Rich Mathematical Task – Grade *3* – *Carnival Prizes*

Task Overview/Description/Purpose:

• In this task, students will find combinations of carnival prizes to add to get a sum of 250 total items.
• The purpose of this task is for students to:
    o add combinations of numbers to get an exact sum of 250; and
    o strategize as they determine what quantity and which items to purchase.

Standards Alignment: Strand – *Computation and Estimation*	
Primary SOL: 3.3ab The student will a) estimate and determine the sum or difference of two whole numbers; and b) create and solve single-step and multistep practical problems involving sums or differences of two whole numbers, each 9,999 or less **Related SOL:** 3.4 a, b, c, d	
Learning Intention(s): • **Content -** I am learning to estimate and add to find a sum. • **Language -** I am learning to explain my strategies and my thinking. • **Social -** I am learning to listen and respond to my peers' mathematical thinking.	
Success Criteria (Evidence of Student Learning): • I can find two or more combinations of items to purchase to equal 250 items. • I can write a number sentence for my solutions. • I can use one or more strategies to combine items to total 250. • I can explain my reasoning and communicate my thinking for solving the problem clearly, using appropriate vocabulary. • I can give specific feedback to my peers and use suggestions to clarify my thinking.	
Mathematics Process Goals	
Problem Solving	• Students will explore strategies to add numbers that have a sum of 250. • Students will select more than one item to add and get a sum of 250 total items.
Communication and Reasoning	• Students will clearly communicate their strategies and thinking process for solving a multi-step problem to their peers. • Students will justify their solutions using pictures, numbers, and words. • Students will use appropriate mathematical language to express ideas with accuracy and precision.
Connections and Representations	• Students will use an appropriate representation to explore the problem and justify their solution. • Students will describe connections between their representations and the representations of their peers.

Task Pre-Planning
Approximate Length/Time Frame*:* 60 minutes
Grouping of Students: Students can begin the task independently. After actively monitoring student strategies and responses, the teacher should purposefully pair or group students together. Groups can consist of 2 to 4 students.

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Task Pre-Planning	
The teacher should look for opportunities for students to be math leaders and choose student groups that encourage collaboration and perseverance.	
Materials and Technology: • Virtual Implementation Google Slides • copy of task • blank and/or grid paper • pencil • place value chart • base ten blocks • money (coins) • place value disks • number line • hundreds chart	**Vocabulary:** • estimate/estimation • addend • addition (add) • sum • subtract • difference • quantity • appropriate • reasonable
Anticipate Responses: See the Planning for Mathematical Discourse Chart (columns 1-3).	

Task Implementation (Before) 10-15 minutes

Task Launch:

- **Anticipate prior knowledge**: Engage students in a discussion about carnivals. Ask if they have been to a carnival at school, in their neighborhood or community. Make a list of things you would find at a school carnival such as: popcorn, games, cotton candy, rides, etc. If students are unfamiliar, with what a carnival is you may want to show pictures as examples.
- **Ensure understanding of task:**
    - The teacher will read the task aloud to students and share the “I can” statements. The teacher will ask questions to make sure the task is understood such as, “What are we trying to figure out?” “What do we already know about the problem?” “What questions do you have about the problem?”
    - Be sure that students understand what purchasing more than one item means. Example: 2 packages of bouncy balls = 100 bouncy balls.
- **Establish clear expectations:** Review rubric with students as a tool for monitoring their proficiency. Review classroom expectations for working independently.

Task Implementation (During) 20-30 minutes

Directions for Supporting Implementation of the Task

- Monitor – Teacher will listen and observe students as they work on task and ask assessing or advancing questions (see the Planning for Mathematical Discourse chart on next page).
- Select – Teacher will decide which strategies will be highlighted (after student task implementation) that will advance mathematical ideas and support student learning. Are there specific combinations to share that may help move some students' thinking forward?
- Sequence – Teacher will decide the order in which student ideas will be highlighted (after student task implementation).
- Connect – Teacher will consider ways to facilitate connections between different student responses.
    - Students work in purposefully planned groups for 20-25 minutes to explore strategies, share ideas and transfer their ideas to paper using pictures, words, and symbols.
    - As the teacher is monitoring, teacher will look for strategies that are being used and record on Planning Chart.
    - The teacher should use questions to assess or advance student thinking.
    - Students should be encouraged to explore different strategies for solving and evaluate effectiveness.

Suggestions For Additional Student Support

- Sentence Frames:
    - I chose ______ (whistles) and ______ (glow sticks). My number sentence is _____________.
    - I made ______ combinations of items with a sum of 250.
- Organization: Table or chart to organize items being added.
- Vocabulary development:
    - Have students estimate how many of each item they think it would take to reach 250 before adding. Review vocabulary for: estimate, estimation, add, subtract, sum, difference
- Students may benefit from concrete materials over pictorial representations such as: a beaded number line, cubes, base ten blocks, coins and place value disks , etc.

Task Implementation (After) 15-20 minutes

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

- Based on the actual student responses, sequence and select particular students to present their mathematical work during a whole class discussion. Some possible big mathematical ideas to highlight could include:
    - A common misconception
    - Trajectory of sophistication in student ideas (i.e. concrete to abstract; learning trajectories for addition or subtraction)
    - Connection between addition and subtraction (could both operations provide the same outcome?) Did any student make a connection to multiplication or to money?
- Connect different students' responses and connect the responses to the key mathematical ideas to bring closure to the task. Possible questions and sentence frames to connect student strategies:
    - How are these strategies alike? How are they different?
    - __________'s strategy is similar to ________'s strategy because __________
    - How do these connect to our Learning Intentions?
    - Why is this important?
- Highlight student strategies to show the connections, either between different ideas for solutions or to show the connection between levels of sophistication of student ideas. Allow students to ask clarifying questions.
- Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion.
    - Students can participate in a Gallery Walk to view all strategies prior to coming together to discuss selected strategies.

Task Implementation (During) 20-30 minutes
○ Students can "Think, Pair, Share" strategies for solving. • Close the lesson by returning to the success criteria. Have students reflect on their progress toward the criteria. **"**How many different combinations did the class create?" "Are there more combinations we could make?" "How do you know?"

Teacher Reflection About Student Learning
• Use the rich mathematical task rubric to determine student progress. Look for: possible misconceptions, learning trajectories and sophistication of student ideas, and multiple solution pathways. Next steps based on this information could include: ○ Informing sequence of future tasks. What will come next in instruction to further student thinking in addition computation? ○ Informing small groups based on misconceptions that are not addressed in sharing. • Use the Process Goals rubric to assess student understanding in relation to the process goals. Did students use appropriate representations? Were they able to reason through the combinations? The teacher may decide to focus on one category. Next steps based on this information could include: ○ Informing small groups based on current student engagement with the process goal(s) (i.e. think aloud, using specific sentence frames for communication, etc.).

Planning for Mathematical Discourse

Mathematical Task: Carnival Prizes   Content Standard(s): SOL 3.3ab

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* • *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
Anticipated Student Response A: "I don't know what to do"	• What do you know about the problem? • How can you show that? • Which prize would you like to start with? • What are some things you know about the number 250? How can that help you get started?	• Can decomposing the number 250 help you get started?		
Anticipated Student Response B: The student is able to total 250 using only one type of prize.	• What strategy did you use to get a total of 250? How can that strategy help you solve another way?	• Could you use a different strategy to find the same solution? • What numbers don't work? Why?		
Anticipated Student Response C: The student is able to combine two items to total 250	• Can you use two different items? • Can you replace one item with another item using the same or different quantity?	• Can you come up with different quantities of the same items that will total 250?		
Anticipated Student Response D: The student is able to create two combinations of prizes that total 250.	• What do you notice about your solutions? • Do you notice any patterns in your representations?	• How many combinations do you think there are to equal 250 prizes?		

	• Can you explain the patterns that you used to find your representations?	• How would your solutions change if there were 150 bouncy balls? • How would your solutions change if there were 175 whistles?		

NAME ____________________________________ DATE _________________________

Carnival Prizes

Jamal is in charge of buying prizes for the school carnival. He needs exactly 250 total prizes. What could he buy? Find at least 2 combinations of prizes he could buy. Use pictures, numbers and words to explain your solution.

Prize item	**How it is packaged**
Bouncy balls	50 in each package
Water Squirters	25 in each package
Whistles	75 in each package
Glow sticks	10 in each package

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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