**A Day at the Beach**

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| In this lesson, students solve a word problem using a strategy of choice and share the strategy to develop the concept of representing and solving problems involving addition and subtraction within 20. This problem type will likely provide an opportunity to explore the commutative property with students. This lesson format may be used with any problem type appropriate for the grade. |

**NC Mathematics Standard(s):**

**Represent and solve problems.**

**NC.1.OA.1** Represent and solve addition and subtraction word problems, within 20, with unknowns in all positions, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem, when solving:

● Add to/Take from-Change Unknown

● Put together/Take Apart-Addend Unknown

● Compare-Difference Unknown

**Additional/Supporting Standard(s): Add and subtract within 20.**

**NC.1.OA.6** Add and subtract, within 20, using 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.

**Understand and apply properties of operations.**

**NC.1.OA.3** Apply the commutative and associative properties as strategies for solving addition problems.

**Reason with shapes and their attributes.**

**NC.1.G.1** Create composite shapes by:

● Making a two-dimensional composite shape using rectangles, squares, trapezoids, triangles, and half-circles naming the components of the new shape.

● Making a three-dimensional composite shape using cubes, right rectangular prisms, right circular cones, and right circular cylinders naming the components of the new shape.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

1. Construct viable arguments and critique the reasoning of others.
2. Model with mathematics.
3. Use appropriate tools strategically.

**Student Outcomes:**

* I can use addition and subtraction to solve problems.
* I can use strategies to solve problems (such as counting on, counting back, making ten).
* I can identify relationships between addition and subtraction when solving problems. (Knowing that if 2+3=5, I also know that 5-3=2).
* I can justify the reasonableness of my answer.
* I can explain my strategy and reason for using it with others.

**Materials:**

* Word problem on chart paper to use with whole group
* A class set of printed copies of the problem for students to glue in their math journals
* Paper or math journals for recording solutions
* Baskets of tools for each table or for groups of students to share. These should include various problem solving manipulatives such as two colored counters, snap cubes, beans, hundreds boards, or number lines

**Advance Preparation**:

* Review the significant ideas in Critical Area 1 for First Grade to connect this lesson with key mathematical ideas of developing an understanding of addition and subtraction.
* Prepare baskets of materials, including only materials which have been introduced and used in previous lessons.
* Prepare a written copy of problem on chart paper.
* Prepare a class set of the problem for individuals.

**Directions:**

1. Gather students on the floor.
2. Show students the following problem on the chart paper, asking them to read aloud with you. Read again.

*Gail and Bill found 12 seashells on the beach.*

*Some of them were shaped like cones. The rest of them were shaped like half circles. How many were shaped like cones? How many were shaped like half circles?*

1. Ask students to restate the problem in their own words. Students “unpack” the problem (give the information they know about the problem from reading it. See the guiding question suggestions in the “before the lesson” question section below). This is also the time to review the shapes (cones and half circles) used in the problem.
2. Suggest several “possible” answers and ask students to explain the reasonableness of the solution, justifying their responses.
3. Send students to their work spaces to glue a personal copy of the problem in their journals or on a piece of paper.
4. Have students solve the problem with manipulatives, words, or pictures.
5. Students should add an equation to match their solution.
6. Record their solution strategy and equation in their journal.
7. While students work, the teacher observes and asks questions, recording student responses. (The teacher also decides which students will share their solution strategies when the whole group reconvenes.)
8. Bring the students back together as a group for sharing. It is important for the teacher to allow students who have been selected to share to do most of the talking, with teacher offering support and clarification if needed.

**Questions to Pose:**

While students are in whole group:

* What do you know about this problem?
* Tell me in your own words.
* Would “13 cone shaped and 3 half circles =26” (give a solution that would be far out of range of an accurate solution, allowing students to think quantitatively about the numbers) be a reasonable solution to this problem? How do you know?
* What are some ways you can show your mathematical thinking when you work on this problem?

As they work on the problem:

* Tell me about your thinking.
* What does this part of your solution show?
* Reread the problem again for me. What is the problem asking you to find?
* What tool did you decide to use for this problem? Why did you select it?
* What would happen if …?
* How can you show that solution on paper for others to see?
* How can you represent this problem in another way?

After solving (whole group):

* Who can restate what our problem was asking us to find?
* Tell the group how you solved it? What did you do first? Why? What did you do next? Why?
* What was your mathematical thinking for this problem?

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Student may put all 12 shells in one set and shows zero in second set. | Reread the problem so student can see there must be two sets with some in each set. |
| Student cannot show representations for 12. | Use a number 0-9. A student who struggles may need objects shaped like the shells to solve the problem and may need to sort them and recombine the two collections into one. |
| Student has a misconception about cones or half circles. | Review properties of cones, half circles. |

**Special Notes:**

Make notes as you observe students working to determine who will share with the group. Decide the sharing order for selected students beginning with a student who has a simple solution and progressing to students with more complex solution strategies. This allows students to visualize connections and relationships in solution strategies.

Look for students whose solutions are commutative to discuss the commutative property with the class. Ask how the two compare (one person shows 7 cones and 5 half circles, 7+5=12, another shows 5 cones and 7 half circles, 7+5=12).

**Extension:**

As a follow-up/extension, ask students to work together in small groups, creating all the combinations they can find for this same problem. Next have the groups record their solutions with equations on charts. Allow groups to justify and compare their charts.

Students will need prerequisite lessons about the properties of shapes.

Additional opportunities to make combinations for different numbers will be needed. The book,

*Twelve Ways to Get to Eleven,* by Eve Merriam is a resource to use when working on this concept.

**Solutions:**

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| 1+11=12 | 2=+10=12 | 3+9=12 | 4+8=12 | 5+7=12 | 6+6=12 |
| 7+5=12 | 8+4=12 | 9+3=12 | 10+2=12 | 11+1=12 |  |

