Student Probe

1. Douglas has 6 football cards. His grandmother gave him 7 football cards for his birthday. How many football cards does Douglas have now? Explain how you solved the problem.

2. Mom made 14 sandwiches. We ate 8 sandwiches for lunch. How many sandwiches do we have for after school? Explain how you solved the problem.

Teacher Note: Identify the specific strategy that the student describes.

Lesson Description

In this lesson students solve contextual addition problems using an efficient strategy. The strategies in this lesson include: counting all, counting on, doubles plus one, doubles minus one, make ten, Identity Property for Addition (zero).

Rationale

Students need to have a repertoire of strategies to solve addition and subtraction problems. The student's strategy must make sense to the student. Addition problems can be solved using several different strategies. The specific strategy the student uses is not important. Teachers should guide students to use a more efficient strategy rather than continue using a less efficient strategy just because he or she feels comfortable with a strategy.

Preparation

Prepare printed problems for students to view as they solve each problem and/or answer questions.

At a Glance

<u>What</u>: Use of an efficient addition and subtraction strategy

<u>Standard:</u>
AR.Math.Content.1.OA.C.6
Add and subtract within 20, demonstrating *computational fluency* for addition and subtraction within 10.
Use strategies such as:
Counting on
Making ten
Decomposing a number leading to a ten
Using the relationship between addition and subtraction
Creating equivalent but easier or known *sums*

<u>Standards for</u> <u>Mathematical Practices:</u>
SMP1: Make sense of problems and persevere in solving them.
SMP2: Reason abstractly and quantitatively.
SMP3: Construct viable arguments and critique the reasoning of others.

<u>What</u>: Students who are unable to solve addition and subtraction problems using efficient strategies.

<u>Grade Level:</u> 2

<u>Prerequisite Vocabulary:</u> None

<u>Prerequisite Skills:</u> None

<u>Delivery Format:</u> individual, small group

<u>Lesson Length:</u> 15-30 minutes

<u>Materials, Resources, Technology:</u> None

<u>Student Worksheets:</u> None

Lesson

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
1. Noah had 8 toy cars. His mother bought him 6 more toy cars. How many toy cars does Noah have now? Explain how you found the number of toy cars Noah has now.	14 toy cars The student explains that he **counted all** (1, 2, 3, 4, 5, 6, 7, 8) (9, 10, 11, 12, 13, 14) **OR** The student explains that he **counted on**: 8,---9, 10, 11, 12, 13, 14 **OR** The student explains that he used **doubles**: 8 + 6 (6 + 2) + 6 $\longrightarrow$ 6 + 6 is 12 $\longrightarrow$ 12 + 2 is 14 **OR** The student explains that he used **makes ten**: 8 + 6 8+ (2 + 4) $\longrightarrow$ (8+ 2) + 4 $\longrightarrow$ 10+ 4 is 14 **OR** Basic Fact: 8 + 6 = 14 Noah has 14 toy cars now	If the student cannot determine 14, then ask the student to represent the problem using counters, blocks, etc. Student builds one group with 8 objects and one group with 6 objects. Then, student "joins" the two groups and counts all of the objects. If the student can determine 14 by representing the problem with objects (including fingers) and counting all of the objects, then guide the student to count on. Hopefully, at this point, the student should not need to represent the problem with objects or just represent one of the numbers. Most students who have difficulty with this problem will model the problem in the order that it occurs in the problem. Thus, students who use the strategy of counting on, will say 8 then count on 6 more---8—9, 10, 11, 12, 13, 14 If a student can determine 14 by counting on—especially by counting on from the larger number, then guide the student to use doubles.

		Before using doubles to solve this problem, guide the student to learn their doubles:
		1 + 1 = 2 2 + 2 = 4
		3 + 3 = 6 4 + 4 = 8
		5 + 5 = 10
		Concentrate on just these 5 addition problems first. Once the student is successful with these five, then guide the student to learn the following doubles:
		6 + 6 = 12 7 + 7 =14
		8 + 8 =16 9 = 9 = 18
		10 + 10 = 20
		8 + 6 $\longrightarrow$ (6 + 2) + 6 $\longrightarrow$
		6 + 6 is 12 $\longrightarrow$ 12 + 2 is 14
		In this problem the student uses knowledge of the sum of doubles to solve the problem.
		Once the student is successful with the use of doubles to solve problems, then guide the student to use the strategy **make ten.**
		8 + 6 $\longrightarrow$ 8 + (2 + 4) $\longrightarrow$
		(8+ 2) + 4 $\longrightarrow$ 10+ 4 is 14
		Teacher Note: Student needs to decompose the smaller number in order to make ten using the larger number.
		6 needs 4 to make 10
		7 needs 3 to make 10
		8 needs 2 to make 10
		9 needs 1 to make 10

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
2. Ola baked 8 cookies for the party. Then, she baked 7 more cookies for the party. How many cookies did Ola bake for the party?	15 cookies The student explains that he **counted all** (1, 2, 3, 4, 5, 6, 7, 8) (9, 10, 11, 12, 13, 14, 15) **OR** The student explains that he **counted on**: 8,---9, 10, 11, 12, 13, 14, 15 **OR** The student explains that he used **doubles and one more**: 8 + 7 $\longrightarrow$ (7 + 1) + 7 $\longrightarrow$ 7 + 7 is 14 $\longrightarrow$ 14 + 1 is 15 **OR** The student explains that he or she used doubles minus one. 8 + 7 (8 − 1) + 1) + 7 $\longrightarrow$ (7 + 1) + 7 $\longrightarrow$ 7 + 7 is 14 $\longrightarrow$ 14 + 1 is 15 **OR** The student explains that he used **makes ten**: 8 + 7 8 + (2 + 5) $\longrightarrow$ (8+ 2) + 5 $\longrightarrow$ 10 + 5 is 15 Ola has 15 cookies now.	The same discussion as for problem 1.

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
3. Mary had 6 black beads on her necklace and 0 white beads. How many beads does Mary have on her necklace?	6 beads The student explains that he **counted all** (1, 2, 3, 4, 5, 6) **OR** The student explains that he **counted on**: 6,--- **OR** The student explains that any number plus 0 does not change the number; 6 + 0 = 6 Mary has 6 beads now.	If the student cannot determine 6, then ask the student to represent the problem using counters, blocks, etc. The student builds one group with 6 objects and one group with no objects. Then, the student "joins" the two groups and counts all of the objects.

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
Subtraction Strategies: 4. Danny had 11 pieces of gum. He gave 4 pieces to his friends. How many pieces of gum does Danny have now?	7 pieces of gum The student explains that he **counted back** (11, 10, 9, 8). Danny has 7 pieces— (10, 9 , 8, 7) Danny has 7 pieces of gum—the last number said. The student explains that he or she **thought about an addition problem**: "What can be added to 4 to obtain a sum of 11?" 7 Danny has 7 pieces of gum now.	

Teacher Notes
1. In addition to the above strategies, students may also use composition and decomposition of Numbers (refer to Composing and Decomposing Numbers) or applies the inverse relationship (refer to Relationship of Addition and Subtraction).
2. Practice with these strategies enables the students to develop basic facts fluency. The following sequence for developing basic fact fluency is suggested:
   1. One more
   2. Two more
   3. Doubles
   4. Doubles plus one
   5. Doubles minus one
   6. Identity Property for Addition

	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					
4	4	5	6	7	8	9				
5	5	6	7		9	10	11			
6	6	7	8			11	12	13		
7	7	8	9				13	14	15	
8	8	9	10					15	16	17
9	9	10	11						17	18

3. For the other facts use the strategies:
   Make 10: Compose and Decompose Numbers Less Than Ten
   Decompose and Compose Numbers: Composing and Decomposing Numbers
   Commutative Property for Addition: Commutative Property of Addition

Variations
Addition problems to use with students for guided practice and/or independent practice and formative assessment:
1. Carl had 7 marbles. His mother gave him 6 more marbles. How many marbles does Carl have now?
2. Brenda has 5 stickers. Her friend gave her 6 more stickers. How many stickers does Brenda have now?
3. Bruce had 9 toy cars. His mother bought him 6 more toy cars. How many toy cars does Bruce have now?
4. Frankie baked 5 cookies for the party. Then, she baked 6 more cookies for the party. How many cookies did Frankie bake for the party?
5. Crystal had 7 white beads on her necklace. She has 0 red beads on her necklace. How many beads does Crystal have on her necklace now?

Subtraction problems to use with students for guided practice and/or independent practice and formative assessment**:**

1. 11 ducks were swimming in the pond. 4 ducks flew away. How many ducks were swimming in the pond now?
2. Skylar had 15 pieces of gum. He gave 6 pieces to his friends. How many pieces of gum did Skylar have now?
3. The baker made 8 cakes. He sold 3 cakes to his customers. How many cakes did the baker have now?
4. 16 birds are sitting in a tree. 7 birds flew away. How many birds are in the tree now?
5. James has 13 pennies in his pocket. He used 6 pennies to buy a piece of gum. How many pennies does James have now?

Formative Assessment

1. Stephen had 17 marbles. He gave 6 of his marbles to Julie. How many does Stephen have now?

2. Julie had 12 marbles. Stephen gave her 6 more. How many marbles does Julie have now?

References

Russell Gersten, P. (n.d.). *RTI and Mathematics IES Practice Guide - Response to Intervention in Mathematics*. Retrieved 2 25, 2011, from rti4sucess: http://www.rti4success.org/images/stories/webinar/rti_and_mathematics_webinar_presentation.pdf.