Near Doubles

Strand: Computation and Estimation

Topic: Developing basic addition and subtraction fact strategies for "near doubles"

Primary SOL: 1.6 The student will create and solve single-step story and picture problems using addition and subtraction within 20.

Related SOL: 1.1, 1.7

Materials

- Beaded Number Rack for teacher demonstration (directions attached)
- Beaded Number Rack for student use (directions attached)
- Find the Double cards (Only the near-double cards are needed for the lesson. The doubles cards are needed for an extension.)
- Where are the Near Doubles? assessment activity
- Doubles Plus One Cover-up Game Board (used for an extension activity)

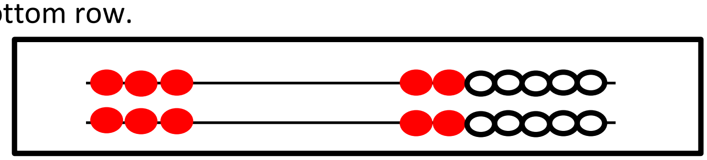
Vocabulary

add, combine/join, doubling, doubles, equation, minus, near doubles, models, number sentence, parts, plus, put together, strategy, subtract, sum, take apart, whole

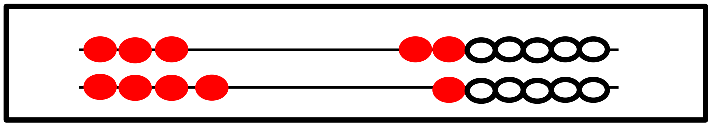
Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: This lesson has been written to focus on near-doubles strategies for basic addition and subtraction facts. Before this lesson, doubles should have been thoroughly explored, and most students should be approaching fluency with most doubles facts, especially through 5 + 5. If your students have never used a beaded number frame before, show them the frame and ask them to tell you what they notice about it (10 beads on the top, 10 beads on the bottom, five red beads and five white beads in each row). You may want to do a mini-lesson about modeling numbers on a beaded number frame, if students have never seen one before.

1. Begin the lesson with a number talk designed to elicit the use of a near-doubles strategy. On the large teacher demonstration beaded number rack (hidden from student view), push three beads to the left on the top row and push three beads to the left on the bottom row.

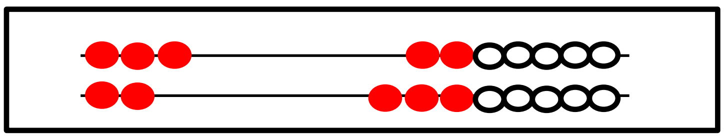
   

   Keeping the 14 beads on the right covered, show the frame to the students for no longer than 3 seconds. (You can use your hand or a folded paper 'tent' to cover the fourteen beads.) Ask: "*How many beads did you see?" "How did you see it?"* Show the frame again for all to verify that it was six.
2. Next, keeping the frame from student view, slide over one more bead on the bottom row.



Show the frame to the students for no longer than 3 seconds and ask*: "How many beads? How do you know?"* (While the goal is for students to see the relationship between 3 + 3 and 3 + 4, students may have a variety of ways of seeing that the total is 7. Honor and respect all responses. Some students may see this as eight with one missing, one less than 4 + 4, some may count 2, 4, 6 and one more by pairing the top and bottom beads, and some students may quickly count on or count all.) Finally, say*: "At first, we saw three beads on the top and three beads on the bottom. What is the same or different on this frame?"*

3. Keeping the frame from view, adjust the frame so that there are three beads on the top and two beads on the bottom.



Show the frame to the students for no longer than three seconds and ask: "*How many beads?" "How do you know?"* Then show the students the frame to verify that there are five beads. Finally say*: "At first, we saw three beads on the top and three beads on the bottom. What is the same or different on this frame?"*

4. Tell students that today they are going to use what they know about doubles to find some other sums. Pass out a beaded number frame to each child. Before beginning, check to be sure that each child is holding the frame so that the white beads are on the right and *all* of the beads are pushed to the right.
5. Ask the children to slide four beads to the left on the top and four beads to the left on the bottom. (Use your demonstration frame as a model.) Ask: *How many beads do we have in all?* Students should quickly be able to tell you eight. (If they can't they need more practice with doubles before being able to use a near doubles strategy.) Immediately after children have told you "eight," say, "*Yes, double four is eight."* Write "4 + 4 = 8" on the board. Now ask children to slide one more bead over on the bottom. Say: "*Now how many total beads do we have? How do you know?"* Once children have answered nine, say: "*Yes, one more than eight is nine."* Then ask, "*How did we change the number on the bottom?"* (added one more). On the board under the equation "4 + 4 = 8", write "4 + 5 = 9" pointing out that because five is one more than four (looking at the second addends), the total or sum is one more. Finally, ask students to look at their beaded number frame showing 4 + 5 and identify "double 4" with their fingers and then identify the one extra on the bottom row. (It helps to move the one more on the bottom a tiny bit to the right to separate it from the other four.)
6. Have students show double four again, and this time slide an extra bead on the top. Ask students to explain how this compares to the last one. Use the same questioning as before. Add the equation "5 + 4 = 9" to the board, again emphasizing that because five is one more than four (looking at the first addends, the sum is one more.) Again, have

children look at the number frame and use their fingers to identify double four and one more on the top. While this shows the commutative property, this is not the goal. The goal is for students to understand that the one extra can be on the top or on the bottom.

7. Repeat the process in step 6 for the following problems that emphasize a doubles-plus-one strategy.
    a. 2 on the top, 2 on the bottom / add one more to the bottom (2 + 3)
    b. 3 on the top, 3 on the bottom/ add one more to the top (4 + 3)
    c. 5 on the top, 5 on the bottom/ add one more to the top (6 + 5)
8. Next, write the following problem on the board and pose it to the students. **There were 7 boys and 6 girls in the library waiting to check out books. How many children were waiting to check out books?** Ask students to think about how they could use the beaded number frame to solve the problem. Ask a few children to share their ideas about how to use the beaded number frame to solve the problem, then let students use the beaded number frame to solve the problem. Tell students that they need to be ready to explain how they found the answer. Observe students as they solve the problem. *Did students model 7 in one row and 8 in another row? Did students have a different way of figuring it out? Did anyone use a double to help them find the answer?* As you observe, decide which children you want to share their solution method. Allow students to share their solutions and encourage them to reflect on one another's strategies. Here are some possible questions to encourage student reflection: "*How did you get your answer?" "Can you describe how you solved the problem to us?" "Why did you decide to do this?" "What do you think about what _____ said? Do you agree? Why or why not?" Does anyone have the same answer but a different way of explaining it?" "Does your answer make sense?" "How is (student's) strategy similar to (student's) strategy? How are they different?"* During the discussion, be sure to address that finding a double to help you can sometimes be an efficient strategy.
9. Model how to complete the partner activity "Find the Double" using the attached cards. Use only the doubles-plus-one cards for this activity. (The doubles cards will be used for an extension of the game.) The object of the game is to use a doubles fact to help you solve a near-doubles problem. Place the cards face down. Partner 1 turns over a card (5 + 6) and models the problem on the beaded number frame. Partner 2 identifies the double using the beads on the frame by saying, "*Here is double 5 (or 5 + 5). Double 5 is 10 and one more is 11."* Partner 2 turns over the next card, and the players switch roles. You may need to model this several times so that students are clear on the expectations. Pass out one set of cards to each pair and collect one beaded number frame from each pair because they will share one for this activity.
10. As the students play, observe for the following: *Are the students modeling the problem correctly? Are the students identifying a doubles fact to help? Who is fluent with their doubles facts? Are the students able to voice the strategy of doubling and adding one more? Who needs more support? Are any students counting on or counting all to consistently find the sums instead of using doubles to help?*

11. After students have had time to play, call students back together to debrief the game. Use the following questions to guide your discussion: "*How did you find the sums of the numbers on the cards?" "How did the beaded number frame help you?" "Why could you use a double to help you?" "When did you think about one more?" "Why do you think people sometimes call this strategy 'doubles plus one'"?* Finally, display all of the cards from the game and ask, "*Did anyone notice anything about the numbers on our cards?"* You want students to notice that the numbers are not the same but one apart. Some children call them neighbors because they are neighbors on a number path or number line. However, if the students do not readily notice this, tell them that you are going to think more about that idea tomorrow. This is an important part of knowing when to use a near doubles strategy.

Assessment

- **Questions**
    - How do doubles help us solve problems?
    - What doubles fact might help you with 4 + 5? How does it help you?
    - John drew four stars. He doubled his stars and then drew one more. How many stars did John draw altogether?
    - Show children a drawing of three red balls and four blue balls. "How can you use doubles to help you find how many balls?"
    - Show the number sentence 4 + 5 = ? How could you use double 5 to help you find the sum?
- **Journal/writing prompts**
    - There were four red apples and five green apples in a basket. How many apples are in the basket altogether? Use pictures, numbers, and words to explain your thinking.
    - Samara had six dollars. Her grandma gave her five dollars for helping her to clean the house. How much money does Samara have now? Use pictures, numbers, and words to explain your thinking.
    - Use pictures to show how you can use doubles to help you find the sum of 6 and 7.
    - April showed a doubles fact on her beaded number frame. Then she added one more. Now she has 7. Draw what April's number frame looks like.
- **Other Assessments**
    - Where are the Near Doubles? (attached): Have students identify facts for which they could use a near-doubles strategy. Ask students to explain how they would use a near-doubles strategy for each identified problem.
    - Observe and make notes during number talks, games, and problem solving. Watch for students who are applying near-doubles reasoning without being prompted to use it. Students may be doubling and adding one or two more, or they may be doubling and subtracting one or two more. Students may also apply a double the number in between strategy when the addends are two apart.

Extensions and Connections (for all students)

- Explore doubles minus one as a strategy for finding the sum when the numbers are one apart.
- Explore doubles plus two/doubles minus two as a strategy for finding the sum when the addends are two apart.
- Help children identify facts that are appropriate for using a near-doubles strategy. After understanding that doubles plus one or minus one can be used when the addends are neighbors (they have a difference of one), students can engage in strategy selection. Place several flash cards in a pocket chart and have students identify which can be solved using a near-doubles strategy.
- After lots of exploration of the strategy with concrete and visual models, use a part-whole or number-bond model to represent doubles plus one and doubles plus two.

- Students could write and solve their own story problem using a near-doubles fact.
- Students need many opportunities to experience part-whole relationships with doubles facts in order to develop fluency with near doubles. Remember that the expectation for first grade is that they explore and develop strategies for facts through 20, but fluency is only expected for facts within 10. See the extensions in the doubles lesson if students need more practice with doubles. Additional activities to practice near doubles that could be introduced and then placed in stations include:
    - **Find the Double Matching Game:** Using the attached cards (near-doubles cards on one color, doubles cards on a different color), students lay all of the doubles cards spread out, face up. They place the near-doubles cards on a pile face-down. Players take turns turning over a near-doubles card and looking for a doubles card that can be used to help with the near-doubles fact. Students must explain how the doubles can be used to help with the near-doubles fact. Play continues until all possible matches have been made. (Students who are flexible in using doubles plus one or doubles minus one thinking can use either justification. However, this will result in some cards not having a match.)
    - **Near Doubles Dominoes:** Use a set of dominoes. Using each side of the domino as an addend, the student(s) sort the dominoes into doubles, near doubles, or other. For near doubles, students must tell how to use a near-doubles strategy to find the sum.
    - **Doubles Plus One Cover-up:** This is a partner game. Each player needs his or her own game board (attached). On their turn, they spin the spinner, double the number and then add one more. Players use a small token to cover that number on their game board. If, on their turn, the number they spin results in a number

already covered, they lose their turn. The first person to cover all of their numbers wins.

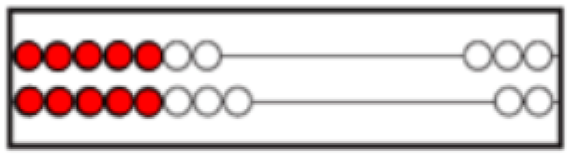
Strategies for Differentiation

- Some students may need to use concrete and visual models for a longer time to be able to see and internalize the relationship between doubles and near doubles facts.
- Use concrete and visual models other than the beaded number frame to explore near doubles strategies. These may include dot cards, dominoes, 10 frames, etc.
- Use a part-whole or number-bond model with concrete materials to represent doubles plus one.
- For students who have not yet internalized the doubles facts, create and display doubles picture posters that include a visual cue for doubles.
    - Eyes (Double 1 is 2.)
    - Legs on a Dog (Double 2 is 4)
    - Legs on an Insect (Double 3 is 6)
    - Legs on a Spider (Double 4 is 8)
    - Fingers on Two Hands (Double 5 is 10)
    - Eggs in an Egg Carton (Double 6 is 12)
    - Days in Two Weeks (Double 7 is 14)
    - Crayons in a Crayon Box (Double 8 is 16)
    - Wheels on an Eighteen-Wheeler (Double 9 is 18)

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Directions for Making a Beaded Number Frame

The directions below are for making one student-sized beaded number frame. You will need to make one frame for each of your students. You will also need one larger frame for the teacher. It is suggested that you use sturdy cardboard and larger beads for the teacher frame.



Materials:

- Approximately 4” x 6” piece of cardstock or craft foam
- 20 pony beads (10 red, 10 white or two contrasting colors)
- Two pipe cleaners (any color) – at least 6” long
- Tape

1) Cut four half-inch slits in the cardboard (two on each of the shorter sides).

2) String five red and five white beads onto each of the two pipe cleaners.
3) Slip the ends of the pipe cleaners through the slits on the side of the cardboard so that the beads are on the front of the cardboard, and the ends of the pipe cleaners are on the back. Tape the pipe cleaners in the back to cover sharp ends.

Beaded number frames can be used for counting and modeling numbers, modeling various part-whole relationships, developing benchmarks of five and ten, modeling ten and some more, and developing addition and subtraction strategies.

Find the Double (Near Double Cards)

Copy on a different color paper than the Double Cards.

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

Find the Double (Double Cards)

Copy on a different color paper than the Near Double Cards.

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

Where are the Near Doubles?

3 + 8 = ______

4 + 4 = ______

5 + 6 = ______

1 + 9 = ______

6 + 3 = ______

2 + 3 = _______

4 + 3 = ______

8 + 2 = _______

0 + 5 = ______

4 + 5 = _______

7 + 1 = ______

3 + 5 = ______

Doubles Plus One Cover-up

3	**5**	**7**	**9**	**11**	**13**	**15**	**17**	**19**	**21**

Say:

"Double _____ is ______ and one more is _____."