Task: Mural Paper Task	**2nd Grade**

Mrs. Johnston measured some butcher paper for her students to paint a mural on. The paper wasn't long enough so, she measured 20 more feet of butcher paper. Now she has 65 feet of butcher paper for the mural. How many feet of paper did she measure before?

Write an equation that represents this problem. Use a symbol for the unknown number. Solve the problem using words, numbers or pictures to explain your reasoning.

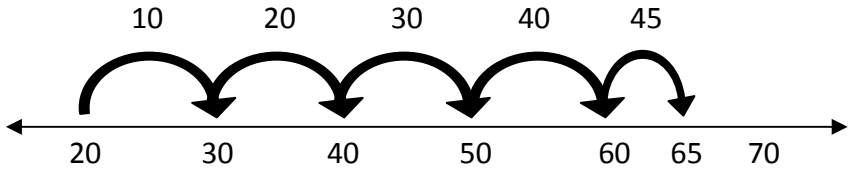
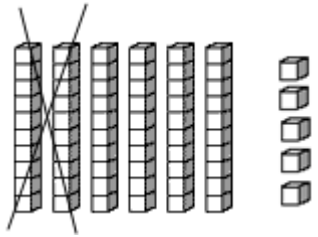
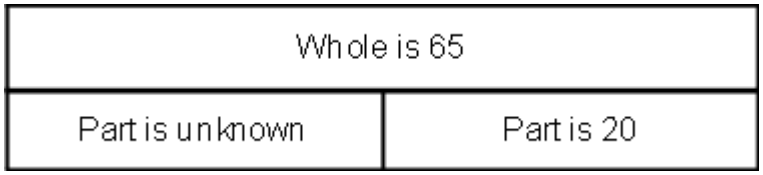
Teacher Notes:

- Students' understanding of addition enhances when they have opportunities to think about and model it in various ways.
- Although it is easy to show students how we picture a situation, we learn a great deal about how they understand the quantities and operations involved in the situation when they create their own representations of problems (Quintera, 1986).
- The inverse relationship between addition and subtraction provides the mathematical basis for the fact families, such as the following: 10 + 5 = 15; 5 + 10 = 15; 15 – 5 = 10; 15 – 10 = 5.

Common Core State Standards for Mathematical Content	**Common Core State Standards for Mathematical Practice**
Focus Standards: **2. MD.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. **2. OA. 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.	**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

- Missing numbers in a math sentence/equation or word problem can be found using addition and subtraction.
- Understand how addition and subtraction relate to one another.
- Subtraction is the inverse operation of addition and is used for different reasons:
  - to remove one amount from another;
  - to compare one amount to another; and
  - to find the missing quantity when the whole quantity and part of the quantity are known.

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
Add To, Start Unknown x + 20 = 65 20 + x = 65 **Counting on**; start at 20 and count up (number line, hundreds chart)  	**Assessing Questions:** Tell me what you were thinking. How do you know that? Why did you choose…? What number should we start with if we want to count up? What number should we count up to? **Advancing Questions:** Can you write the problem as a subtraction problem? Can you explain how to start with 65 and count backwards to find the answer? What would we count backwards to?
65 – 20 = X **Making Tens;** 6 tens and 5 ones and take away 2 tens 10 + 10 + 10 + 10 + 5 = 45 	**Assessing Questions:** Tell me what you were thinking. How do you know that? Why did you choose…? **Advancing Questions:** Can you write the problem as an addition problem? How much paper would Mrs. Johnston have started with if she had ended with 80 feet?
Part/Part/Whole; x + 20 = 65  65-20 = 45	**Assessing Questions:** What is the whole in this problem? What is one part of the whole? How can you find the other part of the whole? **Advancing Questions:** Can you write the problem as a subtraction problem?

Possible Student Misconceptions	
The student adds 20+65=85.	Questions: What does the 85 stand for in the problem? Should the length you end up with be larger than the length Mrs. Johnston ended with? If 65 feet is the length you end with, is the beginning length shorter or longer than 65? If the beginning length is shorter than 65 feet, what can you do with the 20 feet and the 65 feet to get a length shorter than 65 feet?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	What is the question asking us to do? Who can give me an idea of how to start our model? What is the goal of our problem? Can we organize the details to help us draw a picture?
If students finish early….	Tell me what you found. What problems did you have during your work? What if Mrs. Johnston had 73 feet of paper instead of 65 feet? How will that change the problem? What if Mrs. Johnston started with 34 feet of paper, how much more would she need to have 65 feet total?
Discuss/Analyze	
Whole Group Questions	
Key Understandings: • When given a total, one part can be subtracted from the total to find the unknown part. • When given the total and one part, one can begin with the known part and count up to the total to find the missing part. • Addition and subtraction are inversely related and can be used in problem solving.	
Questions: • Can someone explain how you determined the unknown? • How many ways can we model this problem? • Why do all of our different types of models work?	