**The Crayon Box**

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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 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):**

**Represent and solve problems.**

**NC.1.OA.2** Represent and solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, by using objects, drawings, and equations with a symbol for the unknown number.

**Analyze addition and subtraction equations within 20.**

**NC.1.OA.8** Determine the unknown whole number in an addition or subtraction equation involving three whole numbers.

**Standards for Mathematical Practice:**

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.

8. Look for and express regularity in repeated reasoning.

**Student Outcomes:**

* I can use addition and subtraction to solve problems within 20.
* I can determine the unknown whole number in addition and subtraction equations relating to three whole numbers.
* I can justify the reasonableness of my answer and explain my strategies.

**Materials:**

* Word problem on chart paper to use with the 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, ten frames, 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 (Part 1 only, not the extension at this time) on the chart paper, asking them to read aloud with you. Read the problem a second time.

*There are 16 crayons in the box. 9 are sharp and the rest have been used and are dull. How many of the crayons are dull?*

*Extension: Maria colored a picture and broke 2 of the crayons. Can you write an equation to represent the crayons now?*

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). Avoid encouraging students to use key words as a solution strategy.
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, and/or pictures.
5. Students should add an equation to match their solution.
6. Record their solution strategies and equations in their journals.
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. Students who solve this problem easily can work on the extension part of the problem, perhaps working with a partner to encourage more math talk and sharing of strategies. The wording allows for several possible equations depending on the students’ interpretations of the broken crayons.
9. Bring the students back together as a group for sharing. It is important for the teacher to allow students to do most of the talking and questioning, 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.
* 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 adds the two known numbers | Ask the student to reread and “unpack” the problem, noting the problem structure. Use the student’s incorrect answer to discuss the reasonableness of the response. |
| Student cannot organize the information in order to solve. | Student may use actual crayons or cubes and break the problem down into smaller chunks. |
| Student cannot determine that the response is unreasonable. | Help the student create a picture representation of the problem. Reread the problem for the student in small chunks allowing the student to “act out” and test each part of the problem with the materials. |

**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.

This problem is an example of the problem situation, Put Together/Take Apart Addend Unknown.