

Addition & Subtraction

Basic Facts

Strategy Development & Practice Handbook

Salem Keizer Public Schools
Curriculum, Instruction & Assessment

© May 2007

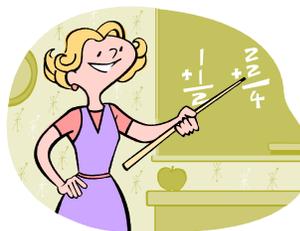
Strategic Development of Basic Facts

When students first learn to add, they move from needing to count all objects to being able to start with one number and count on. This is an important step in the development of addition and subtraction strategies. The next step is the development of *thinking* strategies. Unfortunately, the traditional practice of timed drill encourages students to use counting strategies and does nothing to promote thinking strategies. Because of this, we see many upper elementary students relying on counting to solve basic addition and subtraction facts.

The goal for basic fact practice should be automaticity gained through

practice *after* thinking strategies have been developed. In order to reach this goal, two critical elements are needed for effective fact practice: *development* of efficient strategies; and practice of facts in an *order* that helps to build efficient strategies.

Prior to practice, it is critical to incorporate mini-lessons that deal specifically with strategy development. While *Bridges* includes many lessons on strategy development and practice, additional mini-lesson ideas are included in this handbook for intermediate teachers and for 1-2 teachers who want to include additional practice.



By focusing on strategies, students can build new strategies based upon facts that they already know. Rather than teach facts successively from +0 through +9, a more effective strategy order is: think one (two) more/less; combinations of ten; add ten to a single digit number; doubles; neighbors; make a ten; sharing; think addition; building up/backing down through ten. See pages 4-7 for more information on these strategies.

What's Inside:

Suggested Practice
Timeline for Grades 1-3 2-3

Mini-Lessons,
Discussions, and
Activities for Practice: 4-7

Appendix :

Strings	8
Strategy Cards	9
Around the Class	10
Beat the Calculator	10
Interval Training	11

When To Practice

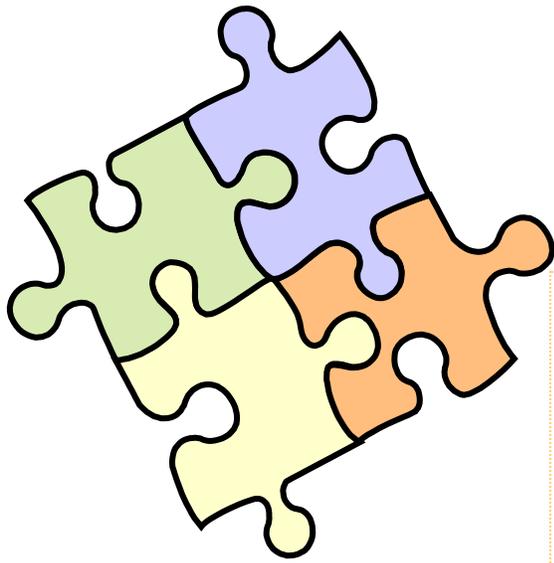
Strategy development and practice for basic facts will be most effective if it happens 2-3 times per week for 5-10 minutes. For 1st and 2nd grades, *Bridges* includes strategy development and practice in Number Corner as well as in Lessons, so **it is critical to include Number Corner** in

your math program. Additional practice (or practice in intermediate grades) can be done as a warm-up at the beginning of math time or for 5-10 minutes at some other time during the day. Several of the practice activities can be incorporated into transition times or used as “sponge” activities.

Except for *Bridges* Lessons specifically devoted to strategy development it is not best practice to devote a whole class period to additional practice. Short, frequent mini-lessons will be much more effective. Fact practice is also an excellent homework assignment.

In order to become fluent with basic addition and subtraction facts, students need:

- A solid understanding of the concepts of addition and subtraction.
- Opportunities to develop efficient strategies for knowing facts.
- Opportunities to practice using those strategies.



What About Fact Practice in Kindergarten?

The focus of kindergarten is to develop number concepts and a basic understanding of the concepts of addition and subtraction. Kindergarten students spend a lot of time developing counting skills and understanding of numbers and how they relate to one another. Time spent developing a good number foundation will benefit students when they begin to develop and practice strategies in first grade.

Why not just count on?

Counting on is a widely promoted strategy. While it is an important step in the development of strategies, it is equally important that students move beyond counting strategies. When adding one, two or three, counting on is efficient because it is easy to keep track of how many have been added on. However, students often apply this strategy to facts where it is not efficient, such as $6+8$. For this reason, counting-on should be downplayed beyond first grade. Even with simple facts like adding two, encourage students to “think two more” rather than count on.

Addition Fact Strategies:

- ◆ Share and Practice Strategies
 - ⇒ Counting All for Addition
 - ⇒ Counting On for Addition
 - ⇒ Think Add Zero: $4+0$ $8+0$

Addition/Subtraction Fact Strategies

- ◆ Share and Practice Strategies
 - ⇒ Counting On for Addition
 - ⇒ Counting Back for Subtraction
 - ⇒ Think Add/Subtract Zero: $4+0$ $8+0$ $7-0$ $2-0$

Addition/Subtraction Fact Strategies

- ◆ Share and Practice Strategies
 - ⇒ Continue practicing strategies listed in October-December as needed
 - ⇒ Addition Doubles (1 thru 5 and 10): $1+1$ $2+2$ $3+3$ $4+4$ $5+5$ $10+10$
 - ⇒ Think One More/Less: $5+1$ or $8-1$
 - ⇒ Add Ten to any Single Digit Number: $3+10$ $10+7$

Addition/Subtraction Fact Strategies

- ◆ Share and Practice Strategies
 - ⇒ Continue practicing strategies listed in October-February as needed
 - ⇒ Combinations of Ten: $9+1$ $4+6$ $8+2$ or $6+?=10$ $?+3=10$ $8+?=10$
 - ⇒ Relate Addition to Subtraction: For $6-3$ think $3+3=6$ so $6-3=3$

Grade 2

Grade 3

September

Addition/Subtraction Fact Strategies:

- ◆ Share and Practice Strategies
 - ⇒ Counting On for Addition
 - ⇒ Counting Back for Subtraction
 - ⇒ Add/Subtract Zero: $8+0$ $3-0$
 - ⇒ Think One More/Less: $5+1$ or $8-1$
 - ⇒ Combinations of Ten: $4+6$ $8+2$ or $6+?=10$ $?+3=10$
 - ⇒ Addition Doubles (all): $3+3$ $7+7$ $4+4$ $6+6$

October

Addition/Subtraction Fact Strategies:

- ◆ Share and Practice Strategies
 - ⇒ Continue practicing strategies listed in September/October as needed
 - ⇒ Addition Doubles and Neighbors: $3+3$ $3+4$ $7+7$ $7+8$ $4+4$ $4+5$
 - ⇒ Relate Addition to Subtraction
 - ⇒ Add Ten to any Single Digit Number: $3+10$ $10+7$

November

December

January

Addition/Subtraction Fact Strategies:

- ◆ Share and Practice Strategies
 - ⇒ Continue practicing strategies listed in September-December as needed
 - ⇒ Think Two More/Less: $9+2$ $2+7$ $8-2$ $6-2$
 - ⇒ Subtraction Neighbors: $7-6$ $9-8$ $6-5$
 - ⇒ Add/Subtract Ten: $10+7$ $8+10$ $13-10$ $16-10$

February

March

Addition/Subtraction Fact Strategies:

- ◆ Share and Practice Strategies
 - ⇒ Continue practicing strategies listed in September-March as needed
 - ⇒ Add/Subtract Ten and Nine: $10+5$ $9+5$ $10+4$ $9+4$ $17-10$ $17-9$ $16-10$ $16-9$
 - ⇒ Doubles and Halves
 - ⇒ Think Addition for Subtraction

April

May-June

Addition/Subtraction Fact Strategy Development and Practice:

- ◆ Share and Practice Strategies
 - ⇒ Think One/Two More/Less: $5+1$ $7+2$ or $8-2$ $4-1$
 - ⇒ Combinations of Ten: $9+1$ $4+6$ $8+2$ or $6+?=10$ $?+3=10$ $8+?=10$
 - ⇒ Doubles: $3+3$ $7+7$ $4+4$ $6+6$
 - ⇒ Neighbors: $3+4$ $7+8$ $4+5$ $6+7$
 - ⇒ Breaking Apart/Sharing:
 - $6+8 = 6+6+2$ (break 8 into 6+2) or
 - $7+5 = 6+6$ (share one from the 7—give to the 5)
 - ⇒ Make a Ten: $5+9 = 4+10$ or $8+6 = 10+4$
 - ⇒ Think Addition: $15-8=?$ Think $8+?=15$
 - ⇒ Building Up/Backing Down Through Ten:
 - $17-9=?$ Think *if I start at 9, I need 1 more to get to 10; then 7 more to get to 17;*
 - $1+7=8$ so $17-9=8$
 - $15-7=?$ Think $15-5=10$; *I need to subtract 2 more because $5+2=7$ so $15-7=8$*
- ◆ Adding/Subtracting Multiples of 10
- ◆ Doubling and Halving

Some Thoughts about Subtraction

It is important for students to know that not all subtraction is take away. While “take away” is a common way of thinking about subtraction, the difference model is a powerful model of subtraction. The difference model of subtraction is how we compare things like quantities, distances, heights and weights. When students only think subtraction as “take away” they often rely upon counting back for all subtraction instead of using thinking strategies. Thinking of subtraction as the difference between two numbers enables students to be more flexible with strategies.

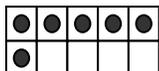
What About +/- Fact Practice for Older Students?

Many older students who have difficulty with facts use counting as their primary strategy. Examine what number relationships the student has. Without a solid understanding of numbers and their relationships thinking strategies are very difficult. Use mini lessons to develop number concepts and relationships that will prepare students to use thinking strategies that are discussed in the following pages.

Add/Subtract Zero, Think One More/Less, Think Two More/Less

Mini-Lessons and Discussions for Developing Strategies

- ◆ **Discussion of Adding or Subtracting 0, 1 or 2**
⇒ Have students solve word problems that involve adding or subtracting 0, 1 or 2. Draw pictures to go with the story. Have students share their thinking.
- ◆ **+/- 0, 1 or 2 using a ten frame**
⇒ Display a Ten Frame and ask students what would be 0, 1, or 2 more or less. Show on the ten frame.



Think two more

Activities for Practice

*see appendix for information on these activities

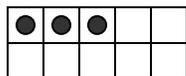
- ◆ **Around the Class** (see p. 10)
⇒ Add or Subtract 0, 1 or 2
- ◆ **Interval Training** (see p. 11)
⇒ Zeros, Ones, Twos and Mixed
- ◆ **Grade 1 & 2 Number Corner Activities:**
⇒ Gr 1, Feb. Thurs. Thinking 3 & 4: One More, One Less/ Two More, Two Less NC TG p. 289-292
⇒ Gr 2, Jan.-Feb. Workout Wheel NC TG p. 152-155

Combinations of Ten

Mini-Lessons and Discussions for Developing Strategies

- ◆ **Make Ten on the Ten Frame or Ten Strip**
⇒ Display a partially filled ten frame card. Ask students how many more are needed to make ten. Say and record the equation.
- ◆ **Grade 1 Number Corner Activity**
⇒ Two to Make Ten NC TG p. 328-329
- ◆ **Make Ten without a Ten Frame**
⇒ Display a blank Ten Frame. Say a number less than ten. Students start with that number and say and record how many are needed to make ten.

$$3 + \underline{\quad} = 10$$



The ability to get to ten from any single digit number is critical. Many thinking strategies that are used with larger numbers are dependent upon this skill. Spending time on developing this concept is time well spent.

Activities for Practice

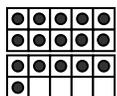
*see appendix for information on these activities

- ◆ **Around the Class** (see p. 10)
⇒ How many do I need to get to ten?
If a student says 6 the class says $6 + 4 = 10$
- ◆ **Interval Training** (see p. 11)
⇒ Make 10
 $\underline{\quad} + \underline{\quad} = 10$ The students record the number they hear in the first blank and fill in the second blank with what they need to make 10.
⇒ For students who need a challenge:
 - Make another target number, such as 11 or 12.
- ◆ **Make Ten Go Fish:** use ten frame cards
⇒ The goal is to make ten. If you have a 7 you would ask one of the other players for a three.

Add/Subtract Ten

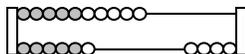
Mini-Lessons and Discussions for Developing Strategies

- ◆ **Ten Frame Cards, Arithmetic Rack**
⇒ Use Ten Frame cards to model adding or subtracting ten.



Ten frame cards or an Arithmetic Rack can be used to show

$10 + 6$ and $16 - 6$



- ◆ **Grade 1 Number Corner Activities**
⇒ Gr1 Ten & More NC TG p. 51-57
⇒ Gr 1 Unifix Cube Ten & More NC TG p. 114-115

Activities for Practice

*see appendix for information on these activities

- ◆ **Around the Class** (see p. 10)
⇒ Add or Subtract 10
- ◆ **Strategy Cards** (see p. 9))
- ◆ **Interval Training** (see p. 11)
⇒ Add 10
- ◆ **Grade 1 Number Corner Activity**
⇒ Gr1 Ten & More a Match Game NC TG p. 53-54

Doubles

Mini-Lessons and Discussions for Developing Strategies

◆ Reflecting Doubles

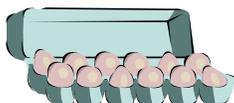
⇒ In pairs, one student holds up 1 to 10 fingers. The partner mirrors the same number of fingers, touching them to their partner's fingers. Emphasize that two touching hands (5+5) will always be ten.

⇒ Say (or say and record) the doubles equation that is being modeled.



◆ Discussion of Double Images

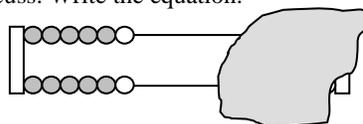
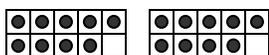
⇒ Discuss images and draw pictures to illustrate the doubles



$6 + 6 =$

◆ Ten Strip, Ten Frame, or Arithmetic Rack Doubles

⇒ Put two like Ten Frame cards or Ten Strips on the overhead or white board and discuss. Write the equation.



Activities for Practice

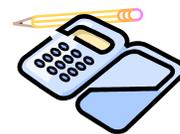
*see appendix for information on these activities

◆ Around the Class (see p. 10)

⇒ Doubles Around the Class

◆ Beat the Calculator (see p. 10)

⇒ Doubles



◆ Interval Training (see p. 11)

⇒ Doubles (___ + ___)

⇒ For students who need a challenge:

- Double and Double Again
- Double, Double Again and Double One More Time

◆ Strategy Cards (see p. 9)

⇒ Double Images

◆ Double Dice

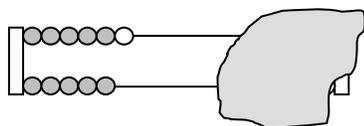
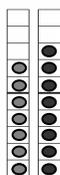
⇒ Roll a die, double it and record the equation
i.e. Roll a 6 and record $6+6 = 12$

Neighbors (Doubles Plus One)

Mini-Lessons and Discussions for Developing Strategies

◆ Discussion of the connection between Doubles and Neighbors Using Visuals

- ◆ Ten Frame Cards
- ◆ Ten Strips
- ◆ Arithmetic Racks



◆ Strings: Doubles and Neighbors (see p. 8)

⇒ Some strings to use:

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

In order to use the thinking strategy of neighbors students must know the doubles facts and be able to think one more.

Activities for Practice

*see appendix for information on these activities

◆ Around the Class (see p. 10)

⇒ Double it and add one

◆ Strategy Cards (see p. 9)

◆ Interval Training (see p. 11)

⇒ Double then Neighbor

◆ Double Dice Plus One

⇒ Roll a single die with numerals or dots then say and record the complete double-plus-one fact. If a 6 is rolled, the student says and records $6+7=13$.

◆ Grade 1 & 2 Number Corner Activities for Doubles and Neighbors

⇒ Gr 1 Seeing Doubles & Neighbors NC TG p. 101-104 and p. 239-241

⇒ Gr 1 Doubles & Neighbors NC TG p. 372-375

⇒ Gr 2 Workout Wheel NC TG p. 152-155



Halves

Mini-Lessons and Discussions for Developing Strategies

◆ Discussion of Doubles and the relationship to Halves

⇒ Use Ten Strips, Ten Frames, or Arithmetic Rack to provide a visual model for doubles. Then have students come up with the related subtraction fact (the half fact).

⇒ You can also use reflecting doubles with fingers to provide a visual model of doubles and then relate them to halves.

$$7+7=14$$

Half of 14 is 7

$$14-7=7$$



◆ Strings: Doubles and Halves

⇒ Some strings to use:

4+4		6+6		8+8
8-4		12-6		16-8
5+5		7+7		9+9
10-5		14-7		___-9

Make a Ten (Fast Nines)

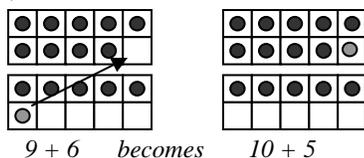
Mini-Lessons and Discussions for Developing Strategies

Make a Ten is one type of sharing strategy. In Make a Ten you break one addend apart to make the other addend ten.

◆ Discussion of making a ten to help with adding a 9 or 8

This strategy involves building onto the 8 or 9 to make a ten and then adding on the rest.

⇒ Use Ten Frames or Ten Strips to model a fact such as $8 + 5$. Show 8 on one ten frame and 5 on another ten frame using counters or cubes. Then decide an easy way to show the answer without counting. Model moving two counters from the 5 to make the 8 become 10. Then your ten frames show $10 + 3$. Discuss how this is the same as $8 + 5$. Give students two blank ten frames and some counters and have them do this strategy with another problem such as: $8+4$, $8+6$, $9+4$, $9+5$, $9+6$, $9+7$

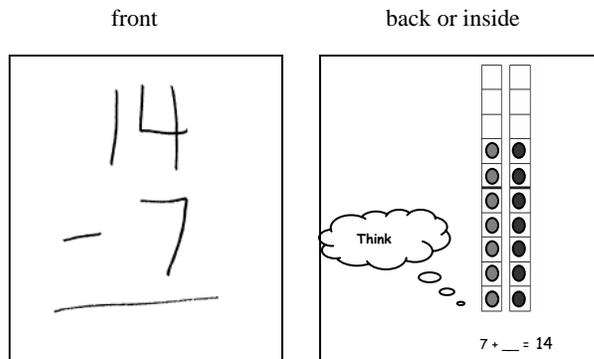


In order to use this strategy students must be able to think of numbers 11-19 as ten and some more.

Activities for Practice

*see appendix for information on these activities

◆ Strategy Cards (see p. 9)



◆ Around the Class (see p. 10)

⇒ Halves Around the Class (even numbers)

◆ Interval Training (see p. 11)

⇒ Halves. Students can half the number ($\div 2$). You may want to say the numbers rather than using a CD so that you can choose only even numbers.

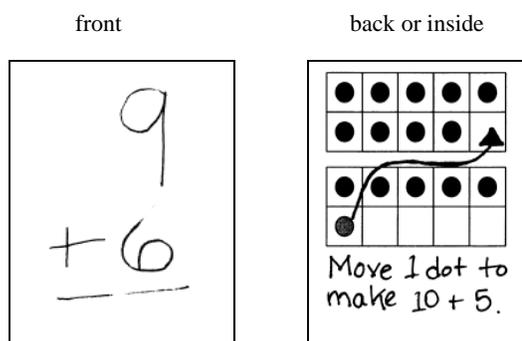
◆ Grade 2 Number Corner Activity to Practice this strategy:

⇒ Grade 2 Jan –Feb Workout Wheel NC TG p 152-155

Activities for Practice

*see appendix for information on these activities

◆ Strategy Cards (see p. 9)



◆ Around the Class (see p. 10)

⇒ +9 or +8 around the class

◆ Interval Training (see p. 11)

⇒ +9 or +8

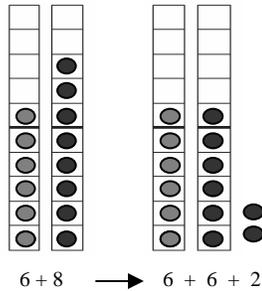
Sharing

Mini-Lessons and Discussions for Developing Strategies

Sharing involves breaking one or more of the numbers apart in order to create an easier problem. Make a ten is one type of sharing that is commonly used when one of the addends is 8 or 9.

◆ Discussion of ways to make an equation easier by using facts they know

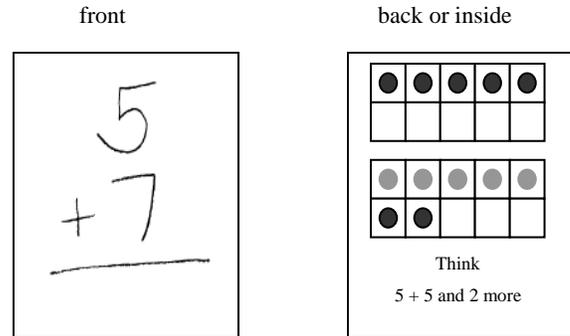
⇒ Put up an equation such as $6 + 8$. Have students think of how to make the equation easier. Represent their thinking using numbers and visuals.



Activities for Practice

*See appendix for information on these activities

◆ Strategy Cards (see p. 9)



Subtraction as Think Addition

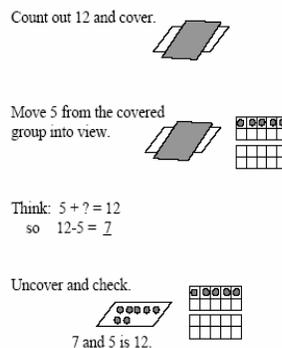
Mini-Lessons and Discussions for Developing Strategies

In order for students to effectively use think addition, students must first master addition facts.

◆ Connect subtraction to addition

⇒ On overhead count out an amount of counters. After counting all of them, cover the entire group. Count and remove some from the covered group. Display those next to remaining covered counters.

* Example: Count and cover 12 counters. Remove and display 5. Have students think “5 and what makes 12”. Record the 2 equations $5 + \underline{7} = 12$ and $12 - 5 = \underline{7}$. Uncover and check.



Activities for Practice

*See appendix for information on these activities

◆ Strategy Cards (see p. 9)

◆ Fact families

⇒ Give students a subtraction fact and have them find the related addition fact.

⇒ Give students 3 numbers in a fact family and have them find the addition and subtraction equations.

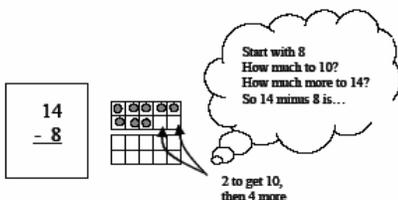
Building up/Backing Down Through 10 for Subtraction

Mini-Lessons and Discussions for Developing Strategies

This strategy is based on the difference model of subtraction. Students use the number 10 to help simplify finding the difference between two numbers.

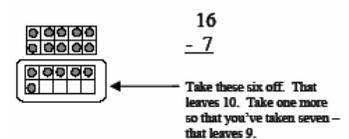
◆ Build up through 10 using ten frames or ten strips

⇒ This strategy is effective for the “hard” subtraction facts starting with teen numbers. Basically you are thinking addition, but using 10 as a bridge to simplify the facts. Modeling on ten frames as shown is a good way to visually show the strategy.



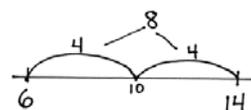
◆ Back down through 10 using ten frames or ten strips

⇒ Instead of building up through to ten you can back down through ten. You are using ten as a bridge as you subtract.



◆ Building up/backing down through 10 using an open number line

⇒ An open number line is a great way to record the thinking for subtraction problems. This is a good transition from using ten frames to model the strategy to having students being able to do the strategy in their heads.



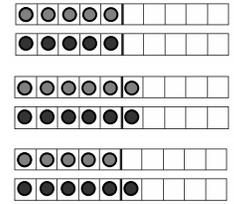
Strings

One of the most effective mini-lessons for developing computational strategies are *strings*. Strings are sets of addition and/or subtraction images or problems that are specifically chosen because they relate in such a way as to highlight number relationships. The problem sets are likely to lead to a discussion of specific strategies. These discussions should explore the relationships between the problems and compare the efficiency of different strategies that are presented by students.

Visual models such as ten frames, ten strips, number lines, or arithmetic racks can be used by the teacher to support students' mathematical thinking during the discussion of the string. A visual model can also be used to help make one child's thinking clearer to other children.

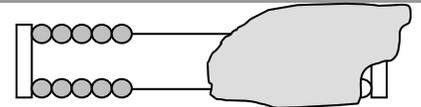
The example below will help illustrate how a string of quick images (in this case $5+5$, $6+6$, $5+6$) can be used to develop the strategy of using a double to solve a neighbor (i.e. using five plus five to solve five plus six). In the example the teacher is using

an arithmetic rack, but the same string could be done with ten strips as the model as show here.



In the example below the model is used to develop the strategy for doubles and neighbors without formally showing an equation ($5+6 = \square$). Once students have had sufficient experience focusing on the number relationships using the model, then an equation can be added while the model is only partially used. For example, show an arithmetic rack or ten strips with six and six as a quick image and ask “How much and how do you know?” Then write the sentence $6+7 = \square$ and ask “How much is $6+7$? How do you know?” Eventually you can show just the number sentence and use the arithmetic rack or ten strips as a model of the strategies when children share their answers. In this way, the model moves from being a support for mathematical thinking to a representation of mathematical thinking.

T: I'll show you some beads on the arithmetic rack for just a moment and I want you to think about how many beads you see and how you know how many there are. (Teacher uncovers the left side of the arithmetic rack for a moment, then covers it up again). What did you see?

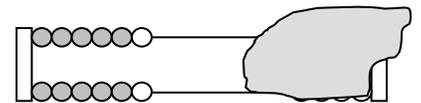


Nina: I saw ten. There were five reds on the top and five reds on the bottom. Five plus five is ten.



T: Here's the next one. Look quick! What did you see?

Jamal: This time there were six on top and six on the bottom. I knew it was six because there were five reds and one white. Six plus six is twelve.

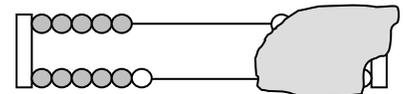


Juan: I saw that there was just one more on the top and one more on the bottom than last time. So it was ten plus two more—ten, eleven, twelve.



T: Here's another one.

Marita: We already did five plus five and this is just one more than that—it's eleven. Five plus five is ten and five plus six is eleven.



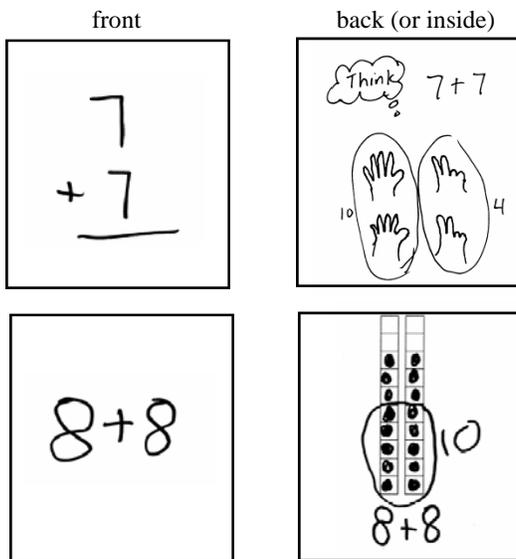
Jamal: I was thinking that it is one less than what we just did. Six plus six is twelve and this is just one less—it's eleven.

Jordan: I just saw five reds and another five reds and then one white. That's five and five is ten, plus one is eleven.

Strategy Cards

What are Strategy Cards? Strategy cards are basic fact flash cards that help students connect a specific thinking strategy to learning that fact. Strategy cards can be made using index cards. If using a 3x5 card, the fact is written on the front of the card and the thinking strategy for getting the answer is recorded on the back of the card. Alternatively, if using a larger card, the card can be folded in half with the fact written on the front and the strategy recorded inside the card. The answer to the fact is **not** written anywhere on the card. The thinking strategy itself is enough for the student to be able to *figure out* the answer to the fact. By not having the answer on the card, students must actively use the thinking strategy. Below is an example of two strategy cards made by a student working on double facts.

The answer to the fact is **not** written anywhere on a strategy card. The thinking strategy itself is enough for the student to be able to *figure out* the answer to the fact. By not having the answer on the card, students must actively use the thinking strategy.



Making Strategy Cards Ideally, strategy cards are made by students or with input from students as they identify facts that they don't yet know. It is important that students use a strategy that makes sense to them, so making the cards should come after mini-lessons or discussions of strategies. For example, after a discussion of ways to remember doubles (see p. 5), students who don't know all of their double addition facts can make strategy cards for those facts they don't yet know. It is fine for an adult or another student to help with the drawing of the cards since we don't want students to spend an inordinate amount of time making the cards.

Using Strategy Cards Students should practice no more than about 5 strategy cards at a time and for no more than 5 minutes at a time. Practice with strategy cards can take place individually or in pairs during class. It is a good 2-minute warm-up prior to Interval Training or Beat the Calculator (see p. 10-11). It also makes an excellent homework assignment. Students should look at the fact(s) on the front of the card. If they don't remember the answer, they should look at the strategy and figure out the answer. The goal is for

students to remember the strategy without needing to turn the card over to look at it. It will be very helpful to model this thought process out loud for your students. For example, hold up the 7+7 strategy card shown at the left with the fact facing you and the strategy facing the students. Then say "hmm... I remember there are two sets of hands showing seven fingers each. Put the fives together to make 10 and put the twos together to make 4. So, 7+7 is 14."

Management of Strategy Cards One way to store and keep track of strategy cards is to give each student a 6x9 manila envelope. For students in second grade and older, an addition table can be glued onto the envelope and facts that the student knows can be colored over with a dark crayon. The facts a student is currently working on can be colored in a light color. In the example shown here, the student knows all of the adding zeros, ones and tens strategy facts. She also knows some addition doubles. She is working on 6+6,

7+7, 8+8, 9+9. Once she knows these facts, they can be colored a darker shade. When a student is finished with a strategy card, that card can be put into a "doubles strategy cards" folder to be reused by another student in the future.

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

Around the Class

In this activity, the first student will call out a number, give a three second “think time” signal and then the whole class will respond with the answer. Then the next student will call out a different number and give the “think time” signal before the class answers. Continue around the class this way. A “think time” signal is important in this activity because it gives all students time to respond rather than shutting down all thinking as soon as the quickest student calls out the answer. The signal can be something simple like holding up one, two, then three fingers or tapping a desk three times. Depending upon the activity, you may want to lengthen the wait time signal. The following example will help make the activity clear.

Think Two More Around the Class could be played after a mini-lesson adding two using a ten frame (see p. 4). To begin Think Two More Around the Class, the first student would choose a number (for example, seven) and say “seven plus two” then give the “think time” signal. Once the signal is given, the class would respond “nine”. Then the next student would choose a number, give the signal and the class would respond. Ten frames can be used to pro-

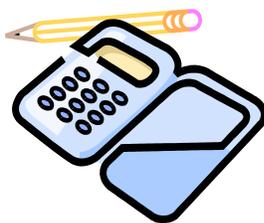
vide a scaffold for students who need it. For example, if a student says “five plus two”, hold up a ten frame with five dots and indicate with two fingers where the additional two dots would go.

Variations This game has many possible variations including Combinations of Ten, (say a number and the students say how many more to make ten), Doubles, Neighbors, and Halves. Around the Class is a quick activity that can be used as a sponge activity anytime you have a spare minute or two.

Modifications Around the Group is good modification for this activity. Students work in threes or fours (or even pairs). The teacher indicates the game (e.g. Doubles Around the Group) One student calls out a number and gives the think signal and the others respond with the answer. Then the next student calls out a number. This goes around the group two or three times. An alternative to having the group responding out loud is to have students write the answer on a personal white board or piece of paper.

Beat the Calculator

In Beat the Calculator, each pair of students needs a calculator. The student with a calculator calls out a number and while the other student tries to “beat the calculator” by writing down the answer before the first student can use the calculator to compute the answer.



For example, when playing **Beat the Calculator Neighbors**, student A calls out “ $8 + 7$ ” and uses the calculator to compute $8 + 7$. Student B will try to beat the calculator by writing “15” before student A gets the answer on the calculator. Prior to playing this game, it is important that students have had a discus-

sion about how a calculator can be used to find a sum. It is also very important that the students who are trying to beat the calculator are using thinking strategies—not counting strategies—to find the sum. Beat the Calculator Neighbors should be played only after several mini-lessons on Neighbors (see p. 5). It may also help to have students practice strategy cards just prior to playing Beat the Calculator.

There are many variations of Beat the Calculator including Think One More, Think One Less, Think Two More, Think Two Less, Think Ten More, Think Ten Less (start with a teen number), Doubles, Neighbors, Halves and Fast Nines.

Interval Training

Interval Training is a simple, yet flexible activity that can provide students with differentiated fact practice. During Interval Training (IT), random numbers are called out at regular intervals of time—generally 8 second intervals are used, but 5 second intervals can be used when students are ready for a challenge. Students write down the number and then perform a pre-determined operation on the number. Numbers can be called out by the teacher who is watching a clock or an Interval Training CD can be used (see p. 12 for more information on how to obtain a CD). A CD has the benefit of allowing the teacher to observe students during the activity. In addition, because an IT CD has music, it tends to be motivational for students (though the music can be distracting to some students). Once a routine is established, IT should take about 6 minutes—two minutes for students to set up their papers, two minutes for the IT, and 2 minutes for students to check answers with a partner (if desired).

It is important to note that IT should be used to practice strategies that have already been developed through mini-lessons or discussions and have been practiced with strategy cards and other activities that do not have time constraints. If a student becomes frustrated or finds this activity difficult because of poor fine-motor skills, then a different practice activity should be used.

A good time to start IT would be after mini-lessons and practice related to the strategies of Think One More. Initially, it is best to give students a preprinted sheet for IT. Later, students will be able to create their own forms. The first time you do IT, demonstrate the process: you write the number that is called out and then perform the operation (+1 “think one more”). As you demonstrate, model your thinking of the strategy out loud (see Fig. 1). You can say something like “one more than six is seven, so $6+1$ is 7; one more than four is five, so $4+1$ is 5.” Once students are proficient with “think one more” and “think two more”, the two strategies can be combined (see Fig. 2).

It is important that students use thinking strategies for

this activity and not revert to counting strategies. If the time constraint is too much for a student then he should just record the numbers he hears and not perform the operation until the CD track is over. Then he can have adequate time for practice using a thinking strategy.

It is easy to differentiate with IT. Students who need more practice with “think one more” can continue that practice (as in Fig. 1 or 2) while those who need more of a challenge can move on to other strategies. Fig. 3 shows a student who is practicing the strategy “combinations of ten”. The first number is the number the student heard and recorded and then had to figure out what number to write in the second blank. Fig. 4 shows practice of the strategy “add ten” and Fig. 5 shows practice of doubles. All of these strategies can be practiced using the same CD track.

Caution: Interval Training should be used to practice strategies that have already been developed through mini-lessons and practiced with strategy cards and other activities that do not have time constraints.

$$\underline{6} + 1 = \underline{7}$$

$$\underline{4} + 1 = \underline{5}$$

$$\underline{\quad} + 1 = \underline{\quad}$$

$$\underline{\quad} + 1 = \underline{\quad}$$

$$\underline{\quad} + 1 = \underline{\quad}$$

Figure 1

$$1 + \underline{4} = \underline{5}$$

$$\underline{8} + 2 = \underline{10}$$

$$\underline{5} + 0 = \underline{5}$$

$$2 + \underline{6} = \underline{8}$$

$$\underline{3} + 1 = \underline{4}$$

Figure 2

$$\underline{4} + \underline{6} = 10$$

$$\underline{8} + \underline{2} = 10$$

$$\underline{5} + \underline{5} = 10$$

$$\underline{6} + \underline{4} = 10$$

$$\underline{3} + \underline{7} = 10$$

Figure 3

$$\underline{4} + 10 = 14$$

$$\underline{8} + 10 = 18$$

$$\underline{5} + 10 = 15$$

$$\underline{6} + 10 = 16$$

$$\underline{3} + 10 = 13$$

Figure 4

$$\underline{4} + \underline{4} = 8$$

$$\underline{8} + \underline{8} = 16$$

$$\underline{5} + \underline{5} = 10$$

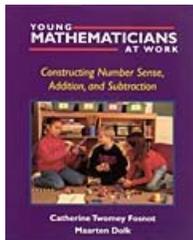
$$\underline{6} + \underline{6} = 12$$

$$\underline{3} + \underline{3} = 6$$

Figure 5

Resources

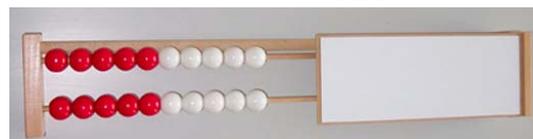
More about Strings For more information about using strings for mini-lessons, we highly recommend the book *Young Mathematicians at Work: Constructing Number Sense, Addition, and Subtraction* by Catherine Fosnot and Maarten Dolk. Several copies of this book are available for check-out from the Curriculum Department (see contact information below). For those wishing to purchase a copy, it can be ordered directly from the publisher at www.heinemann.com



More About Interval Training CDs All building Math Representatives have a copy of a locally-made Interval Training CD. Teachers are free to make copies of this CD. Note that not all CD players will play rerecorded CDs, so be sure to try it out before you plan to use it (especially if you have an older CD player). A similar product can be ordered from Creative Mathematics (Kim Sutton) at www.creativemathematic.com. You will need to order the book *Math Drills to Thrill*, which comes with a random number CD. (Note that the Rapid Fire Random Number CD has numbers at 2 and 3 second intervals, so only order that CD if your class needs a real challenge!)



Arithmetic Racks (Rekenrek) Although an arithmetic rack may look like an abacus, it is not used in the same way. It consists of two rows of ten cubes or beads, which are broken into two sets of five. As with a “ten frame”, the use of the arithmetic rack gives students a visual support to build number relationship—in particular, seeing the relationship of a number to five and ten. An arithmetic rack can be made using Unifix cubes and string. They can also be purchased from the Math Learning Center at: www.mathlearningcenter.org/products. In the keyword box, type the word “rekenrek” (Dutch for “arithmetic rack”). They are available in various forms, including large, demonstration racks and small, individual racks.



For additional information or questions about this handbook, please contact math specialists Kathy Cheval or Kathy Bowers in the Curriculum Department at 503-399-3075 or by e-mail: cheval_kathy@salkeiz.k12.or.us or bowers_kathy@salkeiz.k12.or.us. Additional information and resources can be found on the district math website: <http://is.salkeiz.k12.or.us/StaffResources/Math/MathIndex.htm>. Click on *Investigations*, then *Basic Facts*.

Notes

© May 2007 This handbook has been produced by the Curriculum, Instruction, and Assessment Department of Salem-Keizer Public Schools. It may be reproduced for the use of Salem-Keizer Public School teachers, staff, students and parents. Reproduction of this document for any other use is prohibited without written permission from SKPS.