Rich Mathematical Task – Grade 1 – *Nature Walk*

Task Overview/Description/Purpose:
• In this task, students will represent and solve an open-ended, part-part-whole story problem using the context of finding insects on a nature walk. • The purpose of this task is to deepen students' understanding of addition and subtraction.

Standards Alignment: Strand –*Computation and Estimation*	
Primary SOL: 1.6) The student will create and solve single-step story and picture problems using addition and subtraction within 20. **Related SOL (within or across grade levels/courses):** K.6, 2.6	
Learning Intention(s): • **Content** - I am learning how to represent story problems using tools, words, and equations. • **Language** - I am learning to describe the tools, words, and equations used to represent a story problem. • **Social** - I am learning to listen to my peer's thinking. I am learning to describe ways that strategies are the same and ways they are different.	
Success Criteria (Evidence of Student Learning): • I can represent a story problem using pictures, numbers, or words. • I can explain how my strategy represents the story problem. • I can compare strategies from peers in my class by sharing how they are the same and how they are different.	
Mathematics Process Goals	
Problem Solving	• Students will engage in problem solving as they make sense of and represent an open-ended story problem.
Communication and Reasoning	• Students will share their representation. They will explain how they know their strategy accurately represents the problem. • Students will use appropriate and accurate written and/or oral mathematical language to write and describe equations. • Students will demonstrate sound reasoning and justify why and how there could be many solutions for the given problem.
Connections and Representations	• Students will make connections between a variety of representations including direct modeling, counting on, fact fluency, and recall. • Students will articulate how their strategy is similar to or different from a peer's strategy. They may share which strategy seems most efficient for them. • Students will notice patterns within the multiple solutions for this story problem.

Task Pre-Planning	
Approximate Length/Time Frame: 45 minutes	
Grouping of Students: Students should begin the task independently. After actively monitoring student strategies and responses, the teacher should purposefully pair students together to share ideas. Following partner work, the teacher will purposefully choose 3-4 students to share their work with the class in a whole group setting.	
Materials and Technology: • [Virtual Implementation Google Slides]	**Vocabulary:** • parts, whole

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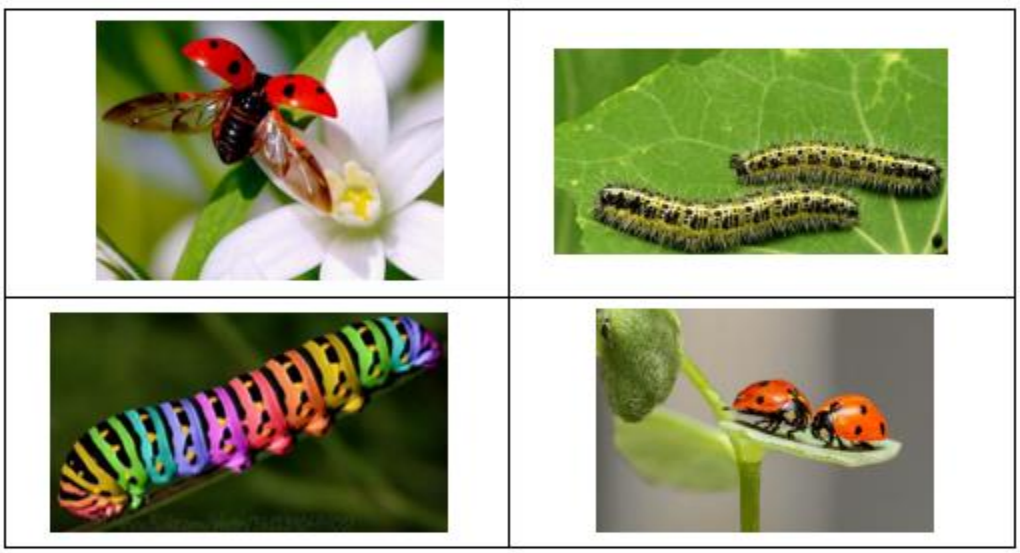
Task Pre-Planning	
• student task template • pencils • part-part- whole mat • counters, connecting cubes • number tracks	• more, less • equal • equation • relationship • inverse (potentially)
Anticipate Responses: See the Planning for Mathematical Discourse Chart (columns 1-3).	

Task Implementation (Before) 10 minutes

Task Launch:

- **Anticipate prior knowledge:** The teacher will activate prior knowledge and possibly build new knowledge by discussing the context of the task. Additionally, the teacher will activate prior knowledge with the routine *Which One Doesn't Belong?*
    - Ask students, "Has anyone ever gone for a walk outside? What did you see?"
    - Say, "Yesterday I went on a walk and I took pictures of what I found! We are going to use these pictures to try a routine called Which One Doesn't Belong."
    - "There is not a right or wrong answer. You can use your observations to justify why one picture might be different than the rest, why it might not belong. There are many reasons why each of the pictures do not belong."



    - After students have a chance to name the bugs and their characteristics say, "Our task today is about ladybugs and caterpillars. They are 2 different types of insects. You have shared so much about them that will help us understand the story problem!"
    - "You noticed some things that are the same about these pictures and some things that are different about them. You will use this idea today for our task when you talk about each other's strategies. You will identify what is the same and what is different."
- **Ensure understanding of task:** Read the task to students. Consider revealing the task slowly over time. As students learn more information, invite them to pause. Ask "What do you know so far? What do you wonder? When the question is revealed consider asking "What is the question asking you to find?" Slowly revealing the problem will support students in processing and making sense of the task.

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Task Implementation (Before) 10 minutes
After students have read and processed the task, ask them how the problem connects to the launch they just experienced. Ask them to think about how they might want to represent the problem. Students can use any representation that works best for them. • **Establish clear expectations:** Review rubric with students as a tool for monitoring their proficiency. Review classroom expectations for working independently, working with a partner, and engaging in a whole group discussion. Review expectations for using any classroom materials and/or manipulatives.

Task Implementation (During) 20 minutes

Directions for Supporting Implementation of the Task

- **Monitor** – The teacher will observe students as they work independently on the task. The teacher will engage with students by asking assessing or advancing questions as necessary (see attached *Question Matrix).*
- **Select** – The teacher will select students to partner up based on the strategies used. The teacher may decide to pair students who used similar strategies or students who used different strategies. Allow students time to work together in pairs on the task. The teacher will engage with pairs by asking assessing or advancing questions as necessary (see page 5).
- **Sequence** – The teacher will select 3-4 student strategies to share with the whole group. One suggestion is to share a variety of strategies that range from concrete to abstract. This purposeful selection will help students make connections from more concrete to more efficient strategies. Note: Every strategy should be valued.
- **Connect** – The teacher will consider ways to facilitate connections between different student solutions.

Suggestions for Additional Student Support

- Sentences frames:
  - I can represent this problem using _________.
  - I know this is a solution because ___________.
  - There could be __ caterpillars and __ ladybugs.
- Vocabulary development:
  - Use Frayer models to deepen understanding of vocabulary terms.
  - Pair vocabulary with visuals.
  - Keep vocabulary on an anchor chart or word wall and reference the visual as needed to reinforce verbal, written, and graphic representations of new vocabulary words.
- Organization:
  - Use a part-part-whole mat.
  - Prepare student workspace with materials required for task.
- Extension:
  - Are there any other solutions that might work for this task?
  - Can you find all possible solutions that work for this task?
  - Do you see any patterns in the solutions you found?

Task Implementation (After) ***15 minutes***

Connecting Student Responses (From Anticipating Student Response Chart) and Closure of the Task:

- There are 8 possible solutions to this task. Possible solutions C+L → 10+8, 11+7, 12+6, 13+5, 14+4, 15+3, 16+2, 17+1. Students may also represent this task by using subtraction “If there are 18 total bugs and 11 are caterpillars, I could think about this as 11+? =18 or 18-11=?
- Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion (opportunity for gallery walk or think/pair/share with a partner or small group).
- Based on the actual student responses, select and sequence specific students to present their mathematical work during class discussion. Consider sharing one strategy that shows a common misconception, and two

Task Implementation (After) ***15 minutes***
other accurate strategies that can connect to each other. Facilitate a discussion about similarities and differences between the strategies. ● Connect different students' responses and connect the responses to the key mathematical ideas (relationship between addition and subtraction, combinations, decomposing the total into parts).
Teacher Reflection About Student Learning:
• Use the rich mathematical task rubric to evaluate students' progress toward the goals of the lesson. • Consider how the evidence provided through student work can be used to inform further instruction. Some suggestions are to: ○ create small groups to address misconceptions or provide extensions ○ implement this rich mathematical task again using slightly different parameters (i.e. providing a smaller total of bugs)

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Planning for Mathematical Discourse

Mathematical Task: Nature Walk

Content Standard(s): SOL 1.6

Teacher Completes Prior to Task Implementation		Teacher Completes During Task Implementation		
Anticipated Student Response/Strategy *Provide examples of possible correct student responses along with examples of student errors/misconceptions*	**Assessing Questions – Teacher Stays to Hear Response** *Teacher questioning that allows student to explain and clarify thinking*	**Advancing Questions – Teacher Poses Question and Walks Away** *Teacher questioning that moves thinking forward*	**List of Students Providing Response** *Who? Which students used this strategy?*	**Discussion Order - sequencing student responses** • *Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion* • *Connect different students' responses and connect the responses to the key mathematical ideas* *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
Anticipated Student Response: Student does not know how to get started.	• What's happening in this problem? • What did Ms. Hart see? • What else do you know about what she found? • What is the problem asking you to find? • What tool might work best for you?	• How could you represent this problem? I'm going to give you some time to think about this.		
Anticipated Student Response: The student found the same number of lady bugs and caterpillars. Or the student found more ladybugs than caterpillars.	• Does your solution match the information in the story problem? • I see you wrote an equation. Which part of the equation represents each insect? Does the order of your equation matter? • How do you know?	• What would it look like for there to be the same number of ladybugs and caterpillars? More caterpillars than ladybugs? Less caterpillars?		

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Anticipated Student Response/Strategy *Provide examples of possible correct student responses along with examples of student errors/misconceptions*	**Assessing Questions – Teacher Stays to Hear Response** *Teacher questioning that allows student to explain and clarify thinking*	**Advancing Questions – Teacher Poses Question and Walks Away** • *Teacher questioning that moves thinking forward*	**List of Students Providing Response** *Who? Which students used this strategy?*	**Discussion Order - sequencing student responses** • *Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion* • *Connect different students' responses and connect the responses to the key mathematical ideas* *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
Anticipated Student Response: Student directly modeled the ladybugs and caterpillars and found the correct solution.	• How did you represent the insects? • How did you count the insects? • Might there be an easier way to represent or count the insects?	• What would it look like to represent the tools you used on paper? • What number sentence/equation would match your thinking? I'll give you a moment to think about this.		
Anticipated Student Response: Student counted on or used number relationships to find an incorrect solution.	• How many ladybugs are in your representation? How many caterpillars? Where are they? • How did you use the number track? • When you counted on, what number did you start from? Why? • How did you know when to stop counting? • How many insects do you have all together?	• You found that you only have __ insects. I wonder how you could revise your thinking. I'll give you a moment to do that. • You tried ___ and found that you don't have 18 insects. How could you represent this problem in another way? What tool might work best for you? • Can you revisit your strategy? How could you		

	• How do you know your solution matches the story? • Can you tell me about your equation? What does each number represent?	check your work? What does that sound like and look like?		
Anticipated Student Response: Student counted on, used number relationships (i.e. making a 10) or fact recall to represent the problem. Solution is correct.	• Tell me about your strategy. • How do you know your solution is correct? • Where are the parts of the problem represented in your strategy?	• Do you think there is just one or more than one solution? • Can you find more solutions? • Do you see any patterns in your solutions? • What equation(s) might match your thinking? Is there only one that could work?		

Name: _________________________ Date: _____________

Nature Walk

Ms. Hart's first grade class went on a nature walk to look for insects. The class found lady bugs and caterpillars!

- Altogether they found 18 insects.
- They found more caterpillars than ladybugs.

How many caterpillars could they have found?
How many ladybugs could they have found?

Show your work and explain your thinking using pictures, numbers, and words.

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Rich Mathematical Task Rubric

	Advanced	Proficient	Developing	Emerging
Mathematical Understanding	Proficient Plus: • Uses relationships among mathematical concepts or makes mathematical generalizations	• Demonstrates an understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to a valid and correct solution	• Demonstrates a partial understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to an incomplete or incorrect solution	• Demonstrates no understanding of concepts and skills associated with task • Applies limited mathematical concepts and skills in an attempt to find a solution or provides no solution
Problem Solving	Proficient Plus: • Problem solving strategy is well developed or efficient	• Problem solving strategy displays an understanding of the underlying mathematical concept • Produces a solution relevant to the problem and confirms the reasonableness of the solution	• Problem solving strategy displays a limited understanding of the underlying mathematical concept • Produces a solution relevant to the problem but does not confirm the reasonableness of the solution	• A problem solving strategy is not evident • Does not produce a solution that is relevant to the problem
Communication and Reasoning	Proficient Plus: • Reasoning or justification is comprehensive • Consistently uses precise mathematical language to communicate thinking	• Demonstrates reasoning and/or justifies solution steps • Supports arguments and claims with evidence • Uses mathematical language to communicate thinking	• Reasoning or justification of solution steps is limited or contains misconceptions • Provides limited or inconsistent evidence to support arguments and claims • Uses limited mathematical language to partially communicate thinking	• Provides no correct reasoning or justification • Does not provide evidence to support arguments and claims • Uses no mathematical language to communicate thinking
Representations and Connections	Proficient Plus: • Uses representations to analyze relationships and extend thinking • Uses mathematical connections to extend the solution to other mathematics or to deepen understanding	• Uses a representation or multiple representations, with accurate labels, to explore and model the problem • Makes a mathematical connection that is relevant to the context of the problem	• Uses an incomplete or limited representation to model the problem • Makes a partial mathematical connection or the connection is not relevant to the context of the problem	• Uses no representation or uses a representation that does not model the problem • Makes no mathematical connections

Task Launch: Which One Doesn't Belong