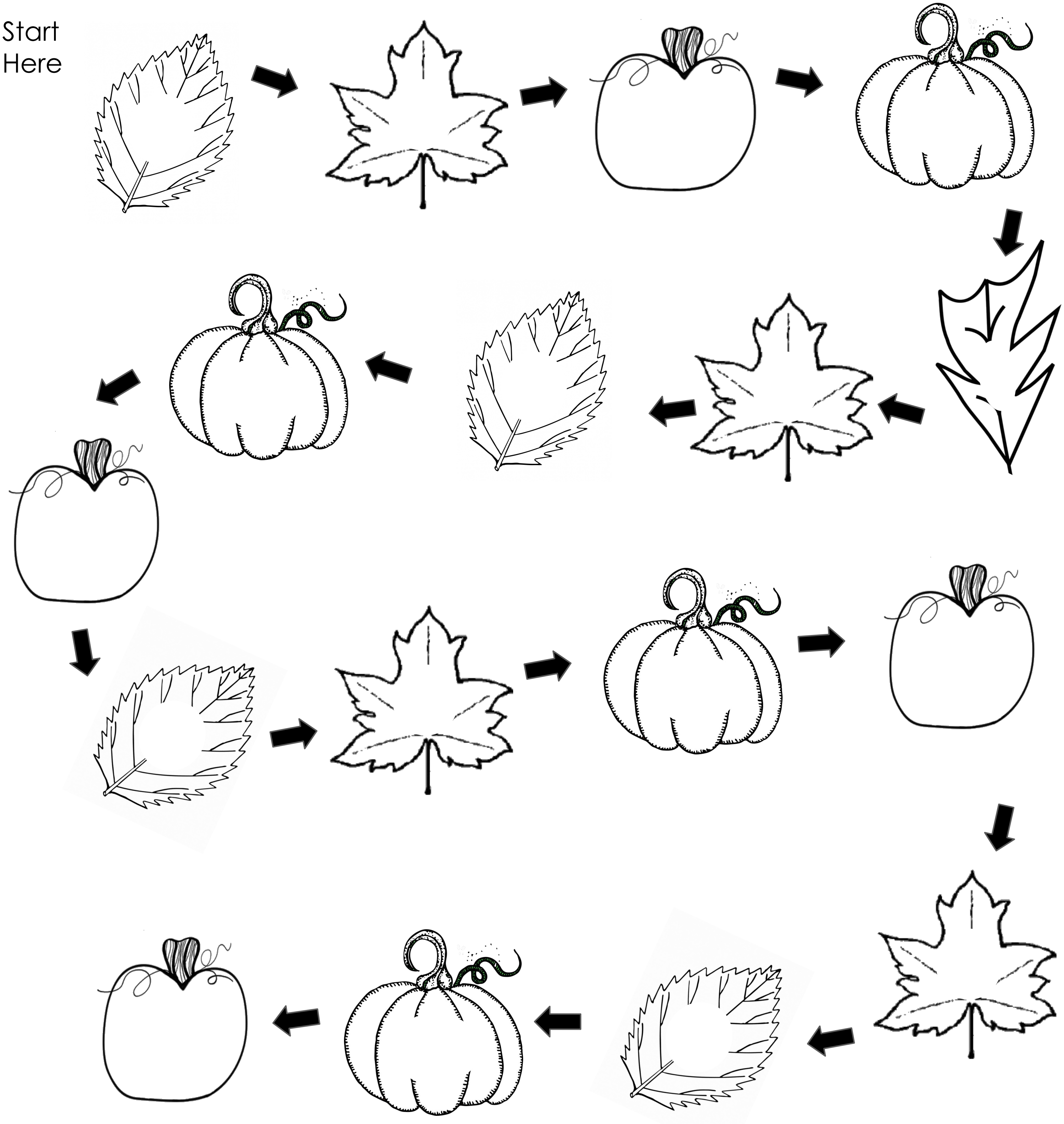

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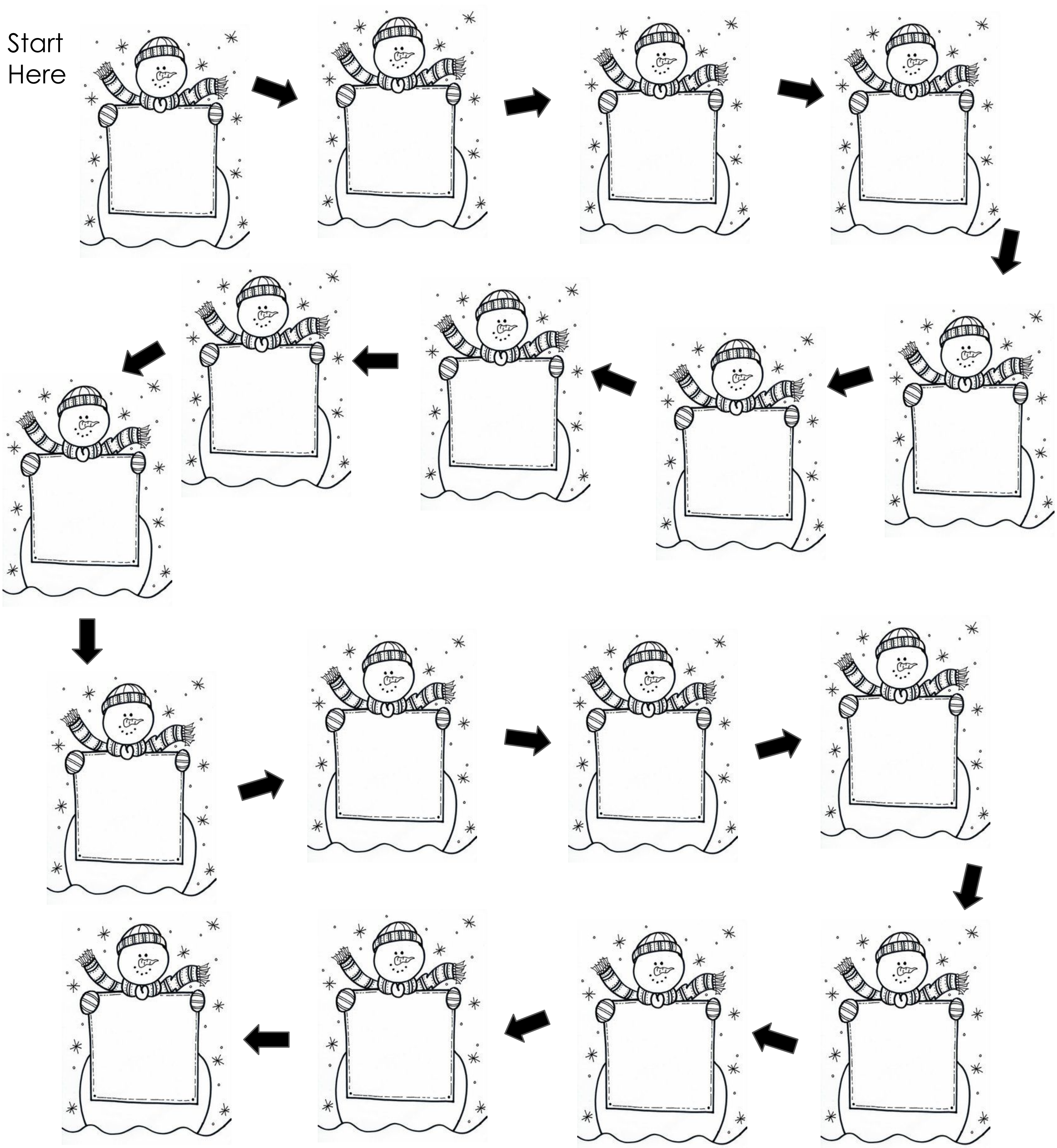

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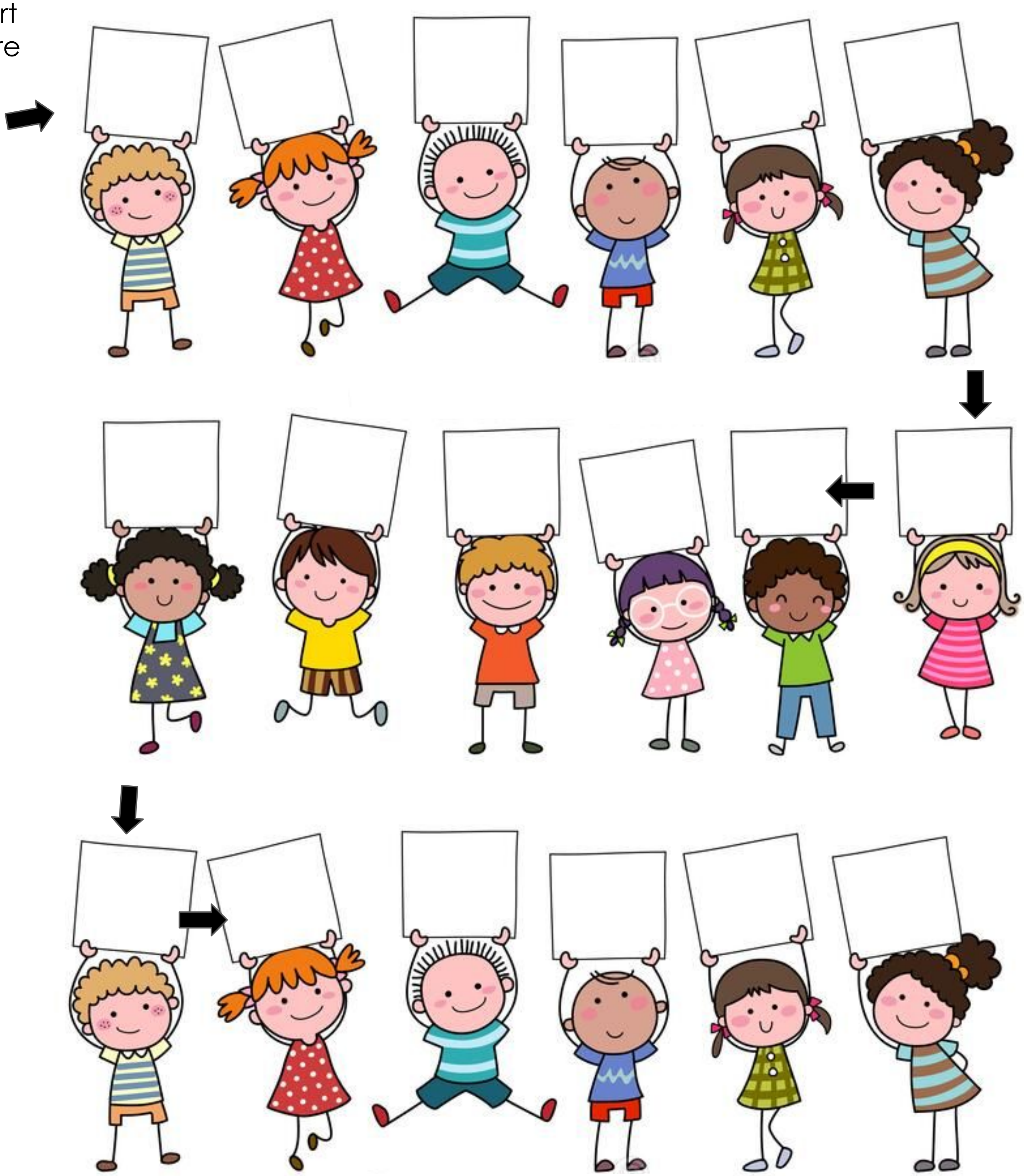

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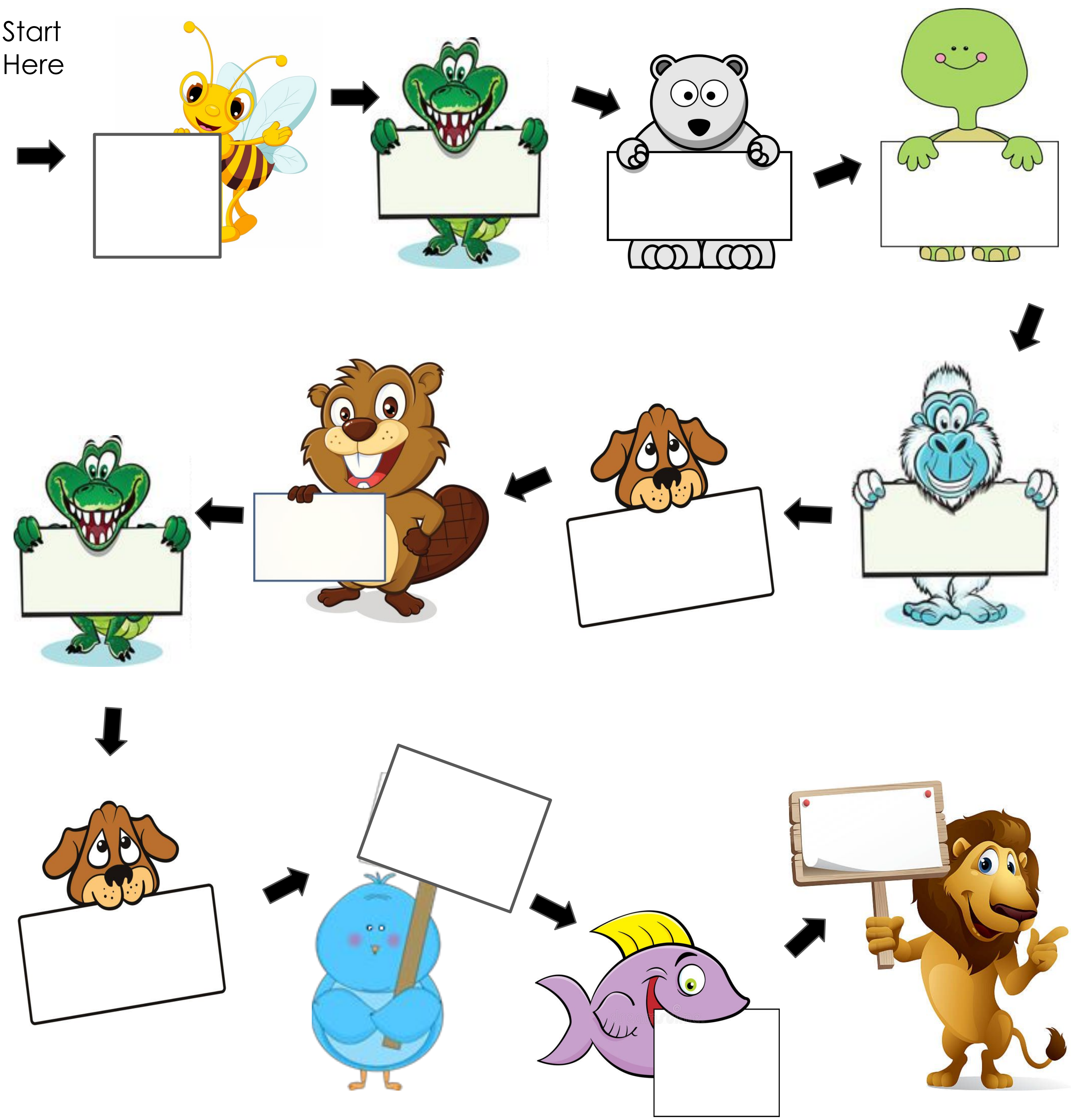
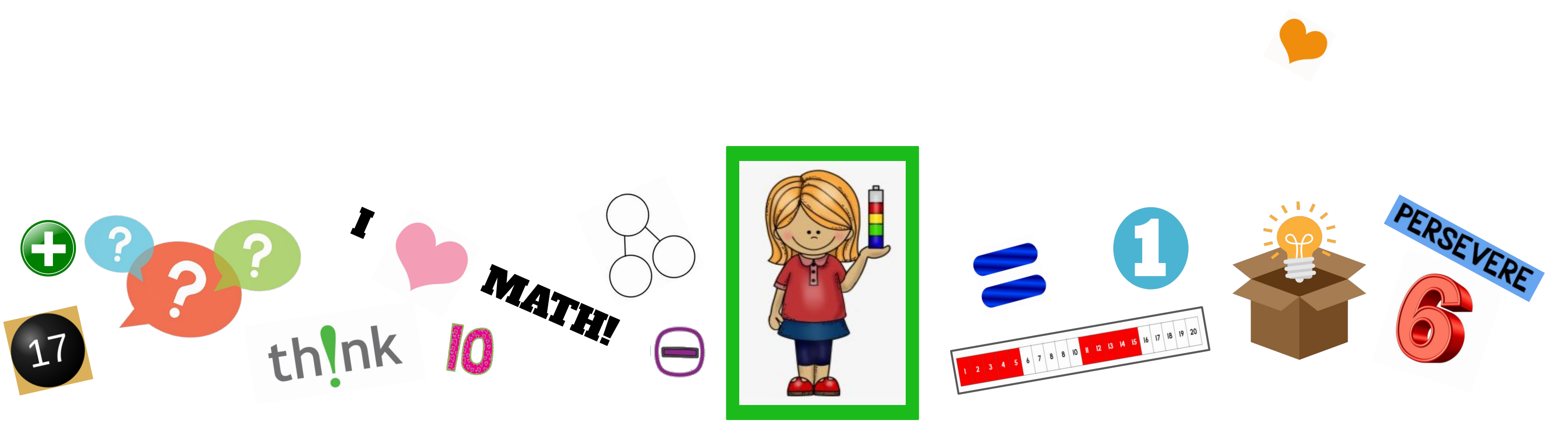


Additional Resources & Information



Consider branching out and looking into these additional resources:

- National Council of Teachers of Mathematics: NCTM https://www.nctm.org/
- Kansas Department of Education (KSDE) https://community.ksde.org/Default.aspx?tabid=5255
- WPS SRG website has additional resources
    - Any suggestion listed below with an * is located on the SRG website
- Dynamic Learning Maps/Essential Elements for some special education programs https://drive.google.com/drive/folders/1Tk3bflBtdbknXsVRsgaeHmuZhRiTTVHH
- *North Carolina Building Conceptual Understanding and Fluency Through Games
- *Articles on fluency and computation
- Let's Get Started (Spiral Text: Sutton)
- Math Drills to Thrill (Spiral Text: Sutton)
- Mastering Basic Math Facts for Addition and Subtraction (Text: O'Connell & SanGiovanni)
- Figuring Out Fluency in Mathematics: Moving Beyond Basic Facts and Memorization (Text: Bay-Williams & SanGiovanni)
- Teaching Student-Centered Mathematics - 1st/2nd/3rd Editions (Text: Van de Walle, Karp, Lovin, & Bay-Williams)
- Mine the Gap: Common Holes and Misconceptions and What to Do About Them (Text: SanGiovanni)
- It Makes Sense (Text: Conklin)
- Jo Boaler resources
- Adding It Up: Helping Children Learn Mathematics (National Research Council, 2001)

This page will be updated in the months and years to come.

- Kansas Multi-Tier System of Supports and Alignment
    - Structuring Guide for Math

Tier 1/Core Mathematics

<u>Essential Core Beliefs</u>

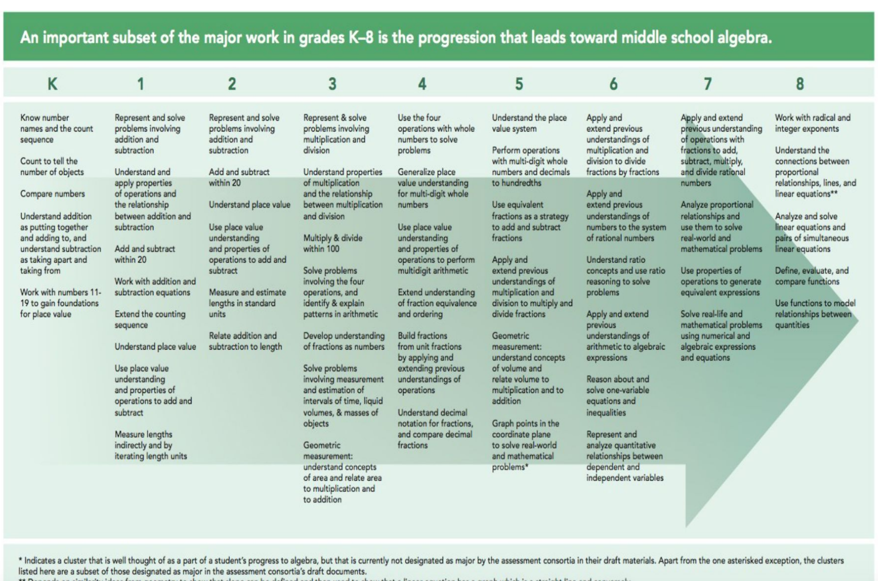
- Engrained belief that all children *can* achieve proficiency with mathematics.
- A high-quality program is essential to each individual child.
- Effective programs effectively address the five strands of mathematical proficiency.
- Effective instruction occurs within all instructional practices at every tier.

The National Research Council (Kilpatrick, Swafford, & Findell, 2001) defined "mathematical proficiency" through the following proficiency strands:

The Five Strands of Mathematical Proficiency	
Conceptual Understanding	Comprehension of mathematical concepts, operations, and relations
Procedural Fluency	Skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
Strategic Competence	Ability to formulate, represent, and solve mathematical problems
Adaptive Reasoning	A capacity for logical thought, reflection, explanation, and justification
Productive Disposition	Habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's efficacy

In addition to the critical mathematical concepts at each grade level, consider the three shifts in mathematics identified by the Common Core mathematics standards when ensuring vertical alignment of your PreK-12 mathematics program:

Focus	**Coherence**	**Rigor**
➢ Focus strongly where the standards focus	➢ Think across grade levels and link to major topics within grades	➢ Within critical areas, pursue conceptual understanding, procedural fluency, and application



An important subset of the major work in grades K–8 is the progression that leads toward middle school algebra.

K	1	2	3	4	5	6	7	8
Know number names and the count sequence Count to tell the number of objects Compare numbers Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from Work with numbers 11-19 to gain foundations for place value	Represent and solve problems involving addition and subtraction Understand and apply properties of operations and the relationship between addition and subtraction Add and subtract within 20 Work with addition and subtraction equations Extend the counting sequence Understand place value Use place value understanding and properties of operations to add and subtract Measure lengths indirectly and by iterating length units	Represent and solve problems involving addition and subtraction Add and subtract within 20 Understand place value Use place value understanding and properties of operations to add and subtract Measure and estimate lengths in standard units Relate addition and subtraction to length	Represent & solve problems involving multiplication and division Understand properties of multiplication and the relationship between multiplication and division Multiply & divide within 100 Solve problems involving the four operations, and identify & explain patterns in arithmetic Develop understanding of fractions as numbers Solve problems involving measurement and estimation of intervals of time, liquid volumes, & masses of objects Geometric measurement: understand concepts of area and relate area to multiplication and to addition	Use the four operations with whole numbers to solve problems Generalize place value understanding for multi-digit whole numbers Use place value understanding and properties of operations to perform multidigit arithmetic Extend understanding of fraction equivalence and ordering Build fractions from unit fractions by applying and extending previous understandings of operations Understand decimal notation for fractions, and compare decimal fractions	Understand the place value system Perform operations with multi-digit whole numbers and decimals to hundredths Use equivalent fractions as a strategy to add and subtract fractions Apply and extend previous understandings of multiplication and division to multiply and divide fractions Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition Graph points in the coordinate plane to solve real-world and mathematical problems*	Apply and extend previous understandings of multiplication and division to divide fractions by fractions Apply and extend previous understandings of numbers to the system of rational numbers Understand ratio concepts and use ratio reasoning to solve problems Apply and extend previous understandings of arithmetic to algebraic expressions Reason about and solve one-variable equations and inequalities Represent and analyze quantitative relationships between dependent and independent variables	Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers Analyze proportional relationships and use them to solve real-world and mathematical problems Use properties of operations to generate equivalent expressions Solve real-life and mathematical problems using numerical and algebraic expressions and equations	Work with radical and integer exponents Understand the connections between proportional relationships, lines, and linear equations** Analyze and solve linear equations and pairs of simultaneous linear equations Define, evaluate, and compare functions Use functions to model relationships between quantities

* Indicates a cluster that is well thought of as a part of a student's progress to algebra, but that is currently not designated as major by the assessment consortia in their draft materials. Apart from the one asterisked exception, the clusters listed here are a subset of those designated as major in the assessment consortia's draft documents.

** Depends on similarity ideas from geometry to show that slope can be defined and then used to show that a linear equation has a graph which is a straight line and conversely.

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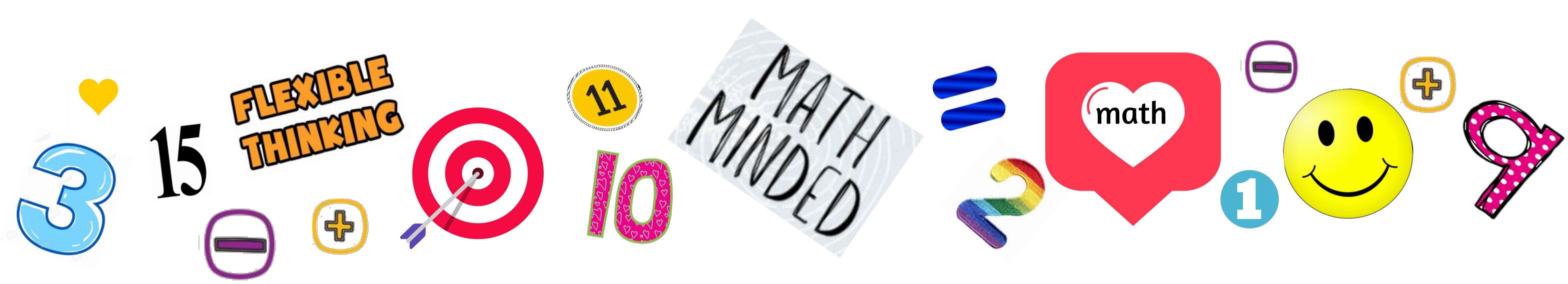

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