Task: Apples for the Fall Festival **2nd Grade**

Hannah and her family went to the apple orchard to pick apples for the Fall Festival at her school. Make a diagram and write an equation to show how you solved each problem.

1. Hannah picked 17 red apples, 12 green apples and 25 yellow apples to put in a basket. How many apples are in the basket?

2. There were 26 red apples and 37 yellow apples in the basket by lunch time. Hannah's brother put some green apples in the basket and now there are 84 apples in the basket. How many green apples did Hannah's brother put in the basket?

3. Later in the day, there were too many apples in the basket. Hannah's mother took 7 red apples and 8 yellow apples from the basket. Now there are 91 apples in the basket. How many apples were in the basket before Hannah's mother took the apples from the basket?

Teacher Notes:

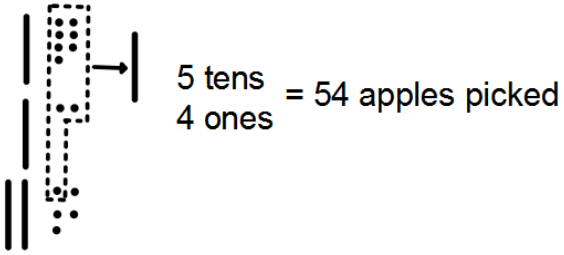
- Although all three problems are about apples for the fall festival, each problem is a separate problem. Therefore the solution from the previous problem should not be considered in solving each problem.
- Models used in solution paths show different interpretations of addition and subtraction. It is possible for a student to use any combination of models shown below.
- The standard algorithm of carrying and borrowing is neither an expectation nor a focus in 2nd grade.

Common Core State Standards for Mathematical Content	Common Core State Standards for Mathematical Practice
2.OA.A.1 Use addition and subtraction within 100 to solve one-and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **2.NBT.B.5** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **2.NBT.B.7** Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in addition or subtracting three-digit numbers, one add or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics. 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning

Essential Understandings

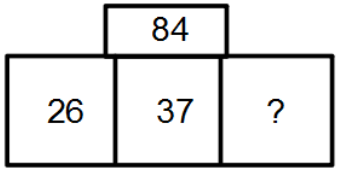
- Mapping devices and tools can help students gain a sense of the quantities involved, to notice increases and decreases, and consider the doing and undoing related to addition and subtraction.
- Addition and subtraction are inverse operations because two or more quantities can come together and then the whole amount of objects can be taken apart, but the composition of the whole quantity remains the same. (Doing, Undoing, Inverse Operations)
- Two quantities can be combined in any order and the whole quantity will remain the same. (Commutative Property)
- Part-part-whole relationships can be expressed by using number sentences like $a + b = c$ or $c – b = a$, where a and b are the parts and c is the whole.
- Problems can be solved by counting all, counting on from a quantity, counting on from the largest set, using derived facts, making tens, doubles or near doubles when solving for the whole amount or the missing part of the whole.

Explore Phase

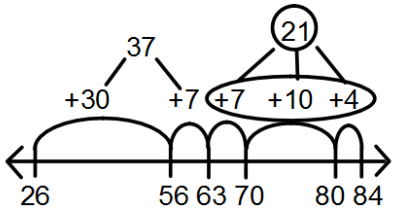
Possible Solution Paths	**Assessing and Advancing Questions**
Problem #1: Result Unknown - ***Partial Sum/Place Value Strategy***	
$\begin{array}{r} 17 \\ 12 \\ +\ 25 \\ \hline 40 \\ +\ 14 \\ \hline 54 \end{array}$ or $\begin{array}{r} 17 \\ 12 \\ +\ 25 \\ \hline 14 \\ +\ 40 \\ \hline 54 \end{array}$	
Base-Ten Model for 17 + 12 + 25 = 54 apples	
	
4 longs/rods add up to 40. Then regroup and make another ten by adding 7 + 2 + 1. That leaves 4 ones left. 40 + 10 + 4 = 54 apples	Assessing Questions: - Tell me what you have shown. How does this describe the problem? - What are 40 and 14 in your problem because I don't see those numbers in the story problem? - How does your equation describe the story problem? Advancing Questions: - Does it matter if you add the tens first and then ones? Explain. - Will the partial sum/place value strategy work on other addition problems? Explain. - How can you make a connection between the model and the partial sum/place value strategy? (Ask students to relate the partial sum/place value strategy to the base-ten model.)

Problem #2: Change Unknown - ***Decomposing into Tens using addition and subtraction strategy***

26 + 37 + __ = 84
26 + 30 = 56
56 + 4 = 60
60 + 3 = 63
84 – 60 = 24
24 - 3 = 21 green apples



Counting on strategy using a number line



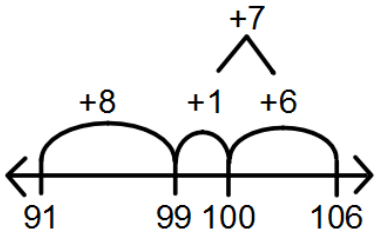
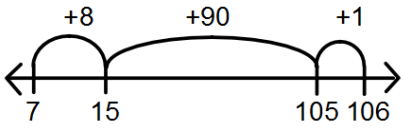
26 + 37 + ___ = 84
26 + 37 + 21 = 84

There are 21 green apples.

Students may count on by starting at 26 and then adding30 by decomposing 37 into 30 and 7. So 26 + 30 = 56.
Then add the remaining 7; 56 + 7 = 63
Then decompose 21 into 7 + 10 + 4.
63 + 7 = 70
70 + 10 = 80
80 + 4 = 84.
Therefore the distance from 63 to 84 is 21.
Counting backwards - Students may also move in the opposite direction by starting at 84 and subtracting by friendly numbers to find the difference.
84 – 26 – 37 = 21 green apples
84 – 20 = 64
64 – 30 = 34
34 – 13 = 21 green apples

Assessing Questions:
- Tell me what you have shown. How does this describe the problem?
- Why did you use the part-part-whole diagram and how does that help you to think about the story problem?
- How did the number line help you to think about solving the problem?
- How did you know to subtract 63?
- What does each number represent in your number line? (Ask students to relate numbers back to the model.)

Advancing Questions:
- How did you know when to add and subtract?
- Does it matter which numbers you add first? Explain.
- How are these two models (part-part-whole and number line) the same and/or different?
- Will these strategies work on other addition and subtraction problems? Explain.
- What is the relationship between addition and subtraction?

Problem #3: Start Unknown - ***Counting on strategy using a number line starting at 91*** **? – 7 – 8 = 91** 91 + 8 = 99 Decompose 7 into 1 and 6 99 + 1 = 100 100 + 6 = 106 91 + 8 + 1 + 6 = 106 apples  ***Counting on strategy using a number line starting at 7.*** Students may also start at 7 and add 8 to get to 15. Then add 90 and 1 to end in 106. Therefore, 15 + 90 + 1 = 106.  	Assessing Questions: - Tell me what you have shown. How does this describe the problem? - How did you know to start at 91 on the first number line? - How did you know to add 7 and 8? - Why did you add 7 and 8 to 91? - How did you know to start at 7 on the second number line? - Can you explain how addition and subtraction equations relate to the model? Explain - Where is the answer in each number line? Advancing Questions: - What is the relationship between addition and subtraction? - How are these two models the same and/or different? - Will these strategies work on other addition and subtraction problems? Explain.
Possible Student Misconceptions	
1. Students may make computational errors. 2. Students may only complete one step of the problem. 3. Students may be confused about when to add and subtract. 4. Students may see all three questions as connected.	Assessing Questions: - What is the question you are trying to answer? - What do you know about using addition and/or subtraction to find the missing part? Advancing Questions: - Does your answer make sense? Explain.
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	Assessing Questions: - How can you state the problem in your own words? - What are you trying to find or do? - What information do you need to solve the problem? - What model could you draw to help you solve the problem?

If students finish early….	<u>Assessing Questions:</u> - Does your solution make sense when you look at the original problem? - Is it reasonable? Explain your thinking. <u>Advancing Questions:</u> - Is there another way of finding the solution?

Discuss/Analyze

Whole Group Questions

Select and sequence refers to when a teacher anticipates possible student strategies ahead of time and then selects and determines the order in which the math ideas/strategies that students will share during the whole group discussion. The purpose of this is to determine which ideas will be most likely to leverage and advance student thinking about the core math idea(s) of the lesson.

During a whole group discussion, students are sharing their strategies that have been pre-selected and sequenced by the teacher. Strategies to consider sharing: partial sum/place value strategy, decomposing into tens, commutative property, counting on/counting backwards and part-part-whole.

- How are these strategies similar and different? (Use Accountable Talk to ask students to compare strategies.)
- One student used adding on strategy and another decomposed the numbers into tens to solve the problem. How are these strategies helpful in solving these problems? Explain your thinking.
- What does each number represent in your equation? (Relate numbers back to the model.)
- When do you use addition to solve a problem? When do you use subtraction to solve a problem?
- Does it matter in which order the numbers are added and subtracted? Explain your thinking.
- What is the relationship between addition and subtraction?

Student Name_____

Apples for the Fall Festival

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