Task: Spaghetti Spill

Janis dropped spaghetti sauce on her math paper. What do you think is under the sauce she dropped? Explain your answer in words, and use an equation to show your thinking.

$$32 - \text{⬛} = 14$$

Teacher Comments:
- This activity is designed to allow students the opportunity to work with the inverse relationship of addition and subtraction. Students need to be familiar with the part, part, whole relationship of addition and subtraction.
- 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).

Common Core State Standards for Mathematical Content	Common Core State Standards for Mathematical Practice
1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ − 3, 6 + 6 = _. 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, 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 and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct a viable argument 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/NCTM Resources

- Subtraction has an inverse relationship with addition.
- Many different problem situations can be represented by part-part-whole relationships and addition or subtraction.
- 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.
- The commutative and associative properties for addition of whole numbers allow computations to be performed flexibly.
- Properties of addition are central in justifying the correctness of computational algorithms.
- The context of a problem situation and its interpretation can lead to different representations.

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
The number under the spaghetti sauce has to be 14 less than 32, so 32-14= 18.	Assessing Questions: • Tell me about the numbers and what they mean. • Show me how you subtracted the numbers. • Is there a way you can check to see if your calculations are correct? Advancing Questions: • Can you use mental math to solve this? • Can you use these numbers in a different way to see if you get the same answer? • Can you show your thinking using a number line, or a part, part, whole diagram? • What if the answer was 21, how would that change things?

I used the fact family to find that the number 18 is under the spaghetti sauce.
 	
      14 + 18 = 32
      18 + 14 = 32
      32 – 14 = 18
      32 – 18 = 14
	Assessing Questions:
	
	• Tell me about the numbers and what they mean.
	• Show me how you added and subtracted the numbers. Is there a way you can check to see if your calculations are correct?
	
	Advancing Questions:
	
	• Can you use mental math to solve this?
	• Can you show your thinking using a number line, or a part, part, whole diagram?
	• What if the answer was 21, how would that change things?

I know it is 18, because I used 32 cubes and made 14 of them yellow and the rest were blue. I counted the blue ones and I got 18. 	Assessing Questions: • Tell me about the numbers and what they mean. • Is there a way you can check to see if your calculations are correct? • Advancing Questions: • Can you use mental math to solve this? • Can you show your thinking using a number line, or a part, part, whole diagram? • What if the answer was 21, how would that change things?

	Assessing Questions: - Tell me about the numbers and what they mean. - Show me how you added and subtracted the numbers. - Is there a way you can check to see if your calculations are correct?
 | 32 | | ? | 14 | I know that I have to subtract to find the missing number, so 32 – 14= 18.	Advancing Questions: - Can you use mental math to solve this? - Can you show your thinking using a number line, or another way? - What if the answer was 21, how would that change things?

Possible Student Misconceptions

	Assessing Questions: - Tell me about the numbers and what they mean. - How did you decide to add the numbers together? - Show me how you added the numbers. - Can you show your thinking in another way?
I know the missing number is 46, because I added 32 + 14 and got 46.	Advancing Questions: - Is there a way you can check to see if your calculations are correct?

Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started…	Assessing Questions: - What do the numbers in the problem represent? - What is the problem asking you to find? Advancing Questions: - Can you draw a model to represent the apples?
If students finish early…	Extension: - Can you use mental math to solve this? - Can you show your thinking using a number line, part, part, whole frame, or another way? - What if the answer was 21, how would that change things?

Discuss/Analyze

Whole Group Questions

- Tell us about the relationship between addition and subtraction.
- Was anyone able to use a part, part, whole relationship to solve this task? Can you tell us about it?
- We didn't all use the same models to solve this task. Can you tell me why? How did we all get the correct answer using different models?
- Did anyone decompose the numbers to solve this task? Tell us how you decomposed the numbers and why you chose that way?
- How can we check to see if our calculations are correct?

Spaghetti Spill   **Name** _____

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32 – **= 14**